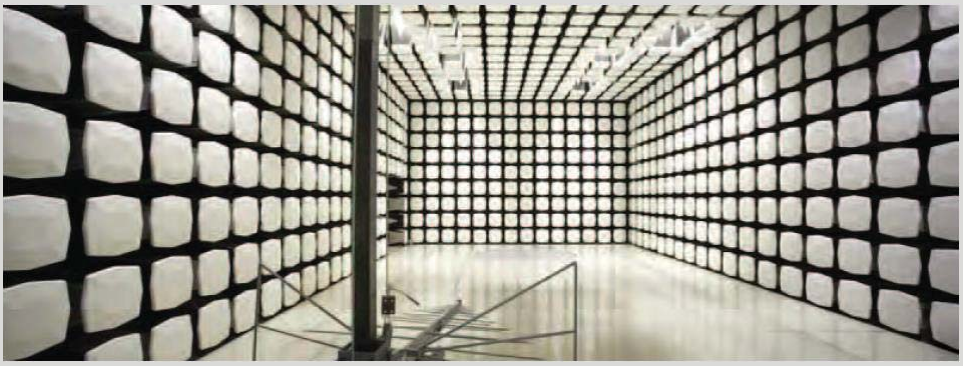
Radio Test Report
Application for Grant of Equipment Authorization

FCC Part 27
[3450MHz – 3550MHz and 3700MHz – 3980MHz]

FCC ID: VBNAVQQA-01

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

Report: NOKI0075.0 Rev. 1, Issue Date: September 12, 2024



CERT #214.19

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Section	Page Number

CERTIFICATE OF TEST

Last Date of Test: August 22, 2024
Nokia Solutions and Networks
EUT: Airscale Base Transceiver Station Radio Unit
Model: AVQQA

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

Results

Test Description	Result	Comments
Average Power	Pass	
Power Spectral Density and EIRP Calculations	Pass	
Peak to Average Power	Pass	
Occupied Bandwidth	Pass	
Band Edge Compliance	Pass	
Spurious Conducted Emissions	Pass	
Spurious Radiated Emissions	Pass	
Frequency Stability	Pass	

Deviations From Test Standards

None

Approved By:

Jeff Alcoke, Senior EMC Test Engineer
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
01	Corrected measurement value typos in Frequency Stability data	2024-09-12	283-284

ACCREDITATIONS AND AUTHORIZATIONS

element
2021.09.01

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Each laboratory is accredited by A2LA to ISO / IEC 17025, and as a product certifier to ISO / IEC 17065 which allows Element to certify transmitters to FCC and IC specifications.

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

United Kingdom

BEIS – Recognized by the UK as an Approved Body under the UK Radio Equipment and UK EMC Regulations.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

For details on the Scopes of our Accreditations, please visit:

California Minnesota Oregon Texas Washington

FACILITIES

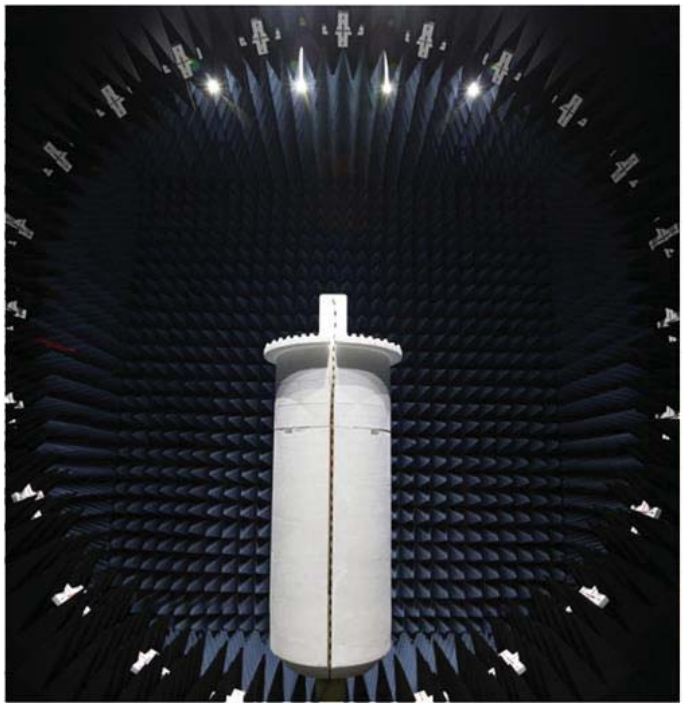
element
2024.08.21

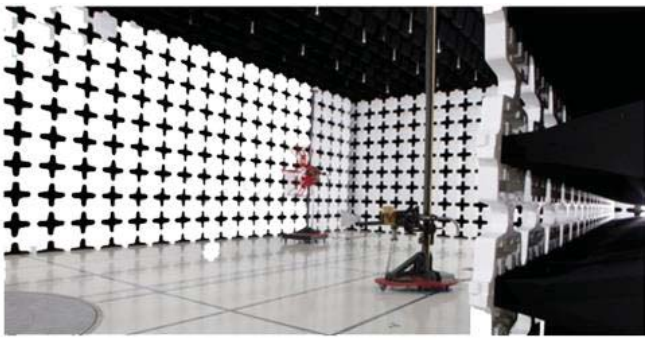
Testing was performed at the following location(s)

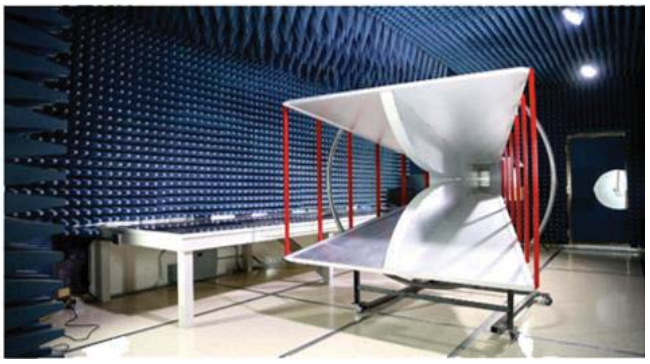
	Location	Labs (1)	Address	A2LA (2)	ISED (3)	BSMI (4)	VCCI (5)	CAB (6)	FDA (7)
☐	California	OC01-17	41 Tesla Irvine, CA 92618 (949) 861-8918	3310.04	2834B	SL2-IN-E-1154R	A-0029	US0158	TL-55
☐	Minnesota	MN01-11	9349 W Broadway Ave. Brooklyn Park, MN 55445 (612) 638-5136	3310.05	2834E	SL2-IN-E-1152R	A-0109	US0175	TL-57
☐	Oregon	EV01-12	6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	3310.02	2834D	SL2-IN-E-1017	A-0108	US0017	TL-56
☒	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	N/A
☐	Texas	TX01-09	3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	3310.03	2834G	SL2-IN-E-1158R	N/A	US0191	TL-54
☐	Washington	NC01-05	19201 120th Ave NE Bothell, WA 98011 (425) 984-6600	3310.06	2834F	SL2-IN-E-1153R	A-0110	US0157	TL-67
☐	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) CAB Identifier. Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA
(7) FDA ASCA No.







MEASUREMENT UNCERTAINTY

element
MU 2023-09-21

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 has been performed for each test per our internal quality document QM205.4.6. 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

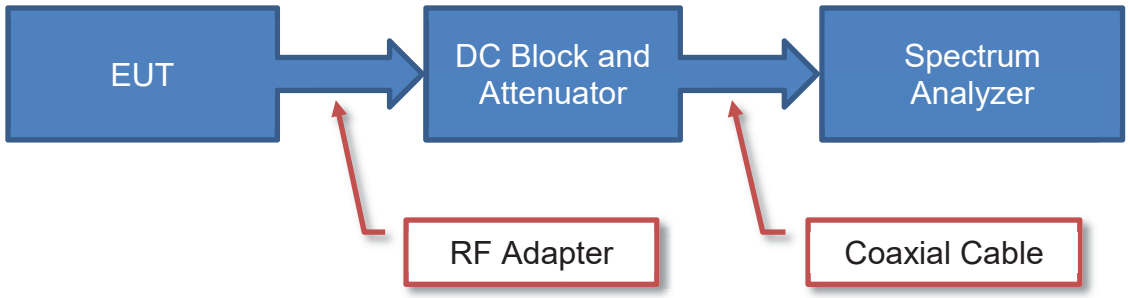
TEST SETUP BLOCK DIAGRAMS

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.

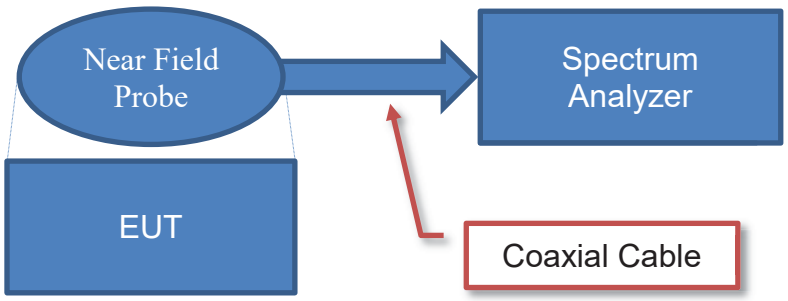
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements

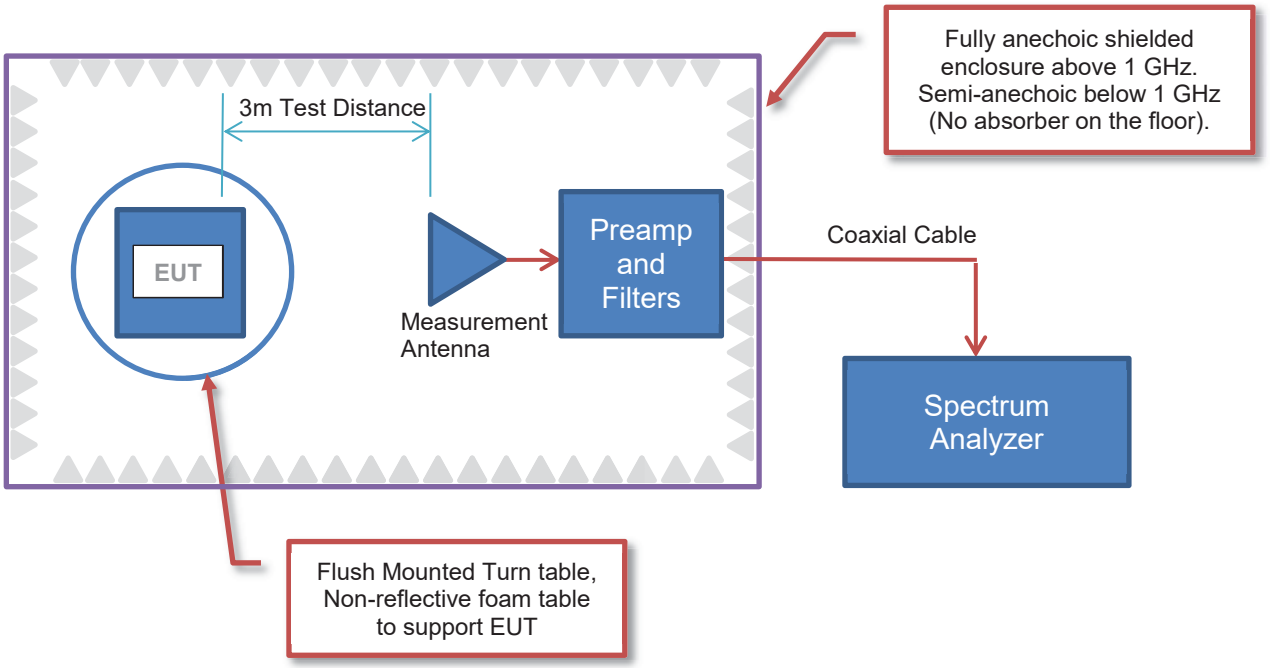


Sample Calculation (logarithmic units)

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**

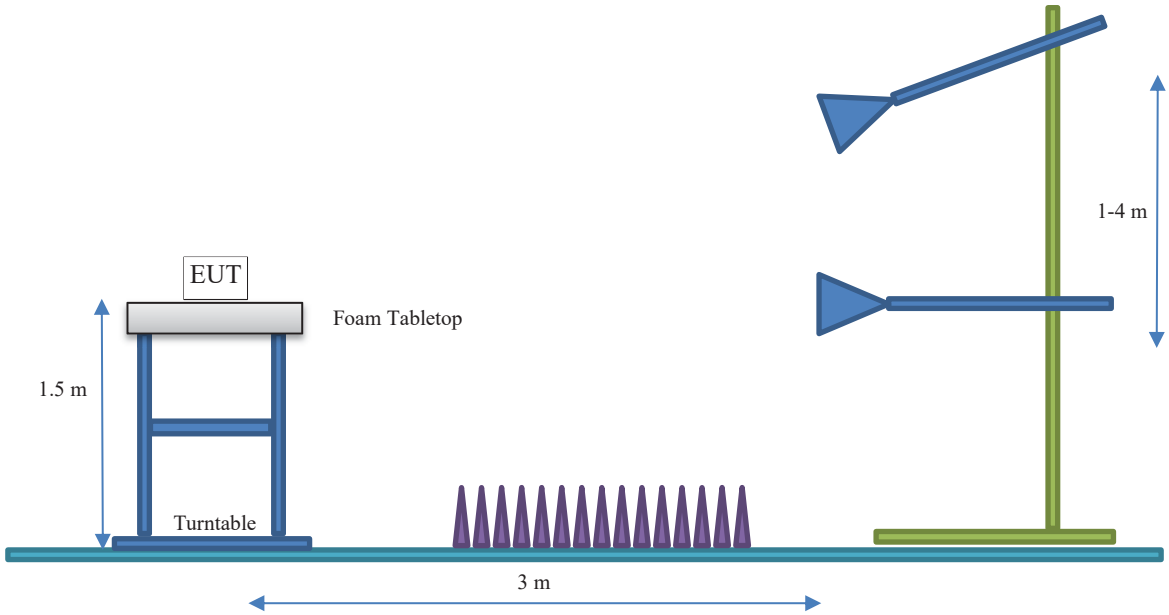
Radiated Power (ERP/EIRP) – Substitution Method:

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: AVQQA
First Date of Test:	August 6, 2024
Last Date of Test:	August 22, 2024
Receipt Date of Samples:	August 6, 2024
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

AirScale Dual Band MAA 64T64R 192AE Radio Unit (RU) variant AVQQA is being developed under this effort. The AVQQA Radio Unit is designed to support 5G NR (New Radio) TDD (Time Division Duplex) operations. **The scope of this testing effort is the FCC radio certification of the AVQQA for 5G NR TDD operations in the 3.45G Band and the 3.7G Band.**

The AVQQA RU supports 3GPP frequency band n77 operations including the 3.45G Band (BTS Tx/Rx: 3450 to 3550 MHz) and 3.7G Band (BTS Tx/Rx: 3700 to 3980 MHz). Each band supports 64 transmit/receive paths.

The AVQQA supports up to 64 port MIMO operation in each band. The 3.45G Band maximum RF output power is 200 watts (3.13W/TRX x 64 TRXs). The 3.7G Band maximum RF output power is 340 watts (5.31W/TRX x 64 TRXs). The total AVQQA RU RF output power is limited to 340W shared between 3.45G and 3.7G Bands. The AVQQA RU 3.45G Band supports 5G NR TDD bandwidths of 10, 20, 30 and 40MHz. The AVQQA RU 3.7G Band supports 5G NR TDD bandwidths of 20, 40, 60, 80 and 100MHz. The single carrier channel bandwidth maximum RF output power per TRX and per Radio are as follows.

Single Carrier 3.45G Band Maximum RF Output Power				
Carrier Power per	**NR10**	**NR20**	**NR30**	**NR40**
TRX	0.78 Watts or 28.9 dBm	1.56 Watts or 31.9 dBm	2.34 Watts or 33.7 dBm	3.13 Watts or 34.9 dBm
Radio (64 x TRX)	50.0 Watts or 47.0 dBm	100 Watts or 50.0 dBm	150 Watts or 51.8 dBm	200 Watts or 53.0 dBm

Single Carrier 3.7G Band Maximum RF Output Power					
Carrier Power per	**NR20**	**NR40**	**NR60**	**NR80**	**NR100**
TRX	1.56 Watts or 31.9 dBm	3.13 Watts or 34.9 dBm	5.31 Watts or 37.3 dBm	5.31 Watts or 37.3 dBm	5.31 Watts or 37.3 dBm
Radio (64 x TRX)	100 Watts or 50.0 dBm	200 Watts or 53.0 dBm	340 Watts or 55.3 dBm	340 Watts or 55.3 dBm	340 Watts or 55.3 dBm

PRODUCT DESCRIPTION

The AVQQA RU supports four downlink modulation types (QPSK, 16QAM, 64QAM and 256QAM). The AVQQA RU instantaneous bandwidth is 100MHz per each band and 200MHz for 3.7G Band. The AVQQA RU occupied bandwidth is 100MHz per each band and 200MHz for 3.7G Band.

The 3.45G Band carrier is required to operate simultaneously/concurrently with a 3.7G Band carrier (i.e.: standalone operation is not supported for the 3.45G Band carriers). Standalone carrier operation is supported for 3.7GHz carriers. Multicarrier operations are supported for the 3.7G Band. Simultaneous single carrier operation in each band is supported (i.e.: Dual Band operation). The radio software supports a maximum of two simultaneous carriers.

The AVQQA 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 25.0dBi ± 1.0dB. The sixty-four AVQQA 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 (AISG/EAC). The RU with applicable installation kit is pole mounted.

Tests to be performed include RF channel power, CCDF- peak to average power ratio, power spectral density (power/1MHz), emission bandwidth (99% and 26 dB down), band edge spurious emissions (± 1MHz), spurious emissions (conducted and radiated), and frequency stability (over required voltage/temperature ranges). 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).

The AVQQA RU is being offered to support 3.45G Band single carrier operation, 3.7G Band Single carrier Stand-alone operation, dual band (3.45G & 3.7G simultaneous) operation and 3.7G Band only multicarrier. The FCC regulatory requirements for OOBE differ between the 3.45G and 3.7G bands. The maximum carrier output for both bands [3.45G (200W) & 3.7G (340W)] cannot be enabled simultaneously because the total radio power is limited to 340W. The requested operational configurations with the output power limitations and single band regulatory requirements will require that the following AVQQA RU configurations be verified/certified.

(a) 3.45G Band Single Carriers at maximum power (200W/Band total)
(b) 3.7G Band Single Carriers stand-alone operation at maximum power (340W/Band total)
(c) 3.7G Band multicarrier at maximum carrier power
(d) Dual band with 3.45G and 3.7G Band carriers

PRODUCT DESCRIPTION

The 3GPP frequency Band n77 – FCC 3.45G Band (3450-3550 MHz) band edge NR-ARFCNs for 5G NR channel bandwidths (10, 20, 30, and 40 MHz) are provided in Table below. The NR-ARFCN is defined as New Radio - Absolute Radio Frequency Channel Number.

	5G NR NR-ARFCN	Frequency (MHz)	5G NR Channel Bandwidth			
			10 MHz	20 MHz	30 MHz	40 MHz
AVQQA 3.45G Band (Antennas 1 through 64)	Band Edge	3450.00	Lower Band Edge			
	630334	3455.01	Bot Ch			
	……					
	630668	3460.02		Bot Ch		
	……					
	631000	3465.00			Bot Ch	
	……					
	631334	3470.01				Bot Ch
	……					
	633334	3500.01	Middle Channel			
	……					
	635332	3529.98				Top Ch
	……					
	635666	3534.99			Top Ch	
	……					
	636000	3540.00		Top Ch		
	……					
	636333	3544.995	Top Ch			
	Band Edge	3550.00	Upper Band Edge			

AVQQA 3.45G Band _Band Edge 5G NR Frequency Channels

PRODUCT DESCRIPTION

The 3GPP frequency Band n77 – FCC 3.7G Band (3700-3980 MHz) band edge NR-ARFCNs for 5G NR channel bandwidths (20, 40, 60, 80 and 100 MHz) are provided in Table below. The NR-ARFCN is defined as New Radio - Absolute Radio Frequency Channel Number.

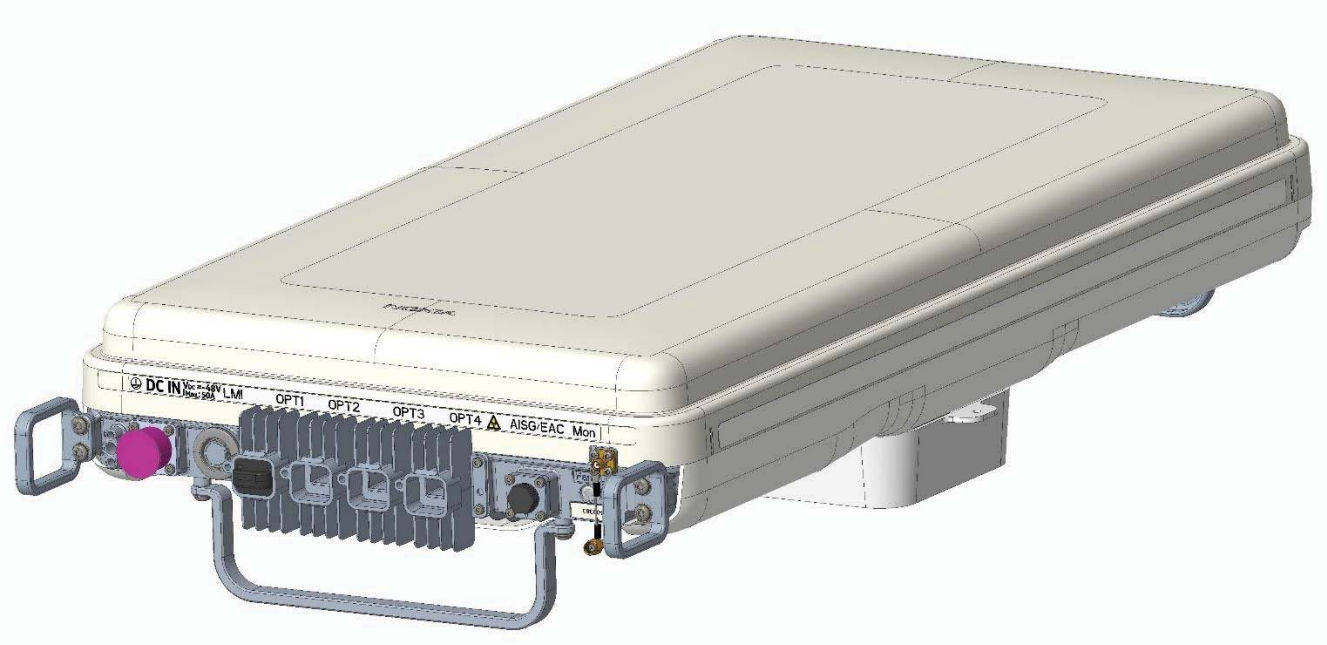
	5G NR NR-ARFCN	Frequency (MHz)	5G NR Channel Bandwidth				
			20 MHz	40 MHz	60 MHz	80 MHz	100 MHz
AVQQA 3.7G Band (Antennas 1 through 64)	Band Edge	3700.00	Lower Band Edge				
	……						
	647334	3710.01	Bot Ch				
	……						
	648000	3720.00		Bot Ch			
	……						
	648668	3730.02			Bot Ch		
	……						
	649334	3740.01				Bot Ch	
	……						
	650000	3750.00					Bot Ch
	……						
	656000	3840.00	Middle Channel				
	……						
	662000	3930.00					Top Ch
	……						
	662666	3939.99				Top Ch	
	……						
	663332	3949.98			Top Ch		
	……						
	664000	3960.00		Top Ch			
	……						
	664666	3969.99	Top Ch				
	……						
	Band Edge	3980.00	Upper Band Edge				

AVQQA 3.7G Band _Band Edge 5G NR Frequency Channels

PRODUCT DESCRIPTION

element
2018-07-17

AVQQA Connector Layout



AVQQA External Interfaces

Name	Qty	Connector Type	Purpose (and Description)
DC IN	1	APPG	Power supply, -48V DC + GND
GND	1	Screw lugs (M8, 2xM5)	Grounding of the Unit
LMI		Minilink42	SW download, for production and R&D test. Not for field use. Disabled in SW by default, for security
OPT1-4	4	SFP+, SFP28 optical LC-connector, SFP56	eCPRI to/from FSMs
AISG/EAC	1	Combined AISG / EAC mech CONNECTOR	AISG to external devices
Mon	1	SMA(F)	To measure RF outputs

Testing Objective:
FCC radio certification of the AirScale Dual Band MAA 64T64R Radio Unit variant AVQQA for 5G NR TDD Single Carrier operations in the 3.45G and 3.7G Bands, dual band and 3.7G band multicarrier operations.

CONFIGURATIONS

Configuration NOKI0075-1

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.SRM7.trunk.20240612.001
BTS Software Version (24R3)	SBTS24R3_ENB_9999_240613_000011

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	L1224802943
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.102	L1205105870
AVQQA (Radio Module Model)	Nokia Solutions and Networks	476596A.M01	L1242403137
3450 – 3980MHz Diplexer – 4dB 100 Watt	CREOWAVE	CW-BSF-3450-3980-E5-M2	2219003
Attenuator 50W/10dB	AeroflexWeinschel	RFS50G26S10FF	20031701
SFP28 70M MM	Nokia	462265	FR213800430
SFP28 70M MM	Nokia	462265	FR214719846
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	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551426/4
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN185855/4
(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 2m	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

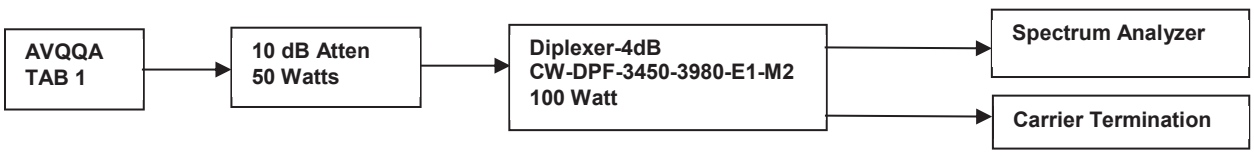
Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic Cable	N	2 meters	N	ABIO	AVQQA
GPS Receiver Cable	Y	20 meters	N	ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIB	WebEM- PC
CBL RF-Cable – RF Load Cables (63)	Y	4 meters	N	EUT [AVQQA] Ant ports 2-64	25W -50ohm-Load
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIB	Analyzer

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_104	Y	2 meters	N	EUT [AVQQA] TAB port #1	Attenuator 50W/10dB
Attenuator 50W/10dB	N	NA	N	RF cable HS-SUCOFLEX_104	3450-3980MHz Blocking Filter
3450-3980MHz Blocking Filter	N	NA	N	Attenuator 50W/10dB	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	3450-3980MHz Blocking Filter	Analyzer
					20W -50ohm - Terminating Load

RF Test Setup Diagram:

3.45G Band Single Carrier and Dual Band:

Conducted Spurious Emissions Test Setup for 9kHz to 150kHz, 150kHz to 30MHz, 30MHz to 3400MHz and 4030MHz to 6000MHz; Limit Line at -58.1 dBm.



CONFIGURATIONS

Configuration NOKI0075-2

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.SRM7.trunk.20240612.001
BTS Software Version (24R3)	SBTS24R3_ENB_9999_240613_000011

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	L1224802943
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.102	L1205105870
AVQQA (Radio Module Model)	Nokia Solutions and Networks	476596A.M01	L1242403137
Low Pass Filter 1.4GHz/100W	Microwave Circuits,Inc.	L13502G1	SN2454-01
Attenuator 150W/10dB	Weinschel Corp	6375	BJ2483
SFP28 70M MM	Nokia	462265	FR213800430
SFP28 70M MM	Nokia	462265	FR214719846
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-B7RU1219	AC20040004
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN185855/4
(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 2m	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

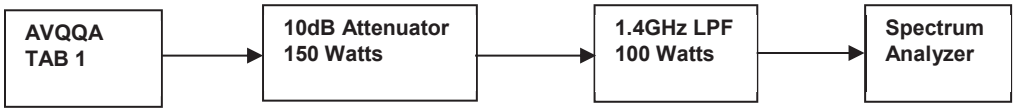
Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic Cable	N	2 meters	N	ABIO	AVQQA
GPS Receiver Cable	Y	20 meters	N	ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIB	WebEM- PC
CBL RF-Cable – RF Load Cables (63)	Y	4 meters	N	EUT [AVQQA] Ant ports 2-64	25W -50ohm-Load
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIB	Analyzer

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
RF cable HS-SUCOFLEX_104	Y	2 meters	N	EUT [AVQQA] TAB port #1	Attenuator 100W/10dB
Attenuator 150W/10dB	N	N/A	N	RF cable HS-SUCOFLEX_104 2 meters	Low Pass filter 1.4G/100W
Low Pass Filter 1.4G/100W	N	N/A	N	Attenuator 150W/10dB	RF cable HS-SUCOFLEX_104 1 meter
RF cable HS-SUCOFLEX_104	Y	1 meter	N	Low Pass Filter 1.4G/100W	Analyzer

RF Test Setup Diagram:

3.7G Band Single Carrier and 3.7G Band multi-carriers:

Conducted Spurious Emissions Test Setup for 9kHz to 150kHz, 150kHz to 30MHz; Limit Line at -31.1 dBm/MHz.



CONFIGURATIONS

Configuration NOKI0075-3

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.SRM7.trunk.20240612.001
BTS Software Version (24R3)	SBTS24R3_ENB_9999_240613_000011

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	L1224802943
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.102	L1205105870
AVQQA (Radio Module Model)	Nokia Solutions and Networks	476596A.M01	L1242403137
Dual Band Diplexer -6.5dB 100W	CREOWAVE	CW-DDPF-3450-3550 & 3700-3980-E1-M2	2205002
Attenuator 50W/10dB	AeroflexWeinschel	RFS50G26S10FF	20031701
SFP28 70M MM	Nokia	462265	FR213800430
SFP28 70M MM	Nokia	462265	FR214719846
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	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551426/4
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN185855/4
(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 2m	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	2 meters	N	ABIO	AVQQA
GPS Receiver Cable	Y	20 meters	N	ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIB	WebEM- PC
CBL RF-Cable – RF Load Cables (63)	Y	4 meters	N	EUT [AVQQA] Ant ports 2-64	25W -50ohm-Load
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIB	Analyzer

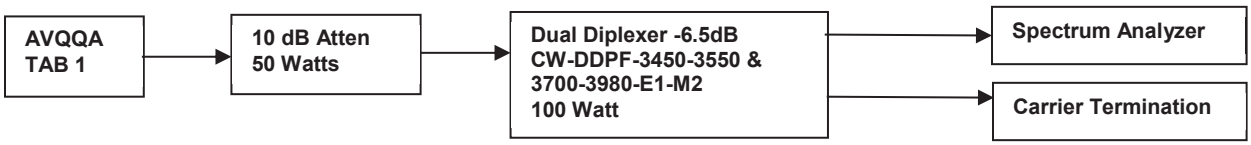
Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
HS-SUCOFLEX_104	Y	2 meters	N	EUT [AVQQA] TAB port #1	Attenuator 50W/10dB
Attenuator 50W/10dB	N	NA	N	RF cable HS-SUCOFLEX_104	3450-3550 & 3700-3980MHz Blocking Filter
3450-3550 & 3700-3980MHz Blocking Filter	N	NA	N	Attenuator 50W/10dB	RF cable HS-SUCOFLEX_104
HS-SUCOFLEX_104	Y	1 meter	N	3450-3550 & 3700-3980MHz Blocking Filter	Analyzer
					20W -50ohm - Terminating Load

RF Test Setup Diagram:

3.45G Band single carrier and dual band:

Band Edge Test Setup for 3100MHz to 3430MHz & 3570MHz to 3680MHz; Limit Line at -58.1 dBm/MHz.

Conducted Spurious Emissions Test Setup for 3100MHz to 3430MHz, 3570MHz to 3680MHz and 4000MHz to 4200MHz; Limit line at -58.1 dBm/MHz



CONFIGURATIONS

Configuration NOKI0075-4

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.SRM7.trunk.20240612.001
BTS Software Version (24R3)	SBTS24R3_ENB_9999_240613_000011

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	L1224802943
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.102	L1205105870
AVQQA (Radio Module Model)	Nokia Solutions and Networks	476596A.M01	L1242403137
Attenuator 250W/30dB	API Weinschel	58-30-34	LL627
SFP28 70M MM	Nokia	462265	FR213800430
SFP28 70M MM	Nokia	462265	FR214719846
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	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551426/4
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN185855/4
(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 2m	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	2 meters	N	ABIO	AVQQA
GPS Receiver Cable	Y	20 meters	N	ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIB	WebEM- PC
CBL RF-Cable – RF Load Cables (63)	Y	4 meters	N	EUT [AVQQA] Ant ports 2-64	25W -50ohm-Load
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIB	Analyzer

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
RF cable HS-SUCOFLEX_104	Y	2 meters	N	EUT [AVQQA] TAB port #1	Attenuator 250W/30dB
Attenuator 250W/30dB	N	NA	N	RF cable HS-SUCOFLEX_104 2 meters	RF cable HS-SUCOFLEX_104 1 meter
RF cable HS-SUCOFLEX_104	Y	1 meter	N	Attenuator 250W/30dB	Analyzer

RF Test Setup Diagram:

3.45G Band Single Carrier and Dual Band:

Test set up for In-Band measurements: Average Power, Emission Bandwidth, CCDF, PSD.

Band Edge Test Setup for 3440MHz to 3450MHz & 3550MHz to 3560MHz; Limit Line at -31.1 dBm

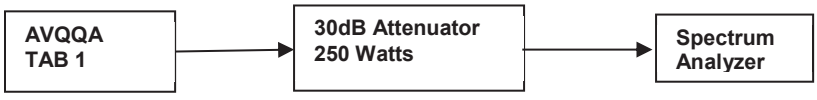
Band Edge Test Setup for 3430MHz to 3440MHz & 3560MHz to 3570MHz; Limit Line at -43.1 dBm/MHz

Conducted Spurious Emissions Test Setup for 3400MHz to 4030MHz; Limit line at -31.1dBm/MHz

3.7G Band Single Carrier and 3.7G Band Multi-carrier:

Test set up for In-Band measurements: Average Power, Emission Bandwidth, CCDF, PSD and Band Edges.

Conducted Spurious Emissions Test Setup for 30MHz to 3400MHz and 3400MHz to 6000MHz; Limit Line at -31.1 dBm



CONFIGURATIONS

Configuration NOKI0075-5

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.SRM7.trunk.20240612.001
BTS Software Version (24R3)	SBTS24R3_ENB_9999_240613_000011

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	L1224802943
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.102	L1205105870
AVQQA (Radio Module Model)	Nokia Solutions and Networks	476596A.M01	L1242403137
Attenuator 50W/10dB	AeroflexWeinschel	RFS50G26S10FF	20031701
High Pass Filter 5.5-13GHz/100W	Microwave Circuits,Inc.	H6G013G1	2452-01
SFP28 70M MM	Nokia	462265	FR213800430
SFP28 70M MM	Nokia	462265	FR214719846
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	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN551426/4
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN185855/4
(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 2m	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	2 meters	N	ABIO	AVQQA
GPS Receiver Cable	Y	20 meters	N	ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIB	WebEM- PC
CBL RF-Cable – RF Load Cables (63)	Y	4 meters	N	EUT [AVQQA] Ant ports 2-64	25W -50ohm-Load
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIB	Analyzer

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
RF cable HS-SUCOFLEX_104	Y	2 meters	N	EUT [AVQQA] TAB port #1	Attenuator 50W/10dB
Attenuator 50W/10dB	N	NA	N	RF cable HS-SUCOFLEX_104 2 Meters	5.5 – 13GHz HPF 100 Watts
5.5 – 13GHz HPF 100 Watts	N	NA	N	Attenuator 50W/10dB	RF cable HS-SUCOFLEX_104 1 Meter
RF cable HS-SUCOFLEX_104	Y	1 meter	N	5.5 – 13GHz HPF 100 Watts	Analyzer
RF cable HS-SUCOFLEX_104	Y	2 meters	N	EUT [AVQQA] Ant port #1	Attenuator 50W/10dB

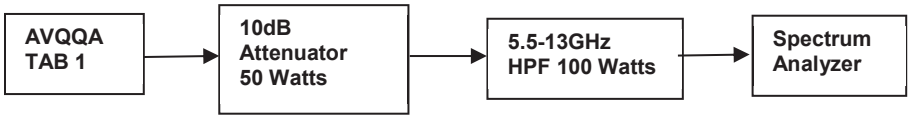
RF Test Setup Diagram:

3.45G Band Single Carrier, Dual Band:

Conducted Spurious Emissions Test Setup for 6GHz to 13GHz; Limit Line at -58.1 dBm/MHz

3.7G Band Single Carrier and 3.7G Band multi-carriers:

Conducted Spurious Emissions Test Setup for 6GHz to 13GHz; Limit Line at -31.1 dBm/MHz



CONFIGURATIONS

Configuration NOKI0075-6

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.SRM7.trunk.20240612.001
BTS Software Version (24R3)	SBTS24R3_ENB_9999_240613_000011

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	L1224802943
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.102	L1205105870
AVQQA (Radio Module Model)	Nokia Solutions and Networks	476596A.M01	L1242403137
Attenuator 50W/10dB	AeroflexWeinschel	RFS50G26S10FF	20031701
High Pass Filter 8-40GHz/15W	RF-Lambda	RHPF23G08G40	17102700014
SFP28 70M MM	Nokia	462265	FR213800430
SFP28 70M MM	Nokia	462265	FR214719846
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-B7RU1219	AC20040004
2 Meter RF cable	Huber + Suhner, Inc.	HS-SUCOFLEX_104	SN185855/4
(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 2m	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	2 meters	N	ABIO	AVQQA
GPS Receiver Cable	Y	20 meters	N	ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIB	WebEM- PC
CBL RF-Cable – RF Load Cables (63)	Y	4 meters	N	EUT [AVQQA] Ant ports 2-64	25W -50ohm-Load
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIB	Analyzer

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
RF cable HS-SUCOFLEX_104	Y	2 meters	N	EUT [AVQQA] TAB port #1	Attenuator 50W/10dB
Attenuator 50W/10dB	N	NA	N	RF cable HS-SUCOFLEX_104 2 Meters	High Pass Filter 8-40GHz/15W
5.5 – 13GHz HPF 100 Watts	N	NA	N	Attenuator 50W/10dB	RF-Lambda - AC20040004
RF-Lambda - AC20040004	Y	1 meter	N	High Pass Filter 8-40GHz/15W	Analyzer

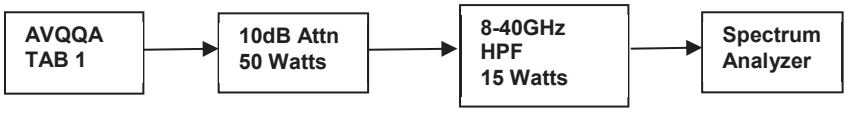
RF Test Setup Diagram:

3.45G Band Single Carrier, Dual Band:

Conducted Spurious Emissions Test Setup for 13GHz to 20GHz and 20GHz to 40GHz; Limit Line at -58.1 dBm/MHz.

3.7G Band Single Carrier and 3.7G Band multi-carriers:

Conducted Spurious Emissions Test Setup for 13GHz to 40GHz; Limit Line at -31.1 dBm/MHz.



CONFIGURATIONS

Configuration NOKI0075-8

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	SRM7.trunk.20240514.006
BTS Software Version (24R3)	SBTS24R3_ENB_9999_240514_000017

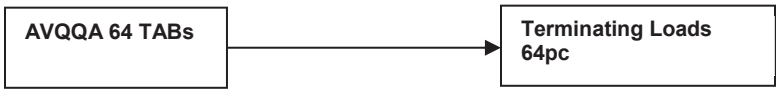
Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	L1224904439
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.104	DH223246455
AVQQA (Radio Module Model)	Nokia Solutions and Networks	476345A.101	L1241906547
EMI Filter	Spectrum Control	12-PMB-260-DC-E	1.0001
SFP28 70M Multi Mode (SM)	Nokia	RTXM330-541-C39	FR214719864
SFP28 70M Multi Mode (Radio)	Nokia	RTXM330-541-C39	FR214719868
SFP28 10Km SM (SM)	Nokia	474902A.101	VF19220012F
SFP28 10Km SM (Radio)	Nokia	474900A.101	FR213800430
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
Terminating Load -50ohms. 25w. Dc to 10GHz (64 pieces)	API Weinschel. Inc	Model 1427-2	CN1869
4 Meter- RF cable (64 pieces)	Times Microwave	CBL-10F-SMSF-402J-N	402J-N/ 64ct
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable (EM-PC)	ETL	E316395	6066M
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431

CONFIGURATIONS

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic cable	N	25 meters	N	ASIB	AVQQA
Cat-5e cable (CSA)	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIB	WebEM- PC
RF-Cable	Y	4 meters	N	EUT [AVQQA] TAB ports 1-64	25w -50ohm Terminating Loads

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
RF-Cable	Y	4 meters	N	EUT [AVQQA] TAB port #1-64	25w -50ohm Terminating Loads
AISG/RET	N	2.4m	N	Remote Radio Head Module	Unterminated
Grounding	N	3m	N	Remote Radio Head Module	Turntable Ground

RF Test Setup Diagram



CONFIGURATIONS

Configuration NOKI0075-9

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	SRM7.trunk.20240514.006
BTS Software Version (24R3)	SBTS24R3_ENB_9999_240514_000017

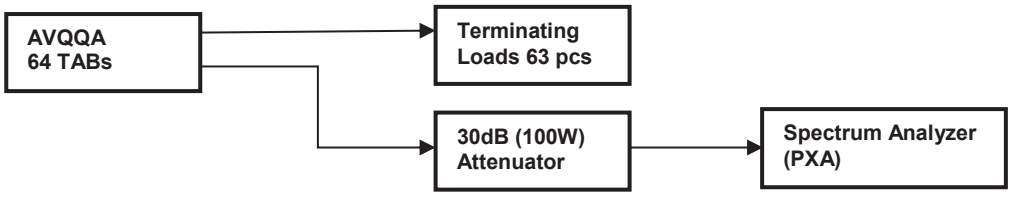
Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.204	UK222201001
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	L1224904439
ABIO (BTS System Module)	Nokia Solutions and Networks	475266A.104	DH223246455
AVQQA (Radio Module Model)	Nokia Solutions and Networks	476345A.101	L1241906547
EMI Filter	Spectrum Control	12-PMB-260-DC-E	1.0001
SFP28 70m MM (SM)	Nokia	RTXM330-541-C39	FR214719864
SFP28 70m MM (Radio)	Nokia	RTXM330-541-C39	FR214719868
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
30dB Attenuator 100 Watts	Weinschel Corp	Model: 73-30-34	MB323
1 Meter – RF cable	Huber + Suhner, Inc.	SUCOFLEX 104	S/N 551426/4
2 Meter – RF cable	Huber + Suhner, Inc.	SUCOFLEX 104	S/N 185837/4
Digital Multimeter	Fluke	77IV	CAL: 27210148
Handheld Temperature/Humidity Meter	Omega Engineering Inc	DVI	S/N230303
Terminating Load -50ohms. 25w. Dc to 10GHz (63 pieces)	API Weinschel. Inc	Model 1427-2	CN1869
4 Meter- RF cable (63 pieces)	Times Microwave	CBL-10F-SMSF-402J-N	402J-N/ 64ct
Fiber Optic cable 25m	Occfiber.com	BX002DAIS	334280
CAT5e data cable (EM-PC)	ETL	E316395	6066M
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic cable	N	25 meters	N	ASIB	AVQQA
Cat-5e cable (CSA)	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e cable	Y	25 meters	N	ASIB	WebEM- PC
HS-SUCOFLEX_104	Y	2 meters	N	AVQQA TAB 1	Attenuator 100W/30dB
HS-SUCOFLEX_104	Y	1 meter	N	Attenuator 250W/40dB	Analyzer
Times Microwave – RF CABLE	Y	4 meters	N	EUT [AVQQA] TAB #2-64	25W -50ohm - Load
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIB	Analyzer

CONFIGURATIONS

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
RF-Cable	Y	4 meters	N	EUT [AVQQA] TAB port #1-64	25w -50ohm Terminating Loads
Grounding	N	3m	N	Remote Radio Head Module	Ground

RF Test Setup Diagram



MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2024-08-06	Frequency Stability	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	2024-08-15	Power Spectral Density	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	2024-08-15	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	2024-08-19	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.
5	2024-08-21	Output 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.
6	2024-08-21	Spurious Conducted Emissions	Tested as delivered to test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2024-08-21	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.
8	2024-08-22	Spurious Radiated Emissions	Tested as delivered to test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

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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 all ports at 40 MHz middle channel in order to show the AVQQA antenna ports are all within the manufacturer's rate output power tolerances (the RF power variation between antenna ports is small as shown in this certification testing).

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2024-03-12	2025-03-12
Generator - Signal	Agilent	N5173B	TIW	2023-08-07	2026-08-07
Block - DC	Fairview Microwave	SD3235-2148	ANF	2024-07-16	2025-07-16

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EUT:	AVQQA Remote Radio Head	Work Order:	NOKI0075
Serial Number:	L1242403137	Date:	2024-08-08
Customer:	Nokia Solutions and Networks	Temperature:	23.1°C
Attendees:	David Le, John Rattanavong	Relative Humidity:	53.6%
Customer Project:	None	Bar. Pressure (PMSL):	1019 mbar
Tested By:	Jarrod Brenden	Job Site:	PT14
Power:	54VDC	Configuration:	NOKI0075-4

TEST SPECIFICATIONS

Specification:	Method:
FCC 27:2024	ANSI C63.26:2015

COMMENTS

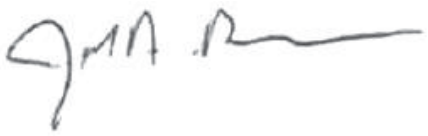
All losses in the measurement path were accounted for in the reference level offset; attenuators, filters, cables, and DC blocks. Band n77 carriers were enabled at maximum power levels for the 3.45 GHz band (at 3.13 watts/carrier) in single carrier operating mode configuration. All measured power values are within tolerance (ie. Rated Power ±2.0dB).

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



Tested By

TEST RESULTS

	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Value (W)	Result
40 MHz Channel Bandwidth					
QPSK Modulation					
Middle Channel, 3500.01 MHz					
Port 1	34.821	0	34.8	3.0	Within Tolerance
Port 2	34.682	0	34.7	3.0	Within Tolerance
Port 3	34.674	0	34.7	3.0	Within Tolerance
Port 4	34.316	0	34.3	2.7	Within Tolerance
Port 5	34.554	0	34.6	2.9	Within Tolerance
Port 6	34.531	0	34.5	2.8	Within Tolerance
Port 7	34.684	0	34.7	3.0	Within Tolerance
Port 8	34.392	0	34.4	2.8	Within Tolerance
Port 9	34.665	0	34.7	3.0	Within Tolerance
Port 10	34.481	0	34.5	2.8	Within Tolerance
Port 11	34.476	0	34.5	2.8	Within Tolerance
Port 12	34.403	0	34.4	2.8	Within Tolerance
Port 13	34.237	0	34.2	2.6	Within Tolerance
Port 14	34.519	0	34.5	2.8	Within Tolerance
Port 15	34.568	0	34.6	2.9	Within Tolerance
Port 16	34.441	0	34.4	2.8	Within Tolerance

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	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Value (W)	Result
Port 17	34.657	0	34.7	3.0	Within Tolerance
Port 18	34.713	0	34.7	3.0	Within Tolerance
Port 19	34.58	0	34.6	2.9	Within Tolerance
Port 20	34.761	0	34.8	3.0	Within Tolerance
Port 21	34.85	0	34.9	3.1	Within Tolerance
Port 22	34.562	0	34.6	2.9	Within Tolerance
Port 23	34.732	0	34.7	3.0	Within Tolerance
Port 24	34.761	0	34.8	3.0	Within Tolerance
Port 25	34.674	0	34.7	3.0	Within Tolerance
Port 26	34.343	0	34.3	2.7	Within Tolerance
Port 27	34.506	0	34.5	2.8	Within Tolerance
Port 28	34.436	0	34.4	2.8	Within Tolerance
Port 29	34.556	0	34.6	2.9	Within Tolerance
Port 30	34.212	0	34.2	2.6	Within Tolerance
Port 31	34.133	0	34.1	2.6	Within Tolerance
Port 32	34.365	0	34.4	2.8	Within Tolerance
Port 33	34.644	0	34.6	2.9	Within Tolerance
Port 34	34.604	0	34.6	2.9	Within Tolerance
Port 35	34.393	0	34.4	2.8	Within Tolerance
Port 36	34.557	0	34.6	2.9	Within Tolerance
Port 37	34.318	0	34.3	2.7	Within Tolerance
Port 38	34.618	0	34.6	2.9	Within Tolerance
Port 39	34.498	0	34.5	2.8	Within Tolerance
Port 40	34.396	0	34.4	2.8	Within Tolerance
Port 41	34.634	0	34.6	2.9	Within Tolerance
Port 42	34.461	0	34.5	2.8	Within Tolerance
Port 43	34.51	0	34.5	2.8	Within Tolerance
Port 44	34.644	0	34.6	2.9	Within Tolerance
Port 45	34.218	0	34.2	2.6	Within Tolerance
Port 46	34.501	0	34.5	2.8	Within Tolerance
Port 47	34.503	0	34.5	2.8	Within Tolerance
Port 48	34.427	0	34.4	2.8	Within Tolerance
Port 49	34.756	0	34.8	3.0	Within Tolerance
Port 50	34.528	0	34.5	2.8	Within Tolerance
Port 51	34.523	0	34.5	2.8	Within Tolerance
Port 52	34.679	0	34.7	3.0	Within Tolerance
Port 53	34.721	0	34.7	3.0	Within Tolerance
Port 54	34.715	0	34.7	3.0	Within Tolerance
Port 55	34.49	0	34.5	2.8	Within Tolerance
Port 56	34.775	0	34.8	3.0	Within Tolerance

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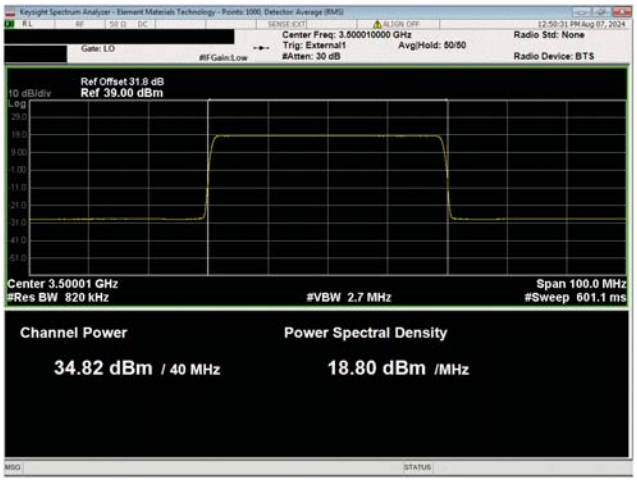
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Value (W)	Result
Port 57	34.437	0	34.4	2.8	Within Tolerance
Port 58	34.526	0	34.5	2.8	Within Tolerance
Port 59	34.352	0	34.4	2.8	Within Tolerance
Port 60	34.57	0	34.6	2.9	Within Tolerance
Port 61	34.294	0	34.3	2.7	Within Tolerance
Port 62	34.439	0	34.4	2.8	Within Tolerance
Port 63	34.114	0	34.1	2.6	Within Tolerance
Port 64	34.373	0	34.4	2.8	Within Tolerance
ALL PORTS	N/A	N/A	52.6	181.6	Within Tolerance

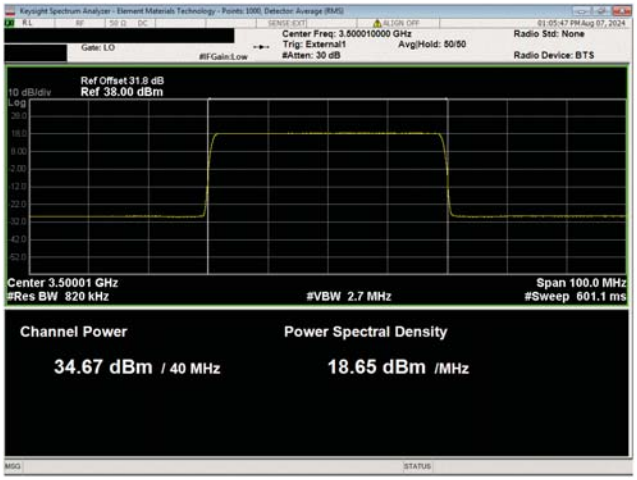
AVERAGE POWER - BAND 3.45G, ALL PORTS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

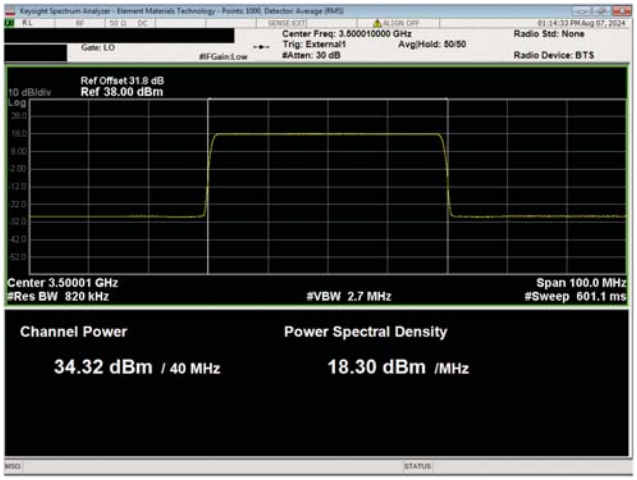


40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 1

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 2



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 3



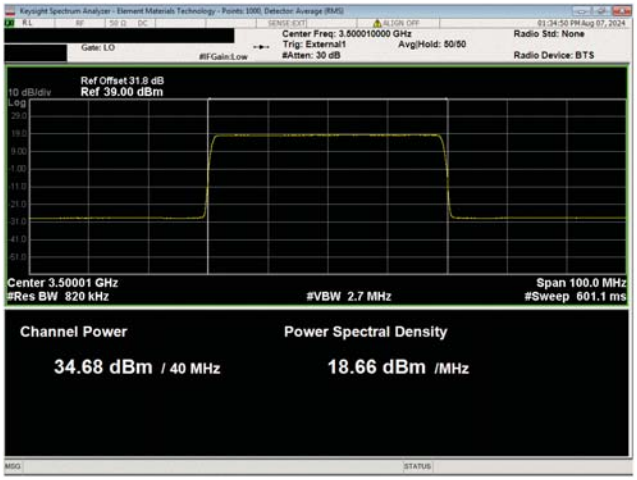
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 4

AVERAGE POWER - BAND 3.45G, ALL PORTS

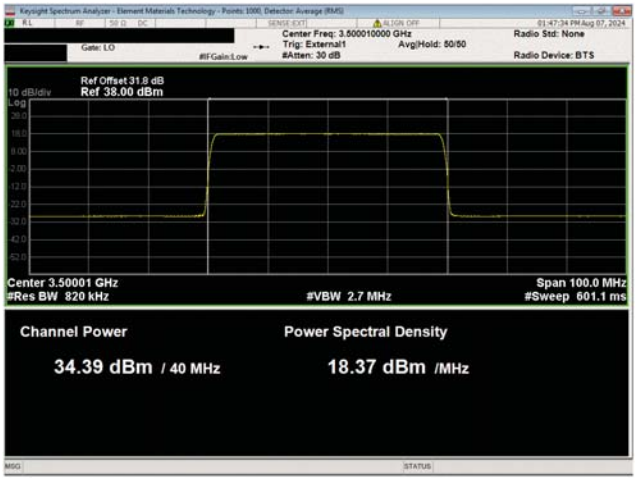
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 5

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 6



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 7



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 8

AVERAGE POWER - BAND 3.45G, ALL PORTS

element
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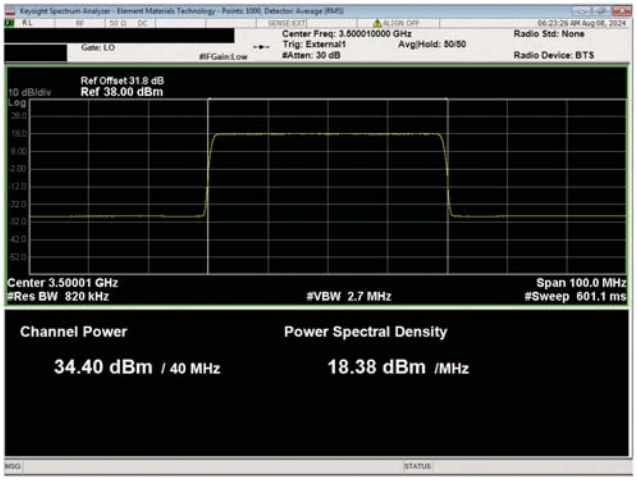
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 9

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 10

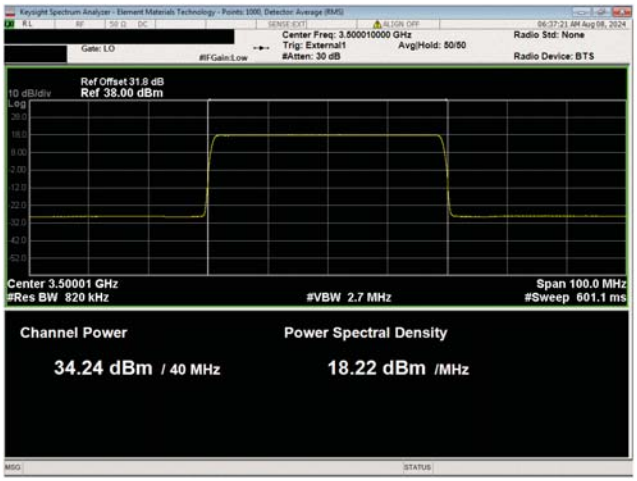
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 11



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 12

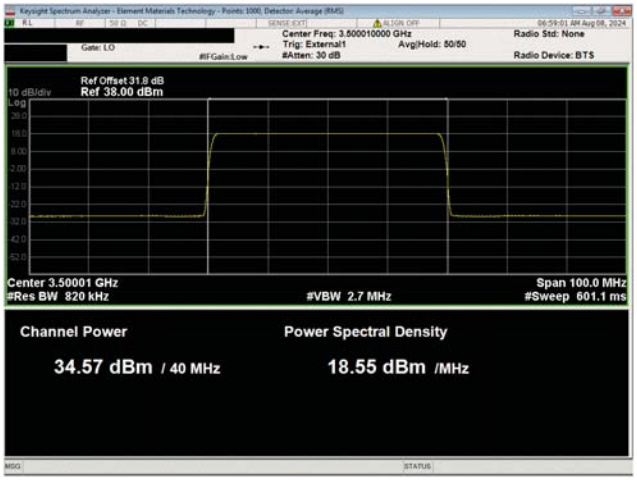
AVERAGE POWER - BAND 3.45G, ALL PORTS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

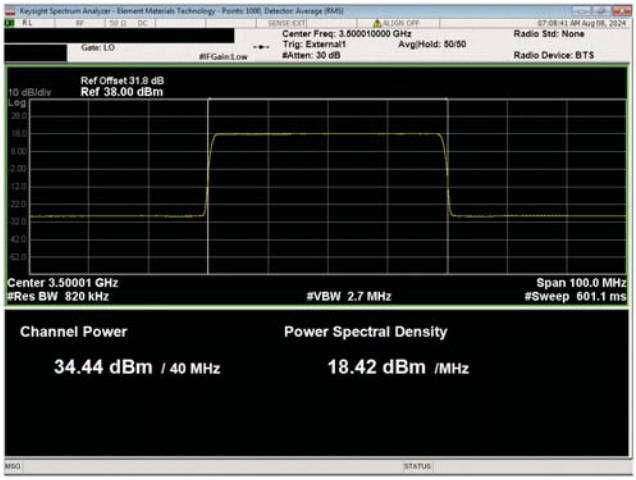


40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 13

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 14



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 15



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 16

AVERAGE POWER - BAND 3.45G, ALL PORTS

element
TbtTx 2024.05.24.1
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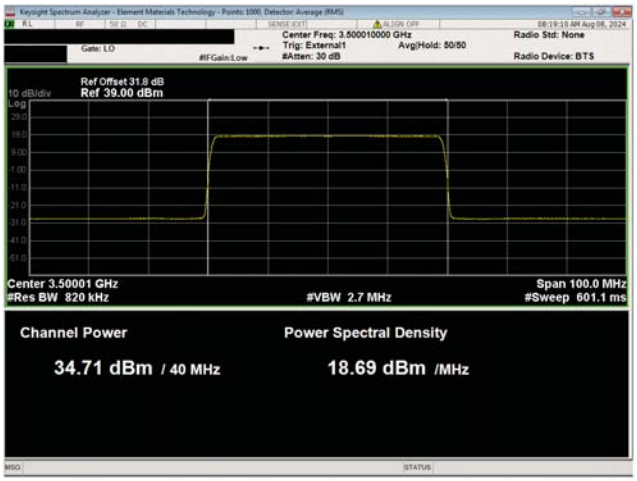
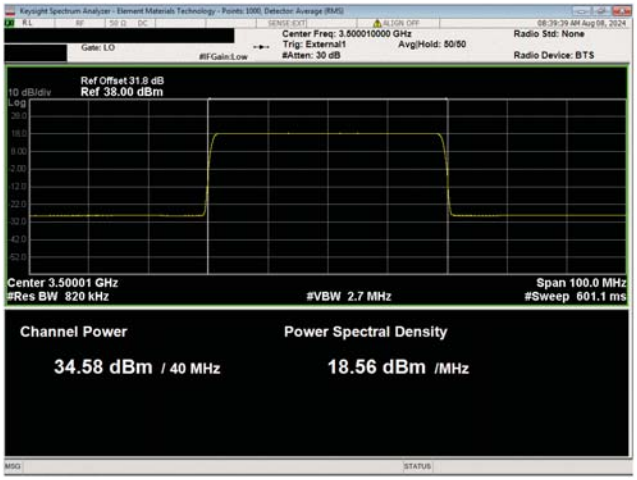
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 17



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 18



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 19

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 20

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element
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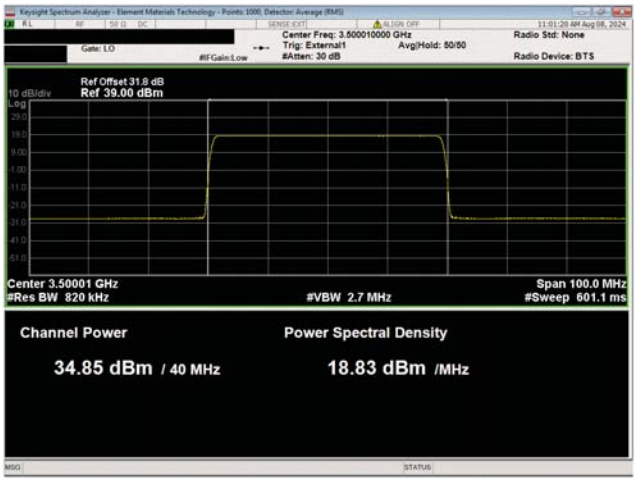
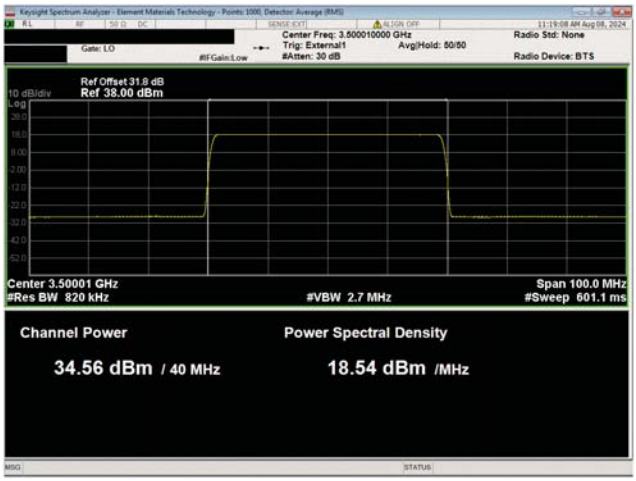
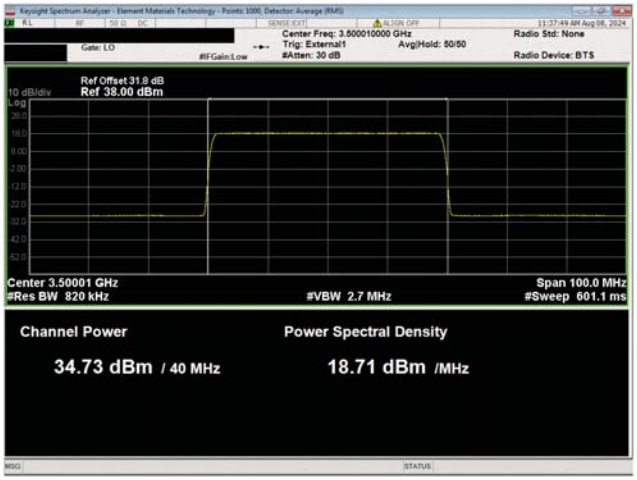
WTD.2024.01.16.0



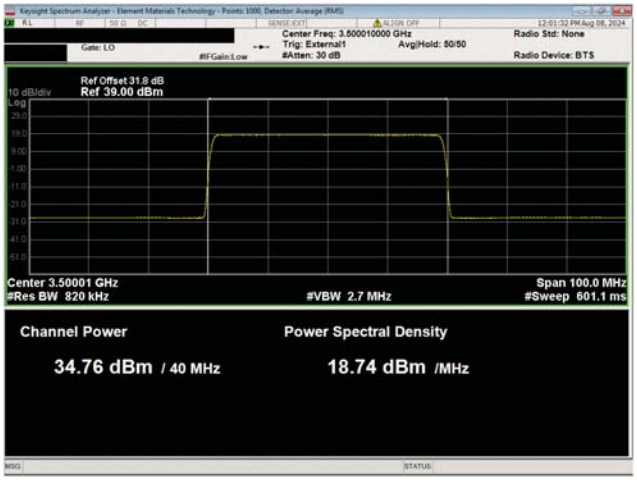
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 21



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 22



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 23



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 24

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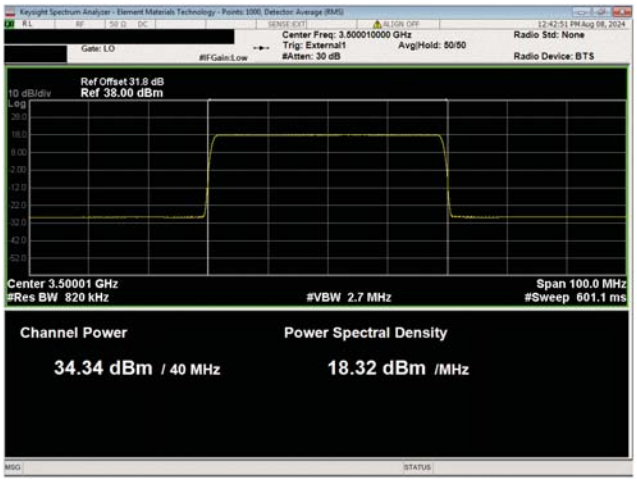
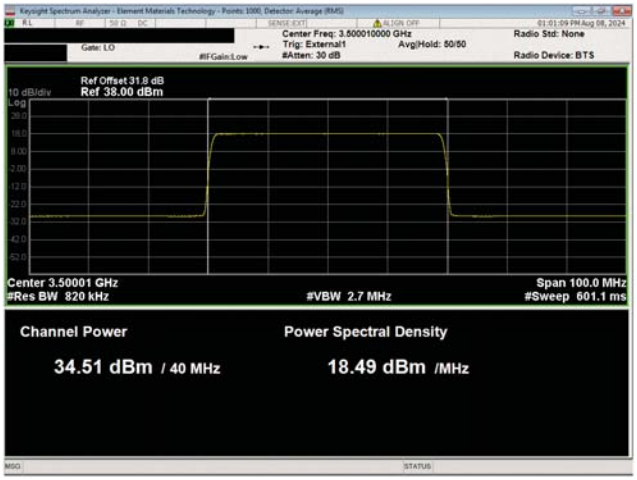
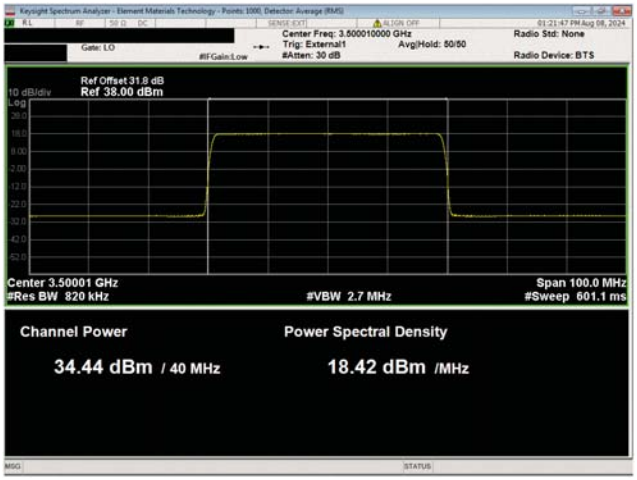
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 25



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 26



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 27



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 28

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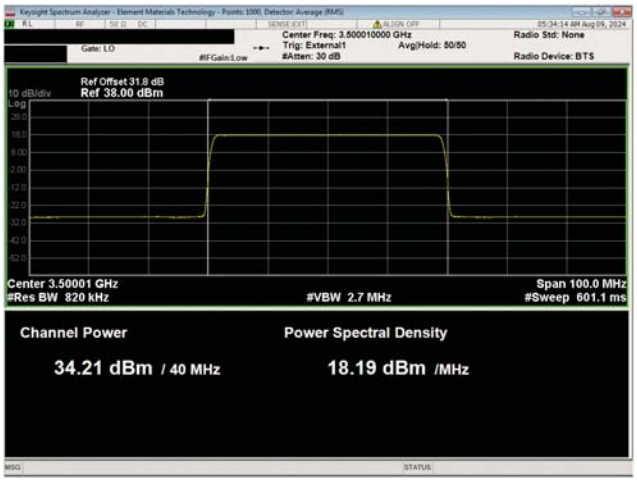
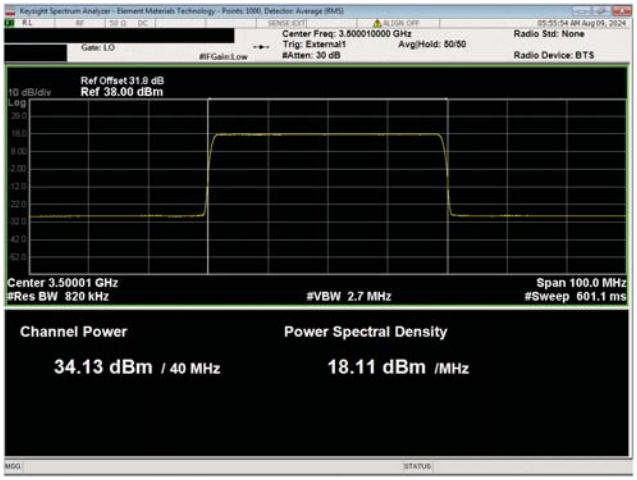
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 29



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 30

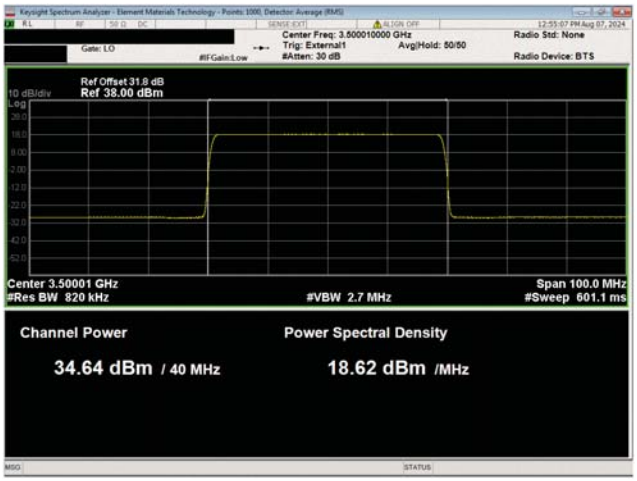


40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 31

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 32

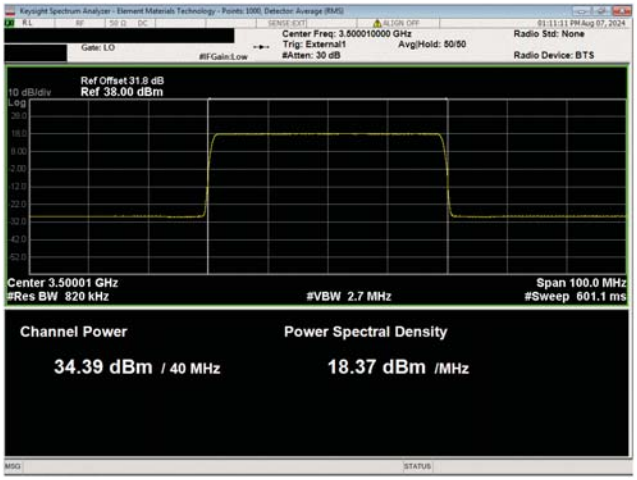
AVERAGE POWER - BAND 3.45G, ALL PORTS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 33

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 34

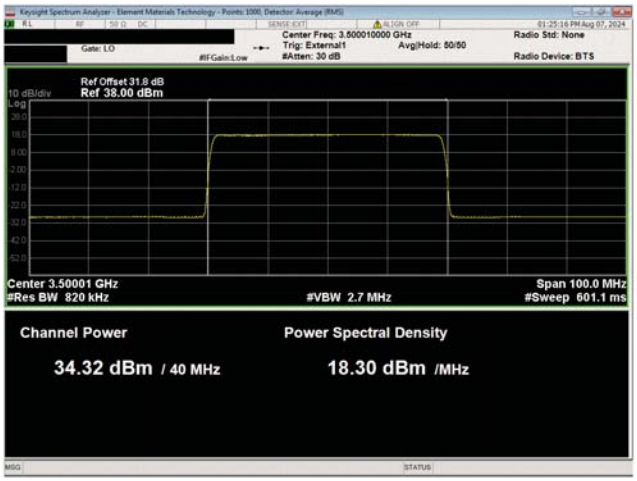


40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 35

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 36

AVERAGE POWER - BAND 3.45G, ALL PORTS

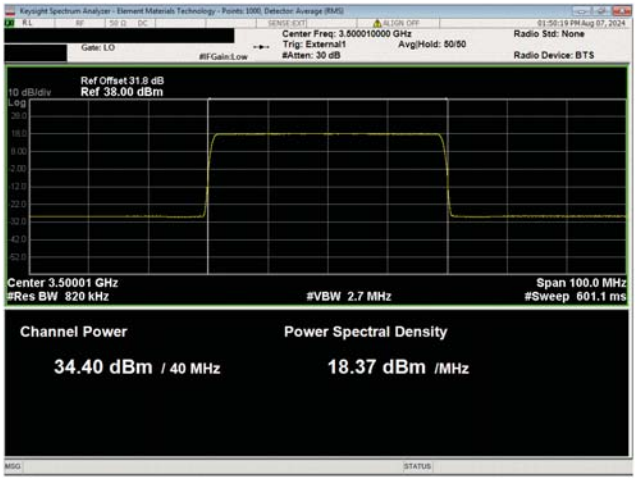
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 37

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 38

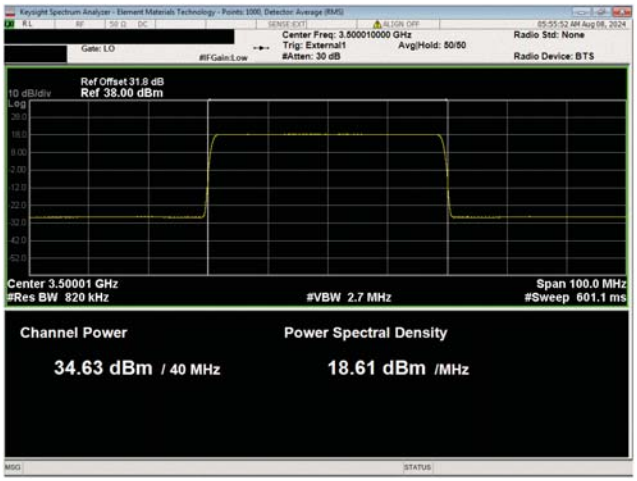
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 39



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 40

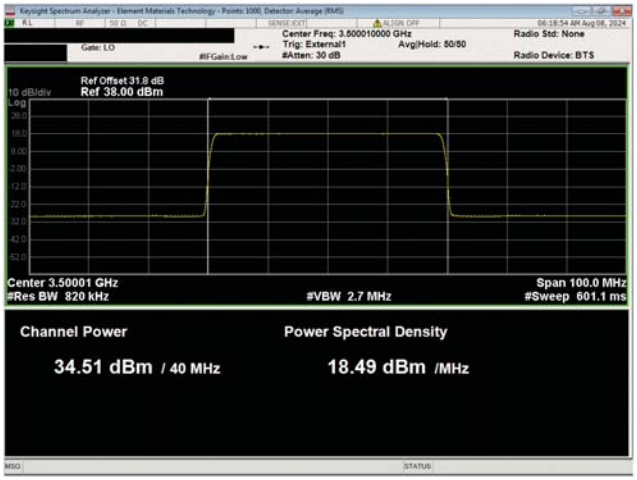
AVERAGE POWER - BAND 3.45G, ALL PORTS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

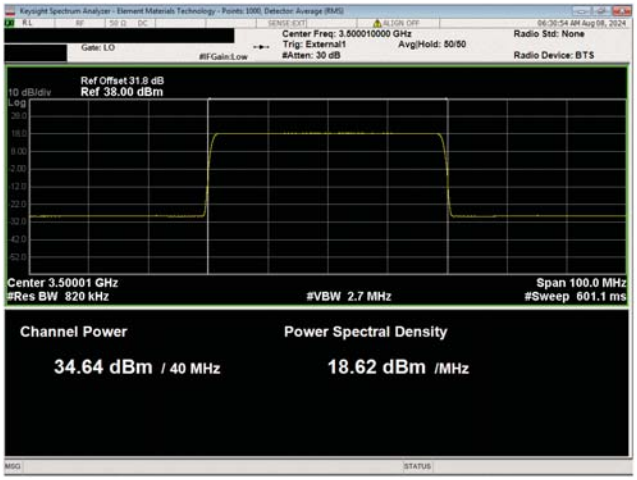


40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 41

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 42



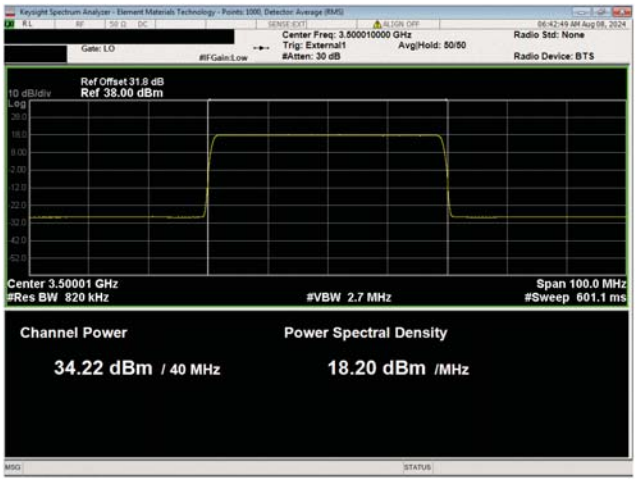
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 43



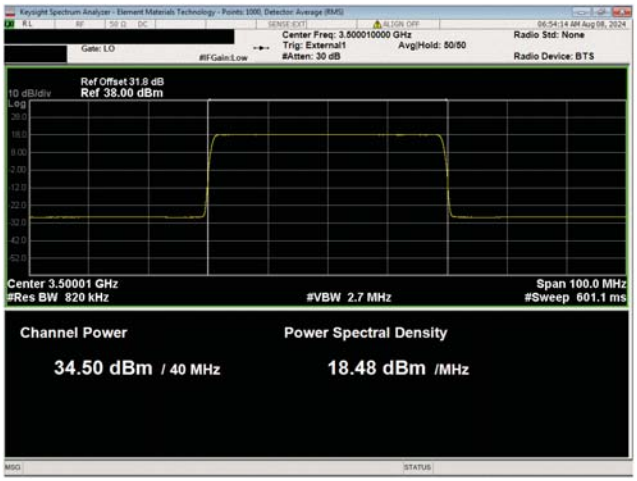
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 44

AVERAGE POWER - BAND 3.45G, ALL PORTS

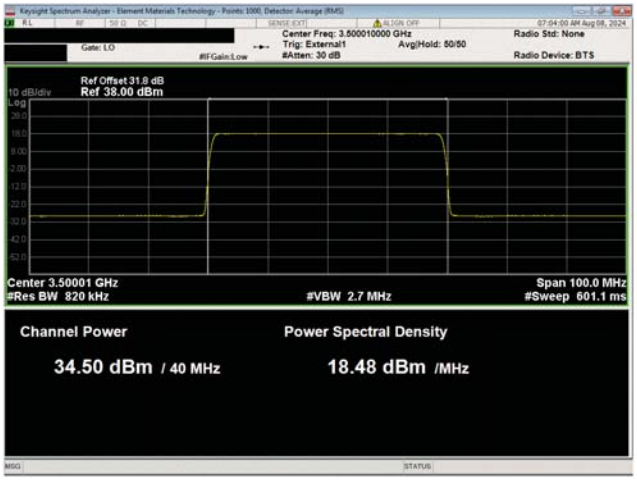
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



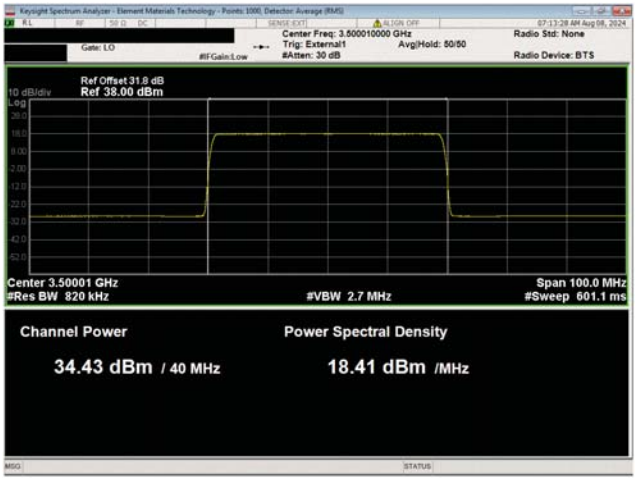
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 45



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 46



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 47



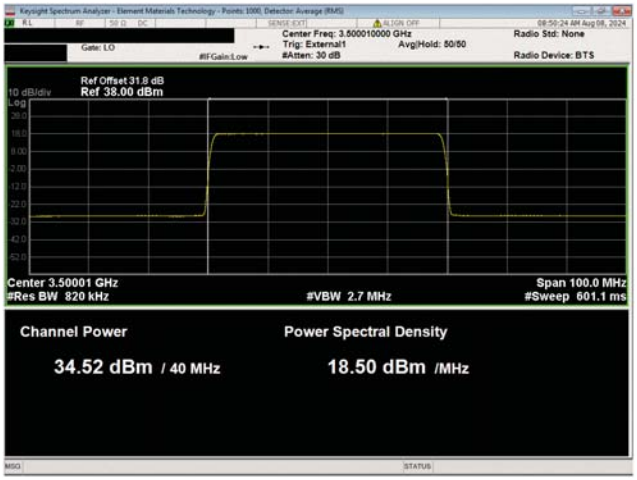
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 48

AVERAGE POWER - BAND 3.45G, ALL PORTS

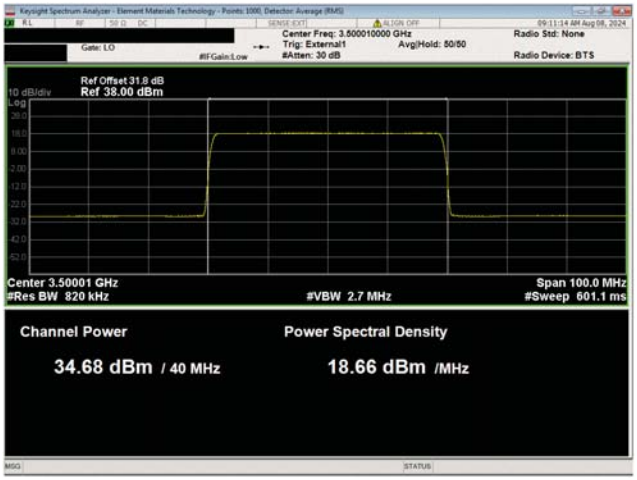
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 49

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 50



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 51

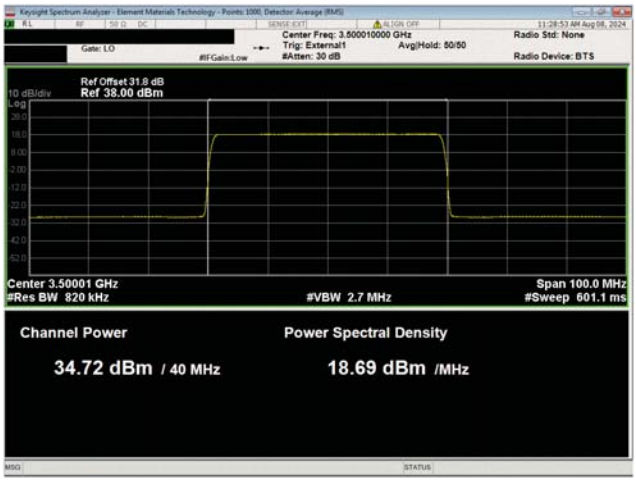


40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 52

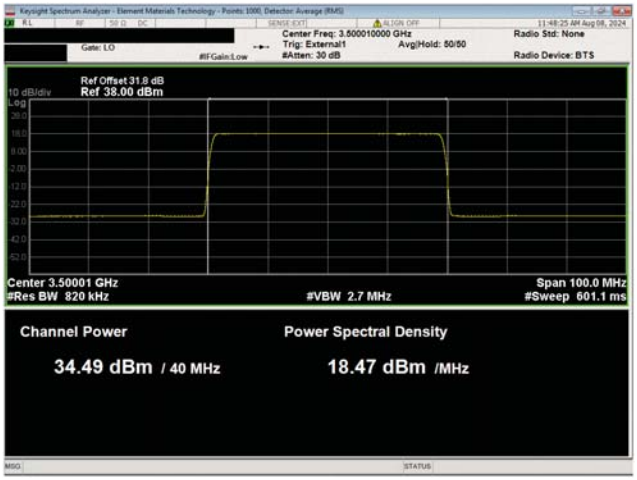
AVERAGE POWER - BAND 3.45G, ALL PORTS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

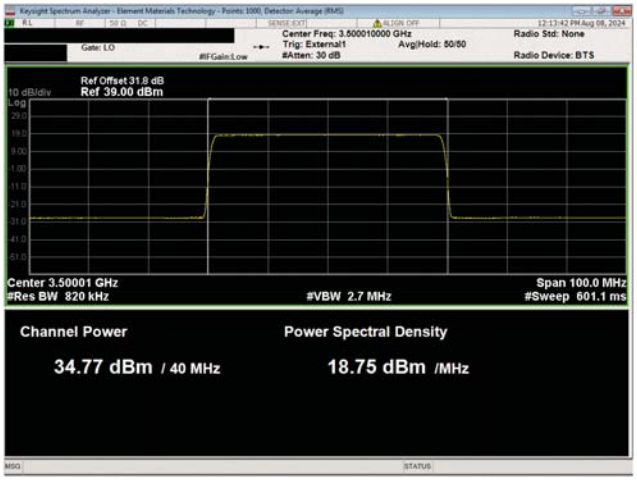
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 53



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 54



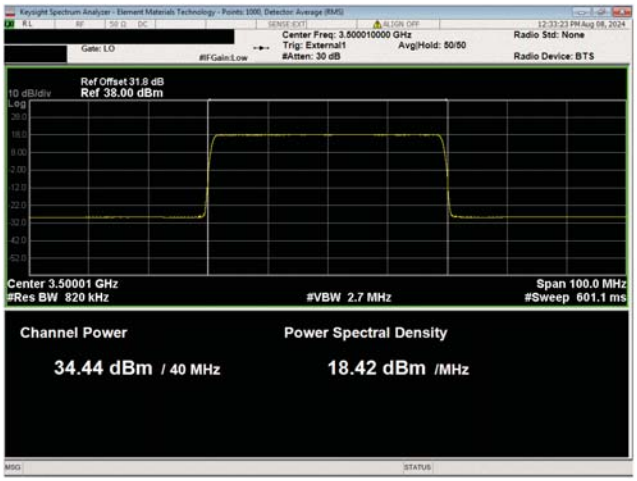
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 55



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 56

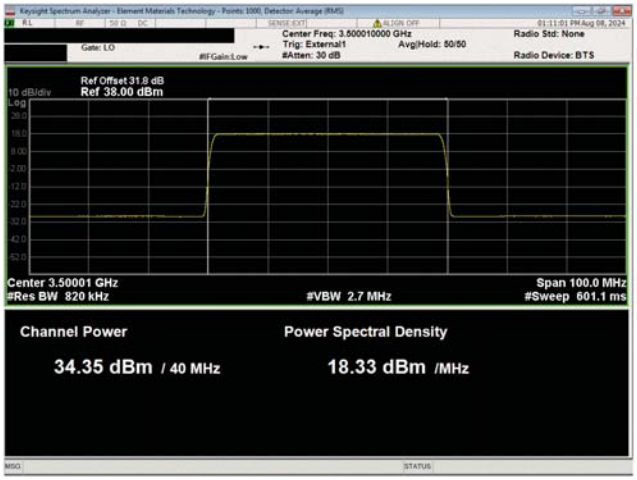
AVERAGE POWER - BAND 3.45G, ALL PORTS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

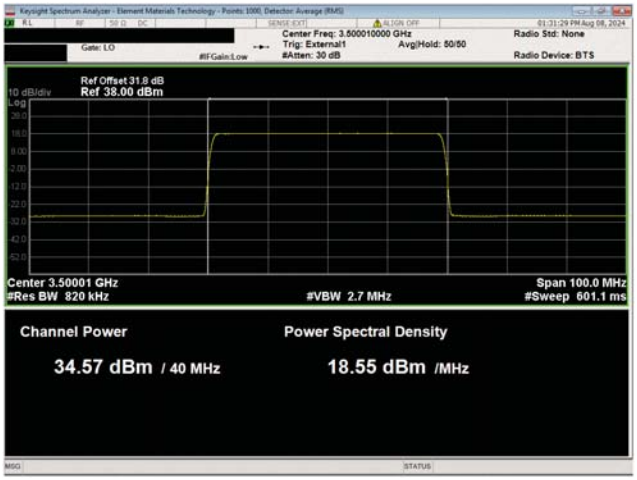


40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 57

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 58



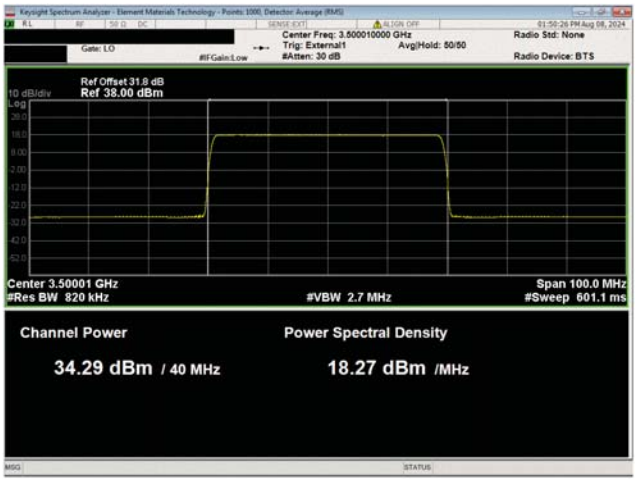
40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 59



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 60

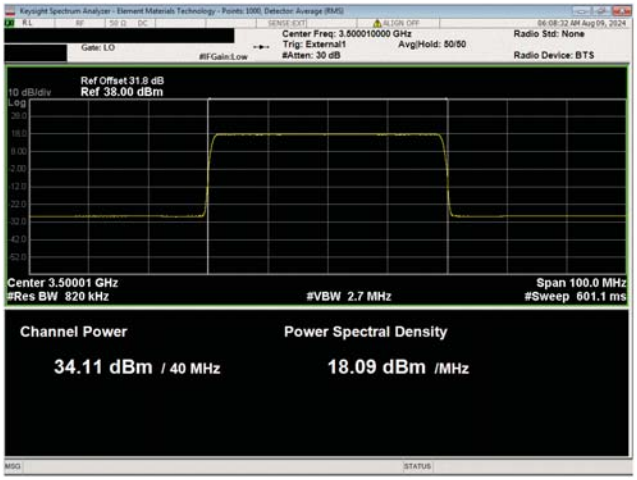
AVERAGE POWER - BAND 3.45G, ALL PORTS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

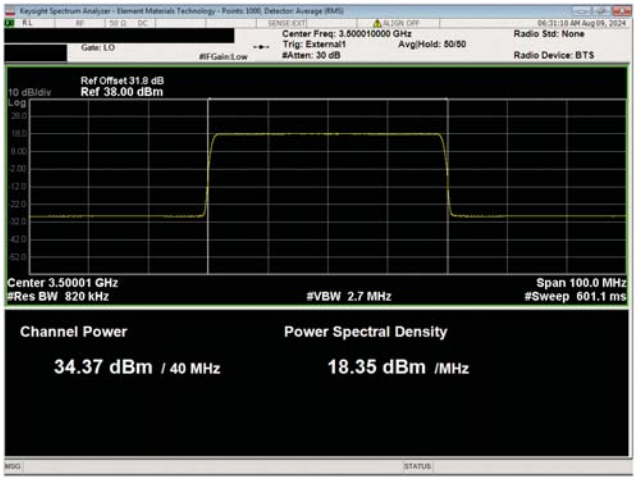


40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 61

40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 62



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 63



40 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3500.01 MHz
Port 64

AVERAGE POWER – BAND 3.7G, ALL PORTS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

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 on all ports at 100 MHz middle channel in order to show the AVQQA antenna ports are all within the manufacturer's rate output power tolerances (the RF power variation between antenna ports is small as shown in this certification testing).

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2024-03-12	2025-03-12
Generator - Signal	Agilent	N5173B	TIW	2023-08-07	2026-08-07
Block - DC	Fairview Microwave	SD3235-2148	ANF	2024-07-16	2025-07-16

AVERAGE POWER – BAND 3.7G, ALL PORTS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

EUT:	AVQQA Remote Radio Head	Work Order:	NOKI0075
Serial Number:	L1242403137	Date:	2024-08-08
Customer:	Nokia Solutions and Networks	Temperature:	23.1°C
Attendees:	David Le, John Rattanavong	Relative Humidity:	56.6%
Customer Project:	None	Bar. Pressure (PMSL):	1020 mbar
Tested By:	Jarrod Brenden	Job Site:	PT14
Power:	54VDC	Configuration:	NOKI0075-4

TEST SPECIFICATIONS

Specification:	Method:
FCC 27:2024	ANSI C63.26:2015

COMMENTS

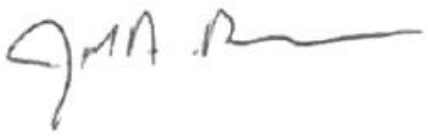
All losses in the measurement path were accounted for in the reference level offset; attenuators, filters, cables, and DC blocks. Band n77 carriers were enabled at maximum power levels for the 3.7 GHz band (at 5.31 watts/carrier) in the single carrier operating mode configuration. All measured power values are within tolerance (ie. Rated Power ±2.0dB).

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



Tested By

TEST RESULTS

	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Value (W)	Results
100 MHz Channel Bandwidth					
QPSK Modulation					
Middle Channel, 3840.00 MHz					
Port 1	36.377	0	36.4	4.4	Within Tolerance
Port 2	36.539	0	36.5	4.5	Within Tolerance
Port 3	36.341	0	36.3	4.3	Within Tolerance
Port 4	36.606	0	36.6	4.6	Within Tolerance
Port 5	36.738	0	36.7	4.7	Within Tolerance
Port 6	36.639	0	36.6	4.6	Within Tolerance
Port 7	36.723	0	36.7	4.7	Within Tolerance
Port 8	36.605	0	36.6	4.6	Within Tolerance
Port 9	36.383	0	36.4	4.4	Within Tolerance
Port 10	36.412	0	36.4	4.4	Within Tolerance
Port 11	36.551	0	36.6	4.6	Within Tolerance
Port 12	36.436	0	36.4	4.4	Within Tolerance
Port 13	36.41	0	36.4	4.4	Within Tolerance
Port 14	36.415	0	36.4	4.4	Within Tolerance
Port 15	36.349	0	36.3	4.3	Within Tolerance
Port 16	36.348	0	36.3	4.3	Within Tolerance

AVERAGE POWER – BAND 3.7G, ALL PORTS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Value (W)	Results
Port 17	36.578	0	36.6	4.6	Within Tolerance
Port 18	36.99	0	37	5.0	Within Tolerance
Port 19	36.796	0	36.8	4.8	Within Tolerance
Port 20	36.919	0	36.9	4.9	Within Tolerance
Port 21	37.1	0	37.1	5.1	Within Tolerance
Port 22	36.913	0	36.9	4.9	Within Tolerance
Port 23	36.902	0	36.9	4.9	Within Tolerance
Port 24	36.891	0	36.9	4.9	Within Tolerance
Port 25	36.92	0	36.9	4.9	Within Tolerance
Port 26	36.675	0	36.7	4.7	Within Tolerance
Port 27	36.754	0	36.8	4.8	Within Tolerance
Port 28	36.653	0	36.7	4.7	Within Tolerance
Port 29	36.866	0	36.9	4.9	Within Tolerance
Port 30	36.369	0	36.4	4.4	Within Tolerance
Port 31	36.436	0	36.4	4.4	Within Tolerance
Port 32	36.393	0	36.4	4.4	Within Tolerance
Port 33	36.696	0	36.7	4.7	Within Tolerance
Port 34	36.615	0	36.6	4.6	Within Tolerance
Port 35	36.76	0	36.8	4.8	Within Tolerance
Port 36	36.536	0	36.5	4.5	Within Tolerance
Port 37	36.748	0	36.7	4.7	Within Tolerance
Port 38	36.786	0	36.8	4.8	Within Tolerance
Port 39	36.579	0	36.6	4.6	Within Tolerance
Port 40	36.565	0	36.6	4.6	Within Tolerance
Port 41	36.578	0	36.6	4.6	Within Tolerance
Port 42	36.539	0	36.5	4.5	Within Tolerance
Port 43	36.326	0	36.3	4.3	Within Tolerance
Port 44	36.32	0	36.3	4.3	Within Tolerance
Port 45	36.283	0	36.3	4.3	Within Tolerance
Port 46	36.409	0	36.4	4.4	Within Tolerance
Port 47	36.395	0	36.4	4.4	Within Tolerance
Port 48	36.427	0	36.4	4.4	Within Tolerance
Port 49	36.93	0	36.9	4.9	Within Tolerance
Port 50	36.755	0	36.8	4.8	Within Tolerance
Port 51	36.841	0	36.8	4.8	Within Tolerance
Port 52	36.73	0	36.7	4.7	Within Tolerance
Port 53	37.05	0	37.1	5.1	Within Tolerance
Port 54	37.034	0	37	5.0	Within Tolerance
Port 55	36.789	0	36.8	4.8	Within Tolerance
Port 56	37.055	0	37.1	5.1	Within Tolerance

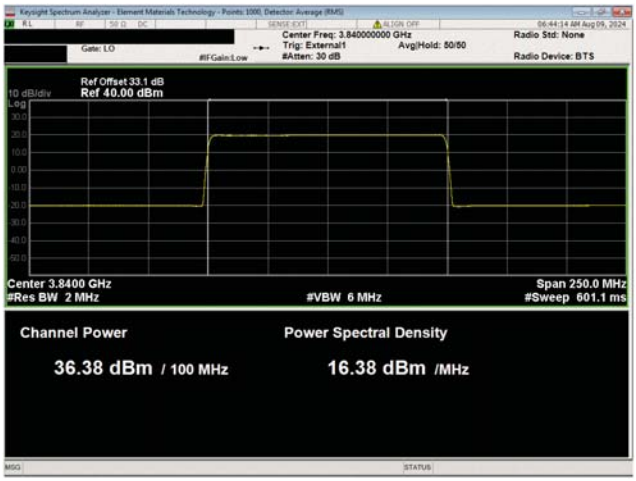
AVERAGE POWER – BAND 3.7G, ALL PORTS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

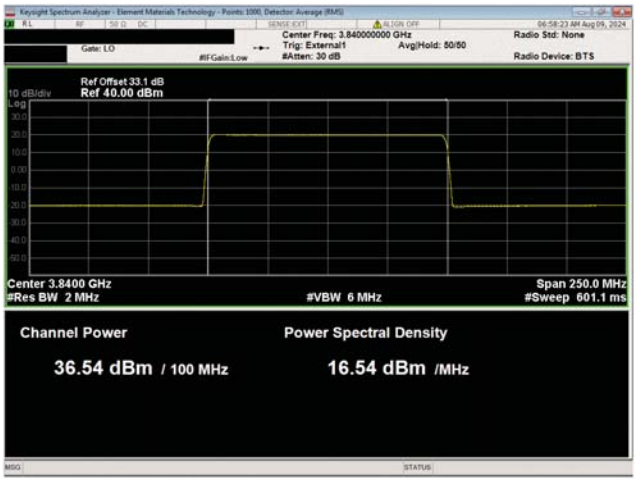
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Value (W)	Results
Port 57	36.905	0	36.9	4.9	Within Tolerance
Port 58	36.845	0	36.8	4.8	Within Tolerance
Port 59	36.572	0	36.6	4.6	Within Tolerance
Port 60	36.78	0	36.8	4.8	Within Tolerance
Port 61	36.744	0	36.7	4.7	Within Tolerance
Port 62	36.583	0	36.6	4.6	Within Tolerance
Port 63	36.363	0	36.4	4.4	Within Tolerance
Port 64	36.51	0	36.5	4.5	Within Tolerance
ALL PORTS	N/A	N/A	54.7	295.6	Within Tolerance

AVERAGE POWER – BAND 3.7G, ALL PORTS

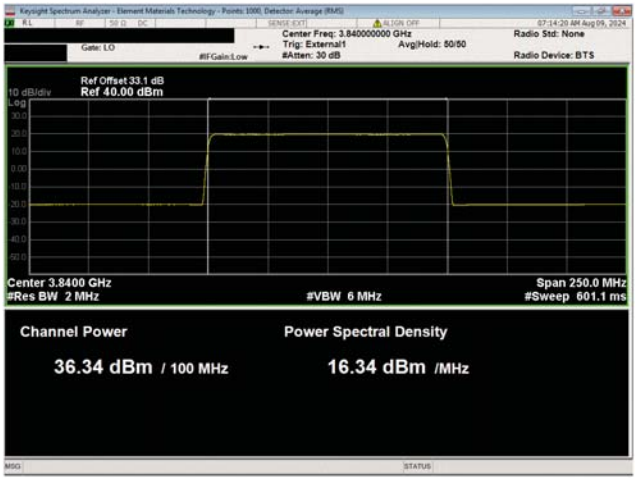
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



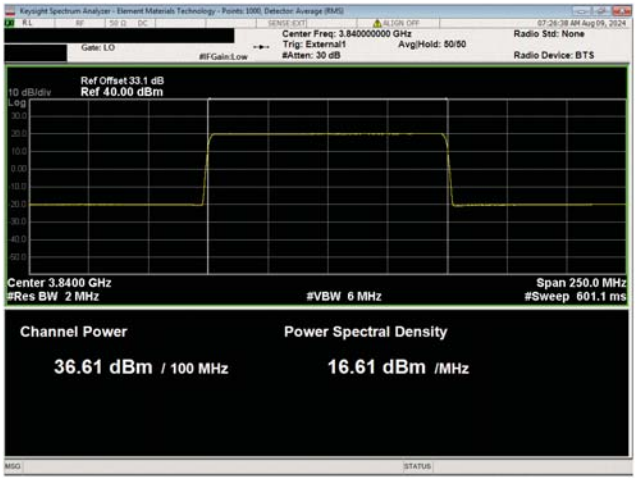
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 1



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 2



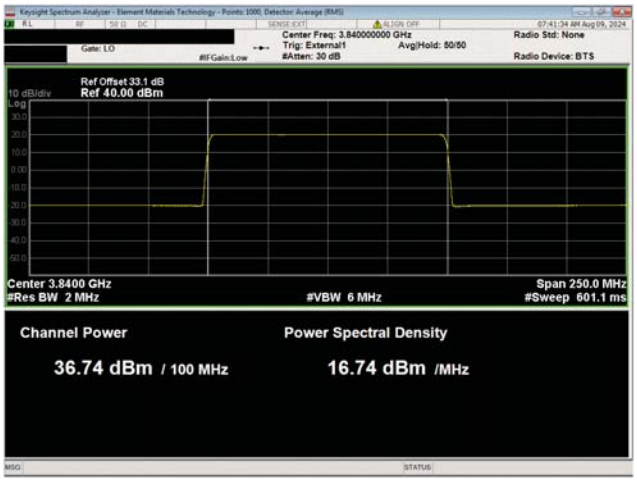
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 3



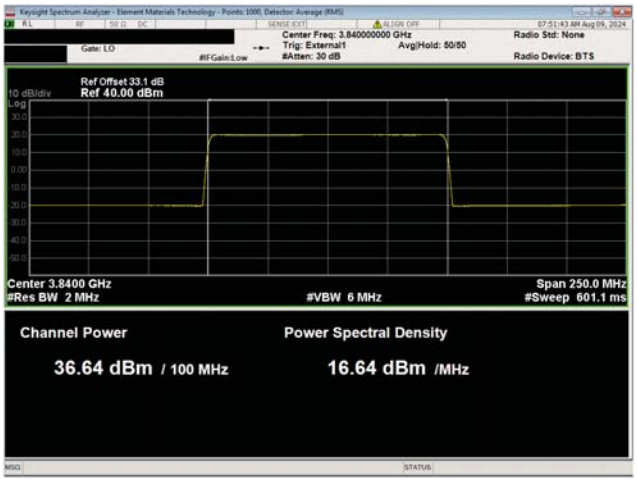
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 4

AVERAGE POWER – BAND 3.7G, ALL PORTS

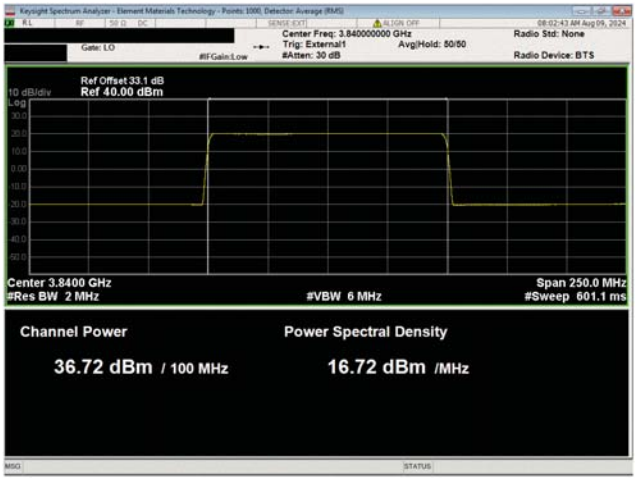
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



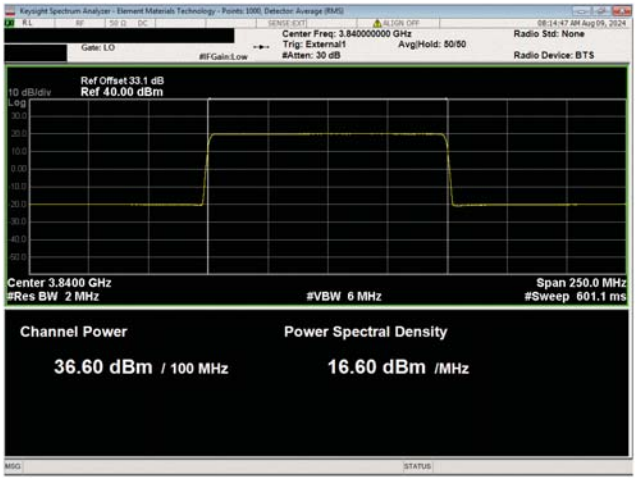
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 5



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 6



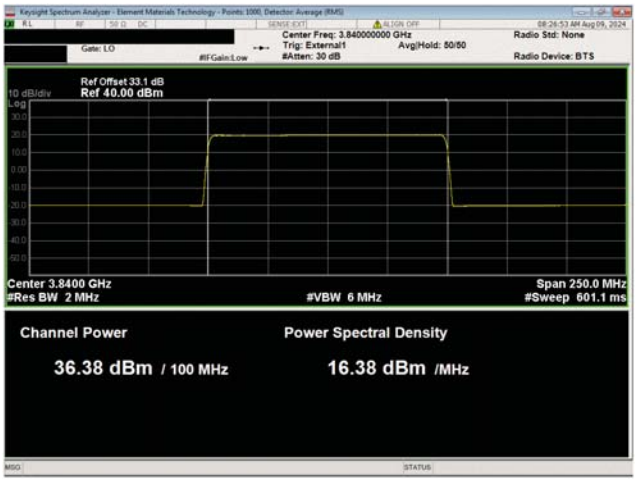
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 7



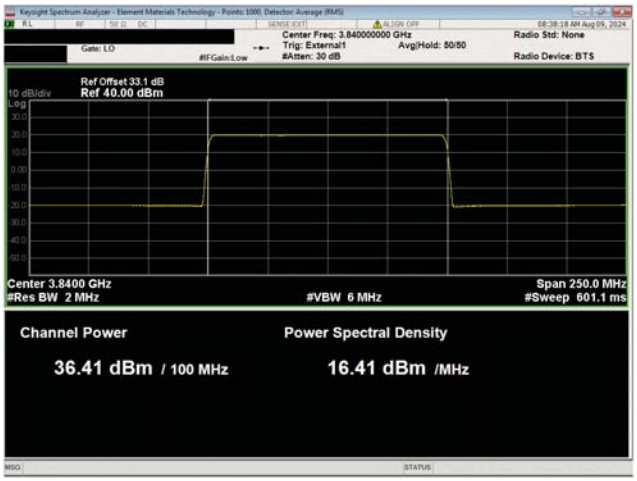
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 8

AVERAGE POWER – BAND 3.7G, ALL PORTS

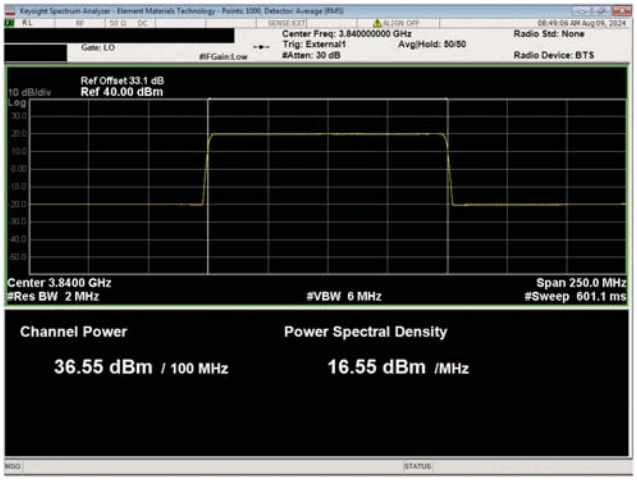
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



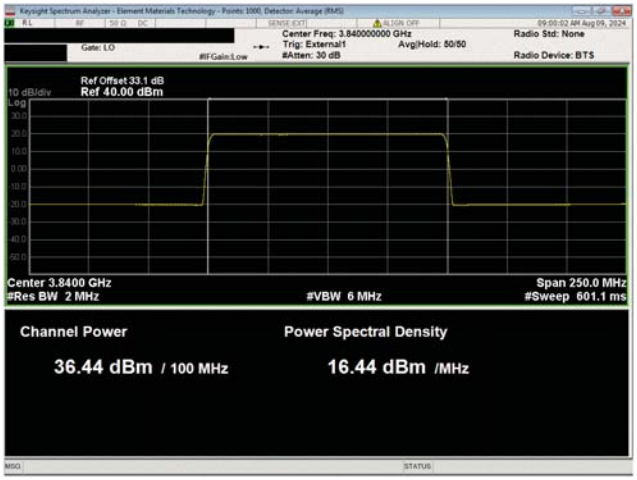
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 9



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 10



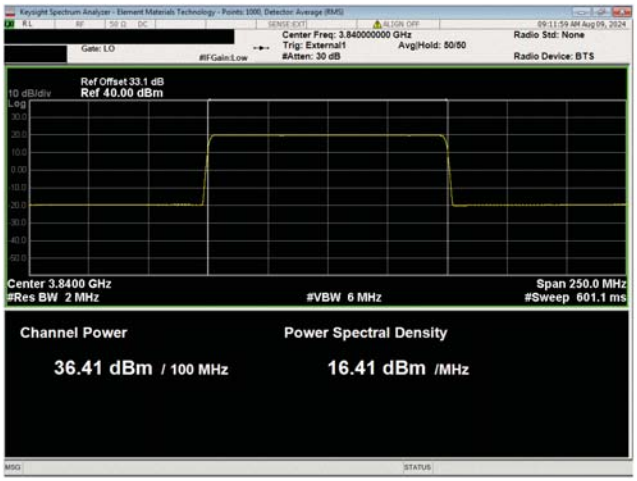
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 11



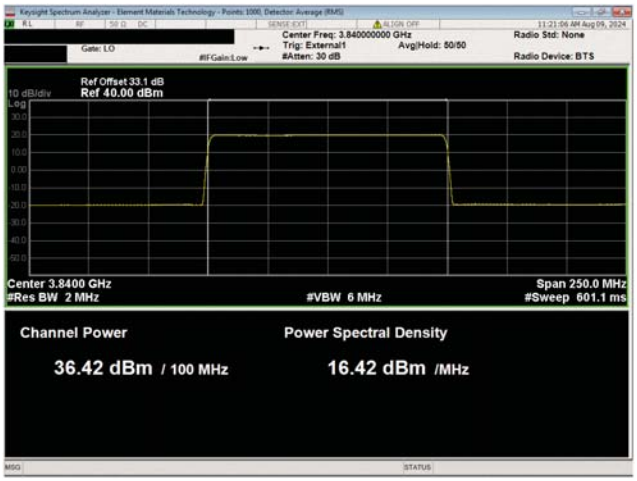
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 12

AVERAGE POWER – BAND 3.7G, ALL PORTS

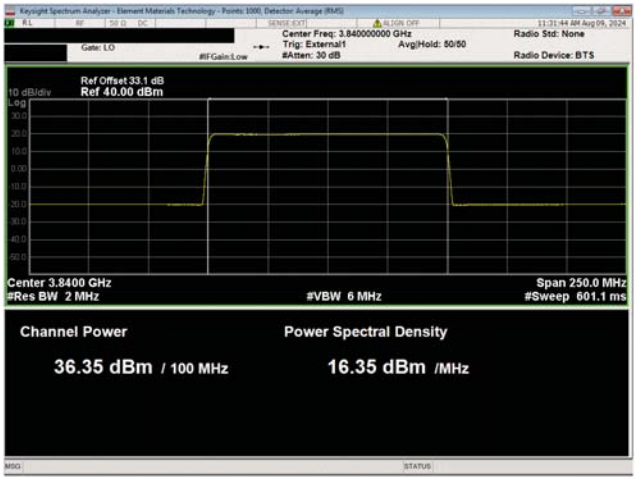
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



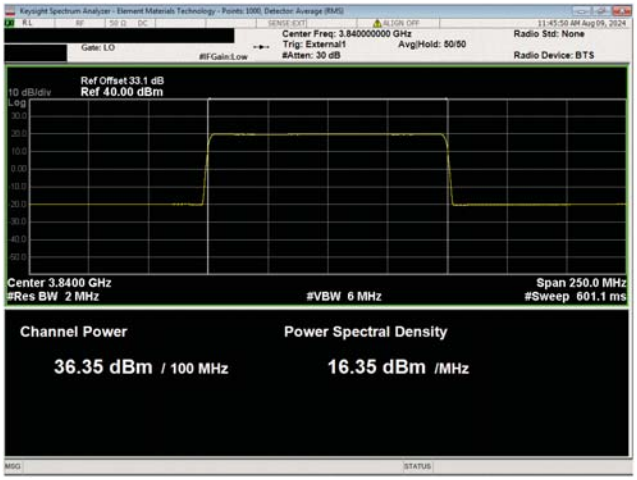
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 13



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 14



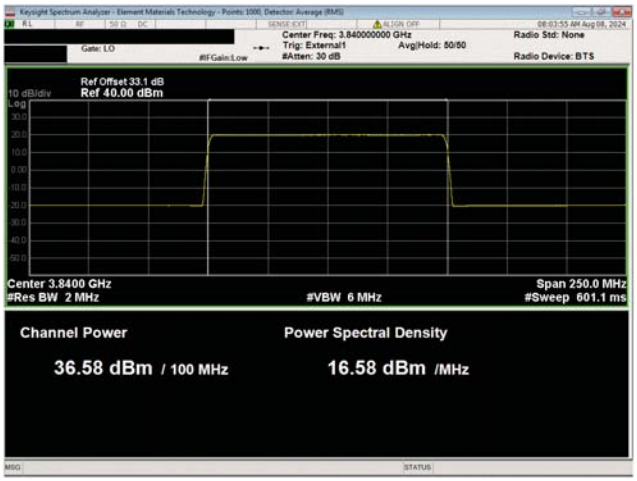
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 15



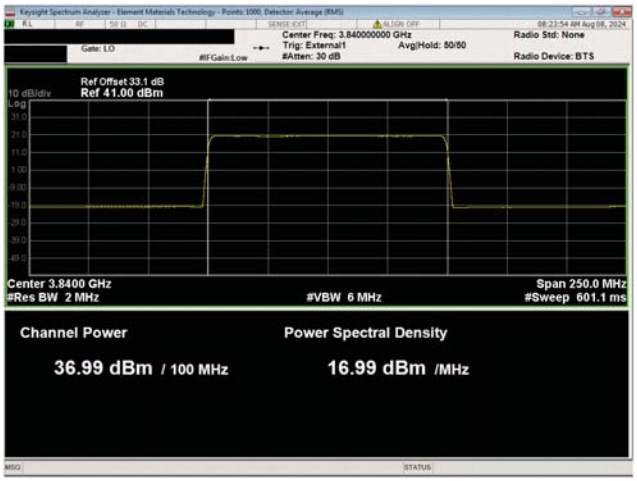
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 16

AVERAGE POWER – BAND 3.7G, ALL PORTS

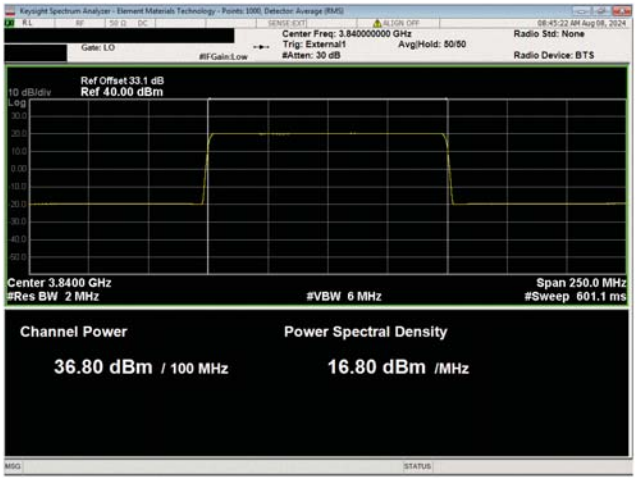
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



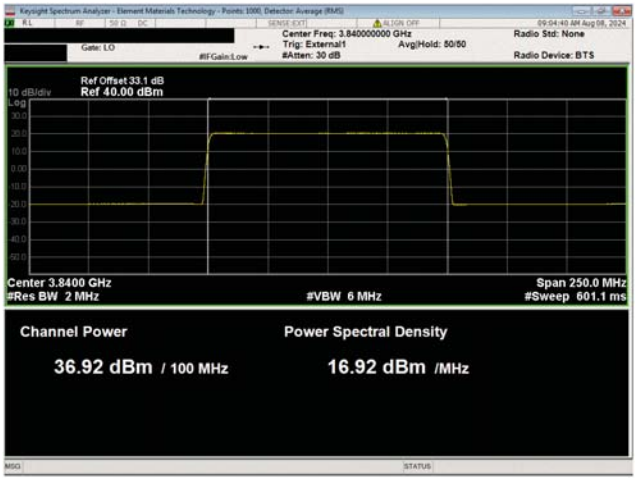
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 17



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 18



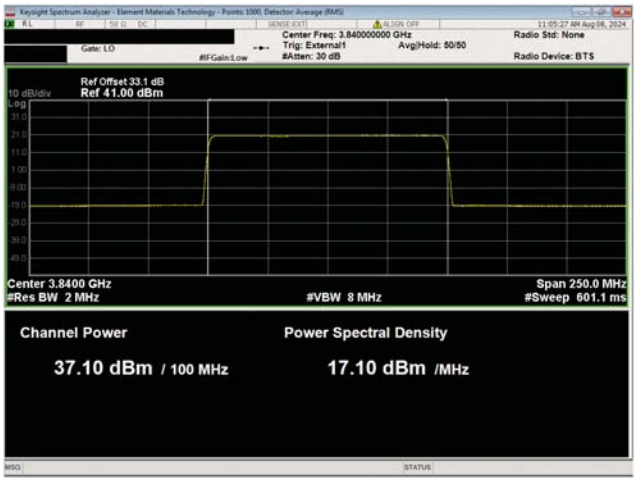
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 19



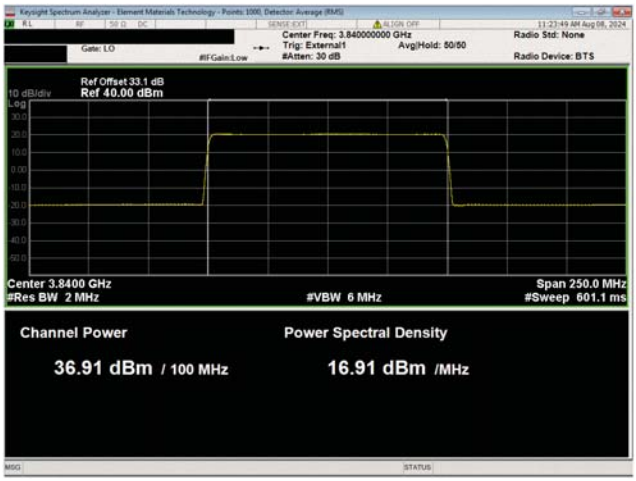
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 20

AVERAGE POWER – BAND 3.7G, ALL PORTS

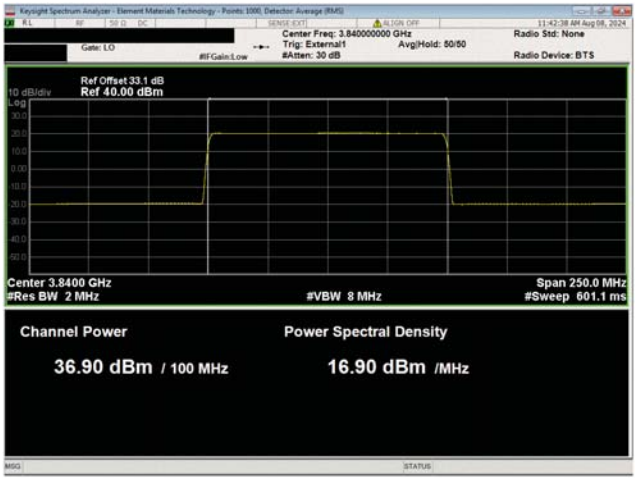
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



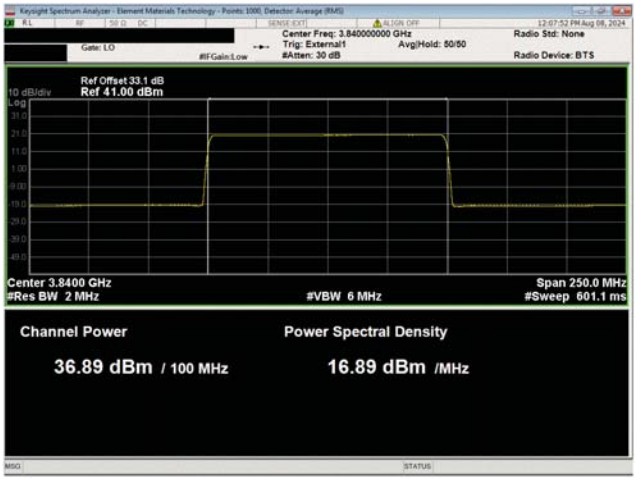
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 21



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 22



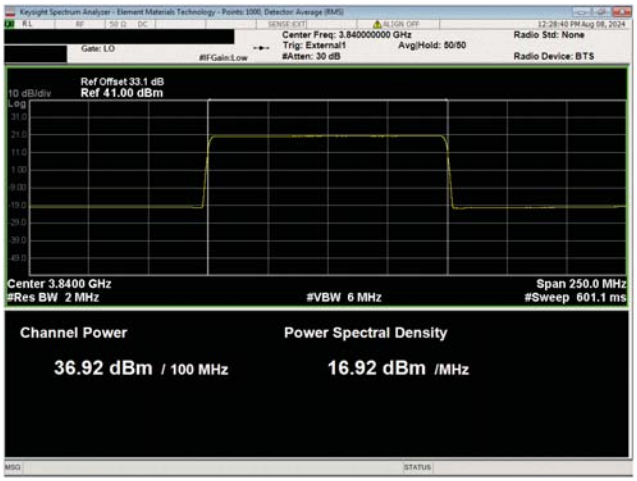
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 23



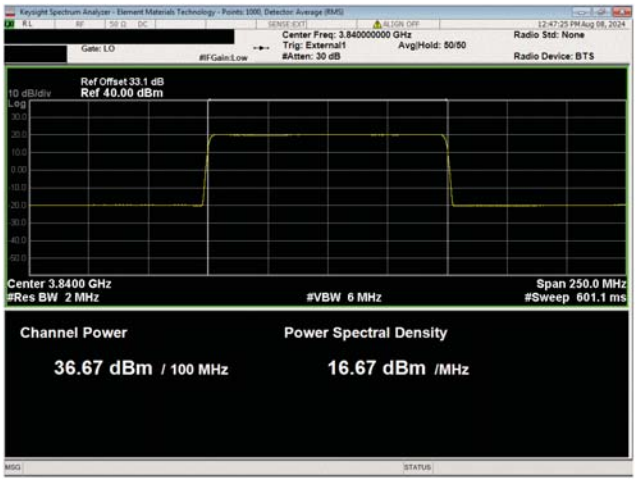
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 24

AVERAGE POWER – BAND 3.7G, ALL PORTS

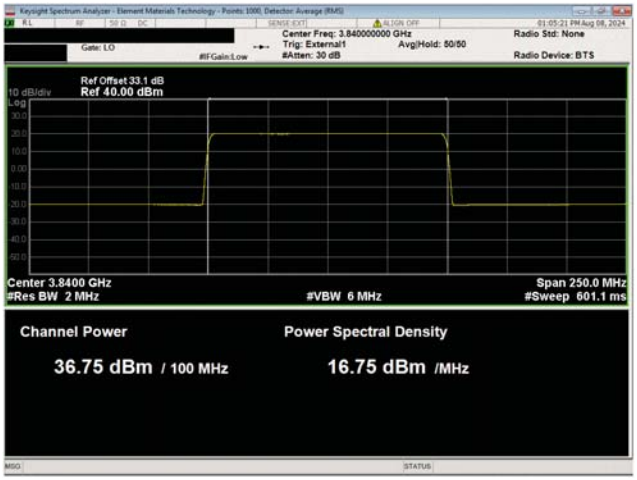
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



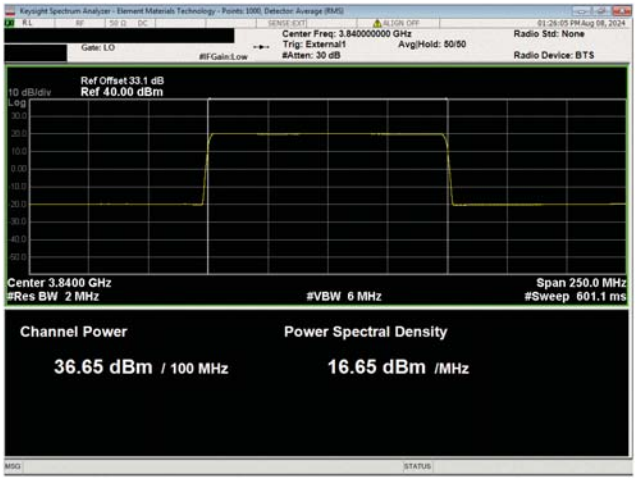
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 25



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 26



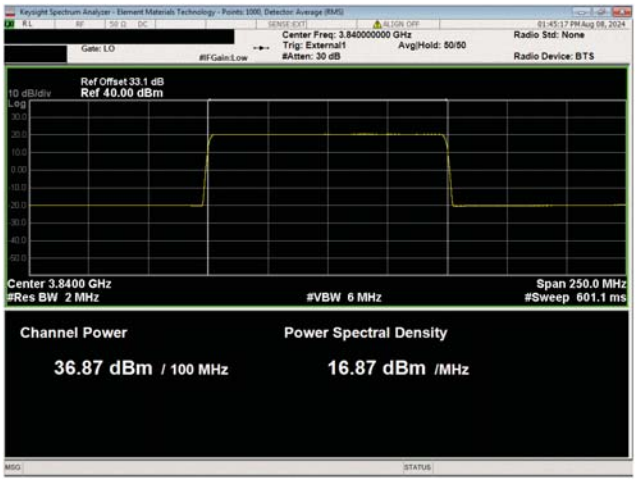
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 27



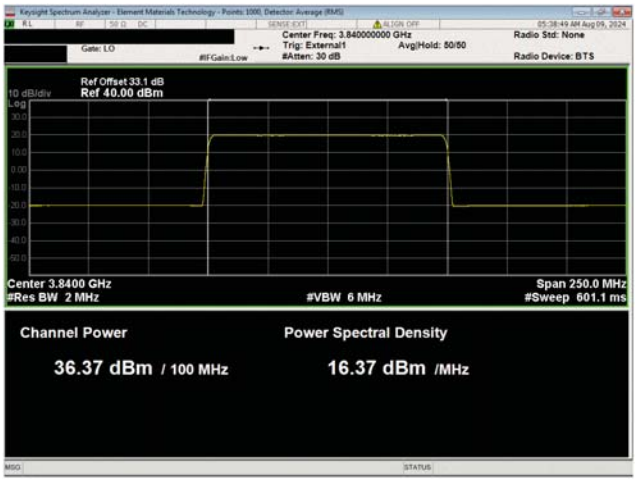
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 28

AVERAGE POWER – BAND 3.7G, ALL PORTS

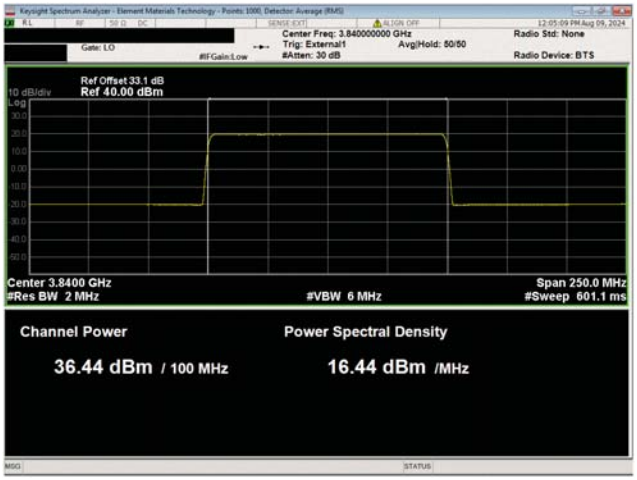
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



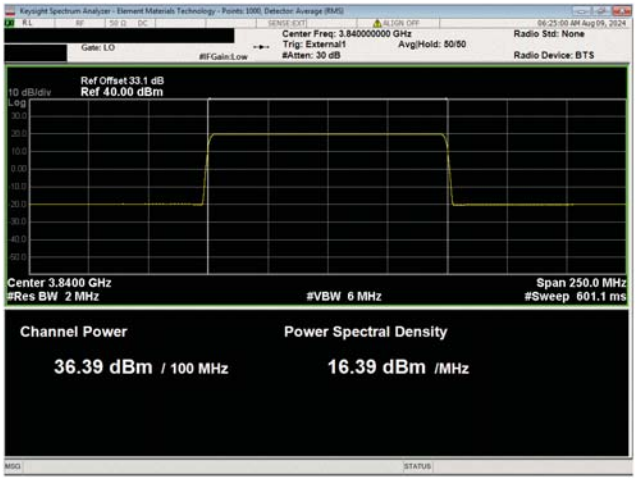
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 29



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 30



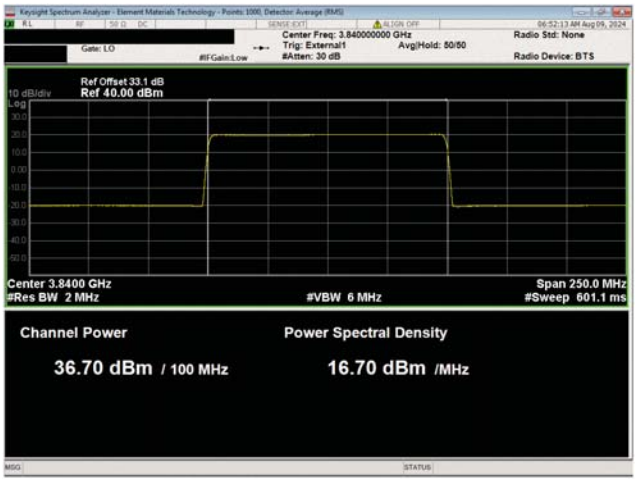
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 31



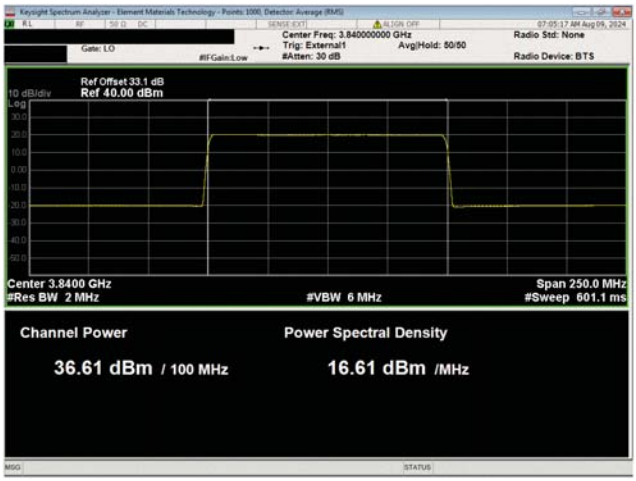
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 32

AVERAGE POWER – BAND 3.7G, ALL PORTS

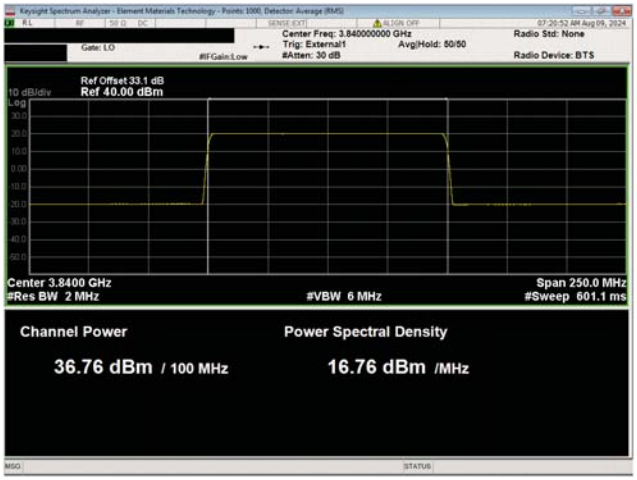
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



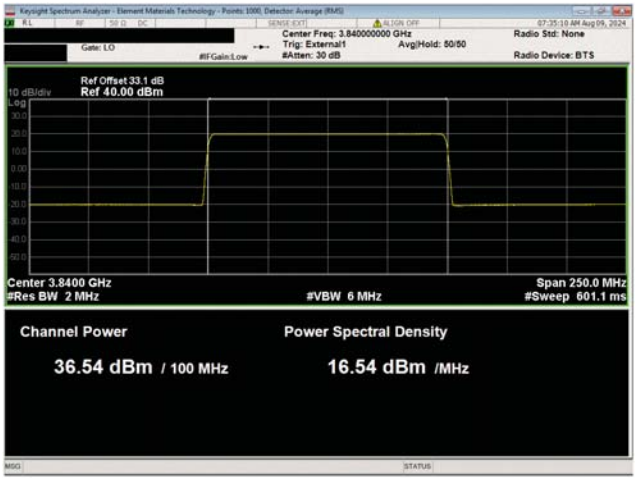
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 33



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 34



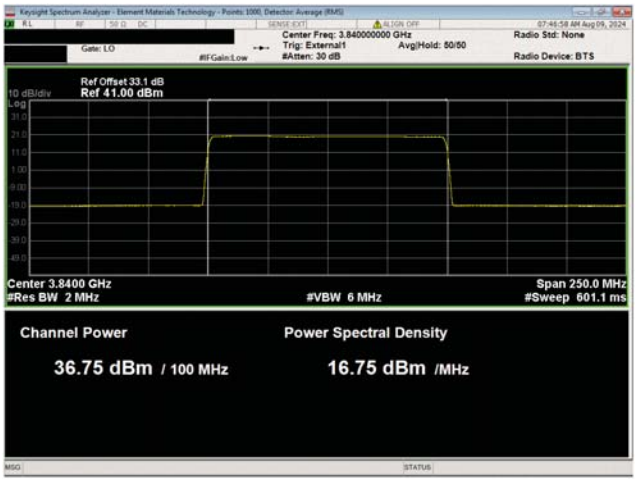
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 35



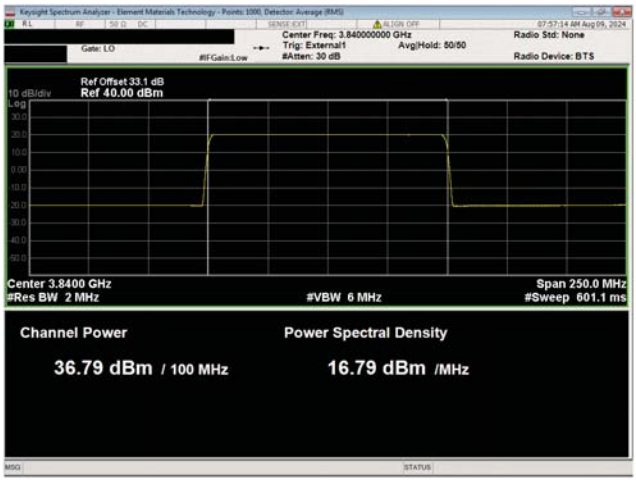
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 36

AVERAGE POWER – BAND 3.7G, ALL PORTS

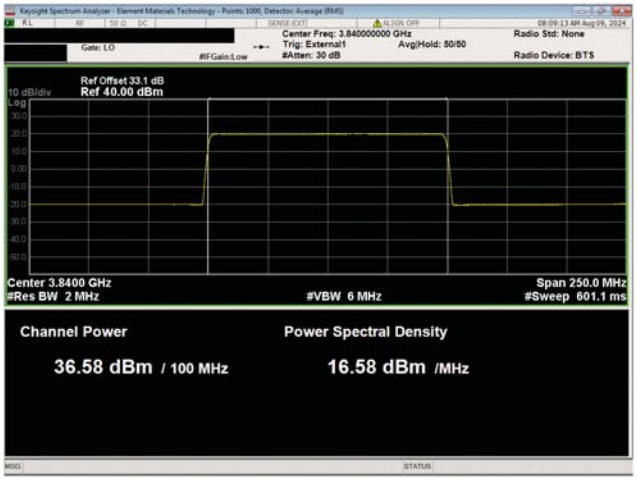
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



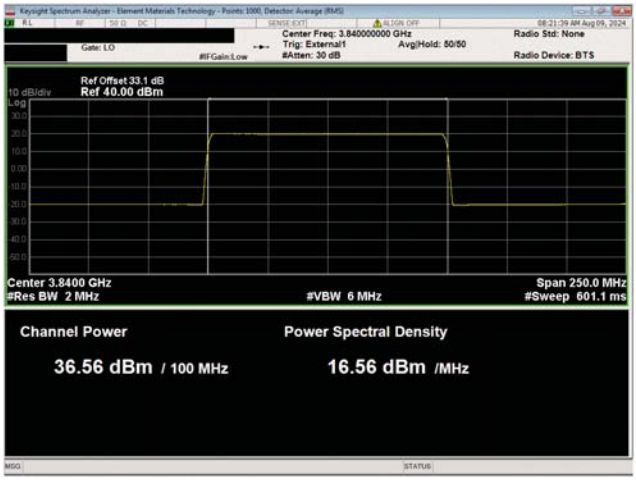
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 37



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 38



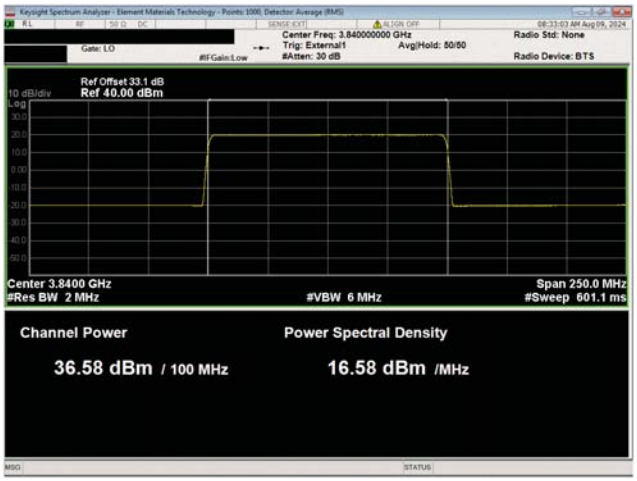
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 39



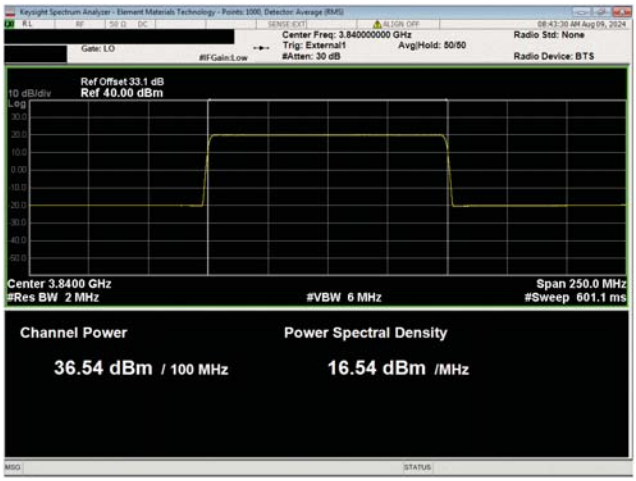
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 40

AVERAGE POWER – BAND 3.7G, ALL PORTS

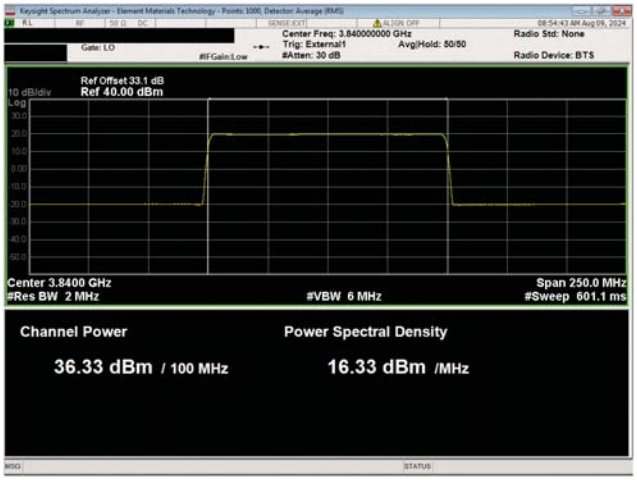
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



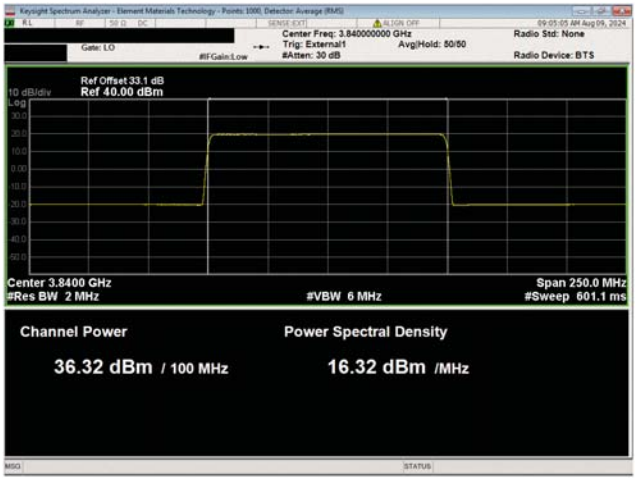
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 41



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 42



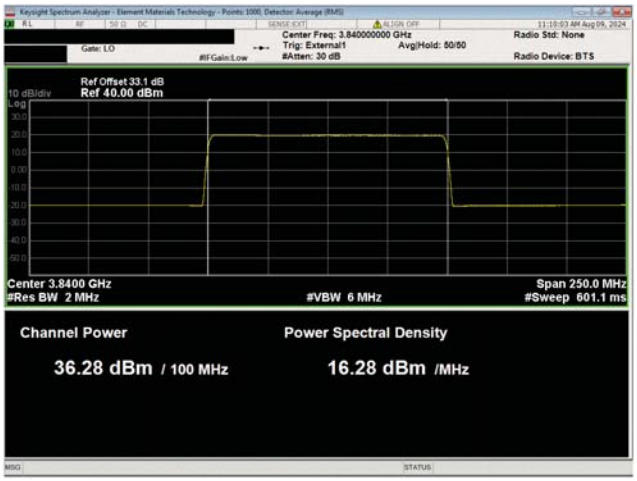
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 43



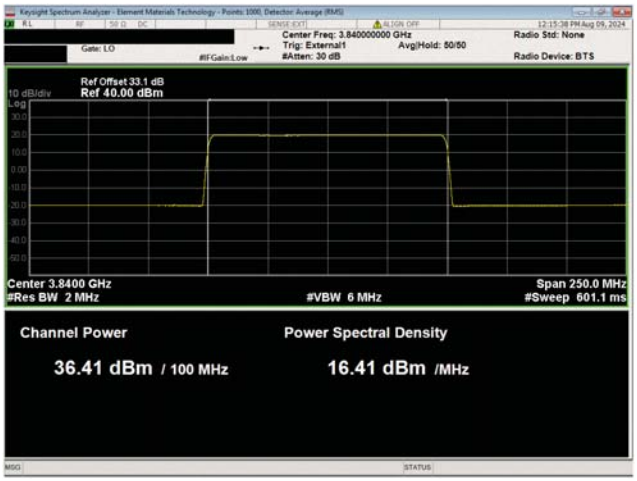
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 44

AVERAGE POWER – BAND 3.7G, ALL PORTS

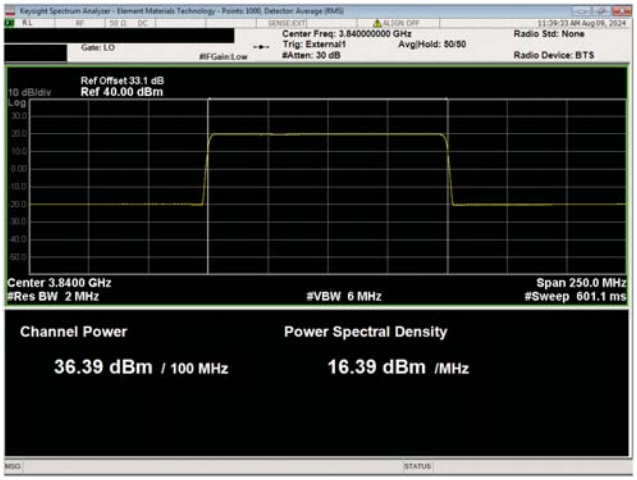
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



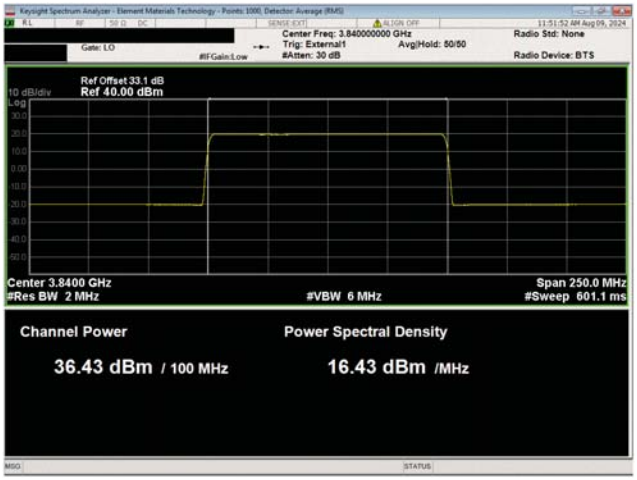
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 45



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 46



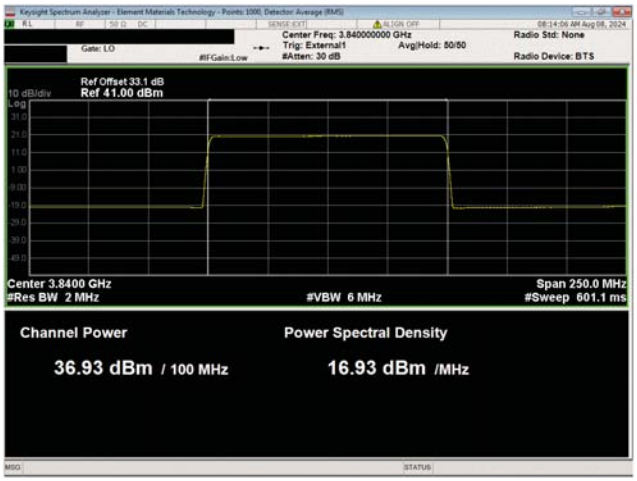
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 47



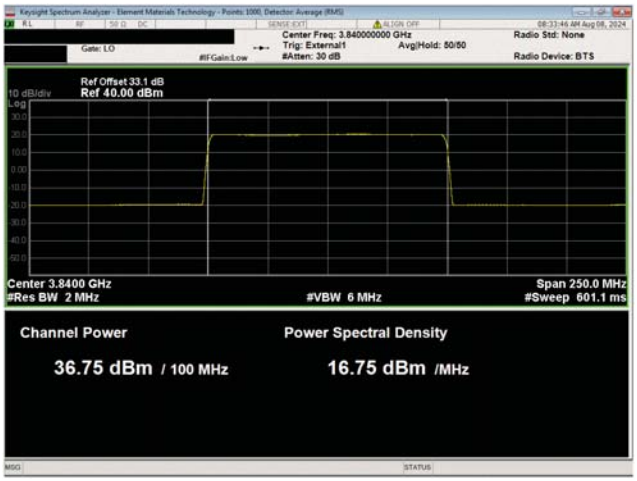
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 48

AVERAGE POWER – BAND 3.7G, ALL PORTS

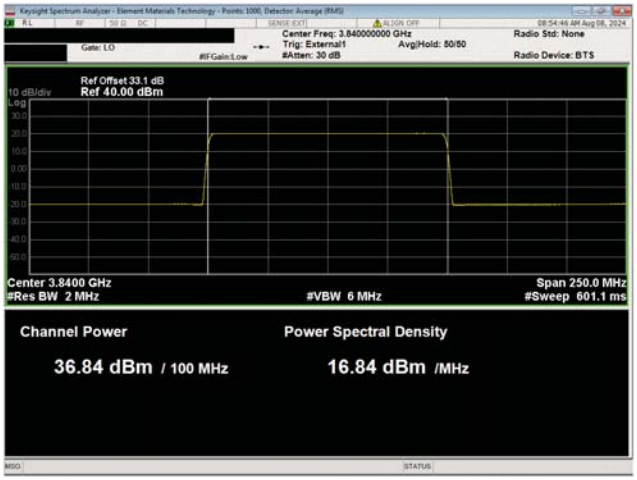
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



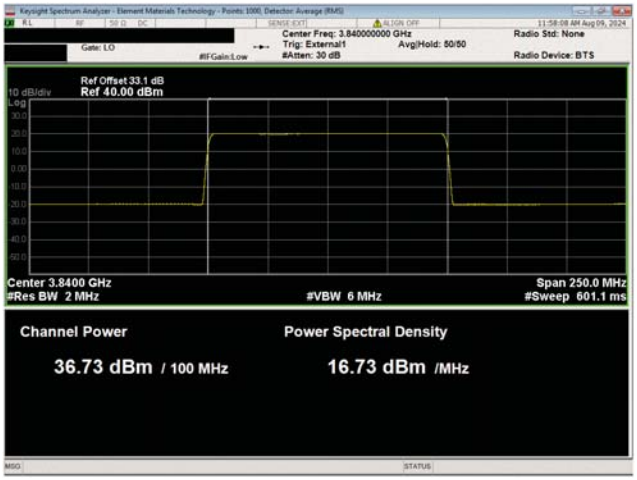
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 49



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 50



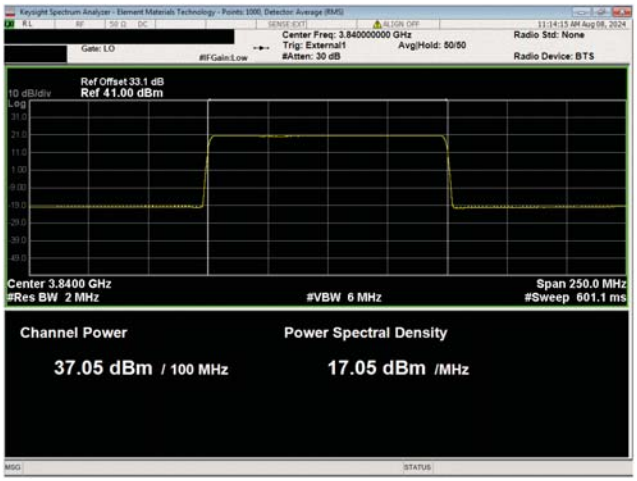
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 51



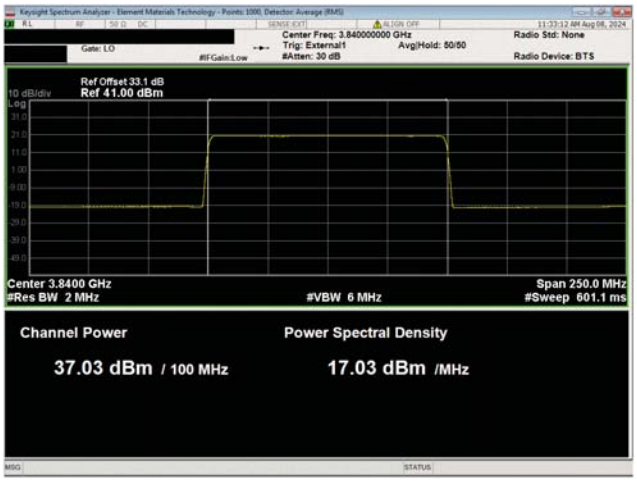
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 52

AVERAGE POWER – BAND 3.7G, ALL PORTS

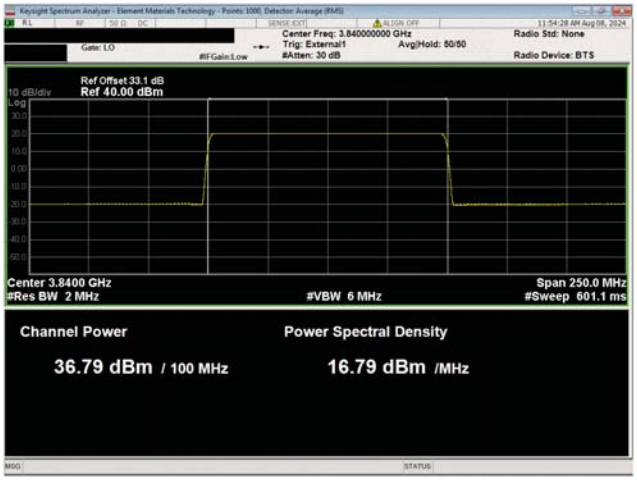
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



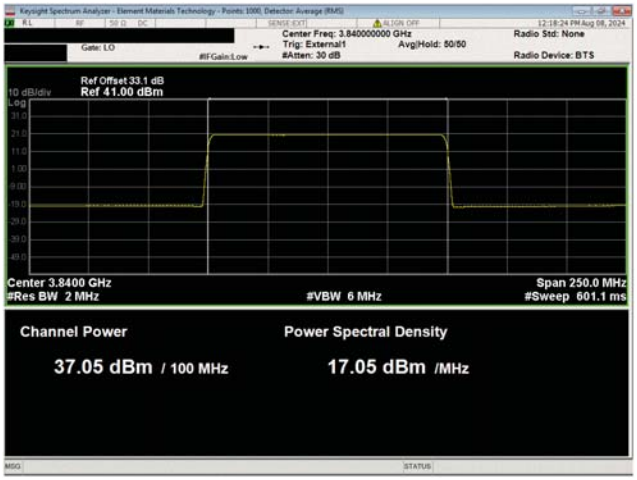
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 53



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 54



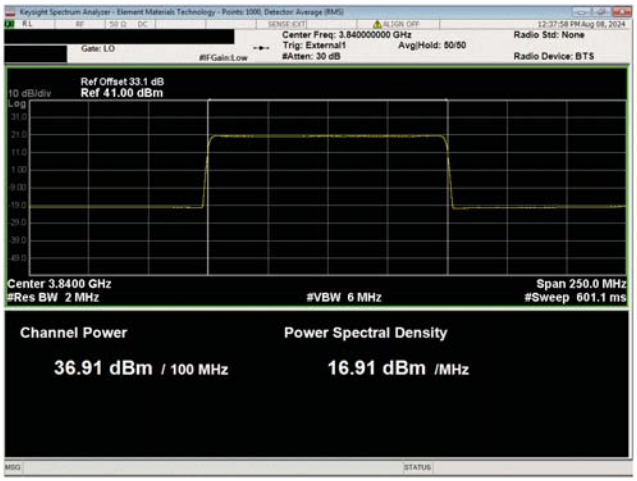
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 55



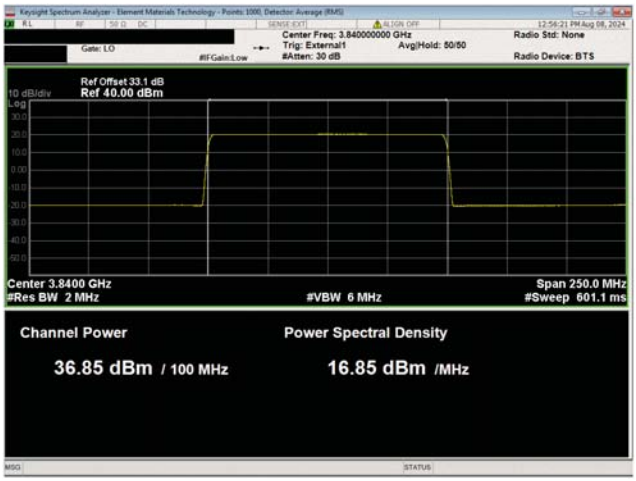
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 56

AVERAGE POWER – BAND 3.7G, ALL PORTS

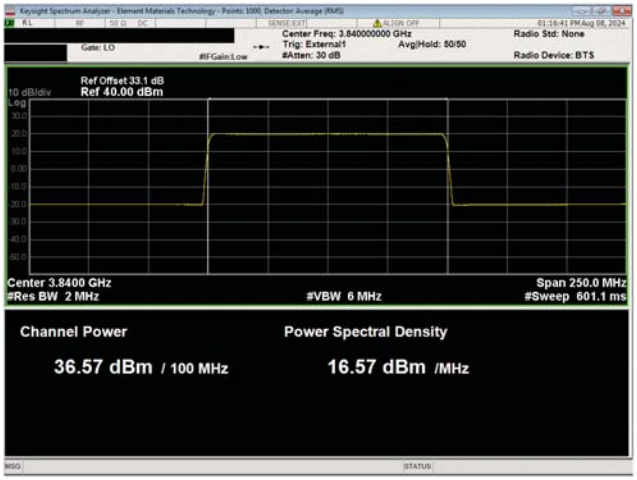
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



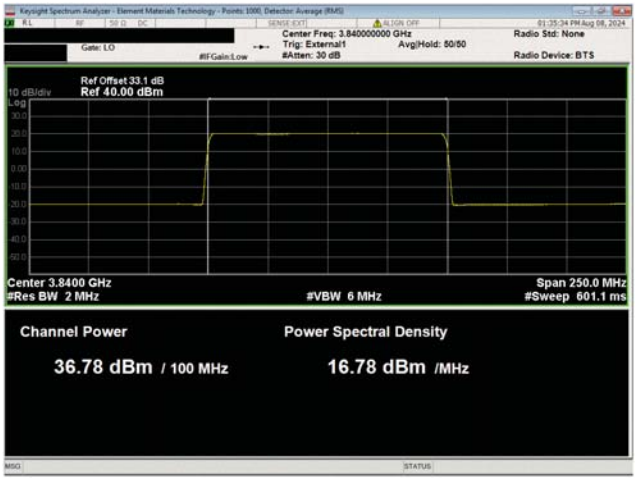
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 57



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 58



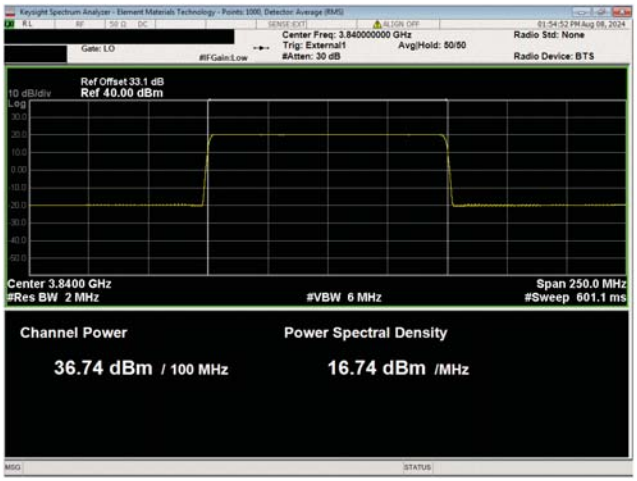
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 59



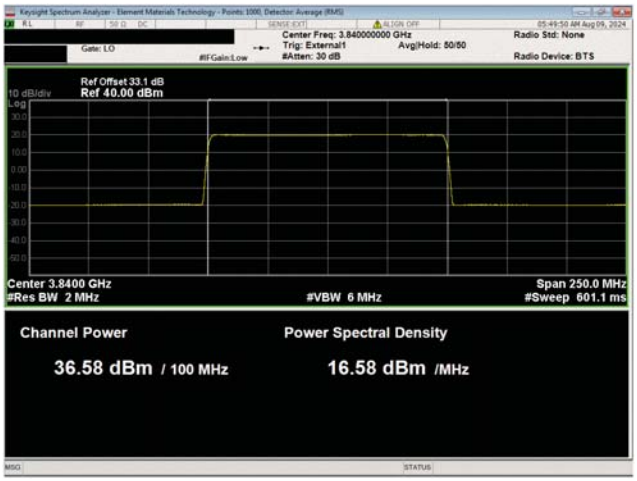
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 60

AVERAGE POWER – BAND 3.7G, ALL PORTS

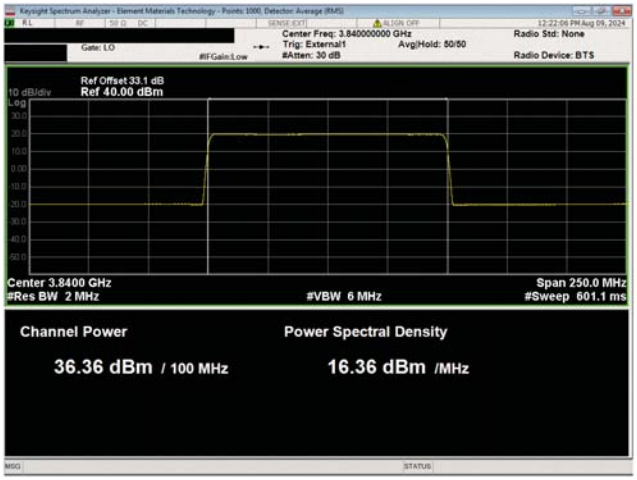
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



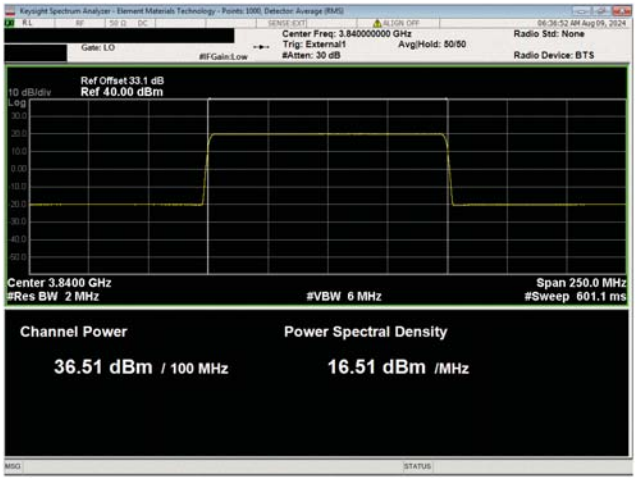
100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 61



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 62



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 63



100 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 3840.00 MHz
Port 64

AVERAGE POWER - BAND 3.45G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

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 AVQQA antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and 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/IC is detailed in section 5.2 of KDB 971168 D01v03r01 and ANSI C63.26-2015 section 5.2.4.4. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times.

The output power was measured for a single carrier over the carrier channel bandwidth. The power was measured for a single carrier over the channel bandwidth indicated in the table. The total power for multi-port (64x64 MIMO) operation was based upon 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)].

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2024-03-12	2025-03-12
Generator - Signal	Agilent	N5173B	TIW	2023-08-07	2026-08-07
Block - DC	Fairview Microwave	SD3239	ANE	2024-02-14	2025-02-14

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EUT:	AVQQA Remote Radio Head	Work Order:	NOKI0075
Serial Number:	L1242403137	Date:	2024-08-21
Customer:	Nokia Solutions and Networks	Temperature:	23.3°C
Attendees:	David Le, John Rattanavong	Relative Humidity:	52.6%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Jarrod Brenden	Job Site:	PT14
Power:	54VDC	Configuration:	NOKI0075-4

TEST SPECIFICATIONS

Specification:	Method:
FCC 27:2024	ANSI C63.26:2015

COMMENTS

All losses in the measurement path were accounted for in the reference level offset; attenuators, filters, cables, and DC blocks. Band n77 carriers were enabled at maximum power levels for the 3.45 GHz band in single carrier operating mode configuration. The power was measured for a single carrier over the channel bandwidth indicated in the table.

3.45G Band single Carrier operations: 3.45GHz Band Single Carrier at maximum power for each carrier bandwidth (10, 20, 30 & 40MHz) at Bottom, Middle and Top channels while 3.7GHz Band single NR20 Carrier operates at 100 watts on middle channel. All measured power values are within tolerance (i.e.: Rated Power ±2.0 dB).

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				
10 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 3455.01 MHz	27.316	0	27.3	45.4
Mid Channel, 3500.01 MHz	28.525	0	28.5	46.6
High Channel, 3544.995 MHz	27.201	0	27.2	45.3
Mid Channel, 3840.00 MHz	31.489	0	31.5	49.6
20 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 3460.02 MHz	30.496	0	30.5	48.6
Mid Channel, 3500.01 MHz	31.429	0	31.4	49.5
High Channel, 3540.00 MHz	30.386	0	30.4	48.5
Mid Channel, 3840.00 MHz	31.449	0	31.4	49.5

AVERAGE POWER - BAND 3.45G

element
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WTD.2024.01.16.0

	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Single Port dBm/carrier BW	Sixty-Four Port (64x64 MIMO) dBm/carrier BW
30 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 3465.00 MHz	32.442	0	32.4	50.5
Mid Channel, 3500.01 MHz	33.165	0	33.2	51.3
High Channel, 3534.99 MHz	32.179	0	32.2	50.3
Mid Channel, 3840.00 MHz	31.308	0	31.3	49.4
40 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 3470.01 MHz	33.789	0	33.8	51.9
Mid Channel, 3500.01 MHz	34.296	0	34.3	52.4
High Channel, 3529.98 MHz	33.483	0	33.5	51.6
Mid Channel, 3840.00 MHz	31.211	0	31.2	49.3
16QAM Modulation				
Mid Channel, 3500.01 MHz	34.295	0	34.3	52.4
64QAM Modulation				
Mid Channel, 3500.01 MHz	34.346	0	34.3	52.4
256QAM Modulation				
Mid Channel, 3500.01 MHz	34.351	0	34.4	52.5

AVERAGE POWER - BAND 3.45G

element
TbtTx 2024.05.24.1
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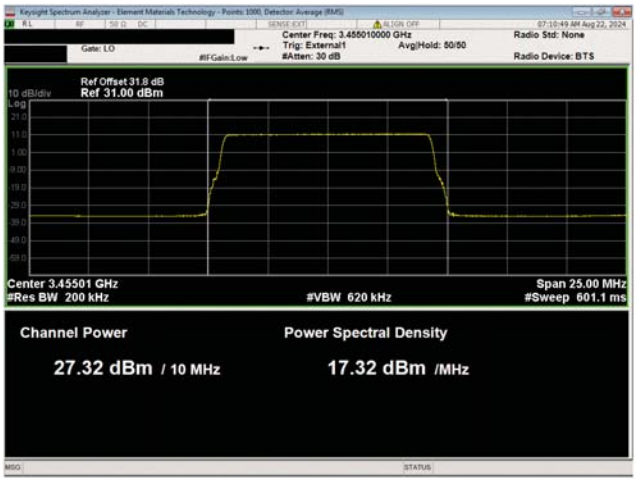
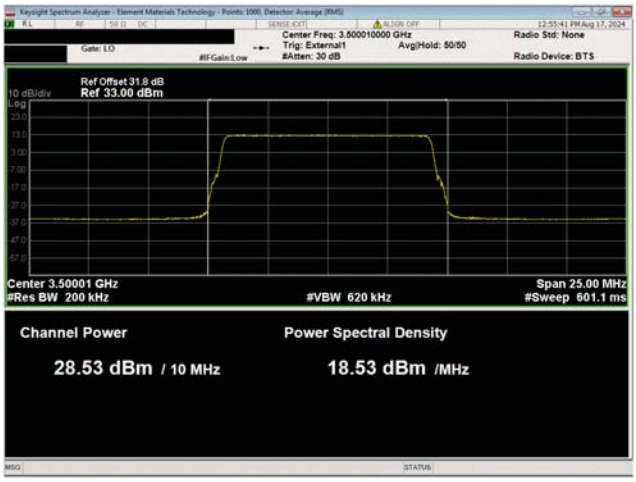
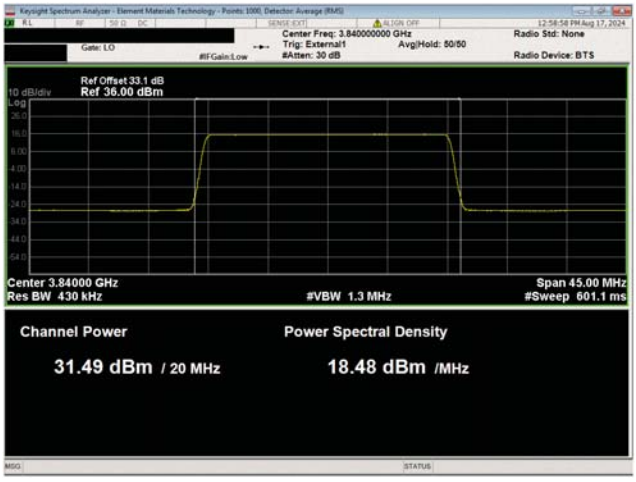


Port 1
10 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3455.01 MHz



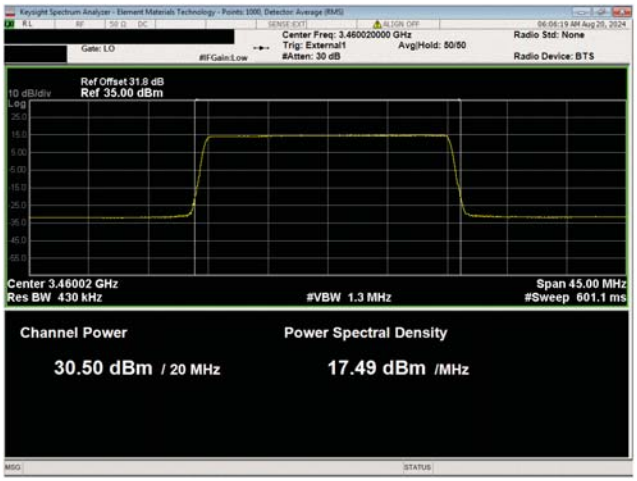
Port 1
10 MHz Channel Bandwidth
QPSK Modulation
Mid Channel, 3500.01 MHz

Port 1
10 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3544.995 MHz



Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Mid Channel, 3840.00 MHz

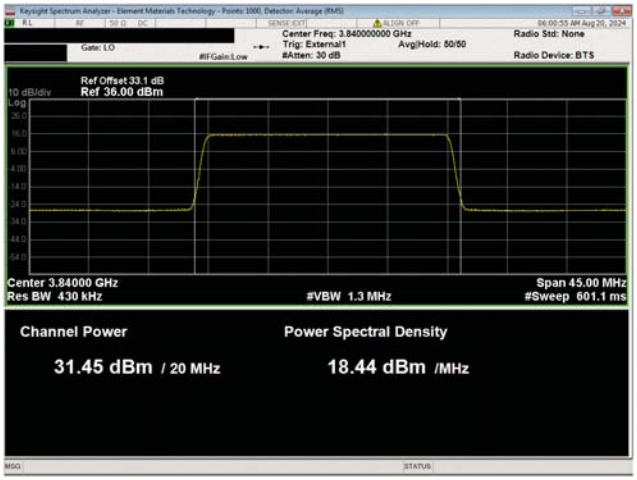
AVERAGE POWER - BAND 3.45G



Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3460.02 MHz

Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Mid Channel, 3500.01 MHz

Port 1
20 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3540.00 MHz



Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Mid Channel, 3840.00 MHz

AVERAGE POWER - BAND 3.45G

element
TbtTx 2024.05.24.1
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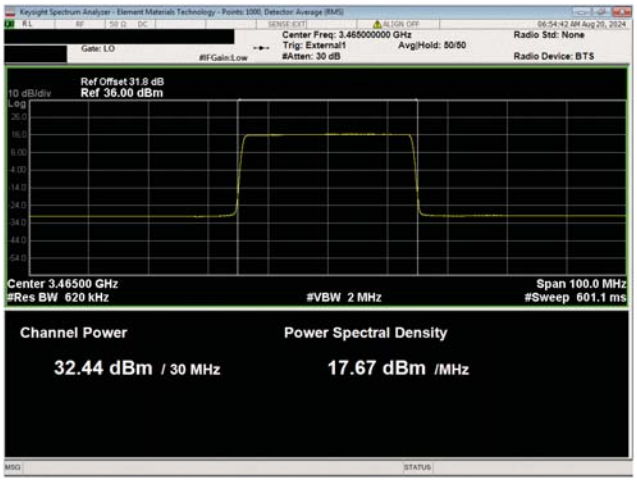
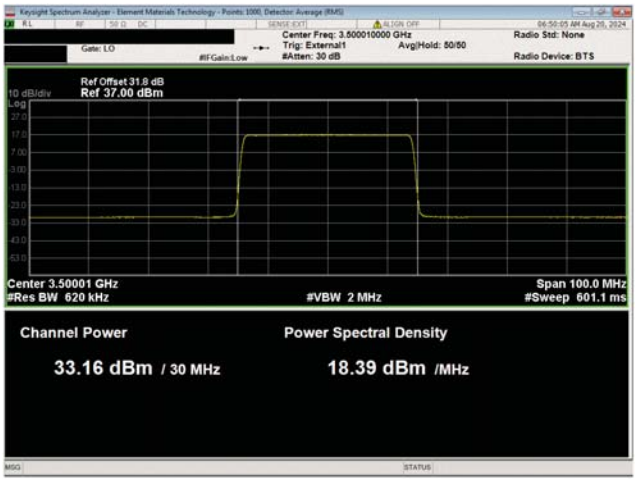
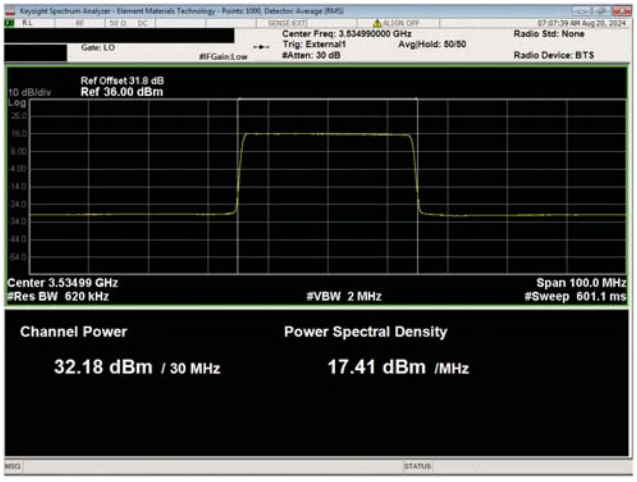


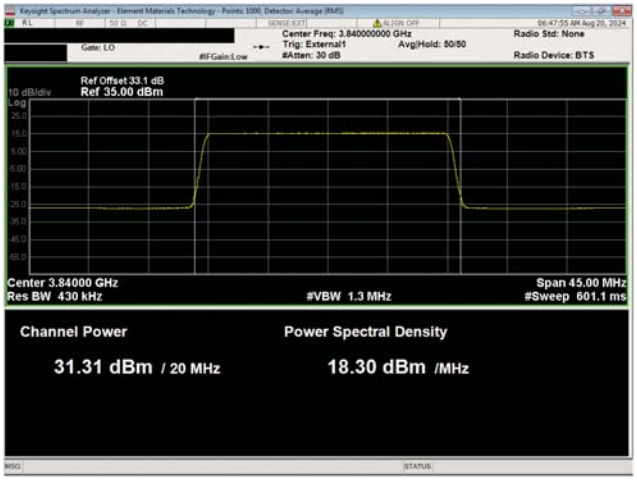
Port 1
30 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3465.00 MHz



Port 1
30 MHz Channel Bandwidth
QPSK Modulation
Mid Channel, 3500.01 MHz



Port 1
30 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3534.99 MHz



Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Mid Channel, 3840.00 MHz

AVERAGE POWER - BAND 3.45G

element
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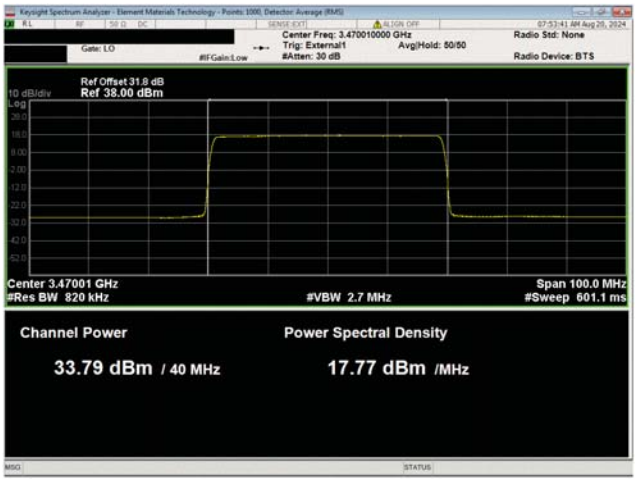
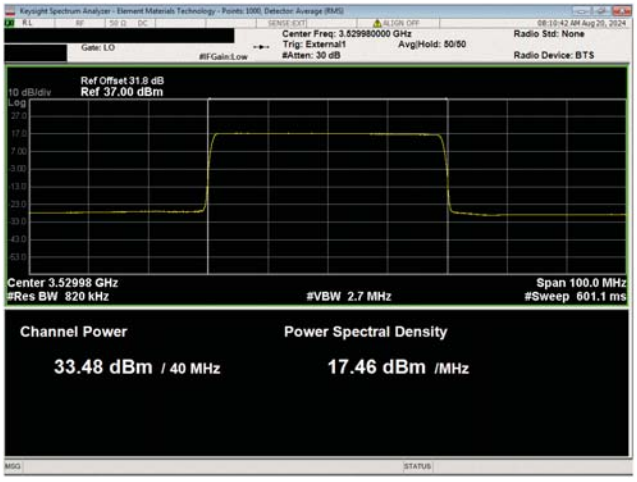
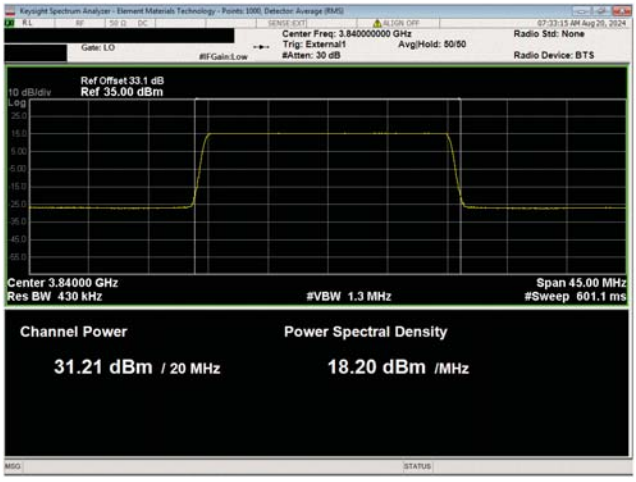


Port 1
40 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3470.01 MHz

Port 1
40 MHz Channel Bandwidth
QPSK Modulation
Mid Channel, 3500.01 MHz



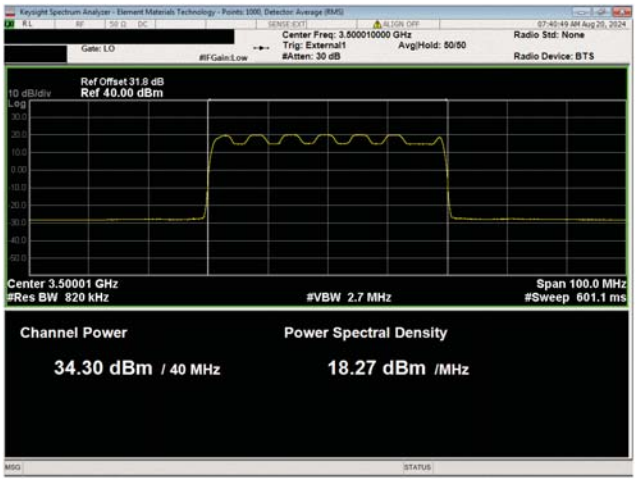
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3529.98 MHz



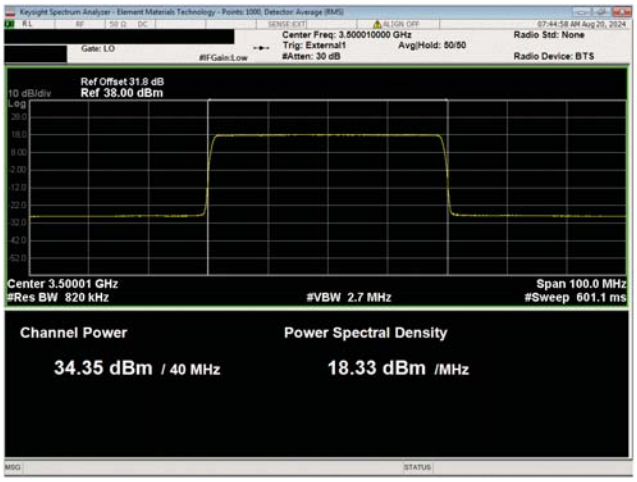
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Mid Channel, 3840.00 MHz

AVERAGE POWER - BAND 3.45G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



Port 1
40 MHz Channel Bandwidth
16QAM Modulation
Mid Channel, 3500.01 MHz



Port 1
40 MHz Channel Bandwidth
64QAM Modulation
Mid Channel, 3500.01 MHz

Port 1
40 MHz Channel Bandwidth
256QAM Modulation
Mid Channel, 3500.01 MHz