OCCUPIED BANDWIDTH - BAND 3.7G

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 Occupied Bandwidth 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 method in section 5.4 of ANSI C63.26 was used to make this measurement. The spectrum analyzer settings were as follows:

- RBW is 1% - 5% of the occupied bandwidth
- VBW is ≥ 3x the RBW
- Peak Detector was used
- Trace max hold was used

The 26dB emission bandwidth is measured in accordance with section 4 of FCC KDB 971168 D01v03r01 and ANSI C63.26 section 5.4. FCC 2.1049 requires an emission bandwidth measurement. FCC 27.53(l)(1) defines the emission bandwidth to be used as 26 dB down.

FCC 5G Emission Designators for 3.7G Band (3700MHz to 3980MHz)

Channel Bandwidth	Radio Channel	5G-NR: QPSK	5G-NR: 16QAM	5G-NR: 64QAM	5G-NR: 256QAM
20MHz	Low	19M8G7W			
	Mid	19M9G7W	19M8G7W	19M8G7W	19M8G7W
	High	19M8G7W			
40MHz	Low	40M3G7W			
	Mid	40M4G7W	40M1G7W	40M3G7W	40M2G7W
	High	40M3G7W			
60MHz	Low	60M8G7W			
	Mid	60M8G7W	60M8G7W	60M9G7W	61M0G7W
	High	60M8G7W			
80MHz	Low	81M5G7W			
	Mid	81M7G7W	81M1G7W	81M6G7W	81M5G7W
	High	81M5G7W			
100MHz	Low	102MG7W			
	Mid	102MG7W	102MG7W	102MG7W	103MG7W
	High	102MG7W			

Note: FCC emission designators are based on 26dB emission bandwidth measurement data.

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

OCCUPIED BANDWIDTH - BAND 3.7G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

EUT:	AVQQA Remote Radio Head	Work Order:	NOKI0075
Serial Number:	L1242403137	Date:	2024-08-15
Customer:	Nokia Solutions and Networks	Temperature:	23.3°C
Attendees:	David Le, John Rattanavong	Relative Humidity:	52.1%
Customer Project:	None	Bar. Pressure (PMSL):	1016 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

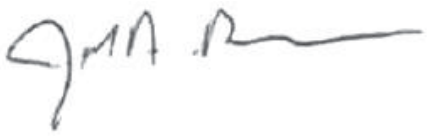
All losses in the measurement path were accounted for in the reference level offset; attenuators, filters, cables, and DC blocks. Band n77 carriers were enabled at maximum power levels for the 3.7 GHz band in the single carrier operating mode configuration.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



Tested By

TEST RESULTS

	Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
Port 1				
20 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 3710.01 MHz	18.317 MHz	19.833 MHz	Within Band	Pass
Mid Channel, 3840.00 MHz	18.323 MHz	19.868 MHz	Within Band	Pass
High Channel, 3969.99 MHz	18.327 MHz	19.821 MHz	Within Band	Pass
16QAM Modulation				
Mid Channel, 3840.00 MHz	18.375 MHz	19.82 MHz	Within Band	Pass
64QAM Modulation				
Mid Channel, 3840.00 MHz	18.321 MHz	19.788 MHz	Within Band	Pass
256QAM Modulation				
Mid Channel, 3840.00 MHz	18.344 MHz	19.794 MHz	Within Band	Pass
40 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 3720.00 MHz	37.892 MHz	40.315 MHz	Within Band	Pass
Mid Channel, 3840.00 MHz	37.89 MHz	40.355 MHz	Within Band	Pass
High Channel, 3960.00 MHz	37.913 MHz	40.295 MHz	Within Band	Pass
16QAM Modulation				
Mid Channel, 3840.00 MHz	38.003 MHz	40.147 MHz	Within Band	Pass

OCCUPIED BANDWIDTH - BAND 3.7G

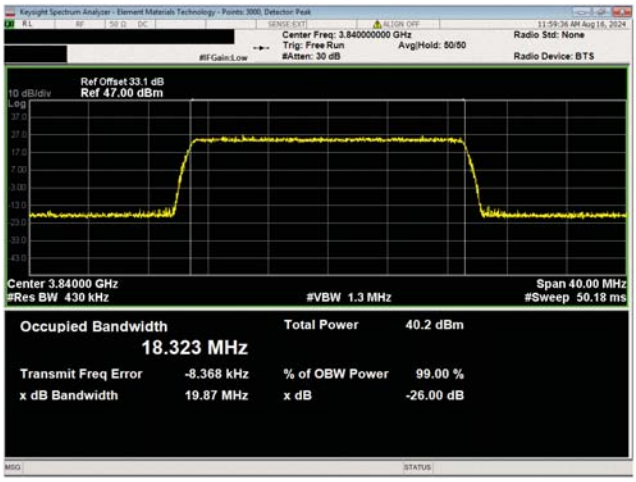
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

	Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
64QAM Modulation				
Mid Channel, 3840.00 MHz	37.964 MHz	40.306 MHz	Within Band	Pass
256QAM Modulation				
Mid Channel, 3840.00 MHz	37.911 MHz	40.23 MHz	Within Band	Pass
60 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 3730.02 MHz	57.859 MHz	60.827 MHz	Within Band	Pass
Mid Channel, 3840.00 MHz	57.927 MHz	60.815 MHz	Within Band	Pass
High Channel, 3949.98 MHz	57.86 MHz	60.834 MHz	Within Band	Pass
16QAM Modulation				
Mid Channel, 3840.00 MHz	58.02 MHz	60.811 MHz	Within Band	Pass
64QAM Modulation				
Mid Channel, 3840.00 MHz	57.919 MHz	60.912 MHz	Within Band	Pass
256QAM Modulation				
Mid Channel, 3840.00 MHz	57.9 MHz	61.025 MHz	Within Band	Pass
80 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 3740.01 MHz	77.476 MHz	81.484 MHz	Within Band	Pass
Mid Channel, 3840.00 MHz	77.525 MHz	81.693 MHz	Within Band	Pass
High Channel, 3939.99 MHz	77.463 MHz	81.484 MHz	Within Band	Pass
16QAM Modulation				
Mid Channel, 3840.00 MHz	77.79 MHz	81.084 MHz	Within Band	Pass
64QAM Modulation				
Mid Channel, 3840.00 MHz	77.65 MHz	81.584 MHz	Within Band	Pass
256QAM Modulation				
Mid Channel, 3840.00 MHz	77.575 MHz	81.511 MHz	Within Band	Pass
100 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 3750.00 MHz	97.48 MHz	102.41 MHz	Within Band	Pass
Mid Channel, 3840.00 MHz	97.561 MHz	102.451 MHz	Within Band	Pass
High Channel, 3930.00 MHz	97.437 MHz	102.45 MHz	Within Band	Pass
16QAM Modulation				
Mid Channel, 3840.00 MHz	97.545 MHz	102.334 MHz	Within Band	Pass
64QAM Modulation				
Mid Channel, 3840.00 MHz	97.672 MHz	102.464 MHz	Within Band	Pass
256QAM Modulation				
Mid Channel, 3840.00 MHz	97.635 MHz	102.598 MHz	Within Band	Pass

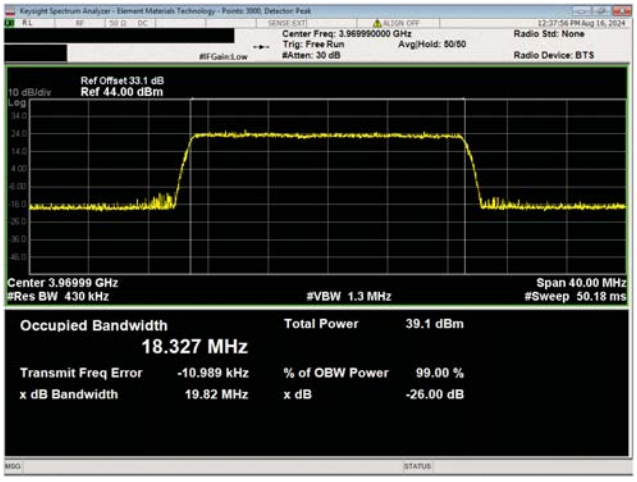
OCCUPIED BANDWIDTH - BAND 3.7G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

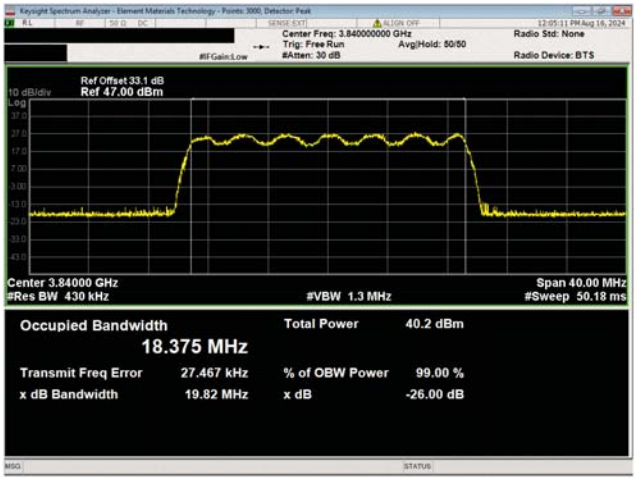
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3710.01 MHz



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



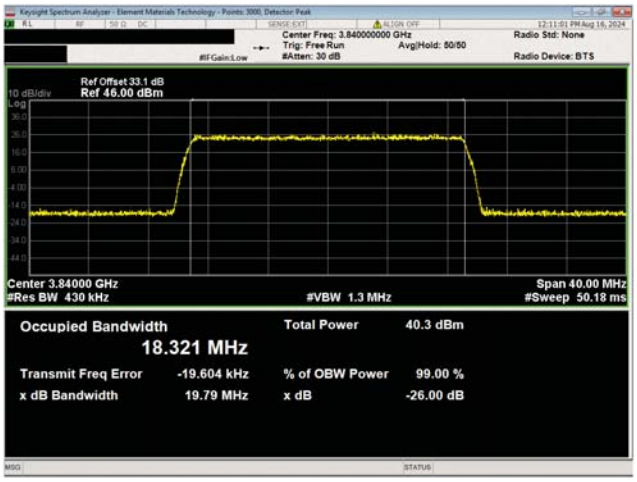
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3969.99 MHz



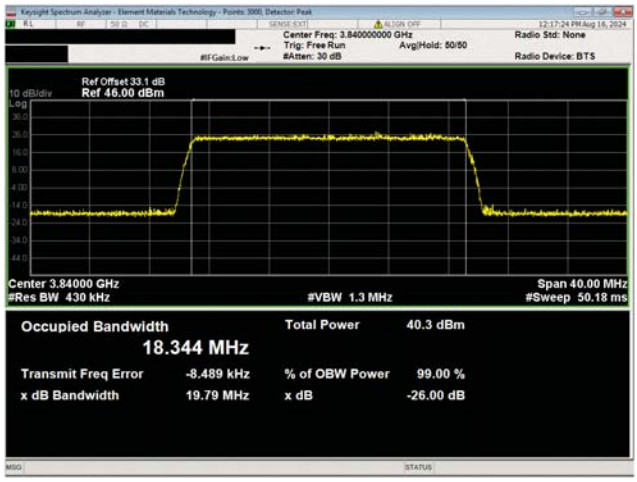
Port 1
20 MHz Channel Bandwidth
16QAM Modulation
Mid Channel, 3840.00 MHz

OCCUPIED BANDWIDTH - BAND 3.7G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



Port 1
20 MHz Channel Bandwidth
64QAM Modulation
Mid Channel, 3840.00 MHz



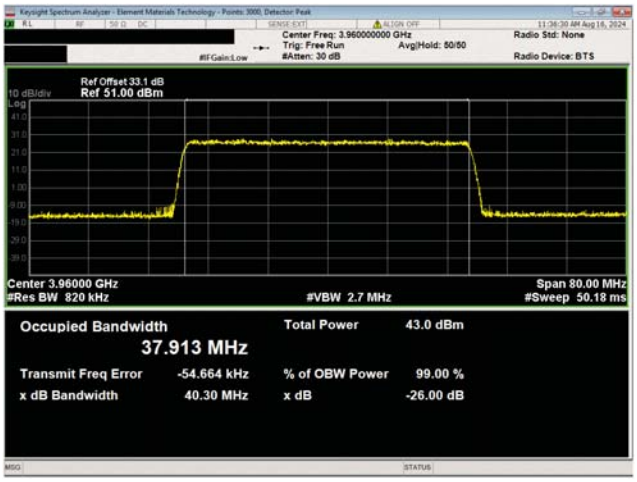
Port 1
20 MHz Channel Bandwidth
256QAM Modulation
Mid Channel, 3840.00 MHz

Port 1
40 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3720.00 MHz

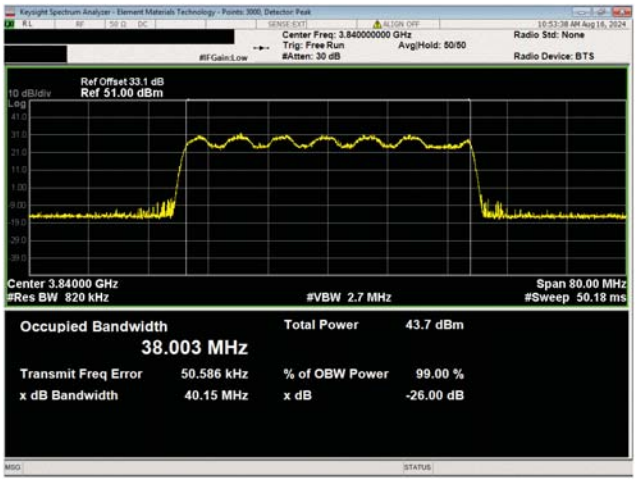
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
Mid Channel, 3840.00 MHz

OCCUPIED BANDWIDTH - BAND 3.7G

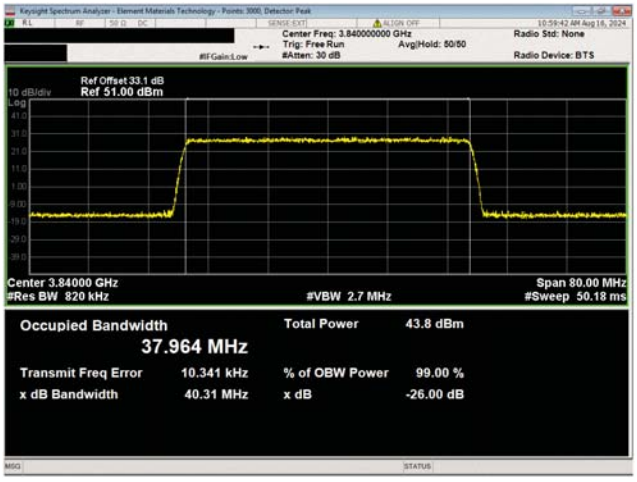
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



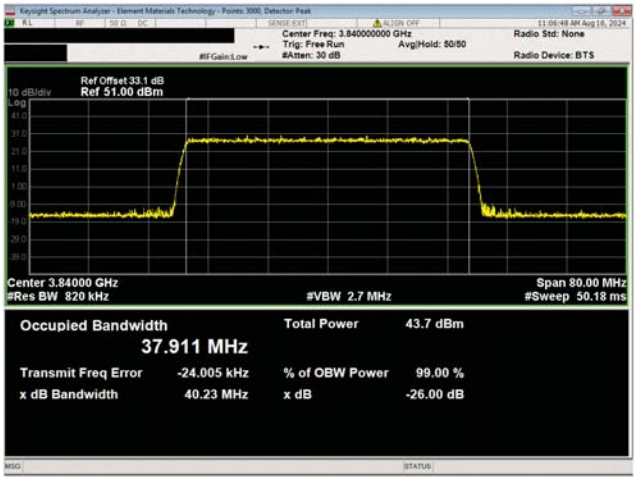
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3960.00 MHz



Port 1
40 MHz Channel Bandwidth
16QAM Modulation
Mid Channel, 3840.00 MHz



Port 1
40 MHz Channel Bandwidth
64QAM Modulation
Mid Channel, 3840.00 MHz

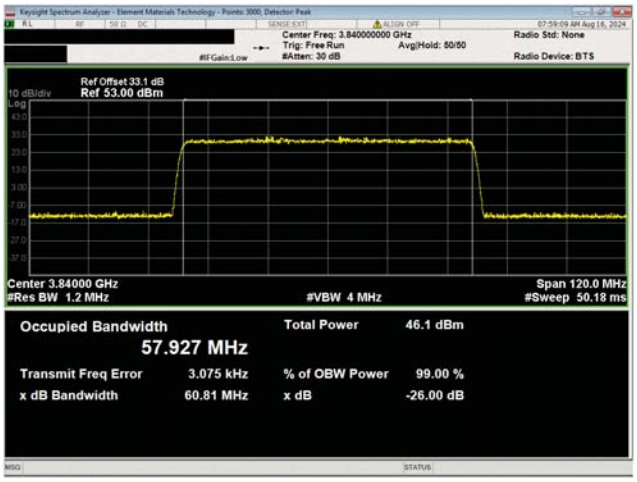


Port 1
40 MHz Channel Bandwidth
256QAM Modulation
Mid Channel, 3840.00 MHz

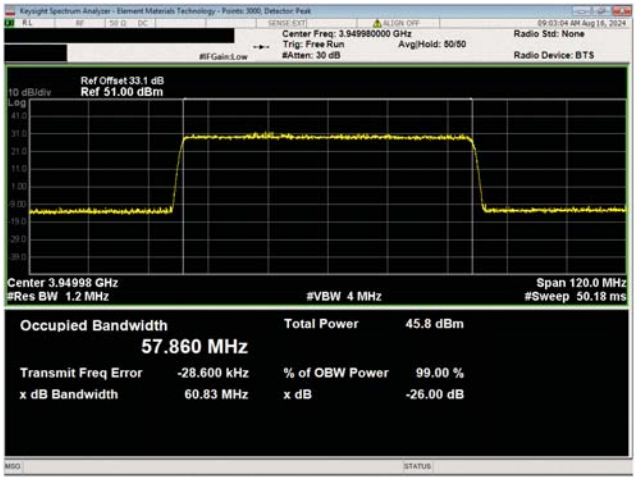
OCCUPIED BANDWIDTH - BAND 3.7G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

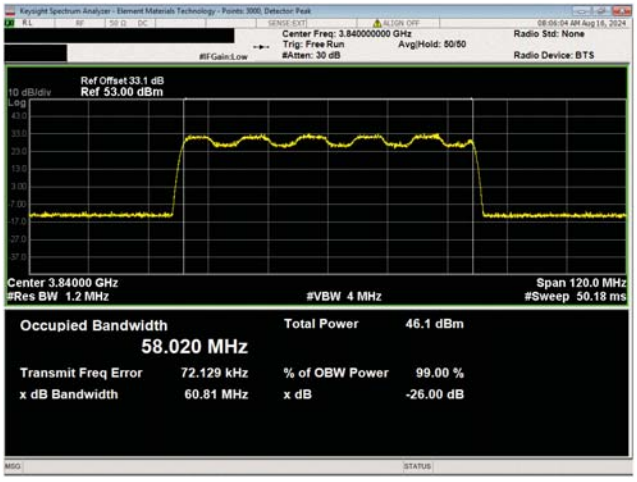
Port 1
60 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3730.02 MHz



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



Port 1
60 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3949.98 MHz



Port 1
60 MHz Channel Bandwidth
16QAM Modulation
Mid Channel, 3840.00 MHz

OCCUPIED BANDWIDTH - BAND 3.7G

element
TbtTx 2024.05.24.1
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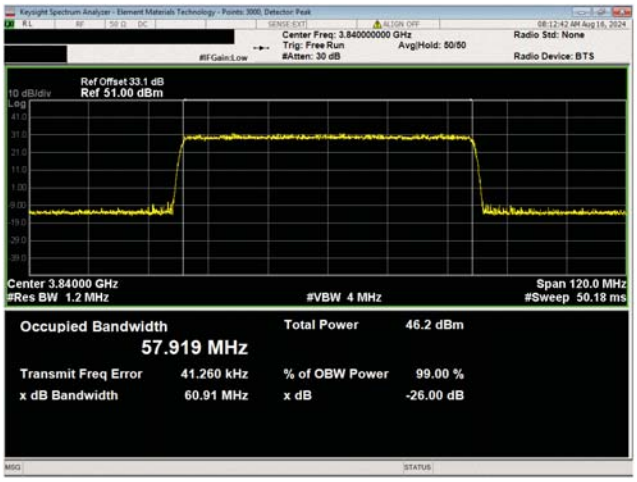
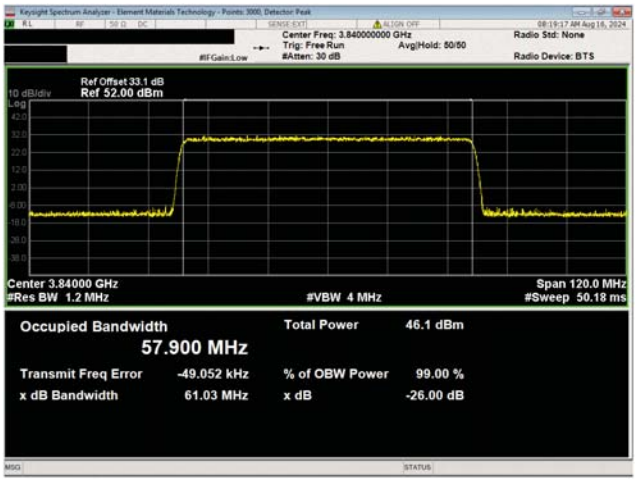
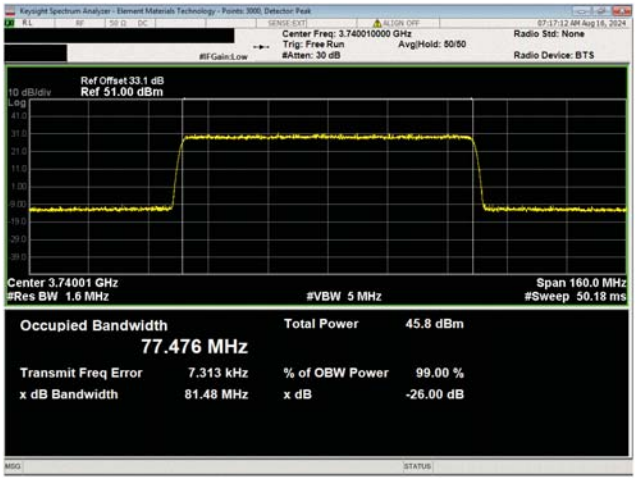


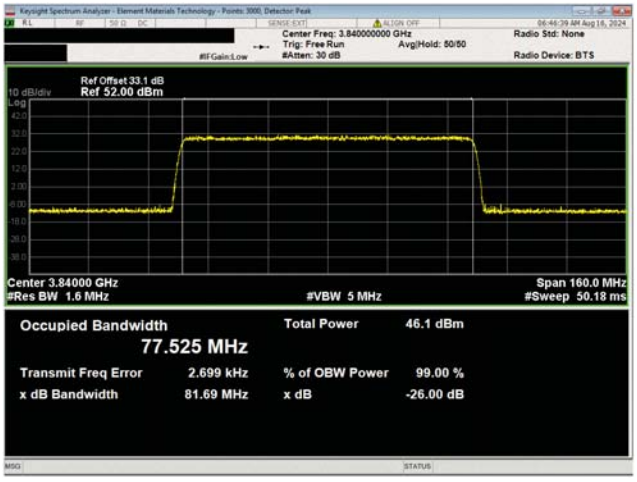
Port 1
60 MHz Channel Bandwidth
64QAM Modulation
Mid Channel, 3840.00 MHz



Port 1
60 MHz Channel Bandwidth
256QAM Modulation
Mid Channel, 3840.00 MHz



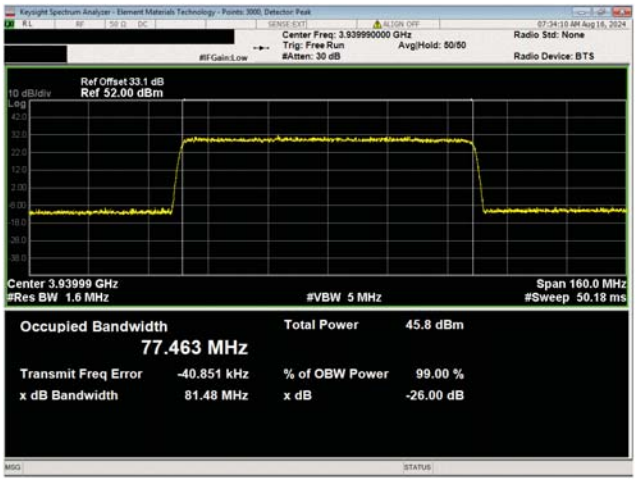
Port 1
80 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3740.01 MHz



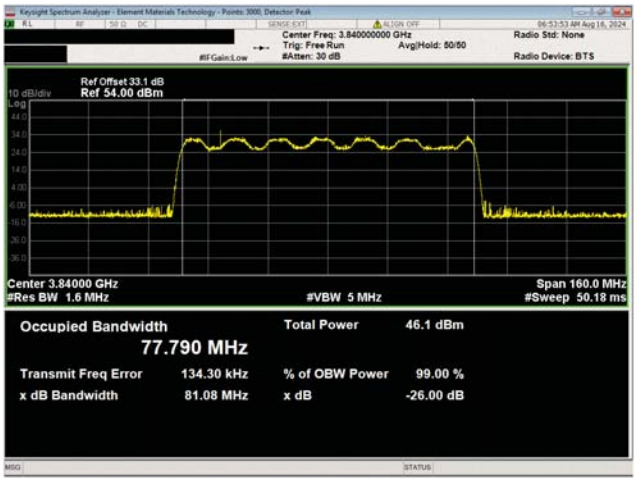
Port 1
80 MHz Channel Bandwidth
QPSK Modulation
Mid Channel, 3840.00 MHz

OCCUPIED BANDWIDTH - BAND 3.7G

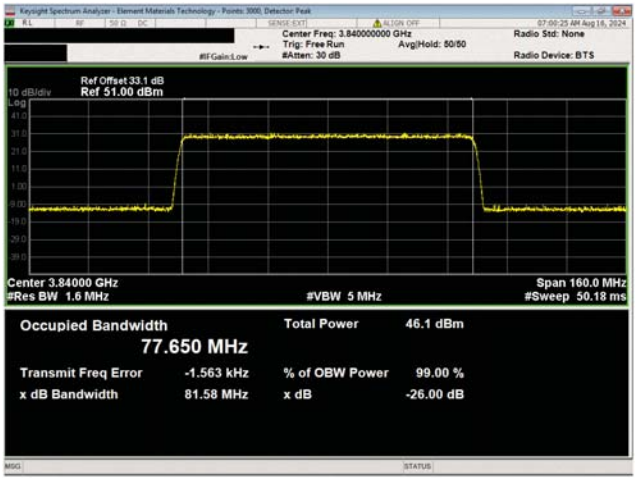
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



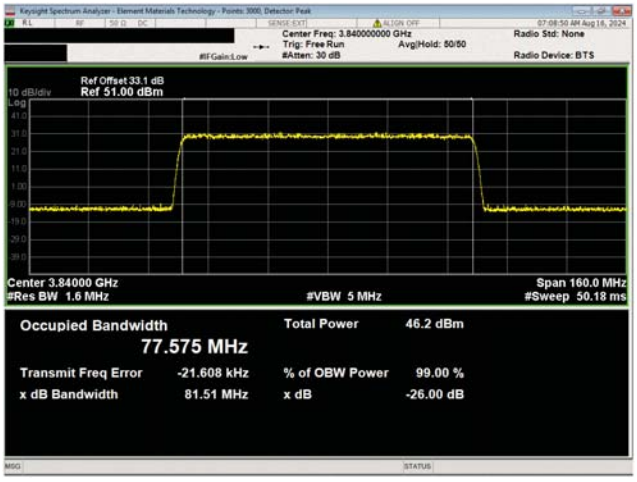
Port 1
80 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3939.99 MHz



Port 1
80 MHz Channel Bandwidth
16QAM Modulation
Mid Channel, 3840.00 MHz



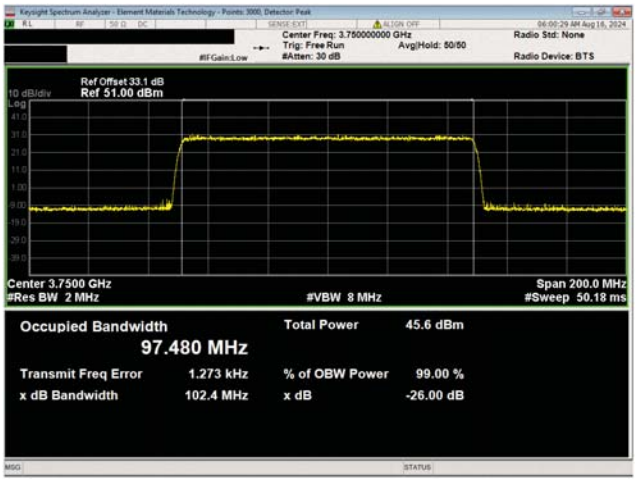
Port 1
80 MHz Channel Bandwidth
64QAM Modulation
Mid Channel, 3840.00 MHz



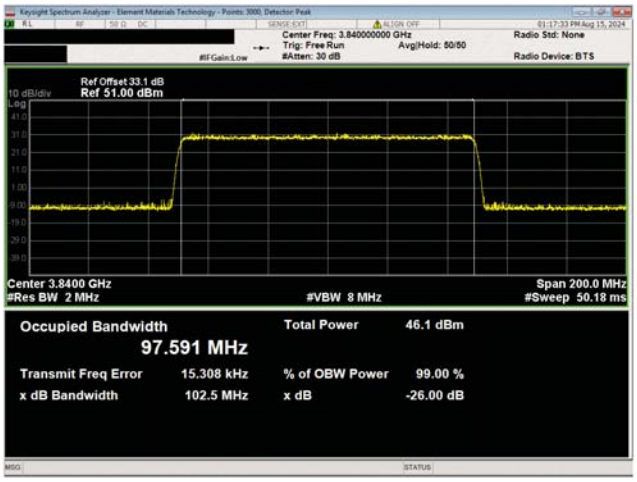
Port 1
80 MHz Channel Bandwidth
256QAM Modulation
Mid Channel, 3840.00 MHz

OCCUPIED BANDWIDTH - BAND 3.7G

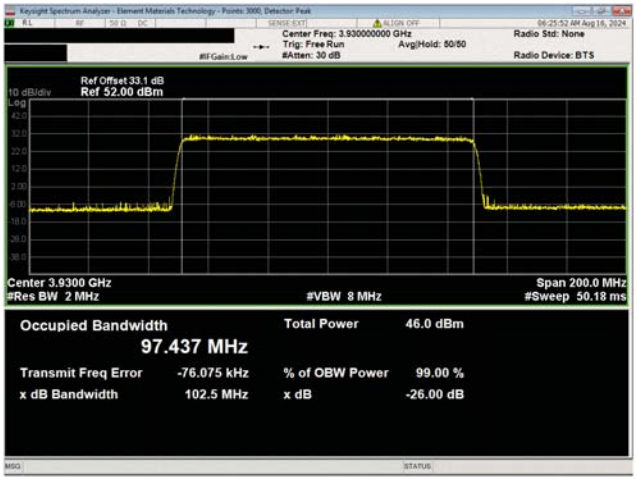
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



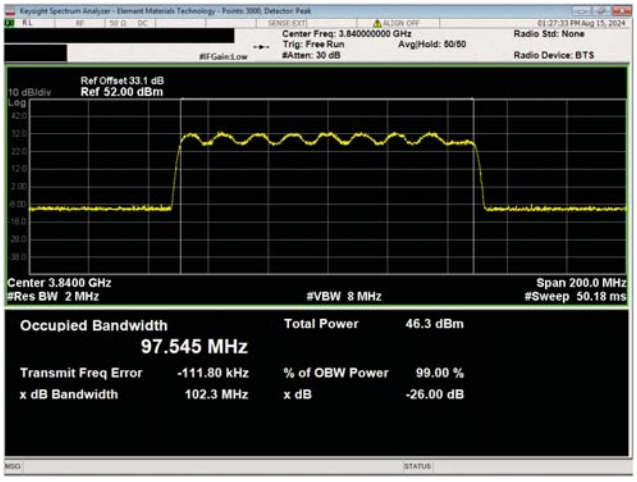
Port 1
100 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3750.00 MHz



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



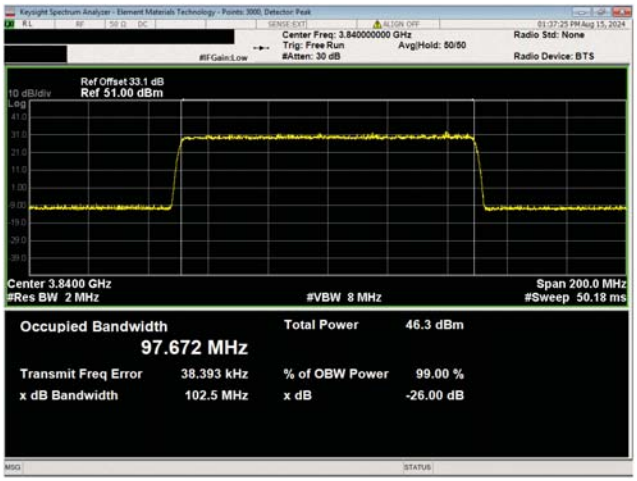
Port 1
100 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3930.00 MHz



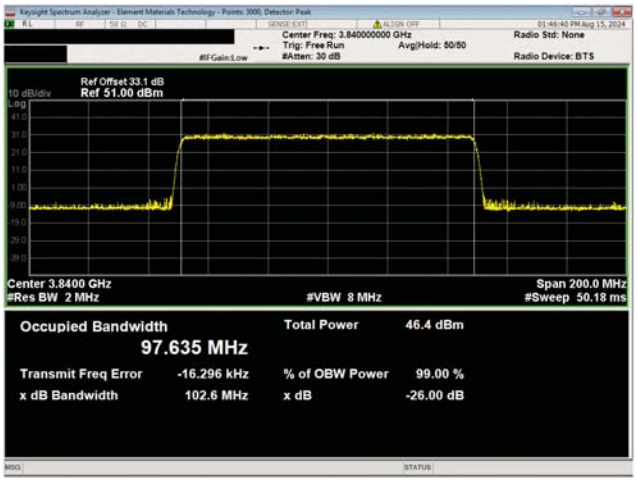
Port 1
100 MHz Channel Bandwidth
16QAM Modulation
Mid Channel, 3840.00 MHz

OCCUPIED BANDWIDTH - BAND 3.7G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



Port 1
100 MHz Channel Bandwidth
64QAM Modulation
Mid Channel, 3840.00 MHz



Port 1
100 MHz Channel Bandwidth
256QAM Modulation
Mid Channel, 3840.00 MHz

BAND EDGE COMPLIANCE - 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 spurious RF conducted emissions at the edges of the authorized bands were measured on the low and high transmit frequencies of the available band. The channels closest to the band edges were selected. The EUT was transmitting at the power and data rate(s) listed in the datasheet.

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 paragraph 5.7.2i.

The spectrum was scanned below the lower band edge and above the higher band edge.

Per section 27.53(n)(1), For base station operations in the 3450-3550 MHz band, the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm/MHz. This limit is adjusted to -31.1 dBm [-13 dBm -10 log(64)] per FCC KDB 662911D01 v02r01 and ANSI C63.26-2015 section 6.4 because the BTS may operate as a 64 port MIMO transmitter. Compliance with the provisions of this paragraph (n)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz.

Per section 27.53(n)(1),Notwithstanding the channel edge requirement of −13 dBm per megahertz, for base station operations in the 3450-3550 MHz band, the conducted power of any emission below 3440 MHz or above 3560 MHz shall not exceed −25 dBm/MHz. This limit is adjusted to -43.1 dBm [-25 dBm -10 log (64)] for the 3430 to 3440MHz & 3560 to 3570MHz ranges per FCC KDB 662911D01 v02r01 and ANSI C63.26-2015 section 6.4 because the BTS may operate as a 64-port MIMO transmitter.

Per section FCC 27.53(n) and FCC 27.53 (I)(1), power of any emission outside of the authorized operating frequency range cannot exceed, of the two rule parts, the more restrictive limits. Per section 27.53(n), the power of any emission outside band edge region (frequency ranges below 3430MHz and above 3570MHz) cannot exceed -40 dBm/MHz. The limit is adjusted to 58.1 dBm [-40 dBm -10 log (64)] per FCC KDB 662911D01 v02r01 and ANSI C63.26-2015 section 6.4 because the BTS may operate as a 64 port MIMO transmitter. The resolution bandwidth to be used for these measurements must be 1MHz per FCC 27.53(n)(1).

The band edge testing was performed using only one modulation type because the Occupied Bandwidth variation between modulation types is small, the average output power variation between modulation types is small and there is significant/good passing margin. The QPSK modulation type was used. (See ANSI C63.26. clause 5.7.2e).

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

BAND EDGE COMPLIANCE - BAND 3.45G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

EUT:	AVQQA Remote Radio Head	Work Order:	NOKI0075
Serial Number:	L1242403137	Date:	2024-08-19
Customer:	Nokia Solutions and Networks	Temperature:	23.3°C
Attendees:	David Le, John Rattanavong	Relative Humidity:	52.4%
Customer Project:	None	Bar. Pressure (PMSL):	1016 mbar
Tested By:	Jarrod Brenden	Job Site:	PT14
Power:	54VDC	Configuration:	NOKI0075-3 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.

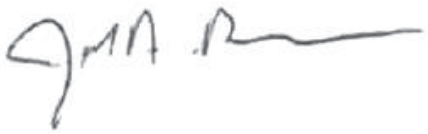
3.45G Band single Carrier operations: 3.45GHz Band Single Carrier at maximum power for each carrier bandwidth (10, 20, 30 & 40MHz) at Bottom, and Top channels while 3.7GHz Band single NR20 Carrier operates at 100 watts on middle channel.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



Tested By

TEST RESULTS

	Frequency Range	Frequency (MHz)	Value (dBm)	Limit (dBm)	Result
Port 1					
10 MHz Channel Bandwidth					
QPSK Modulation					
Low Channel, 3455.01 MHz	3449 MHz - 3451 MHz	3450	-41.037	-31.1	Pass
	3448 MHz - 3449 MHz	N/A	-34.56	-31.1	Pass
	3440 MHz - 3448 MHz	3447.968	-36.277	-31.1	Pass
	3430 MHz - 3440 MHz	3438.87	-52.138	-43.1	Pass
	3100 MHz - 3430 MHz	3220.12	-69.008	-58.1	Pass
High Channel, 3544.995 MHz	3549 MHz - 3551 MHz	3550	-37.707	-31.1	Pass
	3551 MHz - 3552 MHz	N/A	-36.25	-31.1	Pass
	3552 MHz - 3560 MHz	3552.088	-36.416	-31.1	Pass
	3560 MHz - 3570 MHz	3560.1	-51.304	-43.1	Pass
	3570 MHz - 3680 MHz	3615.54	-63.068	-58.1	Pass

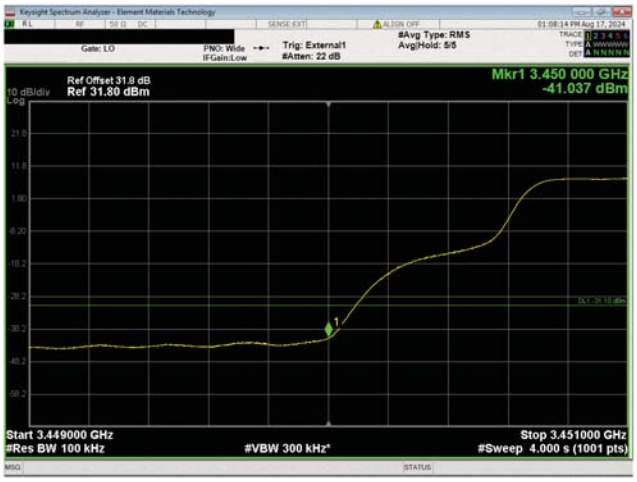
BAND EDGE COMPLIANCE - BAND 3.45G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

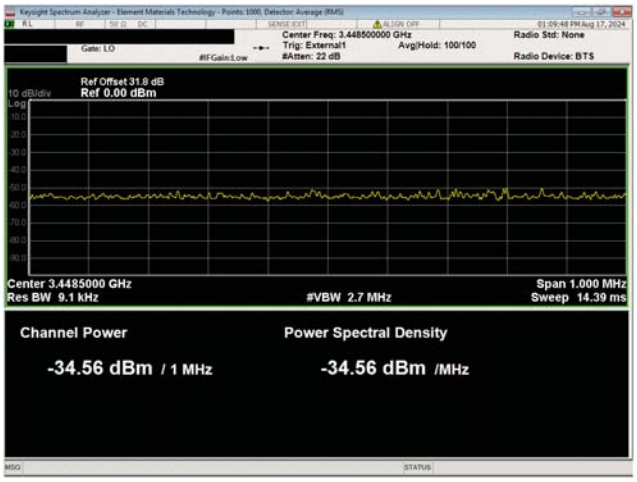
	Frequency Range	Frequency (MHz)	Value (dBm)	Limit (dBm)	Result
20 MHz Channel Bandwidth					
QPSK Modulation					
Low Channel, 3460.02 MHz	3449 MHz - 3451 MHz	3450	-32.739	-31.1	Pass
	3448 MHz - 3449 MHz	N/A	-32.88	-31.1	Pass
	3440 MHz - 3448 MHz	3448	-34.791	-31.1	Pass
	3430 MHz - 3440 MHz	3439.96	-51.573	-43.1	Pass
	3100 MHz - 3430 MHz	3234.64	-68.982	-58.1	Pass
High Channel, 3540.00 MHz	3549 MHz - 3551 MHz	3550	-32.345	-31.1	Pass
	3551 MHz - 3552 MHz	N/A	-34.04	-31.1	Pass
	3552 MHz - 3560 MHz	3552.008	-35.079	-31.1	Pass
	3560 MHz - 3570 MHz	3560	-51.039	-43.1	Pass
	3570 MHz - 3680 MHz	3580.45	-63.266	-58.1	Pass
30 MHz Channel Bandwidth					
QPSK Modulation					
Low Channel, 3465.00 MHz	3449 MHz - 3451 MHz	3450	-33.593	-31.1	Pass
	3448 MHz - 3449 MHz	N/A	-33.09	-31.1	Pass
	3440 MHz - 3448 MHz	3448	-34.569	-31.1	Pass
	3430 MHz - 3440 MHz	3438.91	-51.239	-43.1	Pass
	3100 MHz - 3430 MHz	3195.37	-69.063	-58.1	Pass
High Channel, 3534.99 MHz	3549 MHz - 3551 MHz	3550	-33.309	-31.1	Pass
	3551 MHz - 3552 MHz	N/A	-33.15	-31.1	Pass
	3552 MHz - 3560 MHz	3552	-34.021	-31.1	Pass
	3560 MHz - 3570 MHz	3560	-50.586	-43.1	Pass
	3570 MHz - 3680 MHz	3620.38	-63.198	-58.1	Pass
40 MHz Channel Bandwidth					
QPSK Modulation					
Low Channel, 3470.01 MHz	3449 MHz - 3451 MHz	3450	-32.056	-31.1	Pass
	3448 MHz - 3449 MHz	N/A	-32.28	-31.1	Pass
	3440 MHz - 3448 MHz	3447.952	-32.967	-31.1	Pass
	3430 MHz - 3440 MHz	3439.32	-50.725	-43.1	Pass
	3100 MHz - 3430 MHz	3100.99	-68.98	-58.1	Pass
High Channel, 3529.98 MHz	3549 MHz - 3551 MHz	3550	-32.614	-31.1	Pass
	3551 MHz - 3552 MHz	N/A	-31.42	-31.1	Pass
	3552 MHz - 3560 MHz	3552.048	-32.039	-31.1	Pass
	3560 MHz - 3570 MHz	3560	-49.59	-43.1	Pass
	3570 MHz - 3680 MHz	3583.31	-63.106	-58.1	Pass

BAND EDGE COMPLIANCE - BAND 3.45G

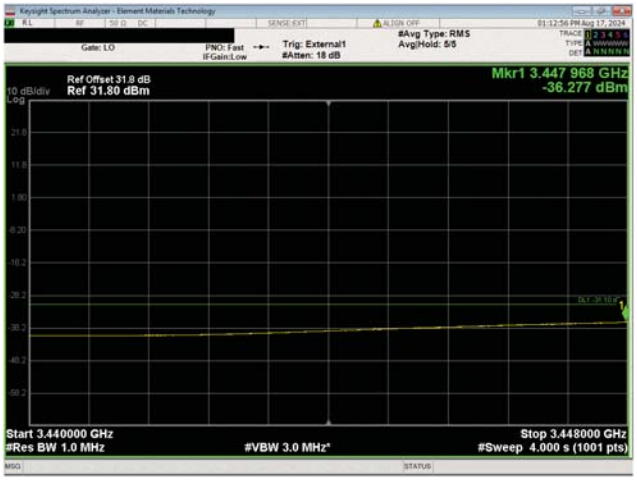
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



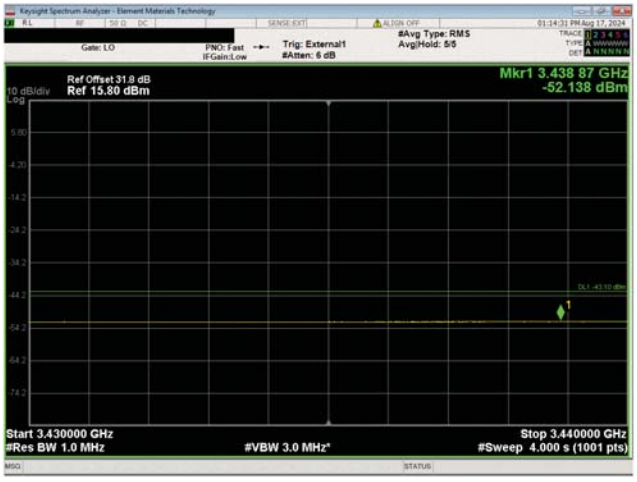
Port 1
10 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3455.01 MHz



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



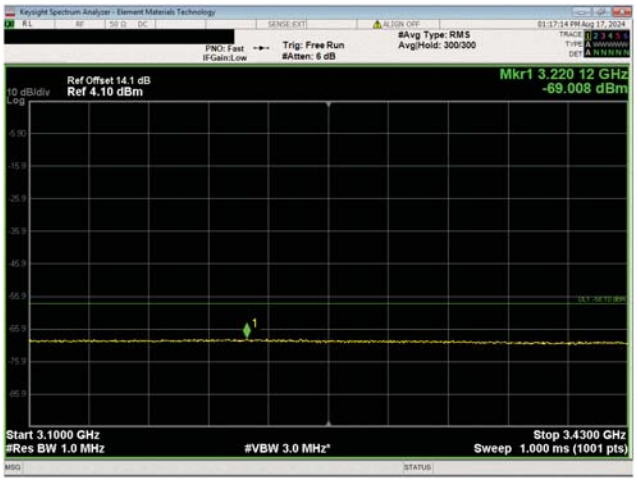
Port 1
10 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3455.01 MHz



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

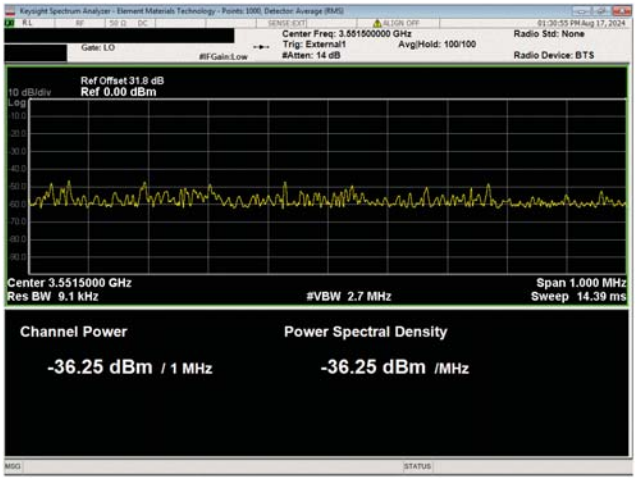
BAND EDGE COMPLIANCE - BAND 3.45G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

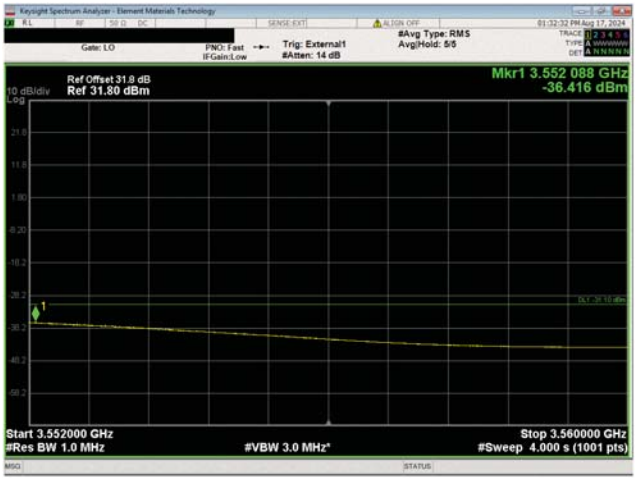


Port 1
10 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3455.01 MHz

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



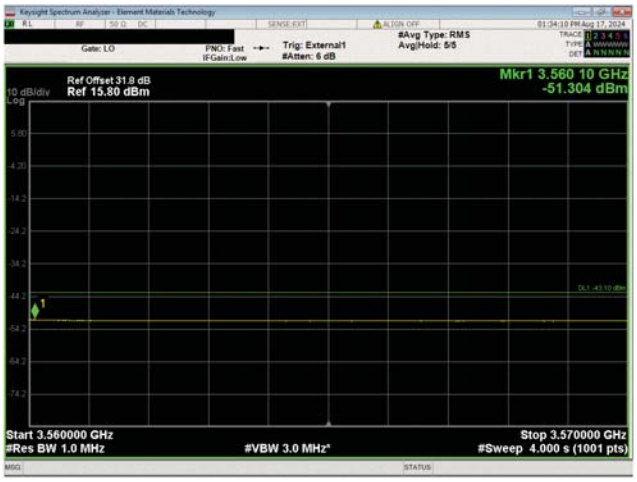
Port 1
10 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3544.995 MHz



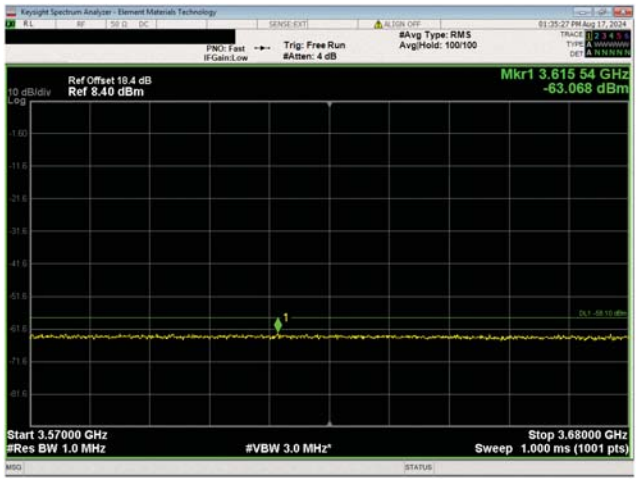
Port 1
10 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3544.995 MHz

BAND EDGE COMPLIANCE - BAND 3.45G

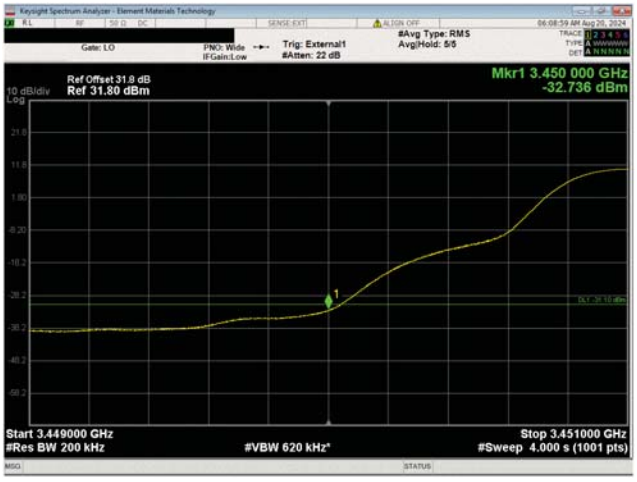
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



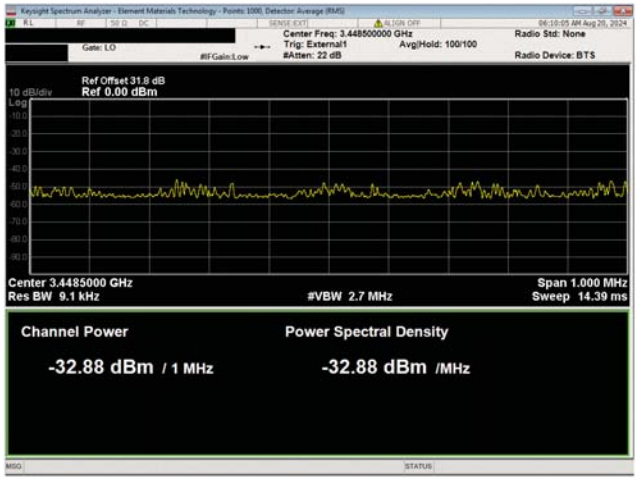
Port 1
10 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3544.995 MHz



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



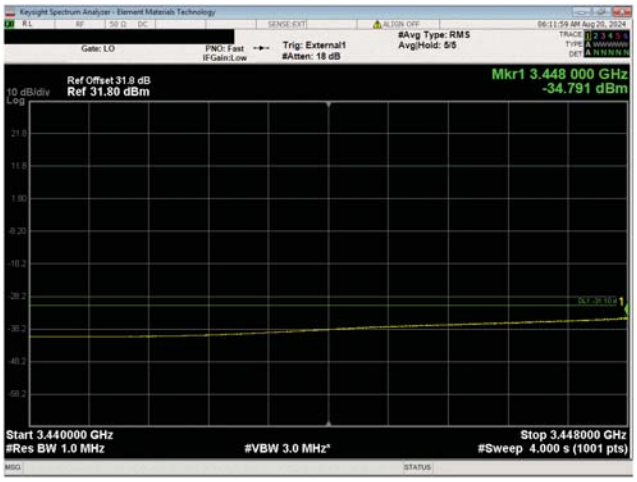
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3460.02 MHz



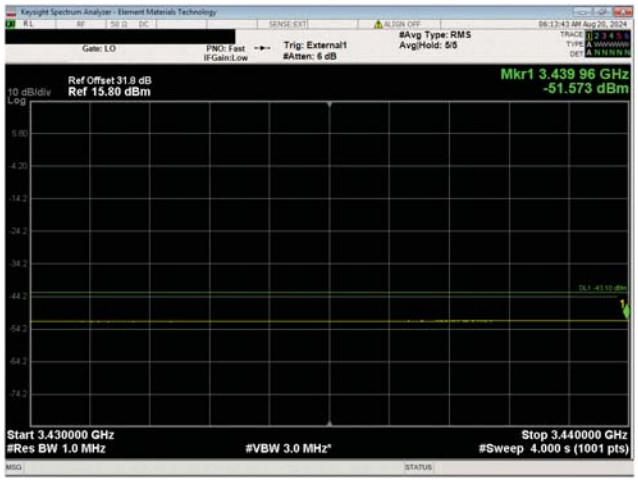
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3460.02 MHz

BAND EDGE COMPLIANCE - BAND 3.45G

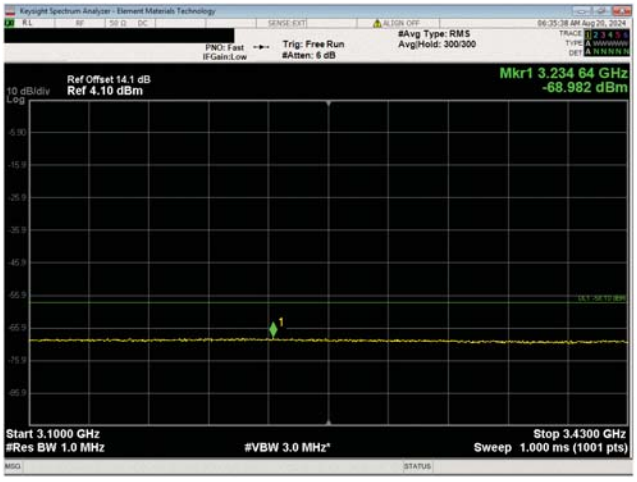
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



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



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

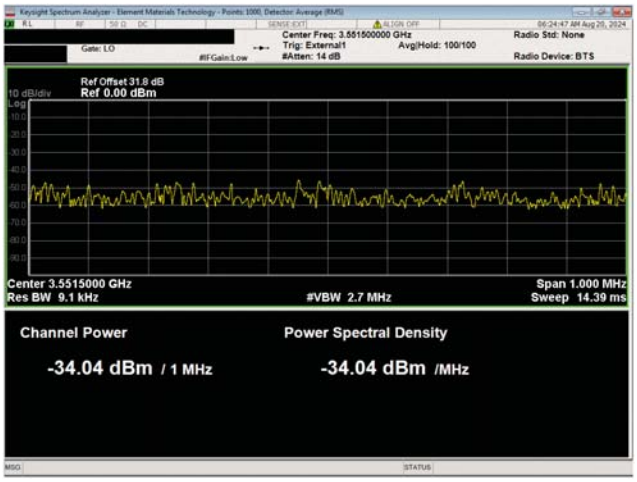


Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3460.02 MHz

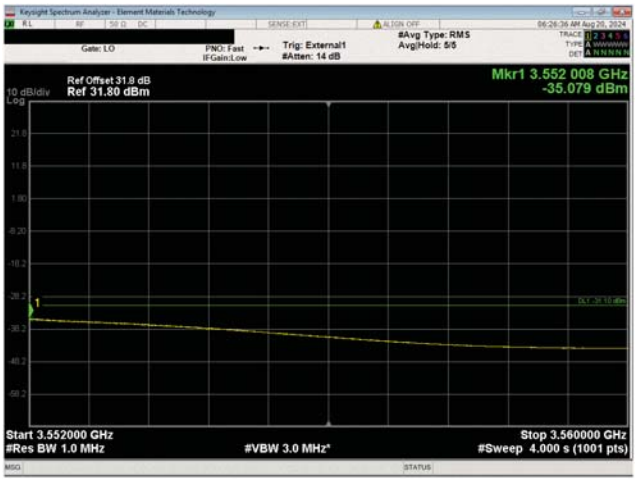
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3540.00 MHz

BAND EDGE COMPLIANCE - BAND 3.45G

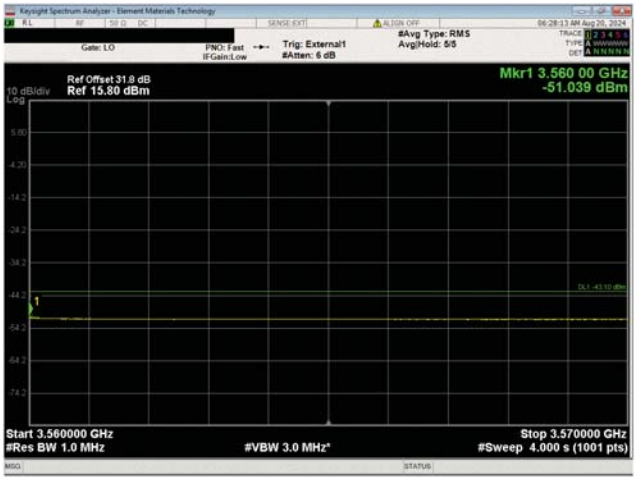
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



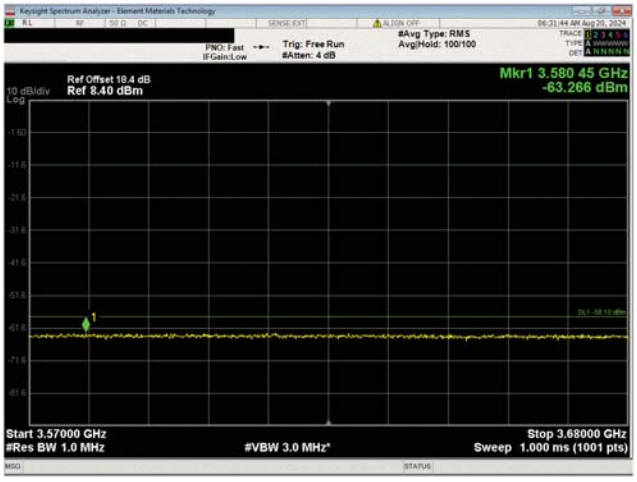
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3540.00 MHz



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



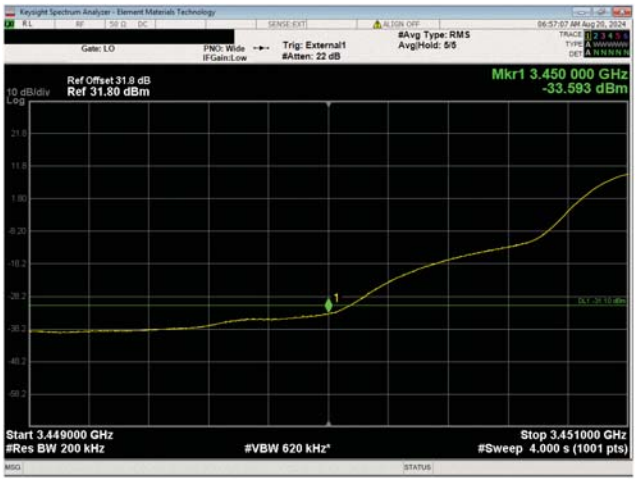
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3540.00 MHz



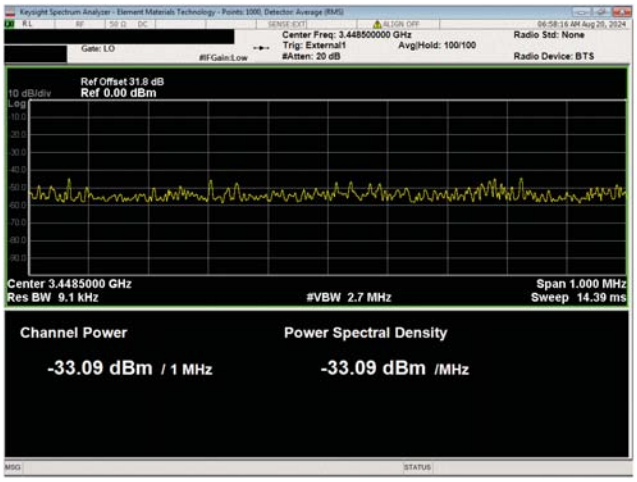
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3540.00 MHz

BAND EDGE COMPLIANCE - BAND 3.45G

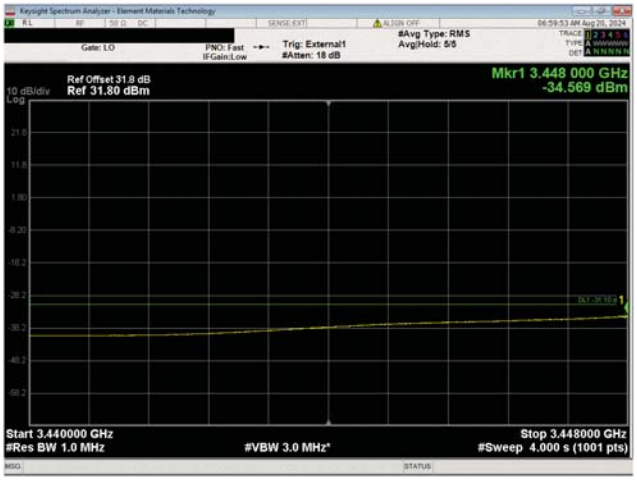
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



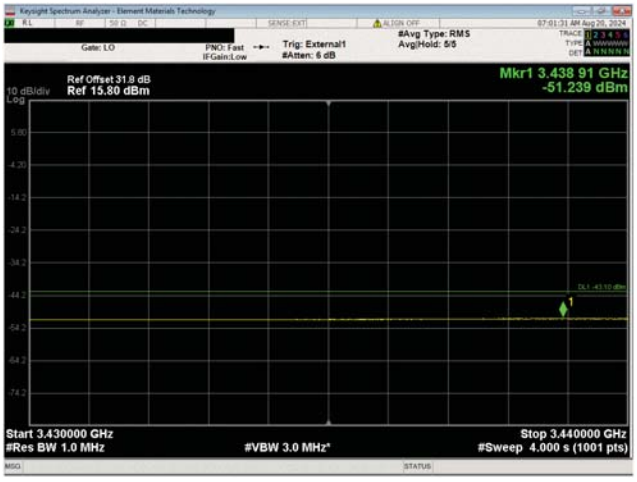
Port 1
30 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3465.00 MHz



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



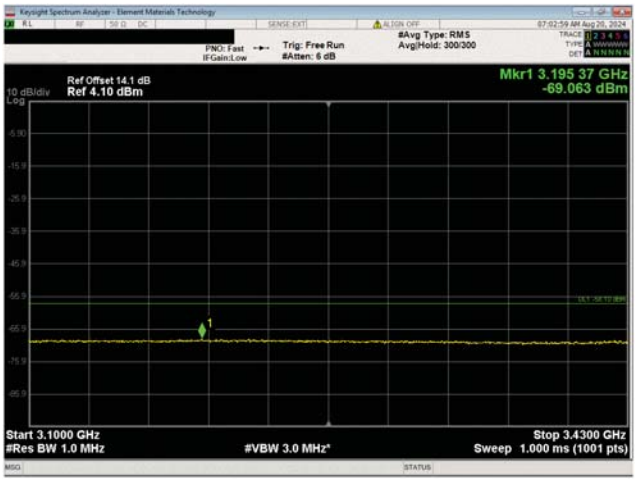
Port 1
30 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3465.00 MHz



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

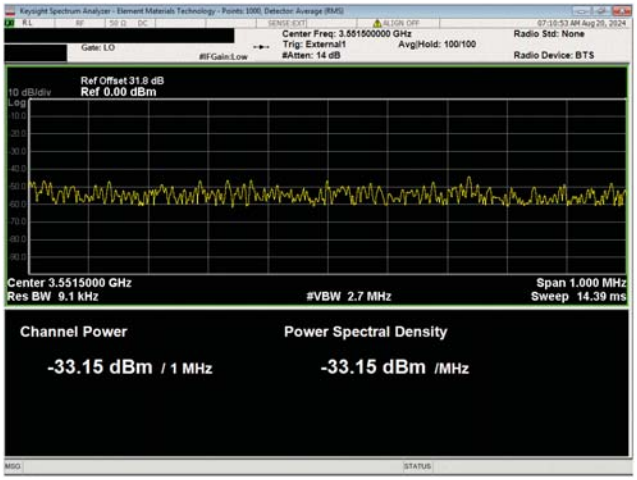
BAND EDGE COMPLIANCE - BAND 3.45G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

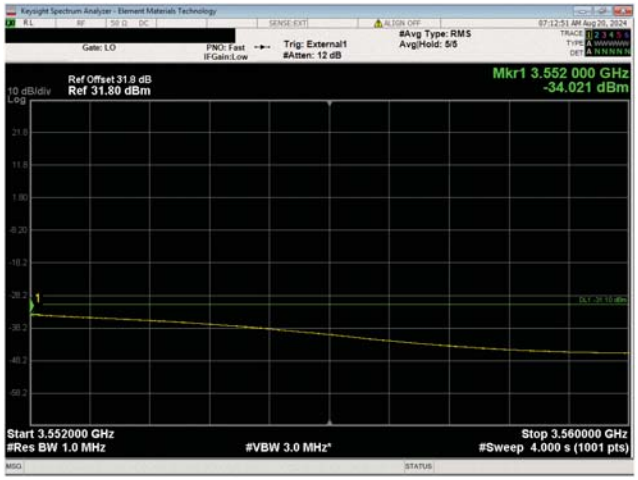


Port 1
30 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3465.00 MHz

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



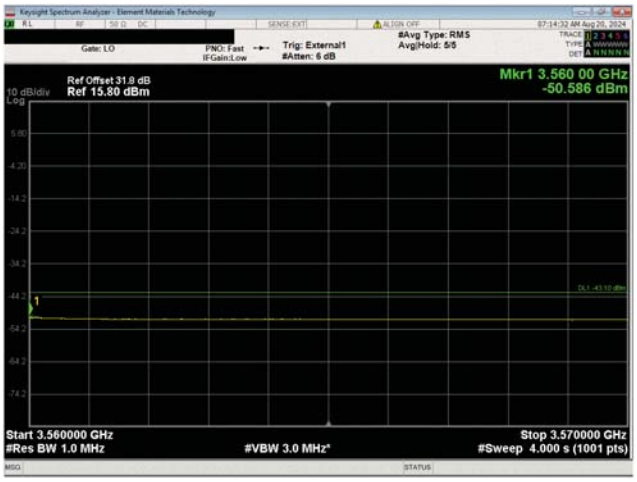
Port 1
30 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3534.99 MHz



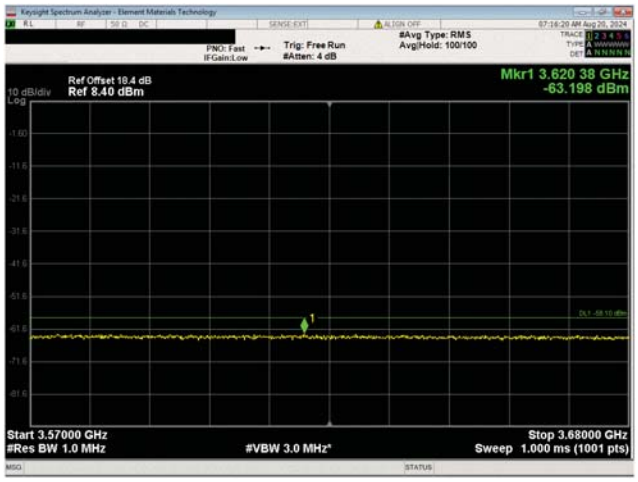
Port 1
30 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3534.99 MHz

BAND EDGE COMPLIANCE - BAND 3.45G

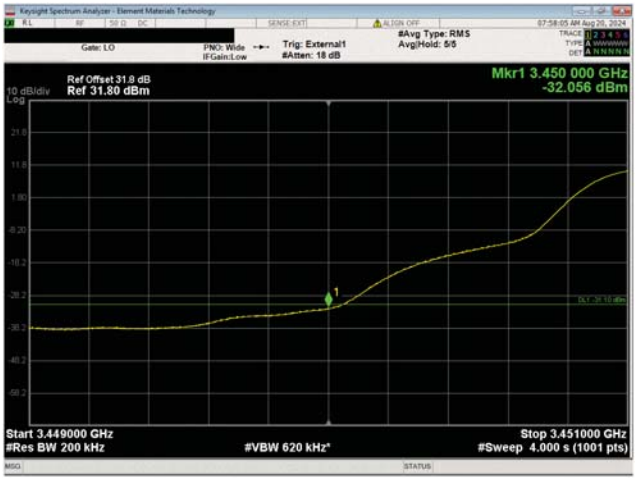
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



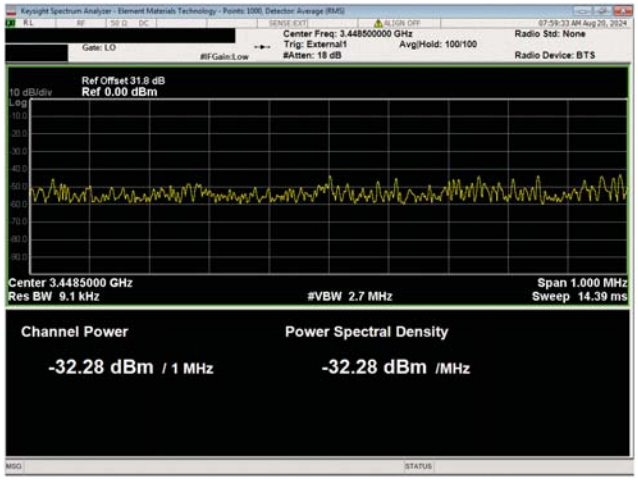
Port 1
30 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3534.99 MHz



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



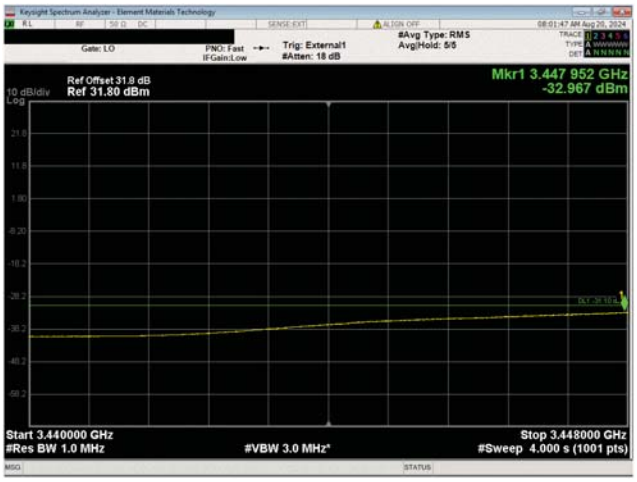
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3470.01 MHz



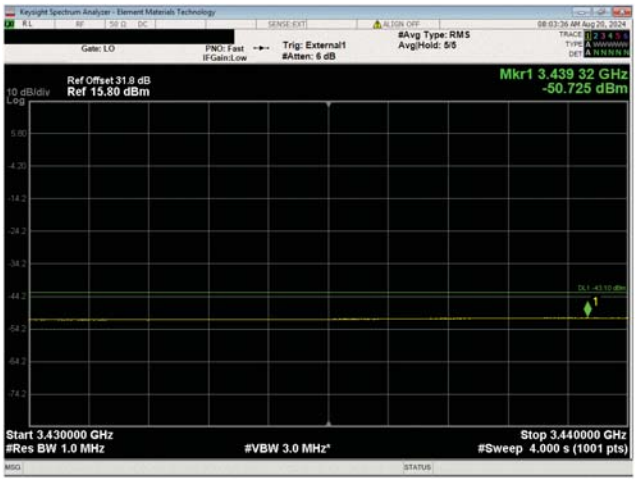
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3470.01 MHz

BAND EDGE COMPLIANCE - BAND 3.45G

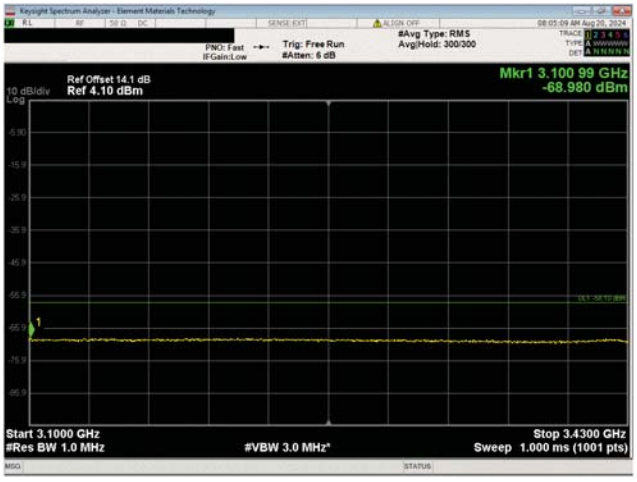
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



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



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

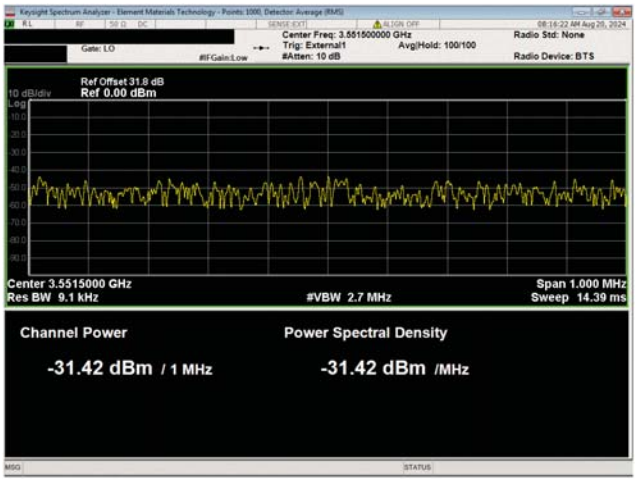


Port 1
40 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3470.01 MHz

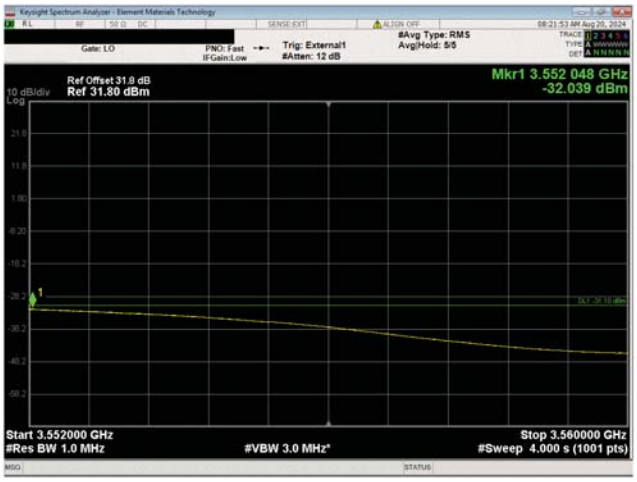
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3529.98 MHz

BAND EDGE COMPLIANCE - BAND 3.45G

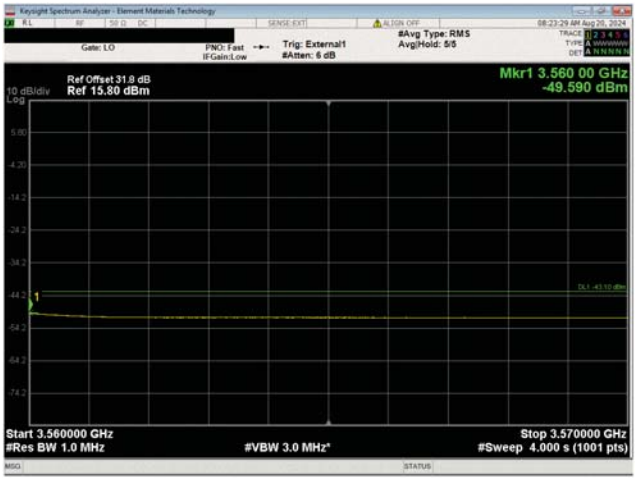
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



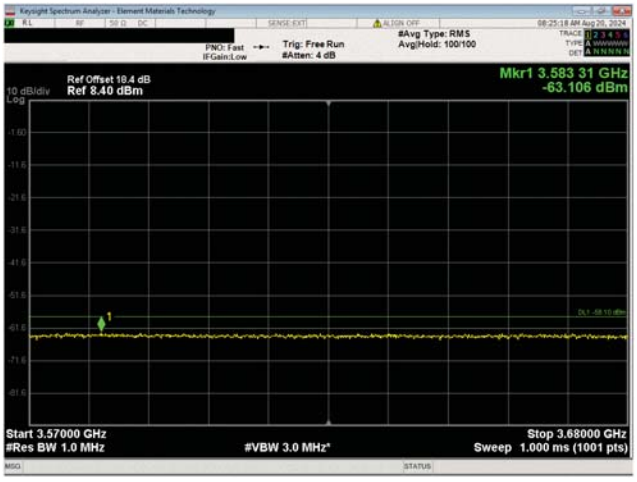
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3529.98 MHz



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



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



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

BAND EDGE COMPLIANCE - BAND 3.7G

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 spurious RF conducted emissions at the edges of the authorized bands were measured on the low and high transmit frequencies of the available band. The channels closest to the band edges were selected. The EUT was transmitting at the power and data rate(s) listed in the datasheet.

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 paragraph 5.7.2i.

The spectrum was scanned below the lower band edge and above the higher band edge.

Per section 27.53(l)(1), For base station operations in the 3700-3980 MHz band, the conducted power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. This limit is adjusted to -31.1 dBm [-13 dBm - 10 log (64)] per FCC KDB 662911D01 v02r01 and ANSI C63.26-2015 section 6.4 because the BTS may operate as a 64 port MIMO transmitter.

Per 27.53(l)(1), emissions seen up to 1 MHz outside of authorized operating frequency range band edges shall be measured with a RBW of 1% of the measured emission bandwidth. Any emission seen to be > 1 MHz further outside the band edges shall be measured with a RBW of 1 MHz. However, a narrower RBW of at least 1% of the emission bandwidth is still allowed provided that the measured power is integrated over the full reference bandwidth of 1 MHz.

The band edge testing was performed using only one modulation type because the Occupied Bandwidth variation between modulation types is small, the average output power variation between modulation types is small and there is significant/good passing margin. The QPSK modulation type was used. (See ANSI C63.26. clause 5.7.2e)

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

BAND EDGE COMPLIANCE - BAND 3.7G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

EUT:	AVQQA Remote Radio Head	Work Order:	NOKI0075
Serial Number:	L1242403137	Date:	2024-08-15
Customer:	Nokia Solutions and Networks	Temperature:	23.3°C
Attendees:	David Le, John Rattanavong	Relative Humidity:	52.1%
Customer Project:	None	Bar. Pressure (PMSL):	1016 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

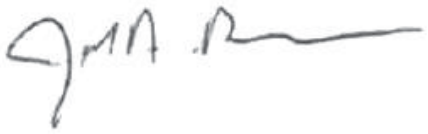
All losses in the measurement path were accounted for in the reference level offset; attenuators, filters, cables, and DC blocks. Band n77 carriers were enabled at maximum power levels for the 3.7 GHz band in the single carrier operating mode configuration.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



Tested By

TEST RESULTS

	Frequency Range	Frequency (MHz)	Value (dBm)	Limit (dBm)	Result
Port 1					
20 MHz Channel Bandwidth					
QPSK Modulation					
Low Channel, 3710.01 MHz	3699 MHz to 3701 MHz	3700	-34.678	-31.1	Pass
	3698 MHz to 3699 MHz	N/A	-33.32	-31.1	Pass
	3550 MHz to 3698 MHz	3698	-34.484	-31.1	Pass
High Channel, 3969.99 MHz	3979 MHz to 3981 MHz	3980	-35.35	-31.1	Pass
	3981 MHz to 3982 MHz	N/A	-32.65	-31.1	Pass
	3982 MHz to 4130 MHz	3982	-34.128	-31.1	Pass
40 MHz Channel Bandwidth					
QPSK Modulation					
Low Channel, 3720.00 MHz	3699.6 MHz to 3700.0 MHz	N/A	-34.6	-31.1	Pass
	3699.2 MHz to 3699.6 MHz	N/A	-35.65	-31.1	Pass
	3699.0 MHz to 3699.4 MHz	N/A	-36.23	-31.1	Pass
	3698 MHz to 3699 MHz	N/A	-33.24	-31.1	Pass
	3550 MHz to 3698 MHz	3697.852	-33.451	-31.1	Pass
High Channel, 3960.00 MHz	3980.0 MHz to 3980.4 MHz	N/A	-36.01	-31.1	Pass
	3980.4 MHz to 3980.8 MHz	N/A	-36.36	-31.1	Pass
	3980.6 MHz to 3981.0 MHz	N/A	-35.85	-31.1	Pass
	3981 MHz to 3982 MHz	N/A	-32.95	-31.1	Pass
	3982 MHz to 4130 MHz	3982	-33.091	-31.1	Pass

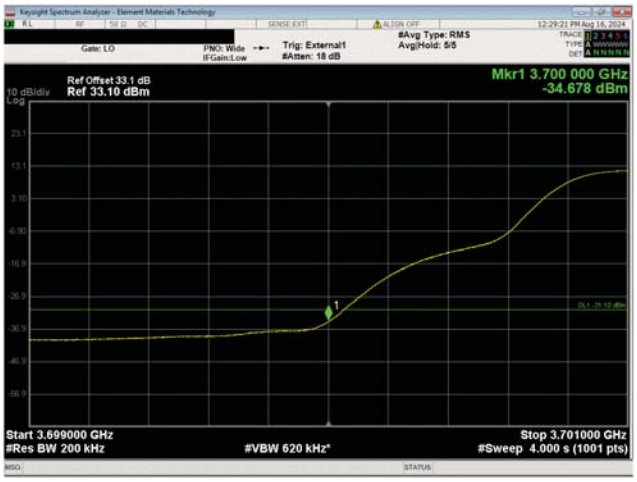
BAND EDGE COMPLIANCE - BAND 3.7G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

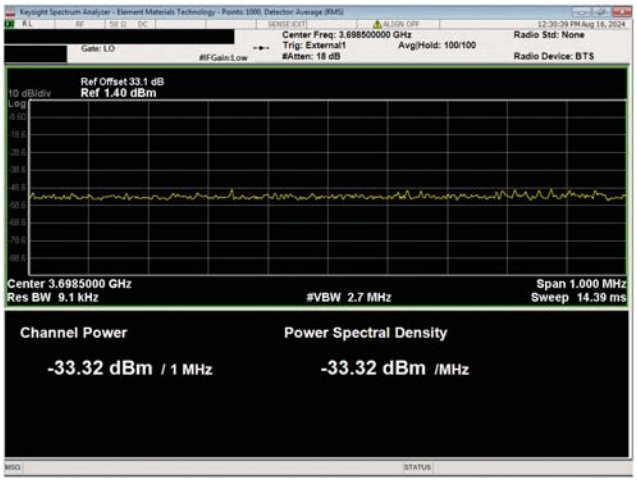
	Frequency Range	Frequency (MHz)	Value (dBm)	Limit (dBm)	Result
60 MHz Channel Bandwidth					
QPSK Modulation					
Low Channel, 3730.02 MHz	3699.4 MHz to 3700.0 MHz	N/A	-32.52	-31.1	Pass
	3699.0 MHz to 3699.6 MHz	N/A	-33.49	-31.1	Pass
	3698 MHz to 3699 MHz	N/A	-32.38	-31.1	Pass
	3550 MHz to 3698 MHz	3698	-31.976	-31.1	Pass
High Channel, 3949.98 MHz	3980.0 MHz to 3980.6 MHz	N/A	-33.24	-31.1	Pass
	3980.4 MHz to 3981.0 MHz	N/A	-34.18	-31.1	Pass
	3981 MHz to 3982 MHz	N/A	-32.4	-31.1	Pass
	3982 MHz to 4130 MHz	3982.148	-32.733	-31.1	Pass
80 MHz Channel Bandwidth					
QPSK Modulation					
Low Channel, 3740.01 MHz	3699.2 MHz to 3700 MHz	N/A	-32.32	-31.1	Pass
	3699.0 MHz to 3699.8 MHz	N/A	-33.2	-31.1	Pass
	3698 MHz to 3699 MHz	N/A	-32.47	-31.1	Pass
	3550 MHz to 3698 MHz	3697.704	-32.957	-31.1	Pass
High Channel, 3939.99 MHz	3980.0 MHz to 3980.8 MHz	N/A	-32.21	-31.1	Pass
	3980.2 MHz to 3981 MHz	N/A	-32.81	-31.1	Pass
	3981 MHz to 3982 MHz	N/A	-32.23	-31.1	Pass
	3982 MHz to 4130 MHz	3982.296	-32.85	-31.1	Pass
100 MHz Channel Bandwidth					
QPSK Modulation					
Low Channel, 3750.00 MHz	3699 MHz to 3700 MHz	N/A	-32.33	-31.1	Pass
	3698 MHz to 3699 MHz	N/A	-31.92	-31.1	Pass
	3550 MHz to 3698 MHz	3697.408	-32.541	-31.1	Pass
High Channel, 3930.00 MHz	3980 MHz to 3981 MHz	N/A	-32.6	-31.1	Pass
	3981 MHz to 3982 MHz	N/A	-32.71	-31.1	Pass
	3982 MHz to 4130 MHz	3982	-32.607	-31.1	Pass

BAND EDGE COMPLIANCE - BAND 3.7G

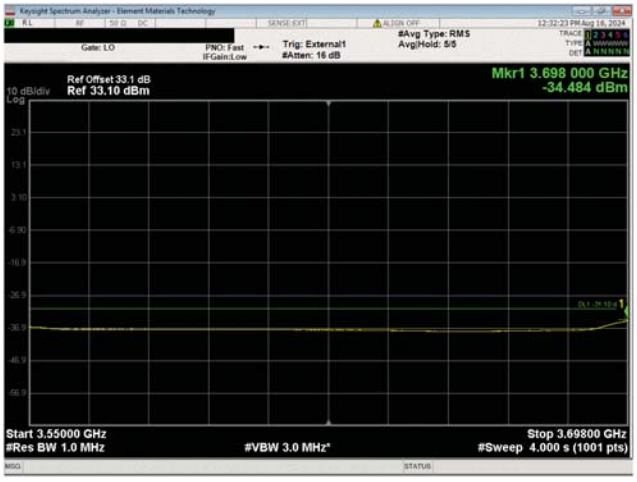
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3710.01 MHz



Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3710.01 MHz

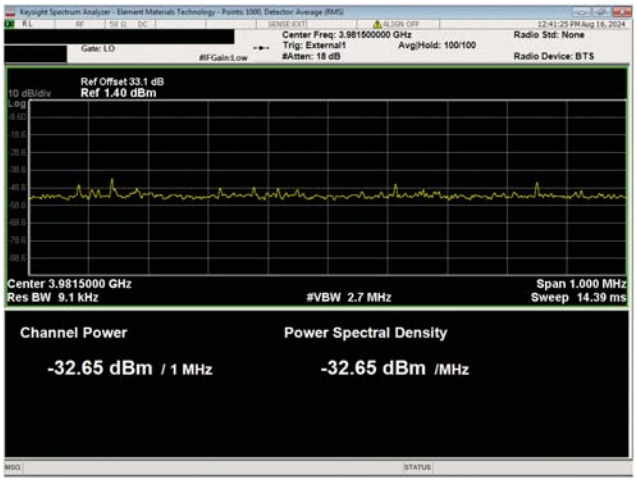


Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3710.01 MHz

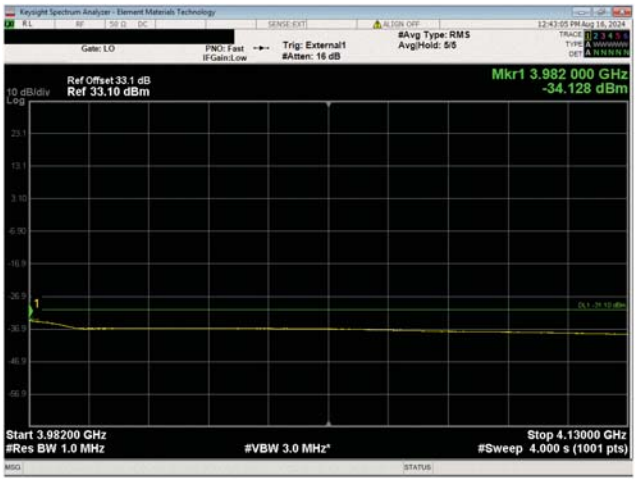
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3969.99 MHz

BAND EDGE COMPLIANCE - BAND 3.7G

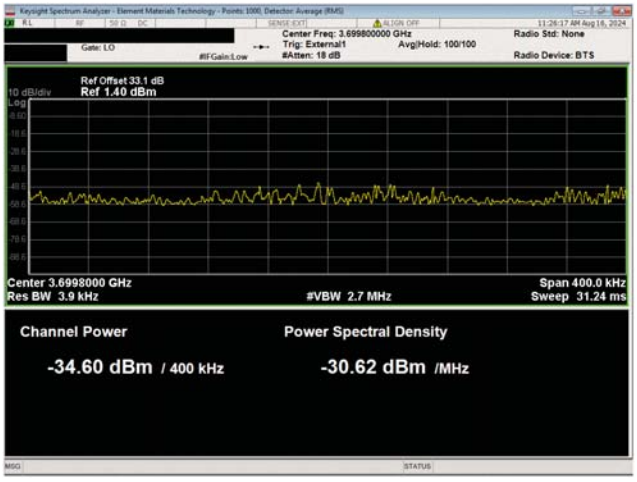
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



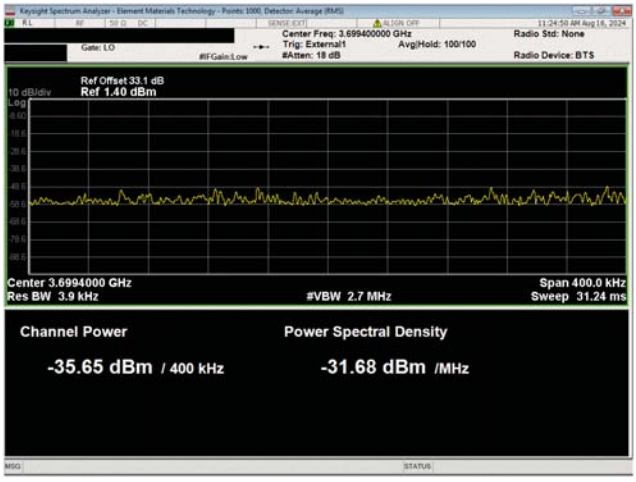
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3969.99 MHz



Port 1
20 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3969.99 MHz



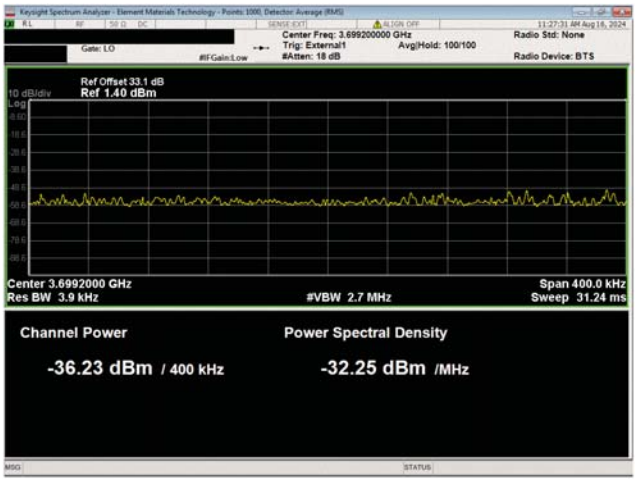
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3720.00 MHz



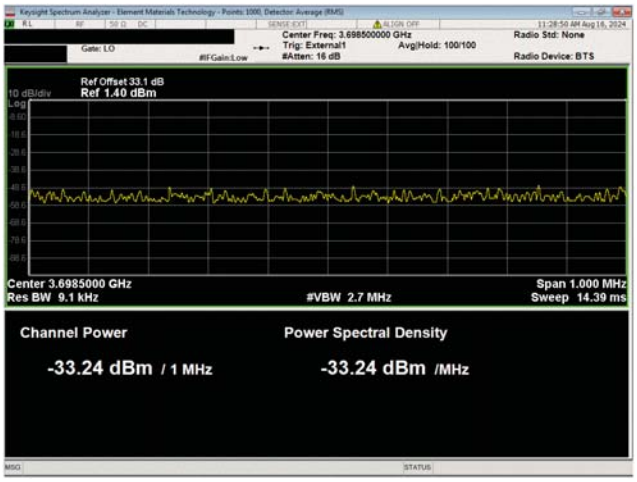
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3720.00 MHz

BAND EDGE COMPLIANCE - BAND 3.7G

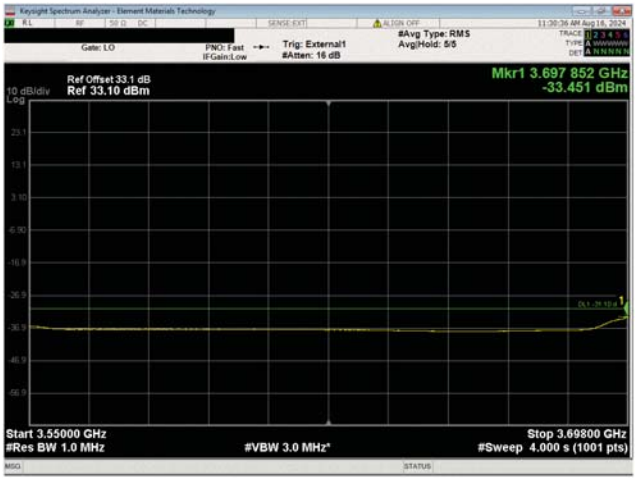
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



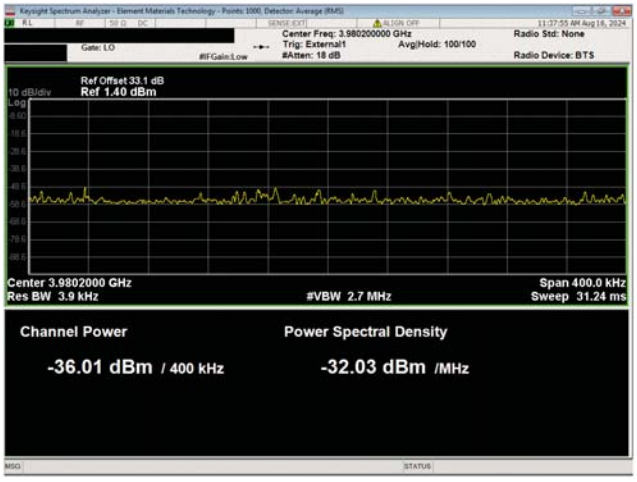
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3720.00 MHz



Port 1
40 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3720.00 MHz



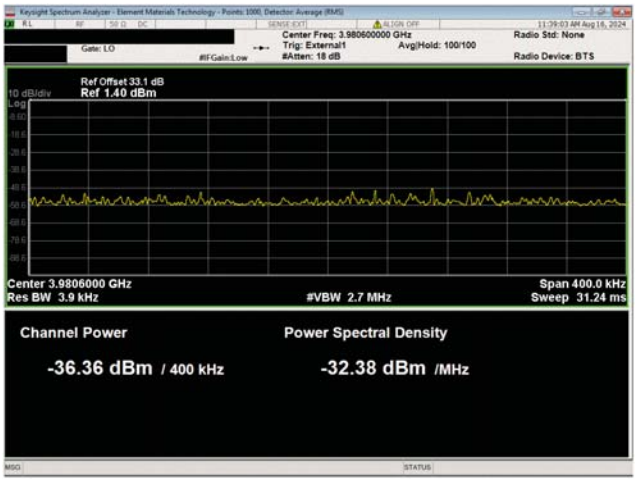
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3720.00 MHz



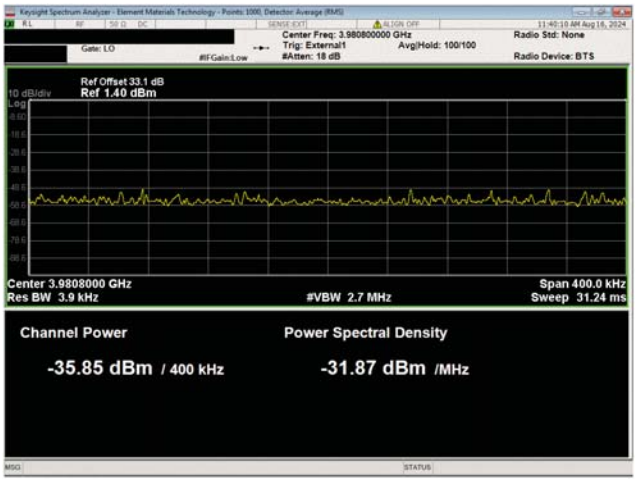
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3960.00 MHz

BAND EDGE COMPLIANCE - BAND 3.7G

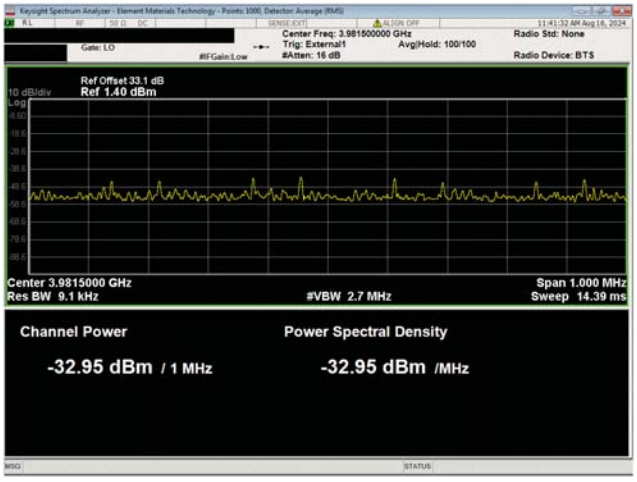
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



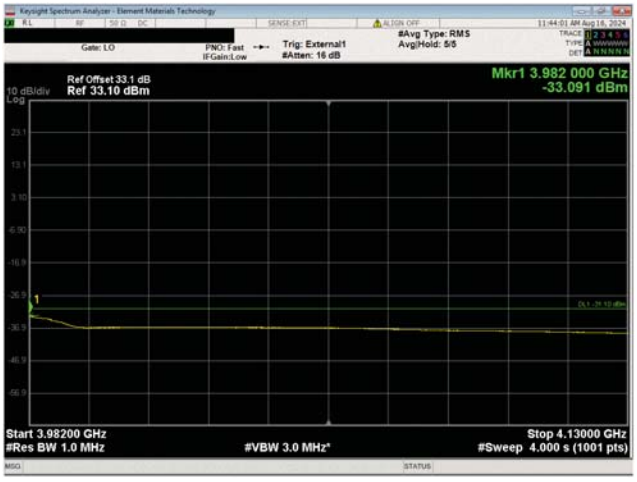
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3960.00 MHz



Port 1
40 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3960.00 MHz



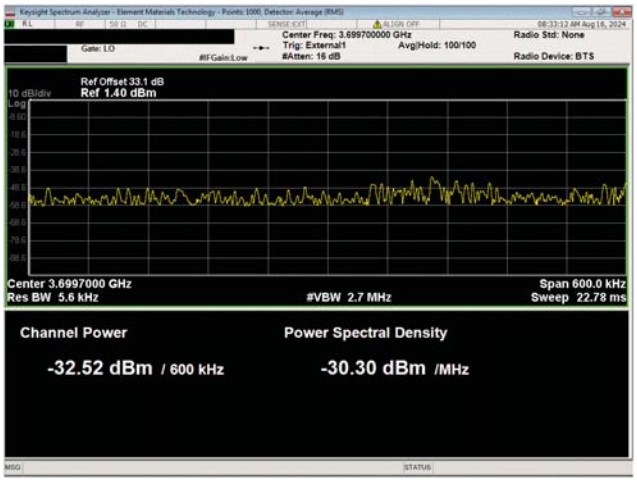
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3960.00 MHz



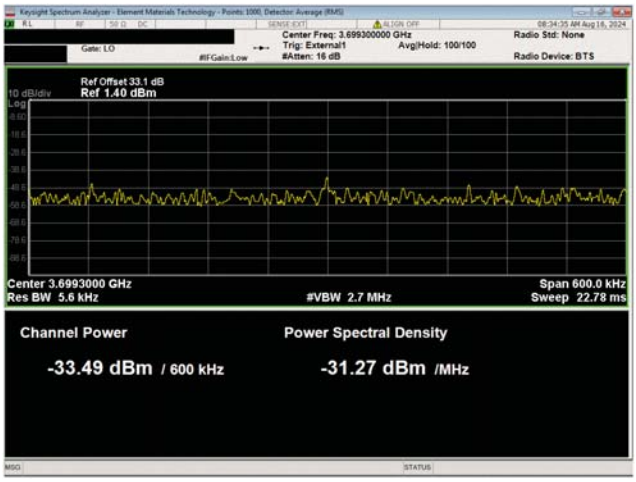
Port 1
40 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3960.00 MHz

BAND EDGE COMPLIANCE - BAND 3.7G

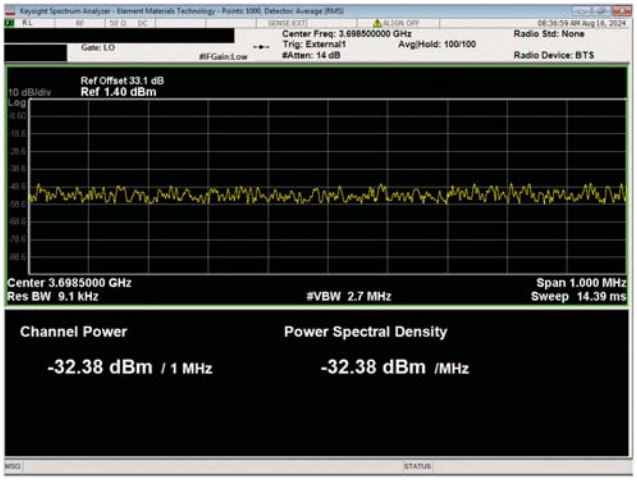
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



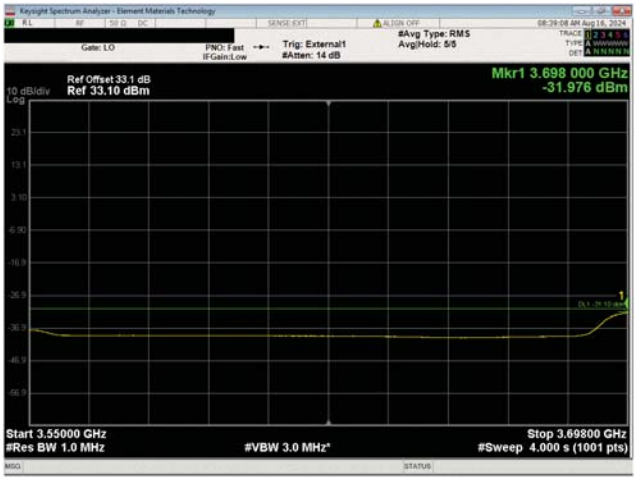
Port 1
60 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3730.02 MHz



Port 1
60 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3730.02 MHz



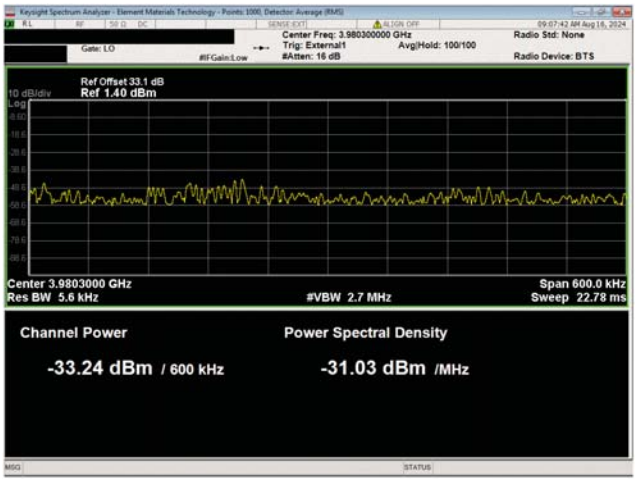
Port 1
60 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3730.02 MHz



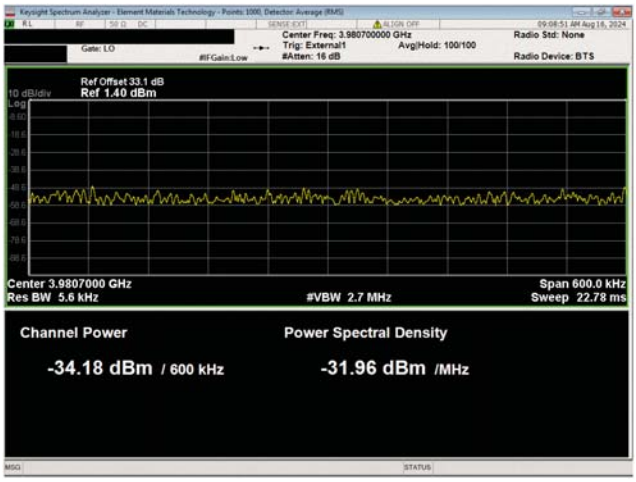
Port 1
60 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3730.02 MHz

BAND EDGE COMPLIANCE - BAND 3.7G

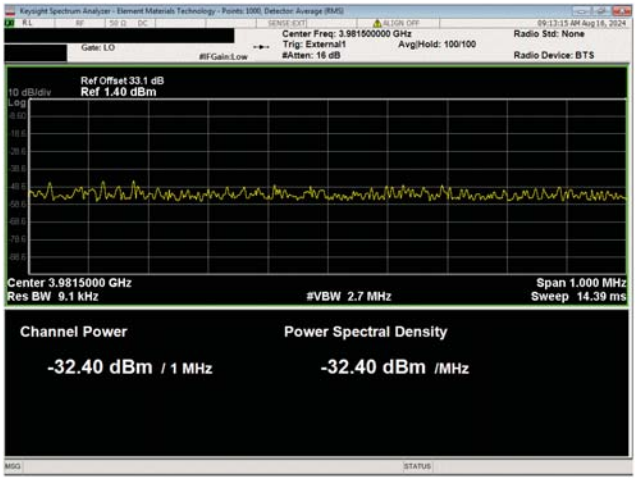
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



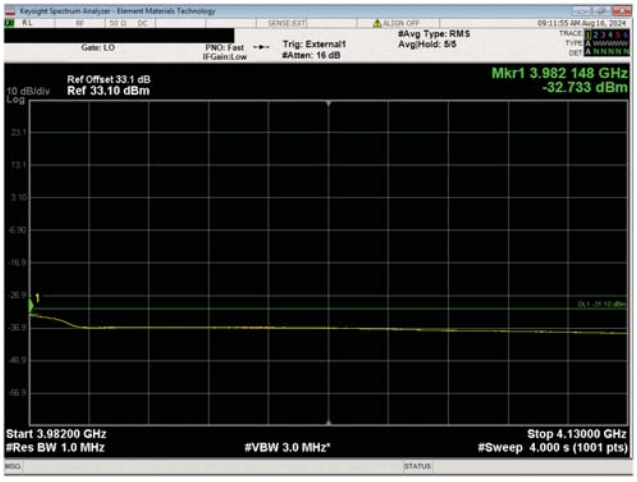
Port 1
60 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3949.98 MHz



Port 1
60 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3949.98 MHz



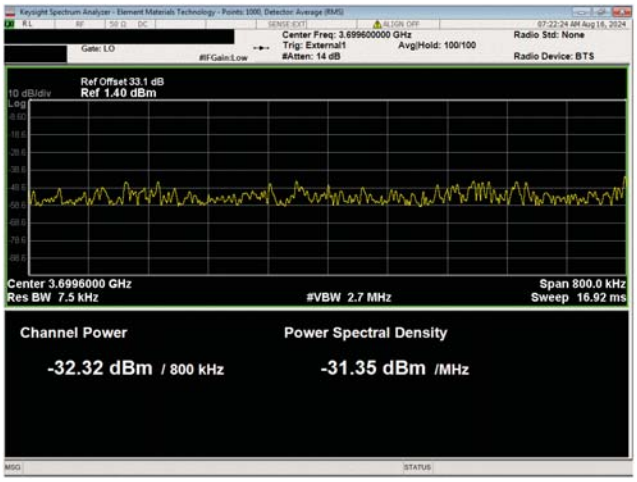
Port 1
60 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3949.98 MHz



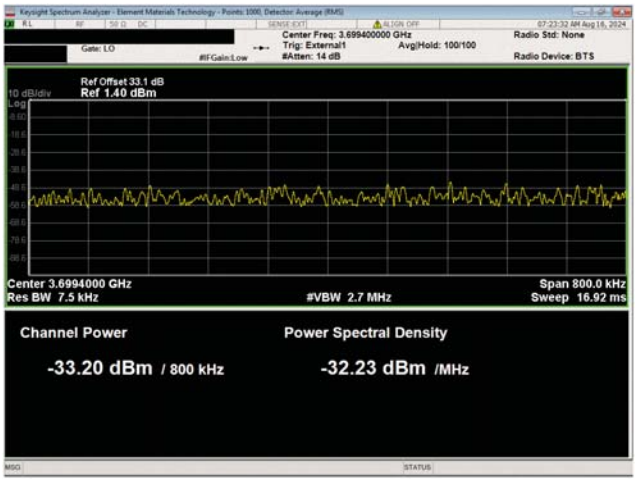
Port 1
60 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3949.98 MHz

BAND EDGE COMPLIANCE - BAND 3.7G

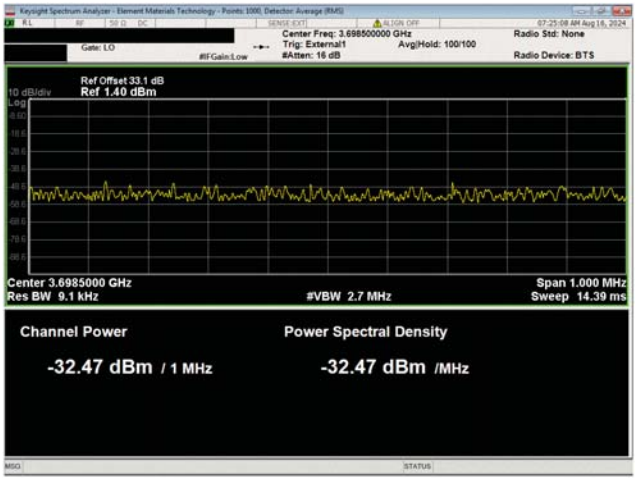
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



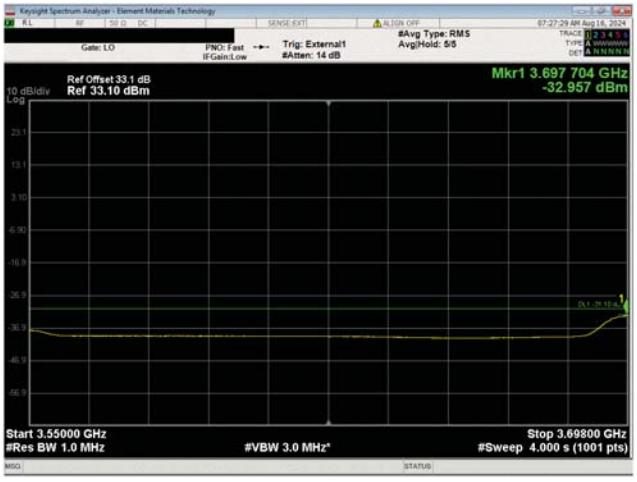
Port 1
80 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3740.01 MHz



Port 1
80 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3740.01 MHz



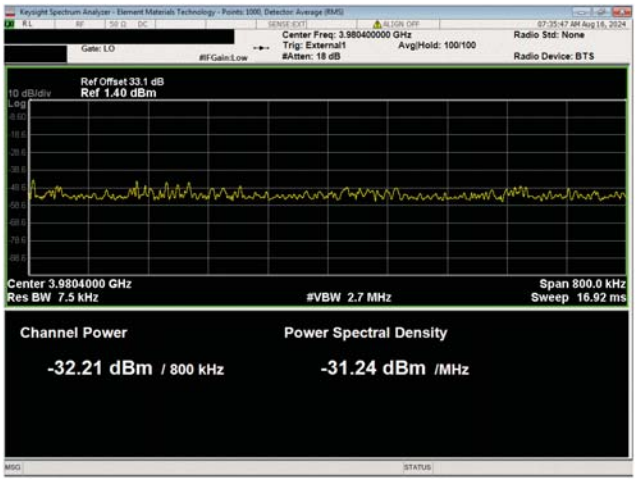
Port 1
80 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3740.01 MHz



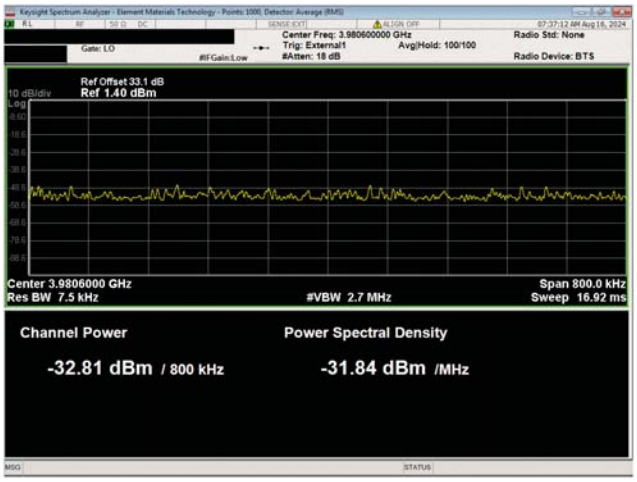
Port 1
80 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3740.01 MHz

BAND EDGE COMPLIANCE - BAND 3.7G

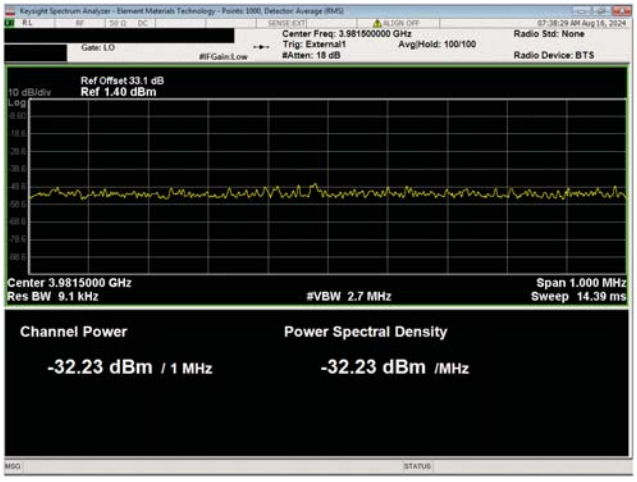
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



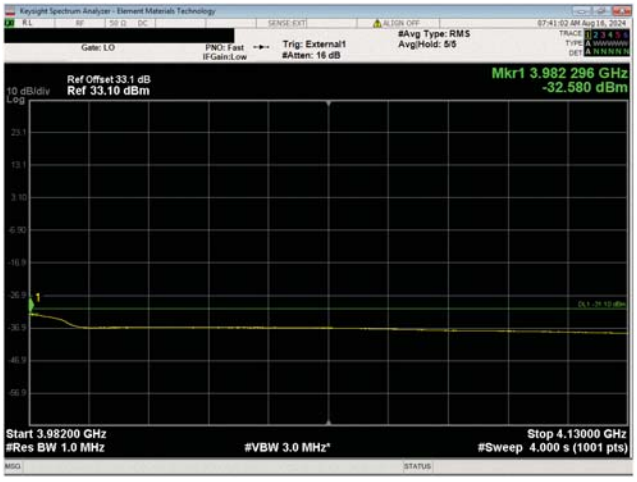
Port 1
80 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3939.99 MHz



Port 1
80 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3939.99 MHz



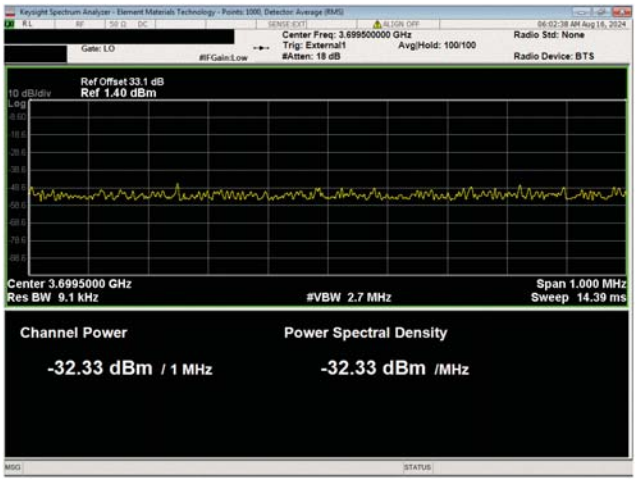
Port 1
80 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3939.99 MHz



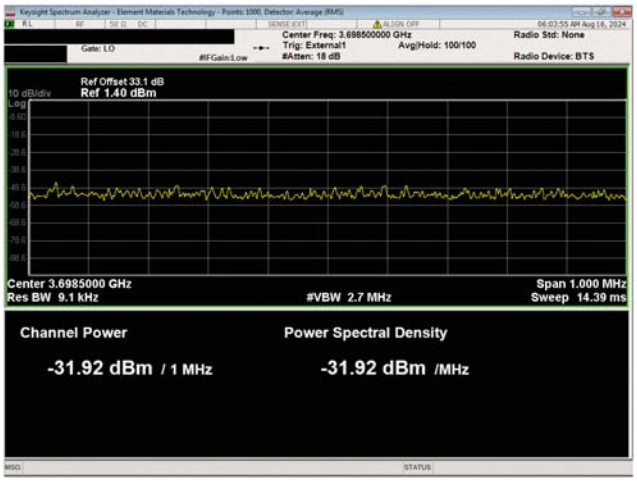
Port 1
80 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3939.99 MHz

BAND EDGE COMPLIANCE - BAND 3.7G

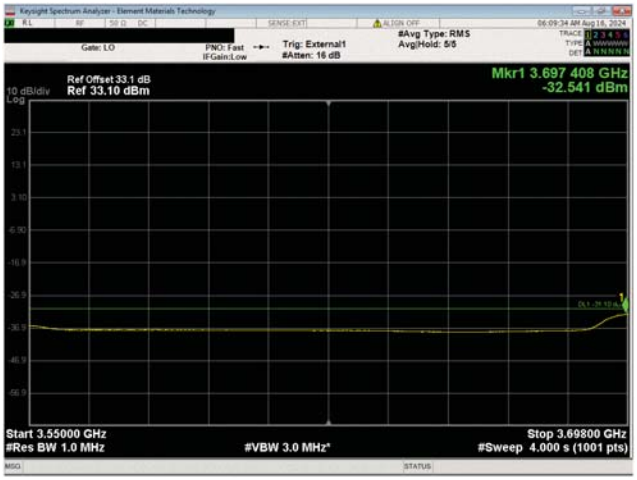
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



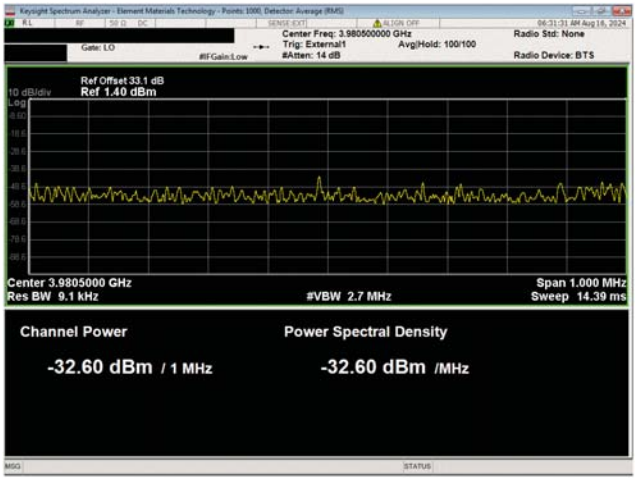
Port 1
100 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3750.00 MHz



Port 1
100 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3750.00 MHz



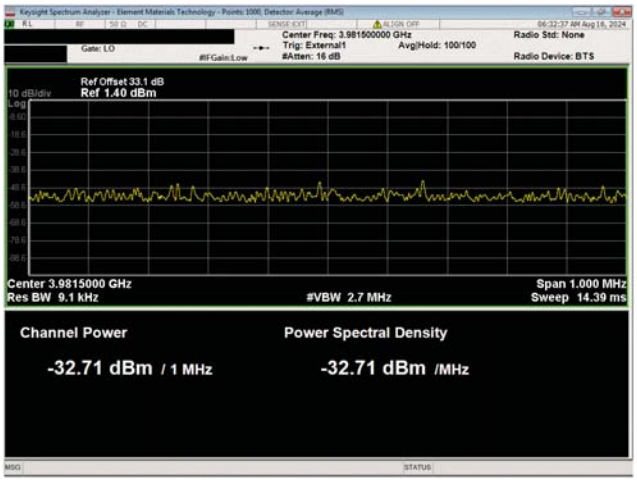
Port 1
100 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 3750.00 MHz



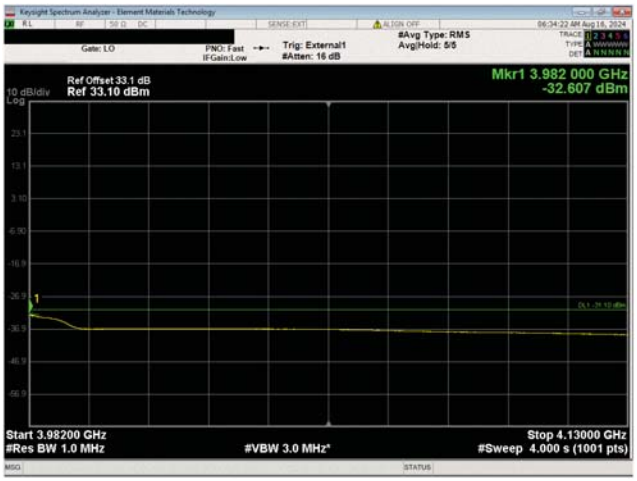
Port 1
100 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3930.00 MHz

BAND EDGE COMPLIANCE - BAND 3.7G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



Port 1
100 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3930.00 MHz



Port 1
100 MHz Channel Bandwidth
QPSK Modulation
High Channel, 3930.00 MHz

BAND EDGE COMPLIANCE - DUAL BAND

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 spurious RF conducted emissions at the edges of the authorized bands were measured on the low and high transmit frequencies of the available band. The channels closest to the band edges were selected. The EUT was transmitting at the power and data rate(s) listed in the datasheet.

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 paragraph 5.7.2i.

The spectrum was scanned below the lower band edge and above the higher band edge.

Per section 27.53(n)(1), For base station operations in the 3450-3550 MHz band, the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm/MHz. This limit is adjusted to -31.1 dBm [-13 dBm -10 log (64)] per FCC KDB 662911D01 v02r01 and ANSI C63.26-2015 section 6.4 because the BTS may operate as a 64 port MIMO transmitter. Compliance with the provisions of this paragraph (n)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz.

Per section 27.53(l)(1), For base station operations in the 3700-3980 MHz band, the power of any emission outside of the authorized operating frequency range cannot exceed -13dBm. This limit is adjusted to -31.1 dBm [-13 dBm -10 log (64)] per FCC KDB 662911D01 v02r01 and ANSI C63.26-2015 section 6.4 because the BTS may operate as a 64 port MIMO transmitter.

Per section 27.53(n)(1),Notwithstanding the channel edge requirement of −13 dBm per megahertz, for base station operations in the 3450-3550 MHz band, the conducted power of any emission below 3440 MHz or above 3560 MHz shall not exceed −25 dBm/MHz. This limit is adjusted to -43.1 dBm [-25 dBm -10 log (64)] for the 3430 to 3440MHz & 3560 to 3570MHz ranges per FCC KDB 662911D01 v02r01 and ANSI C63.26-2015 section 6.4 because the BTS may operate as a 64 port MIMO transmitter.

Per section FCC 27.53(n) and FCC 27.53 (l)(1), power of any emission outside of the authorized operating frequency range cannot exceed, of the two rule parts, the more restrictive limits. Per section 27.53(n), the power of any emission outside band edge region (frequency ranges below 3430MHz and above 3570MHz) cannot exceed -40 dBm/MHz. This limit is adjusted to -58.1 dBm [-40 dBm -10 log (64)] per FCC KDB 662911D01 v02r01 and ANSI C63.26-2015 section 6.4 because the BTS may operate as a 64 port MIMO transmitter. The resolution bandwidth to be used for these measurements must be 1MHz per FCC 27.53(n)(1).

Dual band with 3.45G and 3.7G Band carriers operations test cases using QPSK only:

a. *Test Case 1*. 3.7GHz Band NR20 Carrier at maximum power at the Top channel. 3.45GHz Band NR20 Carrier at maximum power at the bottom channel operating simultaneously. Both carriers are operating at the same power level (1.56W/carrier). Total radio power is 200W.

b. *Test Case 2*. 3.7GHz Band NR20 Carrier at maximum power at the Bottom channel. 3.45GHz Band NR20 Carrier at maximum power at the top channel operating simultaneously. Both carriers are operating at the same power level (1.56W/carrier). Total radio power is 200W.

c. *Test Case 3*. 3.7GHz Band NR100 Carrier at the top channel. 3.45GHz Band NR40 Carrier at the bottom channel operating simultaneously. Both carriers are operating at the same PSD level (3.75W/carrier for NR100 carrier or PSD level at 2.4W/MHz and 1.56W/carrier for NR40 carrier or PSD level at 2.5W/MHz). Total radio power is 340W.

BAND EDGE COMPLIANCE - DUAL BAND

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

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

BAND EDGE COMPLIANCE - DUAL BAND

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

EUT:	AVQQA Remote Radio Head	Work Order:	NOKI0075
Serial Number:	L1242403137	Date:	2024-08-16
Customer:	Nokia Solutions and Networks	Temperature:	23.3°C
Attendees:	David Le, John Rattanavong	Relative Humidity:	52.1%
Customer Project:	None	Bar. Pressure (PMSL):	1016 mbar
Tested By:	Jarrod Brenden	Job Site:	PT14
Power:	54VDC	Configuration:	NOKI0075-3 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.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

Tested By

TEST RESULTS

	Frequency Range	Frequency (MHz)	Value (dBm)	Limit (dBm)	Result
Port 1					
QPSK Modulation					
Test Case 1					
	3449 MHz to 3450 MHz	3450	-32.877	-31.1	Pass
	3448 MHz to 3449 MHz	N/A	-33.98	-31.1	Pass
	3440 MHz to 3448 MHz	3447.952	-34.739	-31.1	Pass
	3430 MHz to 3440 MHz	3438.52	-51.659	-43.1	Pass
	3979 MHz to 3981 MHz	3980	-32.454	-31.1	Pass
	3981 MHz to 3982 MHz	N/A	-33.32	-31.1	Pass
	3982 MHz to 4000 MHz	3982.144	-33.02	-31.1	Pass
Test Case 2					
	3549 MHz to 3551 MHz	3550	-35.845	-31.1	Pass
	3551 MHz to 3532 MHz	N/A	-33.32	-31.1	Pass
	3552 MHz to 3560 MHz	3552.064	-34.799	-31.1	Pass
	3560 MHz to 3570 MHz	3560.03	-51.262	-43.1	Pass
	3699 MHz to 3701 MHz	3700	-34.904	-31.1	Pass
	3698 MHz to 3699 MHz	N/A	-33.81	-31.1	Pass
	3680 MHz to 3698 MHz	3697.982	-33.669	-31.1	Pass

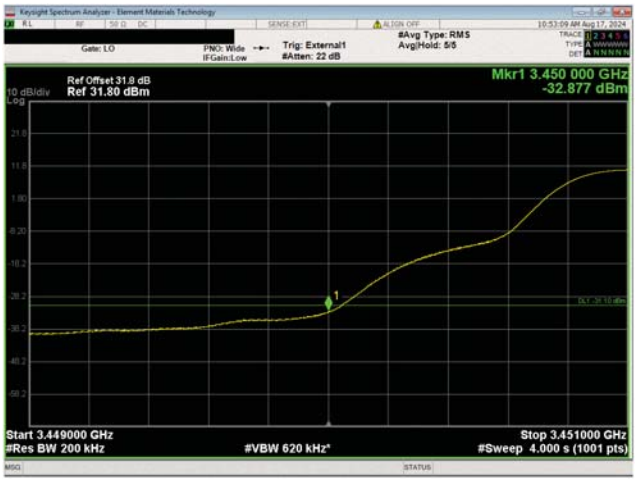
BAND EDGE COMPLIANCE - DUAL BAND

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

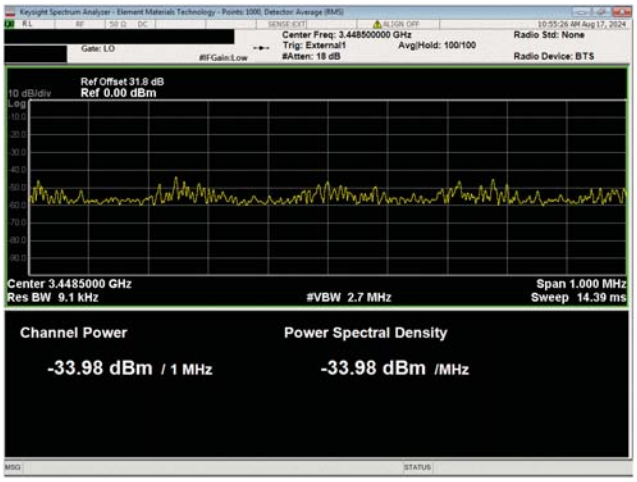
	Frequency Range	Frequency (MHz)	Value (dBm)	Limit (dBm)	Result
Test Case 3					
	3449 MHz to 3450 MHz	3450	-34.975	-31.1	Pass
	3448 MHz to 3449 MHz	N/A	-33.12	-31.1	Pass
	3440 MHz to 3448 MHz	3447.976	-33.891	-31.1	Pass
	3430 MHz to 3440 MHz	3438.3	-50.977	-43.1	Pass
	3980 MHz to 3981 MHz	N/A	-31.94	-31.1	Pass
	3981 MHz to 3982 MHz	N/A	-32.04	-31.1	Pass
	3982 MHz to 4000 MHz	3982	-32.357	-31.1	Pass

BAND EDGE COMPLIANCE - DUAL BAND

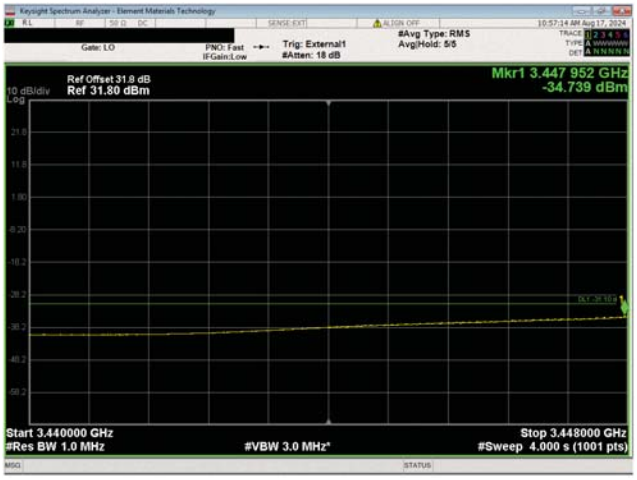
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



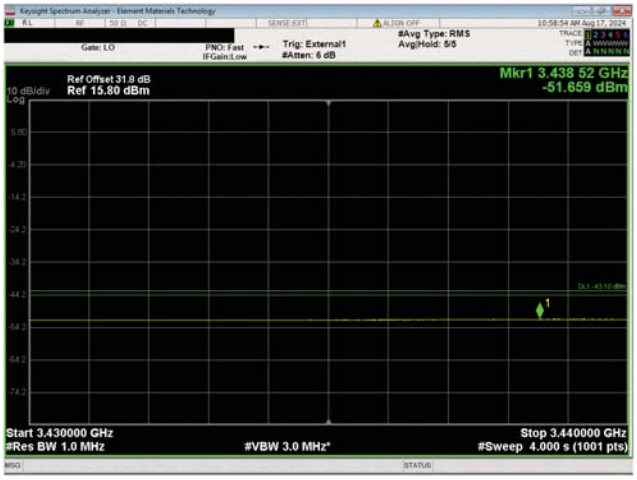
Port 1
QPSK Modulation
Test Case 1



Port 1
QPSK Modulation
Test Case 1



Port 1
QPSK Modulation
Test Case 1

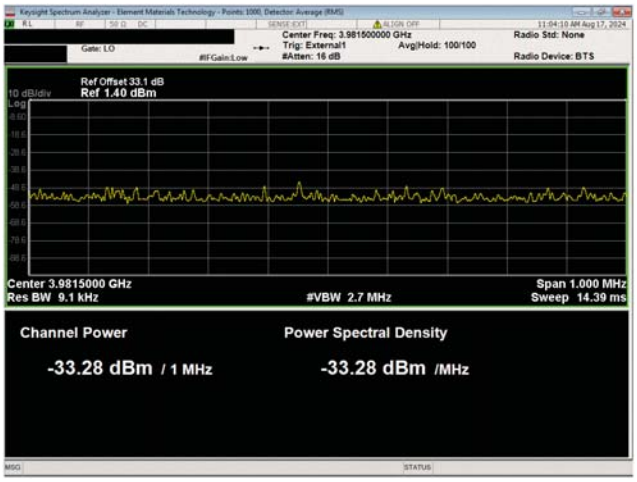


Port 1
QPSK Modulation
Test Case 1

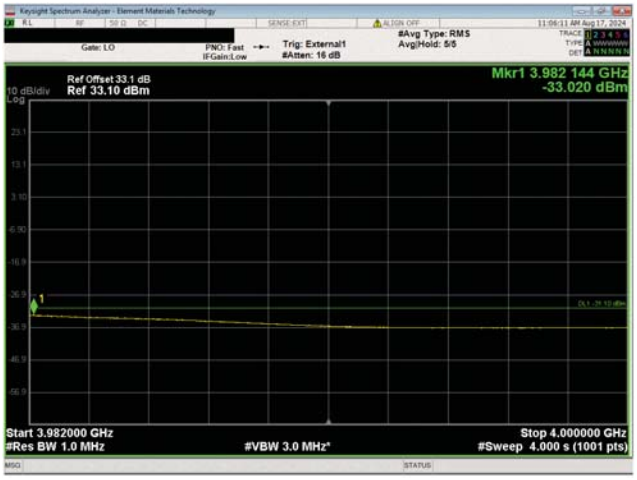
BAND EDGE COMPLIANCE - DUAL BAND

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

Port 1
QPSK Modulation
Test Case 1



Port 1
QPSK Modulation
Test Case 1

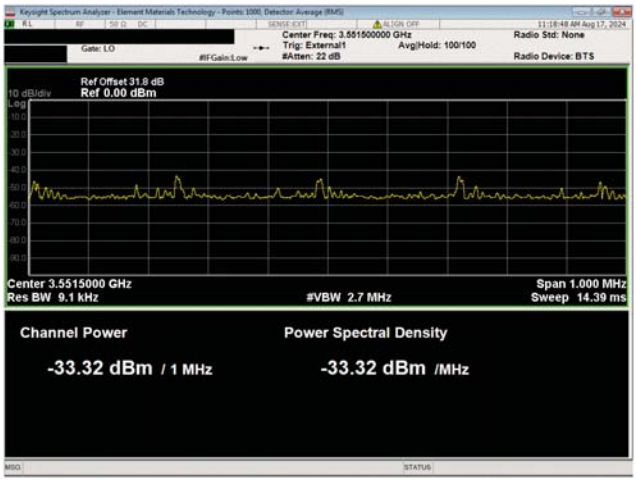


Port 1
QPSK Modulation
Test Case 1

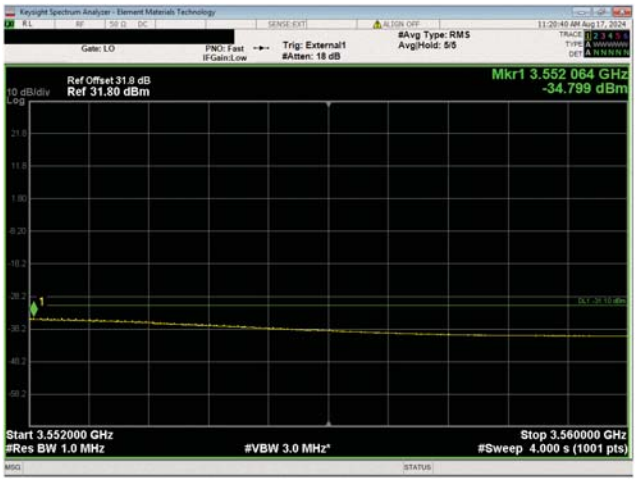
Port 1
QPSK Modulation
Test Case 2

BAND EDGE COMPLIANCE - DUAL BAND

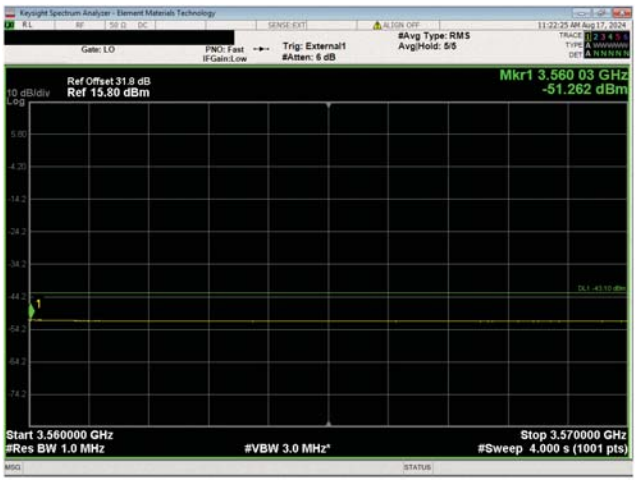
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



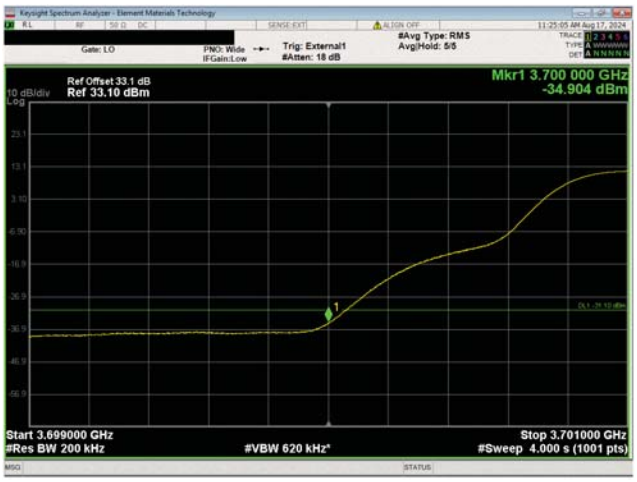
Port 1
QPSK Modulation
Test Case 2



Port 1
QPSK Modulation
Test Case 2



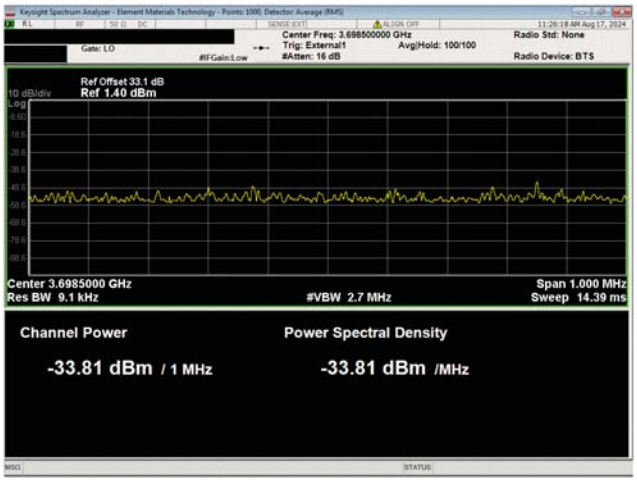
Port 1
QPSK Modulation
Test Case 2



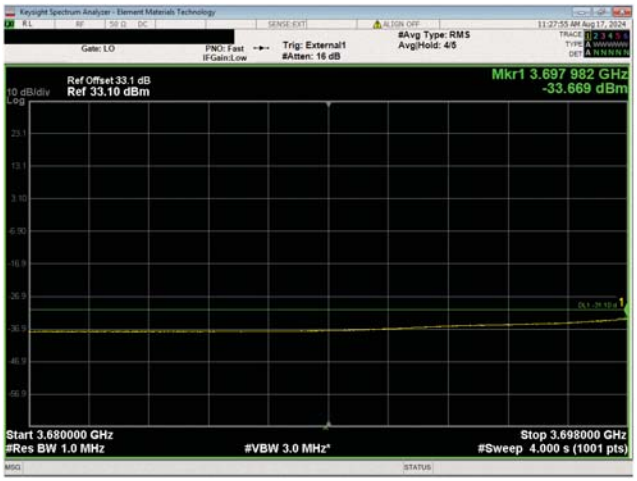
Port 1
QPSK Modulation
Test Case 2

BAND EDGE COMPLIANCE - DUAL BAND

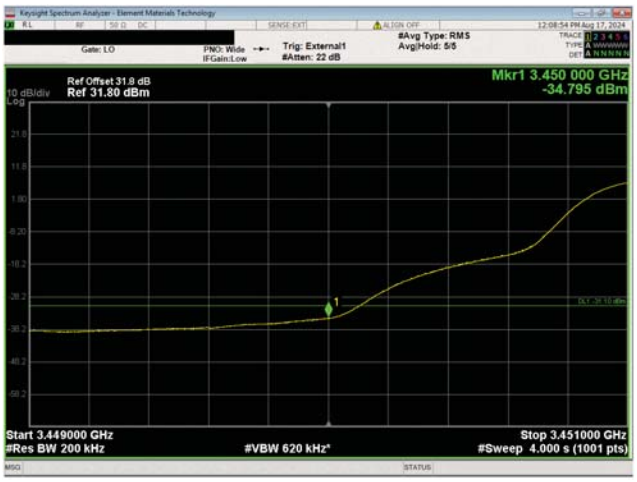
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



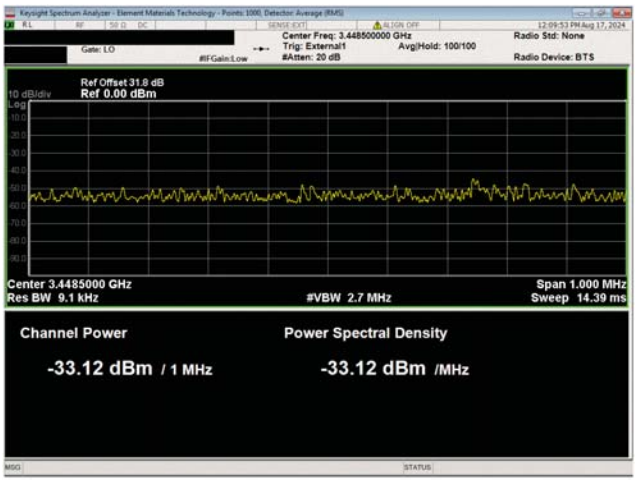
Port 1
QPSK Modulation
Test Case 2



Port 1
QPSK Modulation
Test Case 2



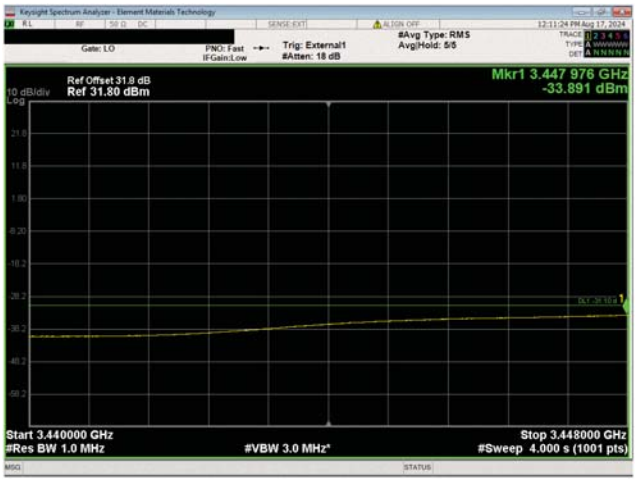
Port 1
QPSK Modulation
Test Case 3



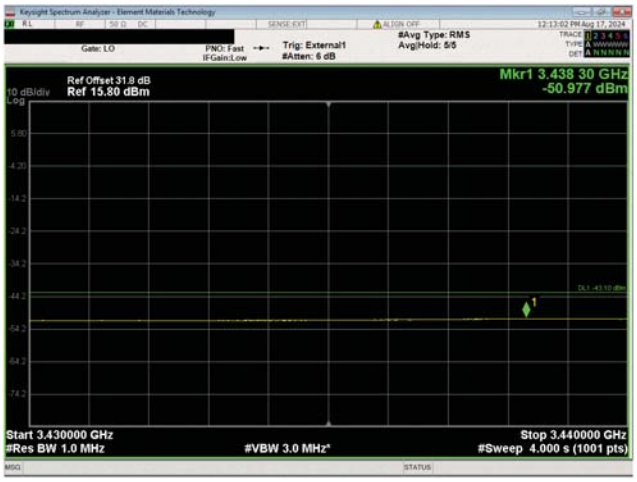
Port 1
QPSK Modulation
Test Case 3

BAND EDGE COMPLIANCE - DUAL BAND

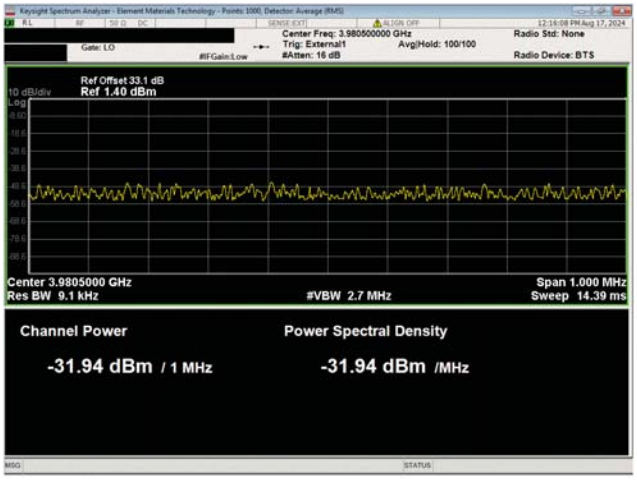
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



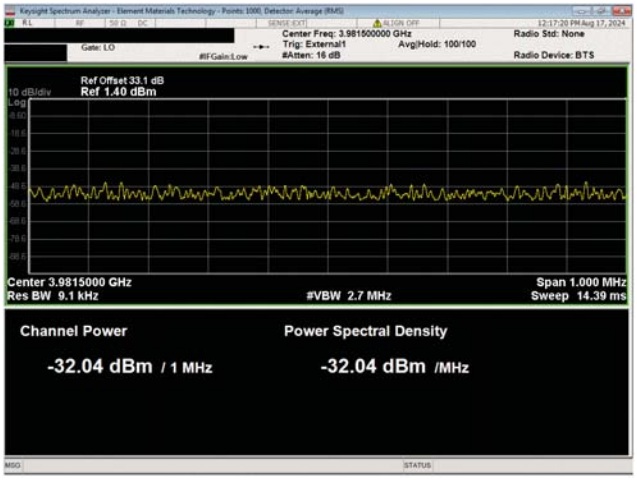
Port 1
QPSK Modulation
Test Case 3



Port 1
QPSK Modulation
Test Case 3



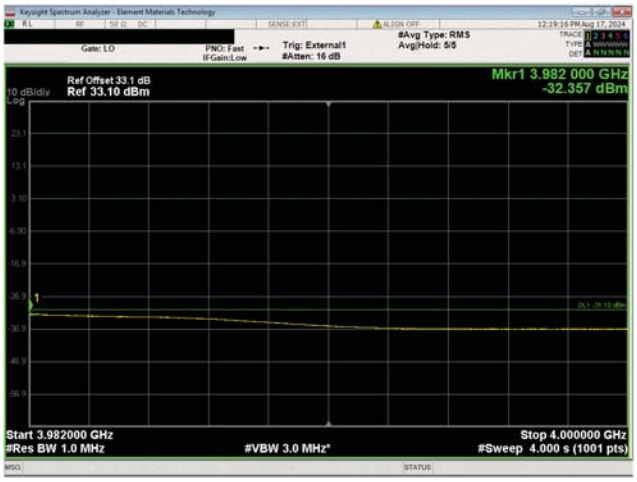
Port 1
QPSK Modulation
Test Case 3



Port 1
QPSK Modulation
Test Case 3

BAND EDGE COMPLIANCE - DUAL BAND

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



Port 1
QPSK Modulation
Test Case 3

BAND EDGE COMPLIANCE – MULTICARRIER, BAND 3.7G

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 spurious RF conducted emissions at the edges of the authorized bands were measured on the low and high transmit frequencies of the available band. The channels closest to the band edges were selected. The EUT was transmitting at the power and data rate(s) listed in the datasheet.

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 paragraph 5.7.2i.

The spectrum was scanned below the lower band edge and above the higher band edge.

Per section 27.53(l)(1), the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. The limit is adjusted to -31.1 dBm [-13 dBm -10 log (64)] per FCC KDB 662911D01 v02r01 and ANSI C63.26-2015 section 6.4 because the BTS may operate as a 64 port MIMO transmitter.

Per 27.53(l)(1), emissions seen up to 1 MHz outside of authorized operating frequency range band edges shall be measured with a RBW of 1% of the measured emission bandwidth. Any emission seen to be > 1 MHz further outside the band edges shall be measured with a RBW of 1 MHz. However, a narrower RBW of at least 1% of the emission bandwidth is still allowed provided that the measured power is integrated over the full reference bandwidth of 1 MHz.

The band edge testing was performed using only one modulation type because the Occupied Bandwidth variation between modulation types is small, the average output power variation between modulation types is small and there is significant/good passing margin. The QPSK modulation type was used. (See ANSI C63.26. clause 5.7.2e).

3.7G Band multi-carrier operations test cases using QPSK only:

a. *3.7G Band Multicarrier Test Case 1:* Two contiguous NR20 carriers with minimum spacing between carrier frequencies at the lower band edge (3710.01 & 3730.02MHz). The smallest channel bandwidth is selected to maximize carrier power spectral density. The carriers are operated at maximum power (~1.56W/carrier) with a total radio power of 200 watts.

b. *3.7G Band Multicarrier Test Case 2:* Two contiguous NR20 carriers with minimum spacing between carrier frequencies at the upper band edge (3949.98 & 3969.99 MHz). The smallest channel bandwidth is selected to maximize carrier power spectral density. The carriers are operated at maximum power (~1.56W/carrier) with a total radio power of 200 watts.

c. *3.7G Band Multicarrier Test Case 3:* Two contiguous NR100 carriers with minimum spacing between carrier frequencies at the lower band edge (3750.00 & 3850.02MHz). The largest channel bandwidth is selected to maximize radio power. The carrier power for NR100 is ~2.65W/carrier. The total radio power is 340 watts.

d. *3.7G Band Multicarrier Test Case 4:* Two contiguous NR100 carriers with minimum spacing between carrier frequencies at the upper band edge (3830.01 & 3930.00 MHz). The largest channel bandwidth is selected to maximize radio power The carrier power for NR100 is ~2.65W/carrier. The total radio power is 340 watts.

e. *3.7G Band Multicarrier Test Case 5:* Two non-contiguous NR20 carriers with maximum spacing between carrier frequencies at the lower band edge (3710.01 & 3889.995MHz). The smallest channel bandwidth is selected to maximize carrier power spectral density. The carriers are operated at maximum power (~1.56W/carrier) with a total radio power of 200 watts.

BAND EDGE COMPLIANCE – MULTICARRIER, BAND 3.7G

f. *3.7G Band Multicarrier Test Case 6:* Two non-contiguous NR20 carriers with maximum spacing between carrier frequencies at the upper band edge (3789.99 & 3969.99MHz). The smallest channel bandwidth is selected to maximize carrier power spectral density. The carriers are operated at maximum power (~1.56W/carrier) with a total radio power of 200 watts.

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

BAND EDGE COMPLIANCE – MULTICARRIER, BAND 3.7G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

EUT:	AVQQA Remote Radio Head	Work Order:	NOKI0075
Serial Number:	L1242403137	Date:	2024-08-21
Customer:	Nokia Solutions and Networks	Temperature:	23.3°C
Attendees:	David Le, John Rattanavong	Relative Humidity:	52.1%
Customer Project:	None	Bar. Pressure (PMSL):	1016 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.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

Tested By

TEST RESULTS

	Frequency Range	Frequency (MHz)	Value (dBm)	Limit (dBm)	Result
Port 1					
QPSK Modulation					
Test Case 1					
NR20, Low Channel, 3710.01 MHz and NR20, Low Channel 3730.02 MHz	3699 MHz to 3701 MHz	3700	-34.101	-31.1	Pass
	3698 MHz to 3699 MHz	N/A	-32.68	-31.1	Pass
	3550 MHz to 3698 MHz	3698	-33.736	-31.1	Pass
Test Case 2					
NR20, High Channel 3949.98 MHz and NR20, High Channel 3969.99 MHz	3979 MHz to 3981 MHz	3980	-35.465	-31.1	Pass
	3981 MHz to 3982 MHz	N/A	-33.41	-31.1	Pass
	3982 MHz to 4130 MHz	3982	-33.466	-31.1	Pass
Test Case 3					
NR100, Low Channel 3750.00 MHz and NR100, Low Channel 3850.02 MHz	3699 MHz to 3700 MHz	N/A	-32.79	-31.1	Pass
	3698 MHz to 3699 MHz	N/A	-33.12	-31.1	Pass
	3550 MHz to 3698 MHz	3698	-33.037	-31.1	Pass
Test Case 4					
NR100, High Channel 3830.01 MHz and NR100, High Channel 3930.00 MHz	3980 MHz to 3981 MHz	N/A	-32	-31.1	Pass
	3981 MHz to 3982 MHz	N/A	-32.03	-31.1	Pass
	3982 MHz to 4130 MHz	3982.44	-32.102	-31.1	Pass
Test Case 5					
NR20, Low Channel 3710.01 MHz and NR20, Low Channel, 3889.995 MHz	3699 MHz to 3701 MHz	3700	-36.125	-31.1	Pass
	3698 MHz to 3699 MHz	N/A	-32.96	-31.1	Pass
	3550 MHz to 3698 MHz	3697.852	-34.142	-31.1	Pass

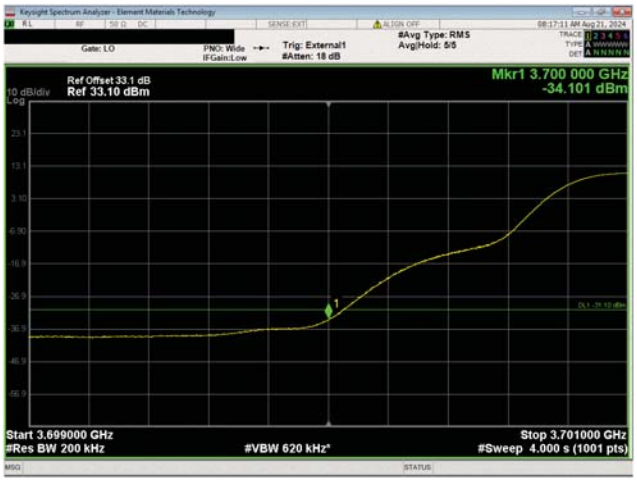
BAND EDGE COMPLIANCE – MULTICARRIER, BAND 3.7G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

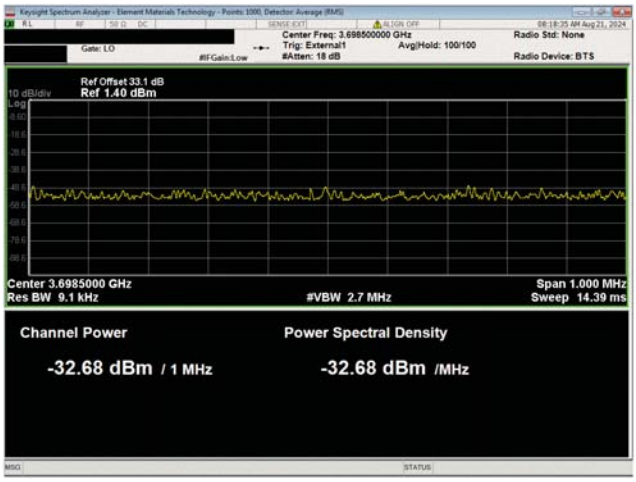
	Frequency Range	Frequency (MHz)	Value (dBm)	Limit (dBm)	Result
Test Case 6					
NR20, High Channel 3789.99 MHz and NR20, High Channel 3969.99 MHz	3979 MHz to 3981 MHz	3980	-33.592	-31.1	Pass
	3981 MHz to 3982 MHz	N/A	-31.87	-31.1	Pass
	3982 MHz to 4130 MHz	3982	-31.834	-31.1	Pass

BAND EDGE COMPLIANCE – MULTICARRIER, BAND 3.7G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



Port 1
QPSK Modulation
Test Case 1



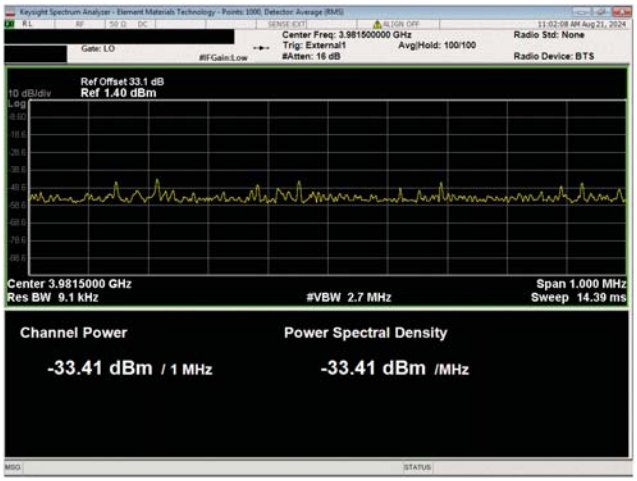
Port 1
QPSK Modulation
Test Case 1

Port 1
QPSK Modulation
Test Case 1

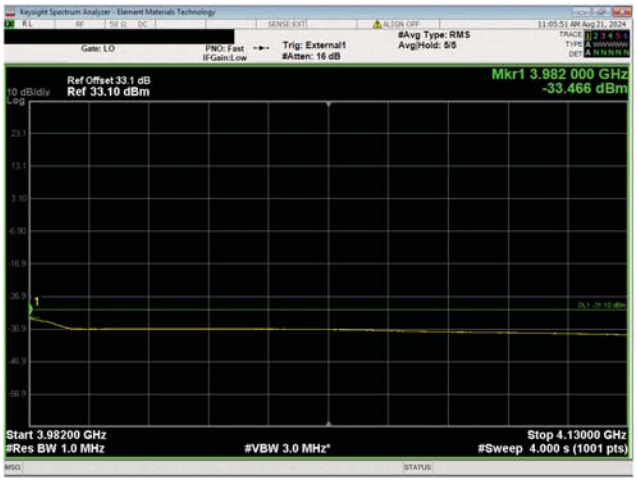
Port 1
QPSK Modulation
Test Case 2

BAND EDGE COMPLIANCE – MULTICARRIER, BAND 3.7G

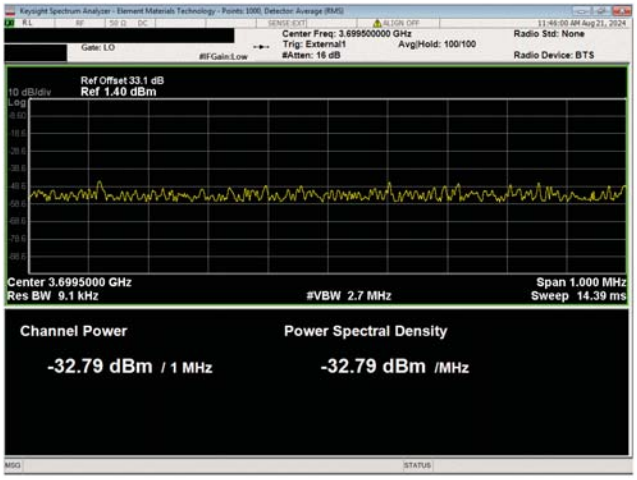
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



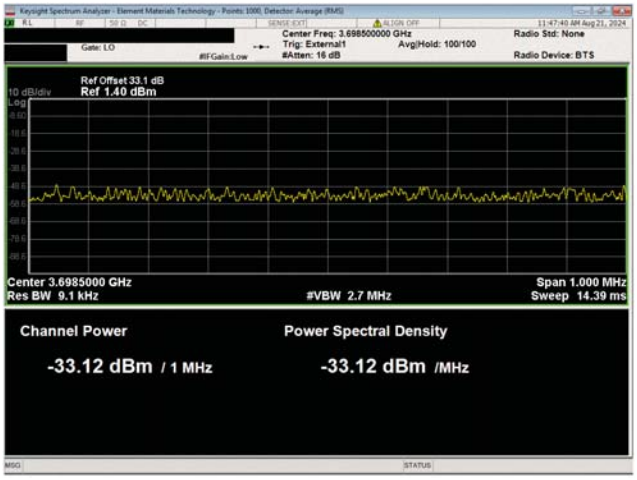
Port 1
QPSK Modulation
Test Case 2



Port 1
QPSK Modulation
Test Case 2



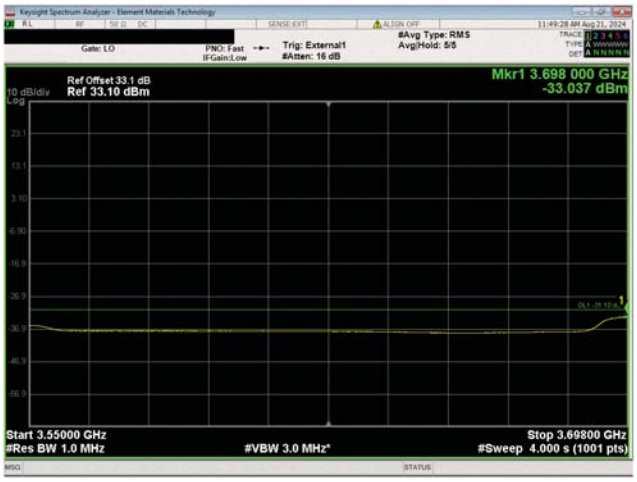
Port 1
QPSK Modulation
Test Case 3



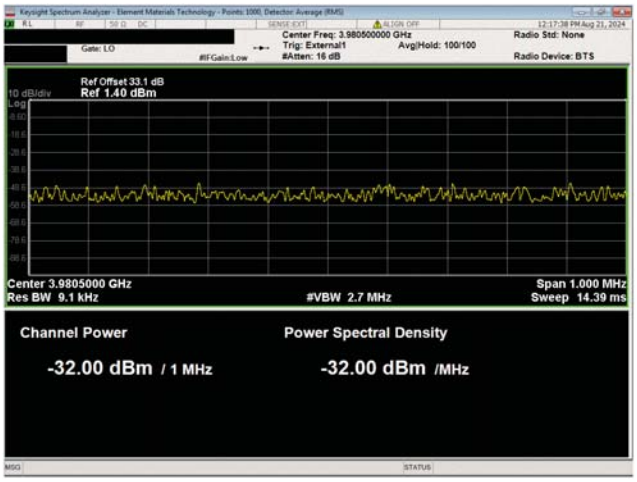
Port 1
QPSK Modulation
Test Case 3

BAND EDGE COMPLIANCE – MULTICARRIER, BAND 3.7G

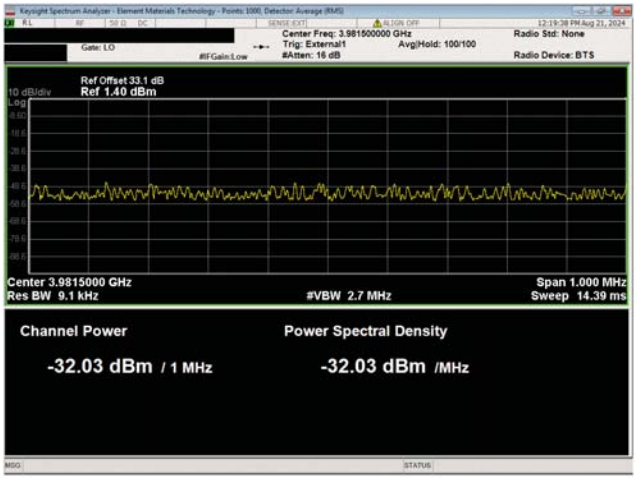
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



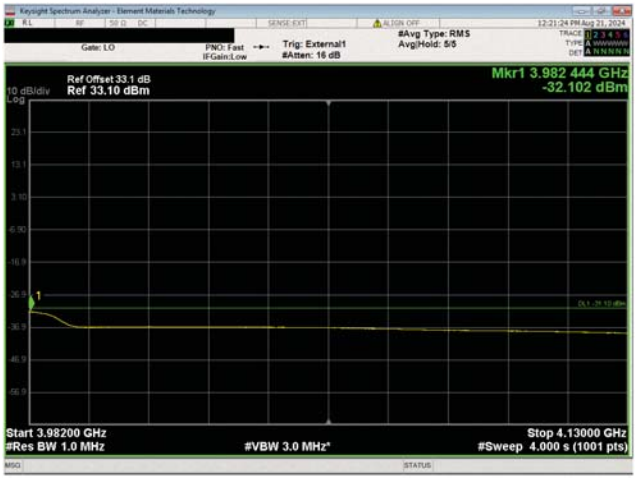
Port 1
QPSK Modulation
Test Case 3



Port 1
QPSK Modulation
Test Case 4



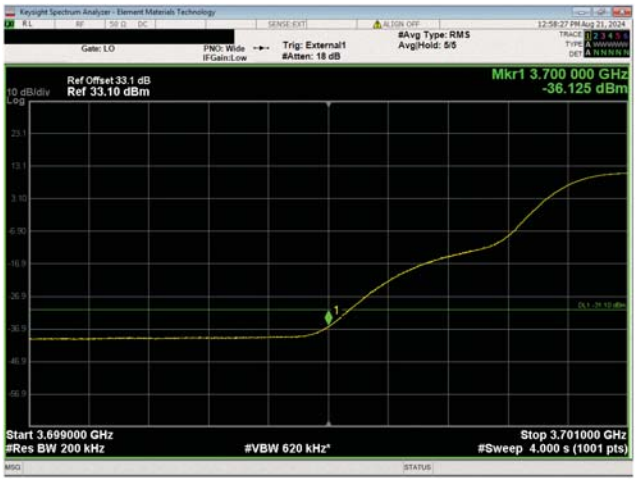
Port 1
QPSK Modulation
Test Case 4



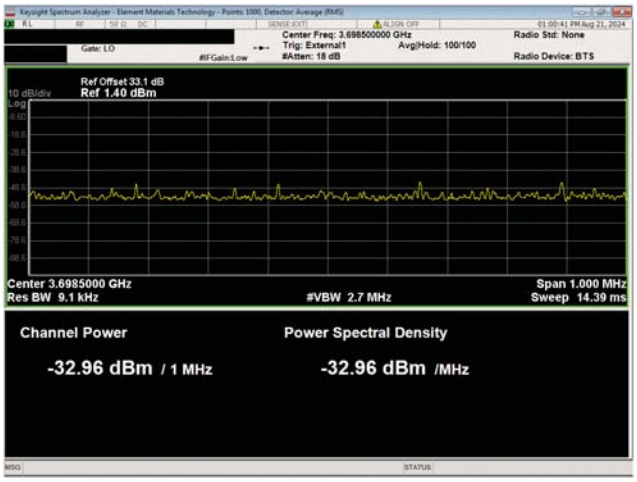
Port 1
QPSK Modulation
Test Case 4

BAND EDGE COMPLIANCE – MULTICARRIER, BAND 3.7G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



Port 1
QPSK Modulation
Test Case 5



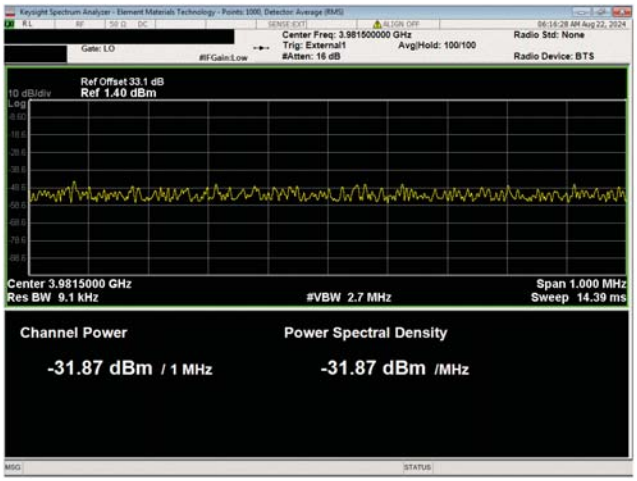
Port 1
QPSK Modulation
Test Case 5

Port 1
QPSK Modulation
Test Case 5

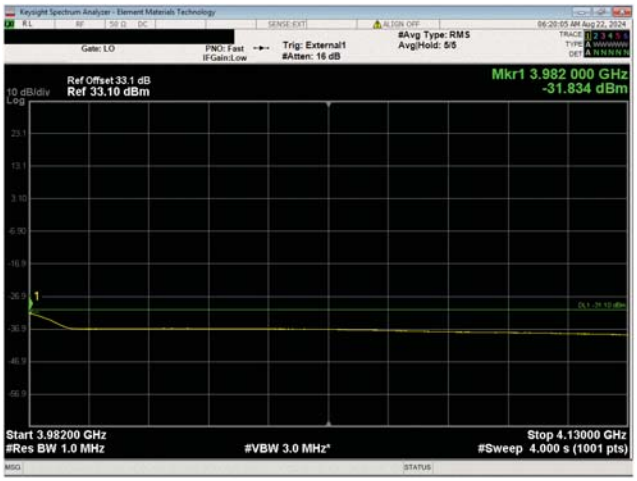
Port 1
QPSK Modulation
Test Case 6

BAND EDGE COMPLIANCE – MULTICARRIER, BAND 3.7G

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



Port 1
QPSK Modulation
Test Case 6



Port 1
QPSK Modulation
Test Case 6