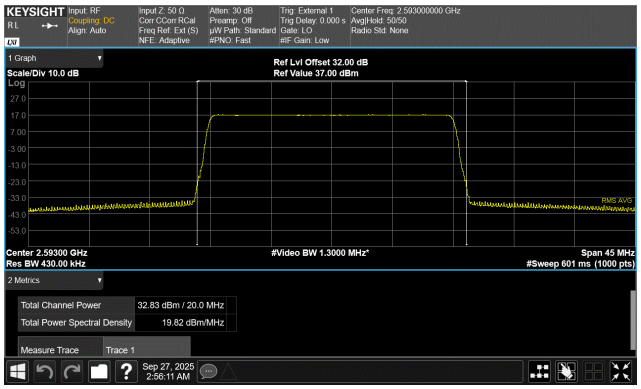
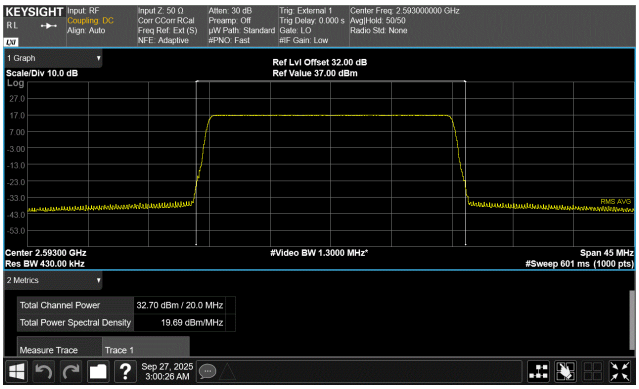
AVERAGE POWER – ALL PORTS

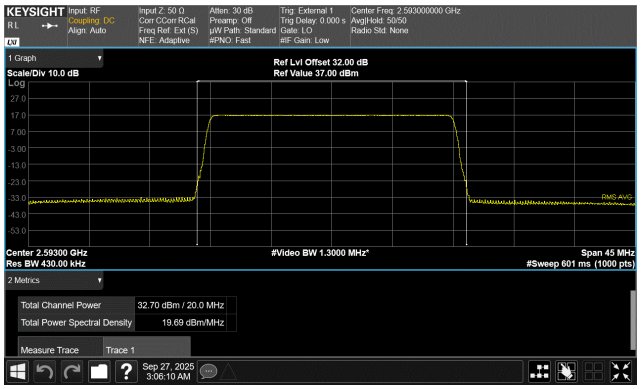
element
TbtTx 2025.05.09.1
WTD.2025.07.14.0



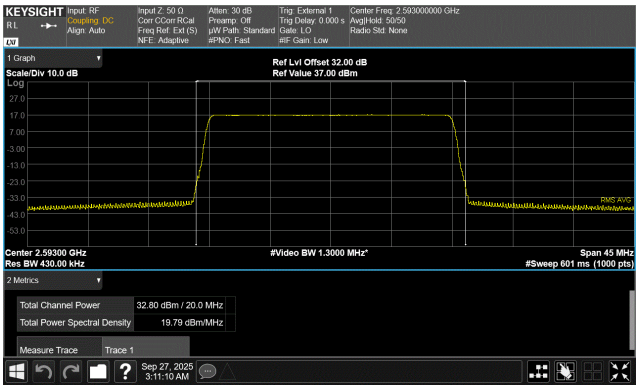
20 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 2593.00 MHz
Port 61



20 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 2593.00 MHz
Port 62



20 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 2593.00 MHz
Port 63



20 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 2593.00 MHz
Port 64

AVERAGE POWER & EIRP CALCULATIONS

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

TEST DESCRIPTION

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

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

The RRH antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the "Output Power - All Ports" report section of this report). Antenna port 1 was selected to perform this testing as allowed by ANSI C63.26 paragraphs 5.2.5.3, 5.7.2i and 6.4.

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

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.

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

FCC Requirements: §27.50 Power limits and duty cycle.

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

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

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

AVERAGE POWER & EIRP CALCULATIONS

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

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

EIRP calculations are needed at each transmitter location to optimize base station operational performance while meeting regulatory requirements. Each cell site installation needs to consider the power measurements in the radio certification report as well as site specific regulatory requirements (such as antenna height, population density, etc.), site installation parameters (line loss between antenna and radio, antenna parameters, etc.) and base station operational parameters (MIMO operational setup, carrier power level, channel bandwidth, modulation type, etc.) to optimize performance. Transmitter output power may be reduced in 0.1dB increments within the parameters of the base station configuration.

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

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

Parameter	10MHz Ch BW	15MHz Ch BW	20MHz Ch BW
Highest Power per Antenna Port	31 dBm	31.9 dBm	32.8 dBm
Ant Ports per Pol (+15.1dB)	32	32	32
Total Power per Pol	46.1 dBm	47 dBm	47.9 dBm
Max Ant Beamforming Gain per Pol	26.0dBi	26.0dBi	26.0dBi
EIRP per Polarization	72.1 dBm	73 dBm	73.9 dBm
Number of Polarizations	2	2	2
EIRP Total (See Note 1)	72.1 dBm	73 dBm	73.9 dBm
EIRP Limit Calculation (See Note 2)	79.0 dBm	80.8 dBm	82 dBm

Note 1: The EIRP per antenna polarity is required to be below the regulatory limit as described in ANSI C63.26-2015 section 6.4.6.3 b)2) and KDB 662911 D02v01 page 3 example (2) since the two transmitter outputs to each antenna are 90 degree-phase shifted relative to each other (cross-polarized radiators).

Note 2: The EIRP limit is defined by FCC part 27.50(h)(ii) as 33dBW+ 10Log(X/Y) dBW + 10 log(360/beamwidth) dBW where X is the channel width in MHz and Y is 5.5 or 6MHz. The AVHA antenna horizontal beamwidth is 13 ± 2 degrees or a maximum of 15 degrees. Y was selected to be 6MHz for this calculation.

Calculation Summary

The worst-case AVHA sixty-four port MIMO EIRP levels for all 4G LTE channel bandwidths are less than the FCC regulatory limits.

AVERAGE POWER & EIRP CALCULATIONS

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

TEST EQUIPMENT

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

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

AVERAGE POWER & EIRP CALCULATIONS

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

EUT:	Airscale Base Transceiver Station Radio Unit AVHA	Work Order:	NOKI0088
Serial Number:	L1252603387	Date:	2025-09-29
Customer:	Nokia Solutions and Networks	Temperature:	28.5°C
Attendees:	David Le, Mitch Hill	Relative Humidity:	33.1%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Jarrod Brenden	Job Site:	PT14
Power:	54VDC	Configuration:	NOKI0088-2

COMMENTS

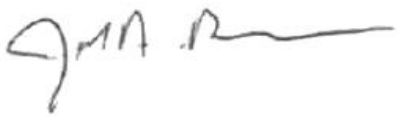
All losses in the measurement path were accounted for in the reference level offset; attenuators, filters, cables, and DC blocks. Carriers were enabled at maximum power levels.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



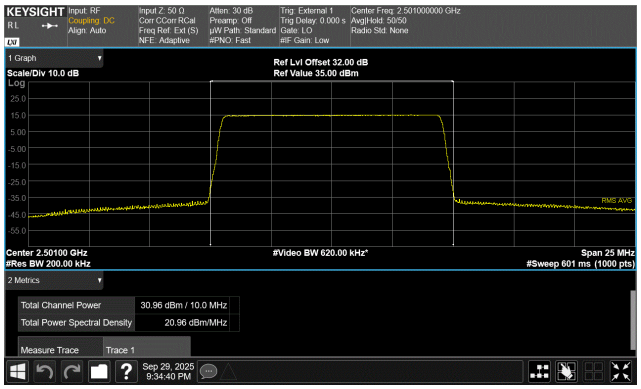
Tested By

TEST RESULTS

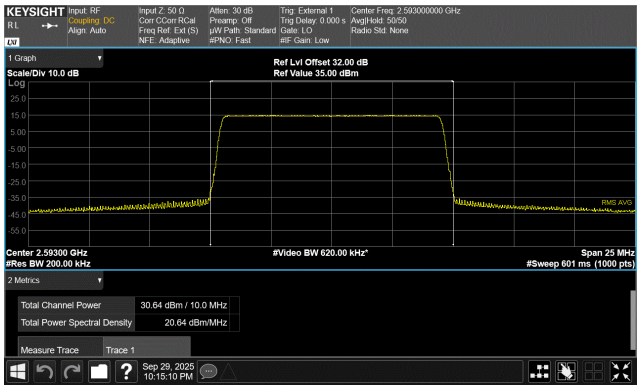
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Sixty-four Port (64x64 MIMO) dBm/carrier BW
Port 1				
10 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 2501.00 MHz	30.958	0	31	49.1
Middle Channel, 2593.00 MHz	30.638	0	30.6	48.7
High Channel, 2685.00 MHz	30.672	0	30.7	48.8
15 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 2503.50 MHz	31.852	0	31.9	50.0
Middle Channel, 2593.00 MHz	31.632	0	31.6	49.7
High Channel, 2682.50 MHz	31.679	0	31.7	49.8
20 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 2506.00 MHz	32.817	0	32.8	50.9
Middle Channel, 2593.00 MHz	32.597	0	32.6	50.7
High Channel, 2680.00 MHz	32.665	0	32.7	50.8
16QAM Modulation				
Middle Channel, 2593.00 MHz	32.6	0	32.6	50.7
64QAM Modulation				
Middle Channel, 2593.00 MHz	32.562	0	32.6	50.7
256QAM Modulation				
Middle Channel, 2593.00 MHz	32.577	0	32.6	50.7

AVERAGE POWER & EIRP CALCULATIONS

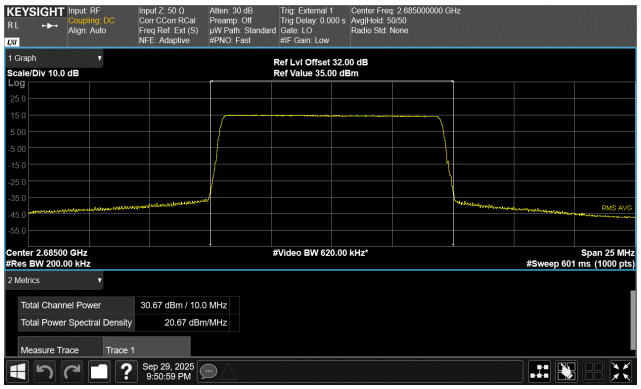
element
TbtTx 2025.05.09.1
WTD.2025.07.14.0



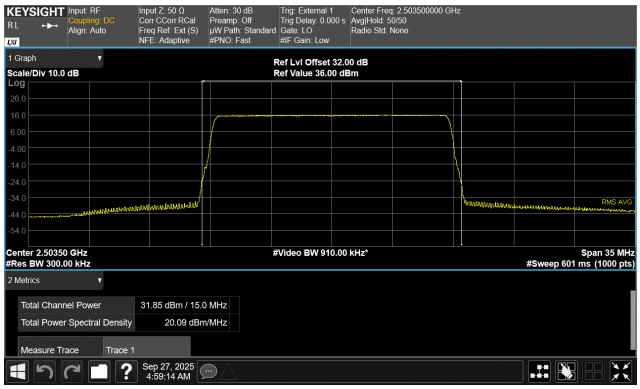
Port 1
10 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 2501.00 MHz



Port 1
10 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 2593.00 MHz

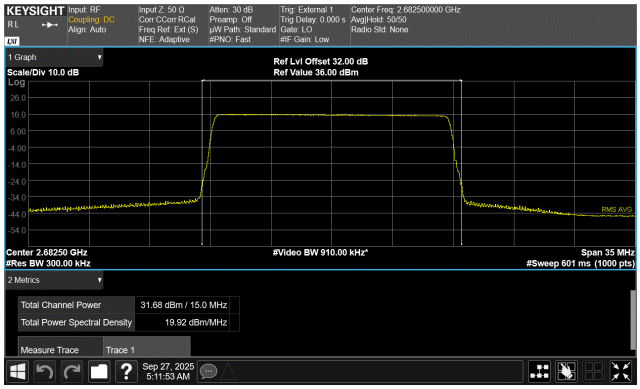


Port 1
10 MHz Channel Bandwidth
QPSK Modulation
High Channel, 2685.00 MHz



Port 1
15 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 2503.50 MHz

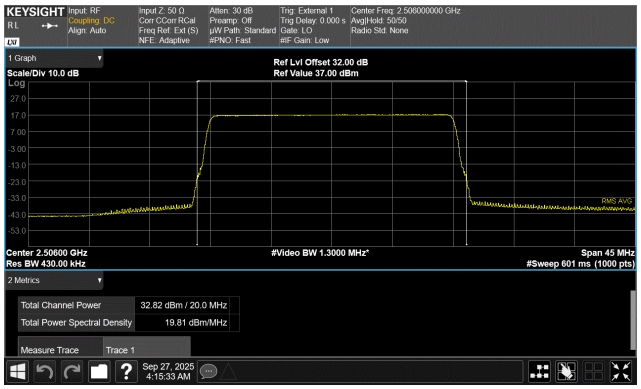
Port 1
15 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 2593.00 MHz



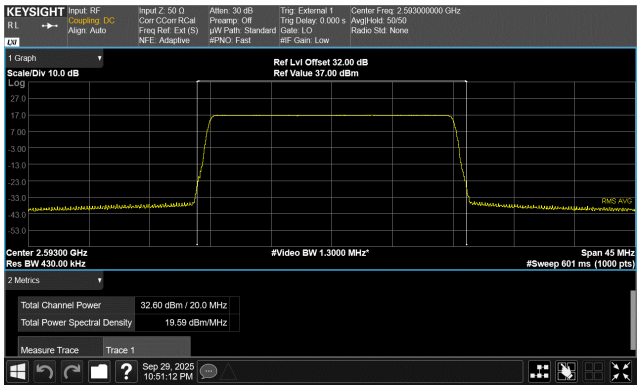
Port 1
15 MHz Channel Bandwidth
QPSK Modulation
High Channel, 2682.50 MHz

AVERAGE POWER & EIRP CALCULATIONS

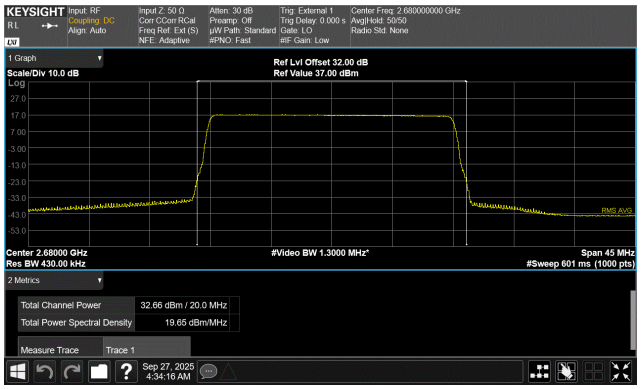
element
TbtTx 2025.05.09.1
WTD.2025.07.14.0



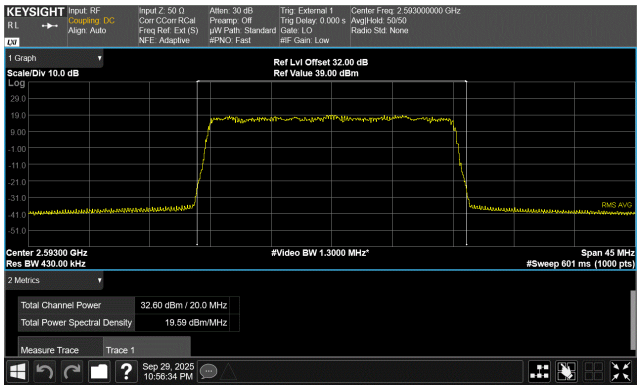
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 2506.00 MHz



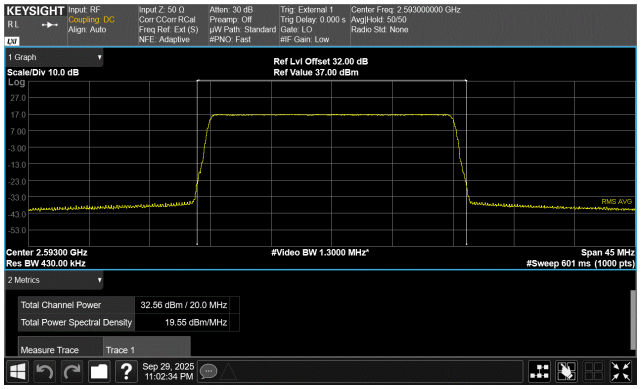
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 2593.00 MHz



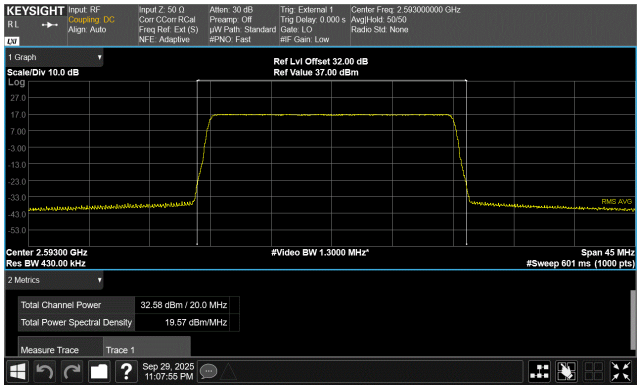
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
High Channel, 2680.00 MHz



Port 1
20 MHz Channel Bandwidth
16QAM Modulation
Middle Channel, 2593.00 MHz



Port 1
20 MHz Channel Bandwidth
64QAM Modulation
Middle Channel, 2593.00 MHz



Port 1
20 MHz Channel Bandwidth
256QAM Modulation
Middle Channel, 2593.00 MHz

AVERAGE POWER - LTE MULTICARRIER

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

TEST DESCRIPTION

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

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

The RRH antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the "Output Power - All Ports" report section of this report). Antenna port 1 was selected to perform this testing as allowed by ANSI C63.26 paragraphs 5.2.5.3, 5.7.2i and 6.4.

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

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.

The RMS average power measurement method for FCC is detailed in section 5.2 of KDB 971168 D01v03r01 and ANSI C63.26-2015 section 5.2.4.4.

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

4G LTE Multicarrier test cases have been developed as shown below:

a) 4G LTE Multicarrier test case A: Two contiguous LTE10 carriers with minimum spacing between carrier frequencies at the lower band edge (2501MHz, 2511MHz) (EARFCN: 39700, 39800). The smallest channel bandwidth is selected to maximize carrier power spectral density. The carriers operate at maximum power (80W/carrier or TRX power is 31dbm/carrier) with a total radio power of 160 watts.

b) 4G LTE Multicarrier test case B: Two contiguous LTE10 carriers with minimum spacing between carrier frequencies at the upper band edge (2675MHz, 2685MHz) (EARFCN: 41440, 41540). The smallest channel bandwidth is selected to maximize carrier power spectral density. The carriers operate at maximum power (80W/carrier or TRX power is 31dbm/carrier) with a total radio power of 160 watts.

c) 4G LTE Multicarrier test case C: Two non-contiguous LTE10 Carriers (maximum spacing between carriers) with one carrier at the lower band edge (2501MHz/EARFCN: 39700) and one carrier at the upper band edge (2685MHz/EARFCN: 41540). The carriers operate at maximum power (80W/carrier or TRX power is 31dbm/carrier) with a total radio power of 160 watts.

d) 4G LTE Multicarrier test case D: Two Non-contiguous carriers (maximum spacing between carriers) with one LTE20 Carrier at the lower band edge (2506MHz/EARFCN: 39750) and one LTE20 Carrier at the upper band edge (2680MHz/EARFCN: 41490). The carriers operate at maximum power (125W/carrier or TRX power is 32.9dbm/carrier) with a total radio power of 250 watts.

AVERAGE POWER - LTE MULTICARRIER

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

TEST EQUIPMENT

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

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

AVERAGE POWER - LTE MULTICARRIER

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

EUT:	Airscale Base Transceiver Station Radio Unit AVHA	Work Order:	NOKI0088
Serial Number:	L1252603387	Date:	2025-09-29
Customer:	Nokia Solutions and Networks	Temperature:	27.1°C
Attendees:	David Le, Mitch Hill	Relative Humidity:	33%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Jarrod Brenden	Job Site:	PT14
Power:	54VDC	Configuration:	NOKI0088-2

COMMENTS

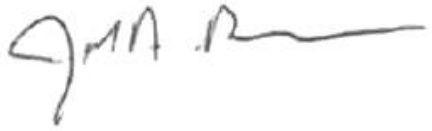
All losses in the measurement path were accounted for in the reference level offset; attenuators, filters, cables, and DC blocks. Carriers were enabled at maximum power levels.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



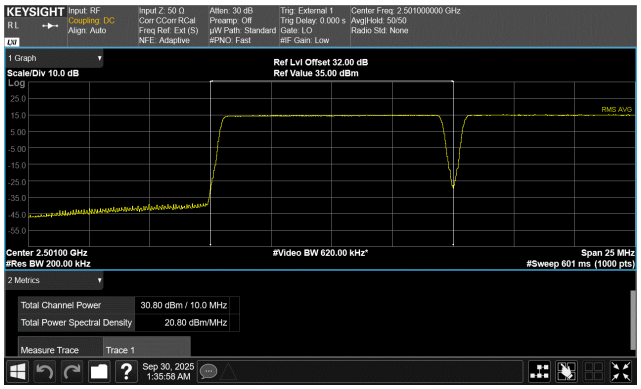
Tested By

TEST RESULTS

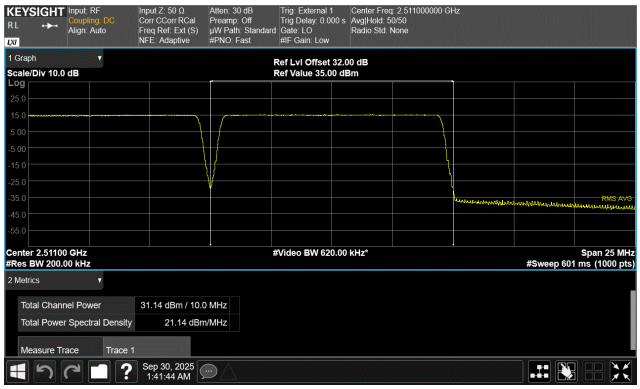
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Sixty-four Port (64x64 MIMO) dBm/carrier BW
Port 1				
QPSK Modulation				
Test Case A				
2501.00 MHz, LTE10	30.805	0	30.8	48.9
2511.00 MHz, LTE10	31.137	0	31.1	49.2
Test Case B				
2675.00 MHz, LTE10	30.971	0	31	49.1
2685.00 MHz, LTE10	30.505	0	30.5	48.6
Test Case C				
2501.00 MHz, LTE10	30.814	0	30.8	48.9
2685.00 MHz, LTE10	30.534	0	30.5	48.6
Test Case D				
2506.00 MHz, LTE20	32.71	0	32.7	50.8
2680.00 MHz, LTE20	32.543	0	32.5	50.6

AVERAGE POWER - LTE MULTICARRIER

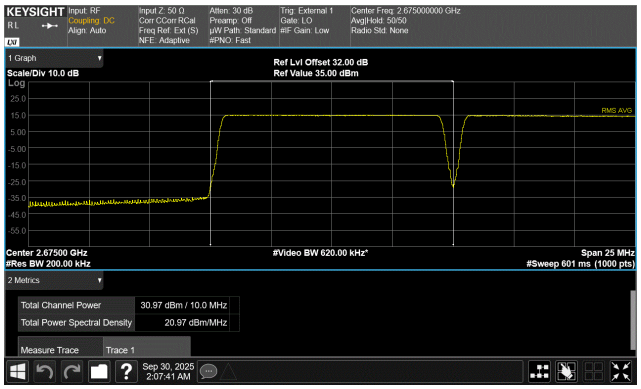
element
TbtTx 2025.05.09.1
WTD.2025.07.14.0



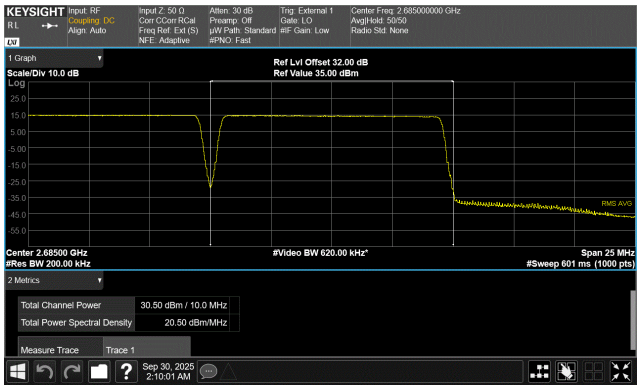
Port 1
QPSK Modulation
Test Case A
2501.00 MHz, LTE10



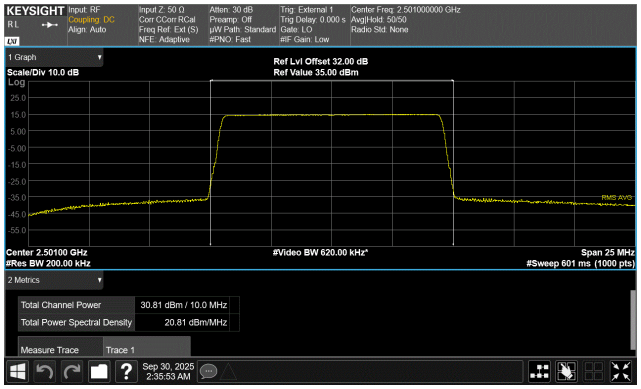
Port 1
QPSK Modulation
Test Case A
2511.00 MHz, LTE10



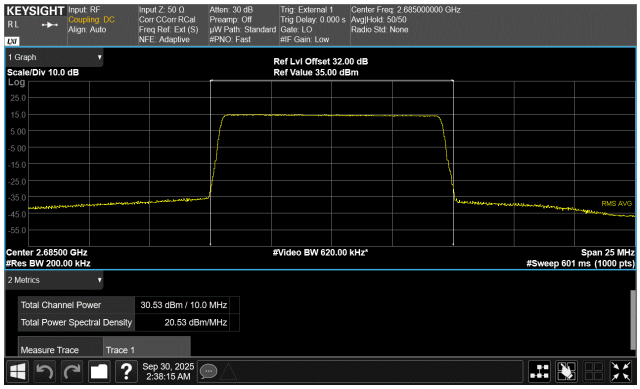
Port 1
QPSK Modulation
Test Case B
2675.00 MHz, LTE10



Port 1
QPSK Modulation
Test Case B
2685.00 MHz, LTE10



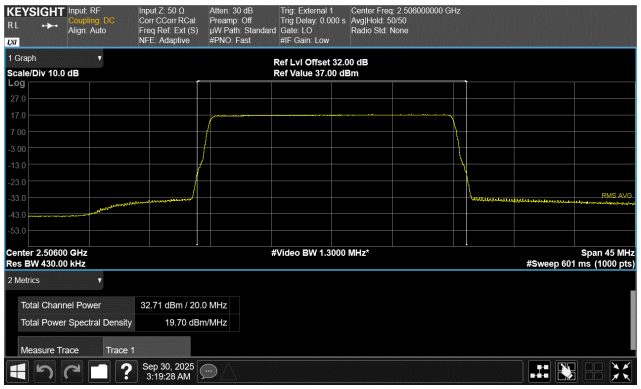
Port 1
QPSK Modulation
Test Case C
2501.00 MHz, LTE10



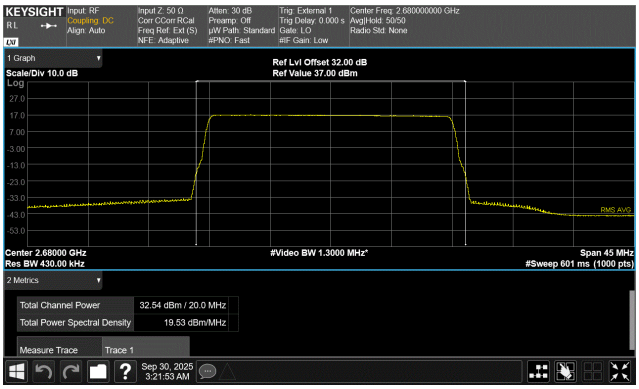
Port 1
QPSK Modulation
Test Case C
2685.00 MHz, LTE10

AVERAGE POWER - LTE MULTICARRIER

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0



Port 1
QPSK Modulation
Test Case D
2506.00 MHz, LTE20



Port 1
QPSK Modulation
Test Case D
2680.00 MHz, LTE20

AVERAGE POWER - MULTI-RAT

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

TEST DESCRIPTION

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

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

The RRH antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the "Output Power - All Ports" report section of this report). Antenna port 1 was selected to perform this testing as allowed by ANSI C63.26 paragraphs 5.2.5.3, 5.7.2i and 6.4.

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

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.

The RMS average power measurement method for FCC is detailed in section 5.2 of KDB 971168 D01v03r01 and ANSI C63.26-2015 section 5.2.4.4.

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

Multi-RAT (4G LTE/5G NR) Concurrent Operation test cases have been developed as shown below:

a) Multi-RAT Operation Test Case A: Two contiguous LTE20 carriers at the lower band edge (2506MHz, 2526MHz/EARFCN: 39750, 39950) with two contiguous NR50 carriers at minimum spacing from LTE carriers (2561.01MHz/NR-ARFCN: 512202 and 2611.02MHz/NR-ARFCN: 522204). The LTE20 carriers operate at 50W/carrier (PSD = 2.5W/MHz or 28.9dbm/carrier). The NR50 carriers operate at 150W/carrier (PSD = 3W/MHz or 33.7dbm/carrier). Total radio power is 400W.

b) Multi-RAT Operation Test Case B: Two contiguous LTE20 carriers at the upper band edge (2660MHz, 2680MHz/EARFCN: 41290, 41490) with two contiguous NR50 carriers at minimum spacing from LTE carriers (2625MHz/NR-ARFCN: 525000 and 2574.99MHz/NR-ARFCN: 514998). The LTE20 carriers operate at 50W/carrier (PSD = 2.5W/MHz or 28.9dbm/carrier). The NR50 carriers operate at 150W/carrier (PSD = 3W/MHz or 33.7dbm/carrier). Total radio power is 400W.

c) Multi-RAT Operation Test Case C: Two contiguous NR50 carriers at the lower band edge (2521.02MHz/NR-ARFCN: 504204 and 2571MHz/NR-ARFCN: 514200) and two contiguous LTE20 carriers at minimum spacing from NR carriers (2606MHz and 2626MHz/EARFCN: 40750 and 40950). The LTE20 carriers operate at 50W/carrier (PSD = 2.5W/MHz or 28.9dbm/carrier). The NR50 carriers operate at 150W/carrier (PSD = 3W/MHz or 33.7dbm/carrier). Total radio power is 400W.

d) Multi-RAT Operation Test Case D: Two contiguous NR50 carriers at the upper band edge (2664.99MHz/NR-ARFCN: 532998 and 2614.98MHz/NR-ARFCN: 522996) and two contiguous LTE20 carriers at minimum spacing from NR carriers (2580MHz and 2560MHz/EARFCN: 40490 and 40290). The LTE20 carriers operate at 50W/carrier (PSD = 2.5W/MHz or 28.9dbm/carrier). The NR50 carriers operate at 150W/carrier (PSD = 3W/MHz or 33.7dbm/carrier). Total radio power is 400W.

e) Multi-RAT Operation Test Case E: Two contiguous LTE10 carriers at the lower band edge (2501MHz, 2511MHz/EARFCN: 39700, 39800) and two contiguous NR10 at the upper band edge (2685MHz, 2675.01MHz/NR-ARFCN: 537000, 535002). All carriers operate at the same power level 50W/carrier (PSD = 5W/MHz or 28.9dbm/carrier). Total radio power is 200W.

f) Multi-RAT Operation Test Case F: Two contiguous LTE10 carriers at the upper band edge (2685MHz, 2675MHz/EARFCN: 41540, 41440) and two contiguous NR10 at the lower band edge (2501.01MHz, 2511MHz/NR-ARFCN: 500202, 502200). All carriers operate at the same power level 50W/carrier (PSD = 5W/MHz or 28.9dbm/carrier). Total radio power is 200W.

TEST EQUIPMENT

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

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

AVERAGE POWER - MULTI-RAT

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

EUT:	Airscale Base Transceiver Station Radio Unit AVHA	Work Order:	NOKI0088
Serial Number:	L1252603387	Date:	2025-09-30
Customer:	Nokia Solutions and Networks	Temperature:	27.7°C
Attendees:	David Le, Mitch Hill	Relative Humidity:	32.3%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Jarrod Brenden	Job Site:	PT14
Power:	54VDC	Configuration:	NOKI0088-2

COMMENTS

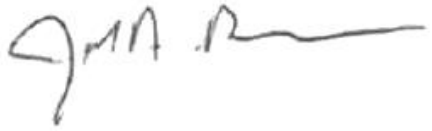
All losses in the measurement path were accounted for in the reference level offset; attenuators, filters, cables, and DC blocks. Carriers were enabled at maximum power levels.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



Tested By

TEST RESULTS

	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Sixty-four Port (64x64 MIMO) dBm/carrier BW
Port 1				
QPSK Modulation				
Test Case A				
2506.00 MHz, LTE20	28.689	0	28.7	46.8
2526.00 MHz, LTE20	29.068	0	29.1	47.2
2561.01 MHz, NR50	34.05	0	34.1	52.2
2611.02 MHz, NR50	33.924	0	33.9	52.0
Test Case B				
2660.00 MHz, LTE20	28.927	0	28.9	47.0
2680.00 MHz, LTE20	28.494	0	28.5	46.6
2625.00 MHz, NR50	33.899	0	33.9	52.0
2574.99 MHz, NR50	34.068	0	34.1	52.2
Test Case C				
2521.02 MHz, NR50	33.649	0	33.6	51.7
2571.00 MHz, NR50	33.969	0	34	52.1
2606.00 MHz, LTE20	28.865	0	28.9	47.0
2626.00 MHz, LTE20	28.781	0	28.8	46.9
Test Case D				
2664.99 MHz, NR50	33.599	0	33.6	51.7
2614.98 MHz, NR50	33.924	0	33.9	52.0
2580.00 MHz, LTE20	29.351	0	29.4	47.5
2560.00 MHz, LTE50	29.256	0	29.3	47.4
Test Case E				

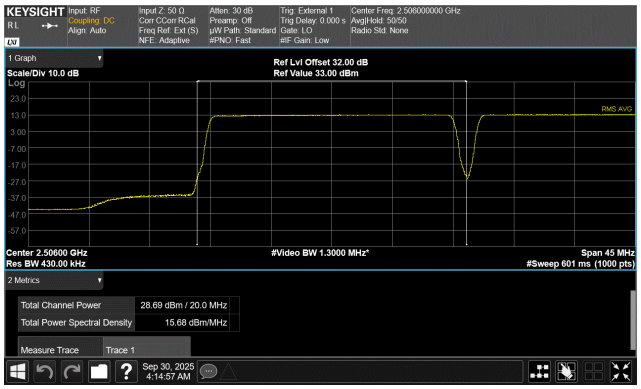
AVERAGE POWER - MULTI-RAT

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

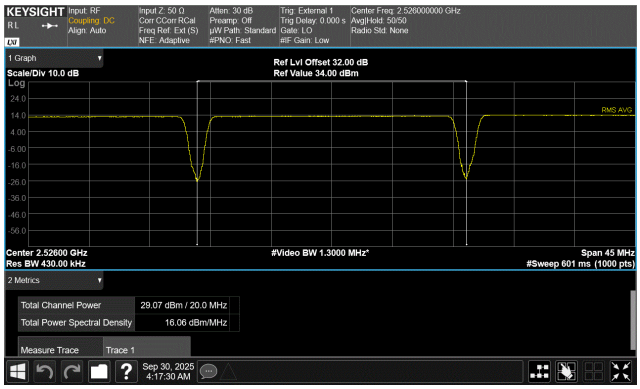
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Sixty-four Port (64x64 MIMO) dBm/carrier BW
2501.00 MHz, LTE10	28.754	0	28.8	46.9
2511.00 MHz, LTE10	29.108	0	29.1	47.2
2685.00 MHz, NR10	28.487	0	28.5	46.6
2675.01 MHz, NR10	28.977	0	29	47.1
Test Case F				
2685.00 MHz, LTE10	28.306	0	28.3	46.4
2675.00 MHz, LTE10	28.781	0	28.8	46.9
2501.01 MHz, NR10	28.796	0	28.8	46.9
2511.00 MHz, NR10	29.102	0	29.1	47.2

AVERAGE POWER - MULTI-RAT

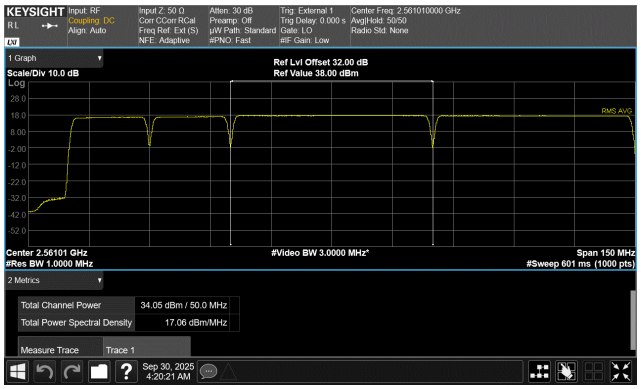
element
TbtTx 2025.05.09.1
WTD.2025.07.14.0



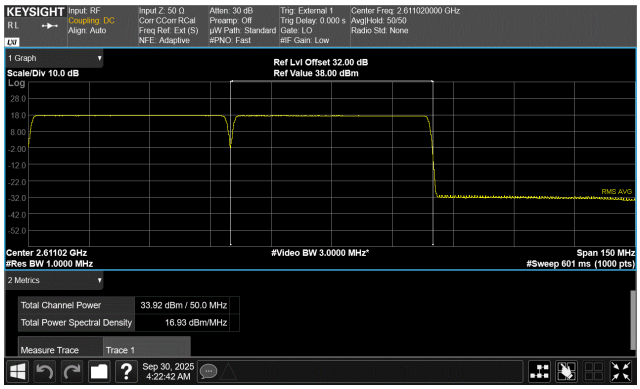
Port 1
QPSK Modulation
Test Case A
2506.00 MHz, LTE20



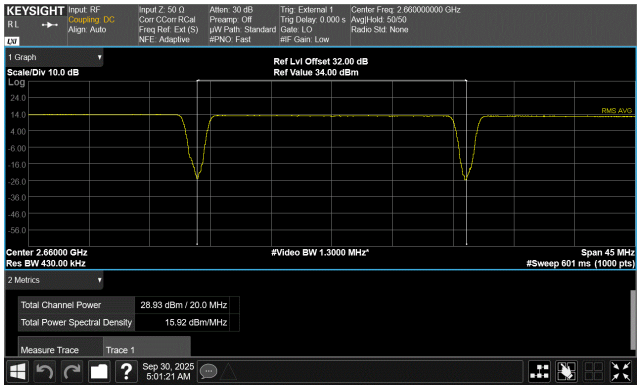
Port 1
QPSK Modulation
Test Case A
2526.00 MHz, LTE20



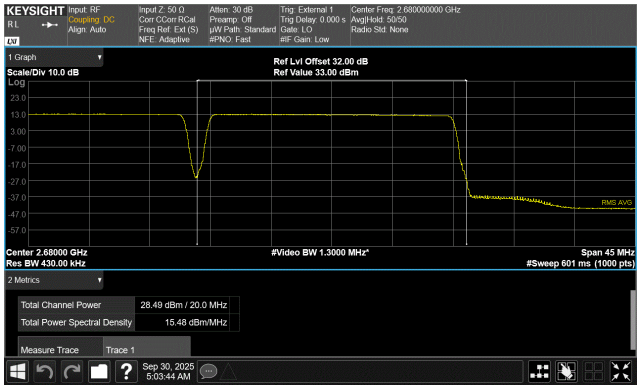
Port 1
QPSK Modulation
Test Case A
2561.01 MHz, NR50



Port 1
QPSK Modulation
Test Case A
2611.02 MHz, NR50



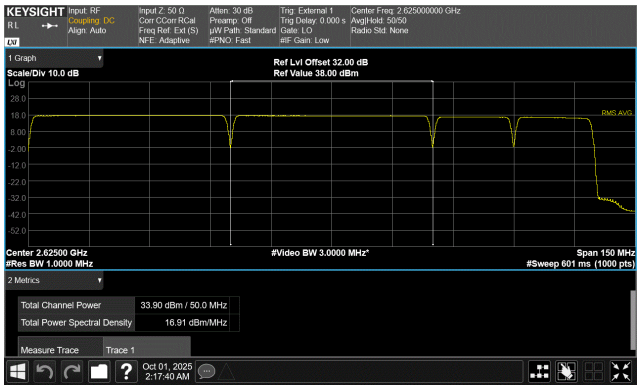
Port 1
QPSK Modulation
Test Case B
2660.00 MHz, LTE20



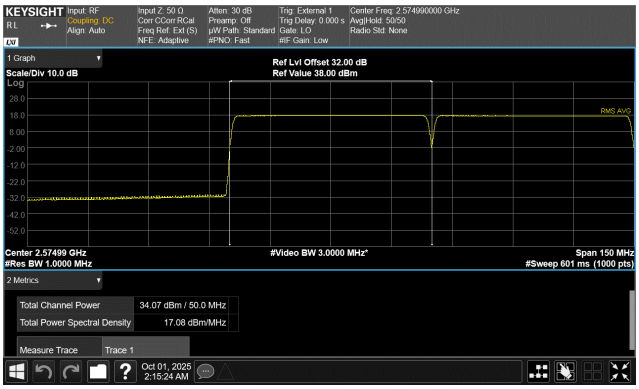
Port 1
QPSK Modulation
Test Case B
2680.00 MHz, LTE20

AVERAGE POWER - MULTI-RAT

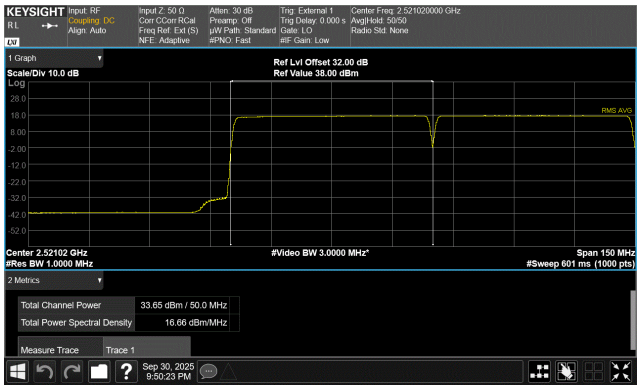
element
TbtTx 2025.05.09.1
WTD.2025.07.14.0



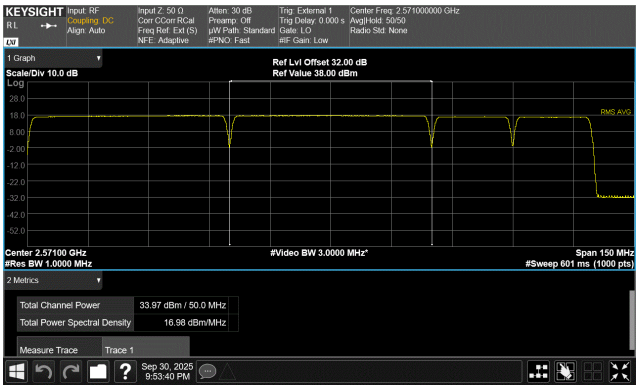
Port 1
QPSK Modulation
Test Case B
2625.00 MHz, NR50



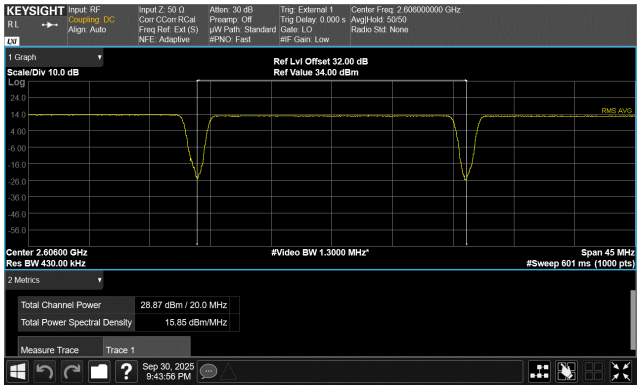
Port 1
QPSK Modulation
Test Case B
2574.99 MHz, NR50



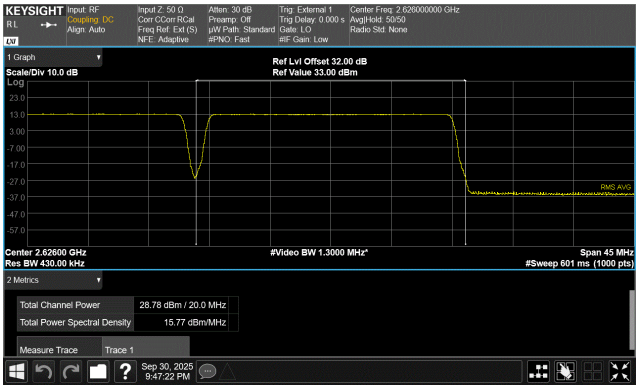
Port 1
QPSK Modulation
Test Case C
2521.02 MHz, NR50



Port 1
QPSK Modulation
Test Case C
2571.00 MHz, NR50



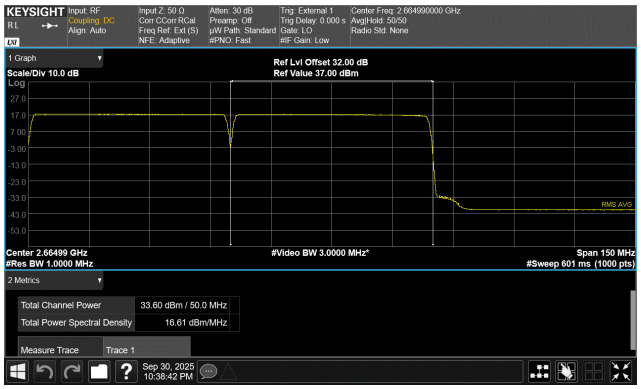
Port 1
QPSK Modulation
Test Case C
2606.00 MHz, LTE20



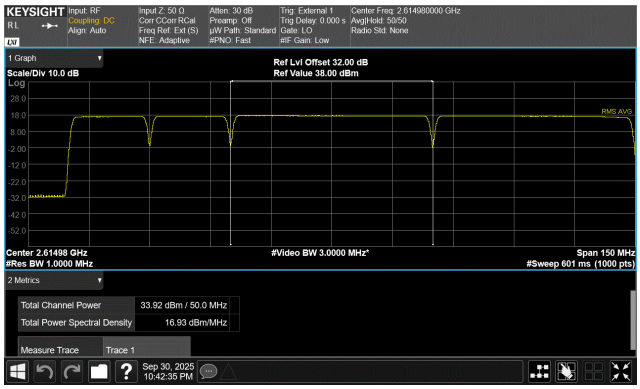
Port 1
QPSK Modulation
Test Case C
2626.00 MHz, LTE20

AVERAGE POWER - MULTI-RAT

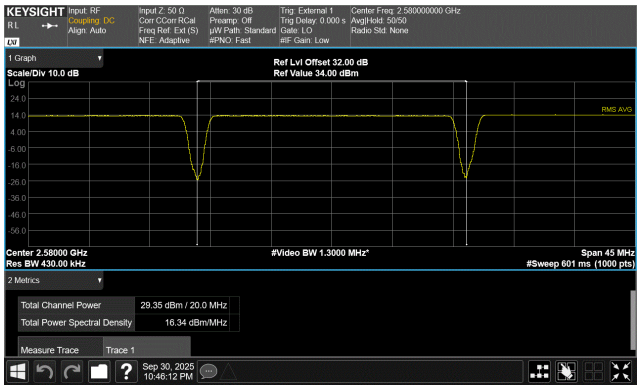
element
TbtTx 2025.05.09.1
WTD.2025.07.14.0



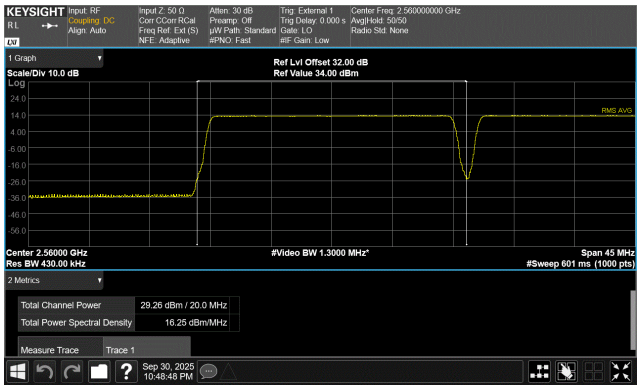
Port 1
QPSK Modulation
Test Case D
2664.99 MHz, NR50



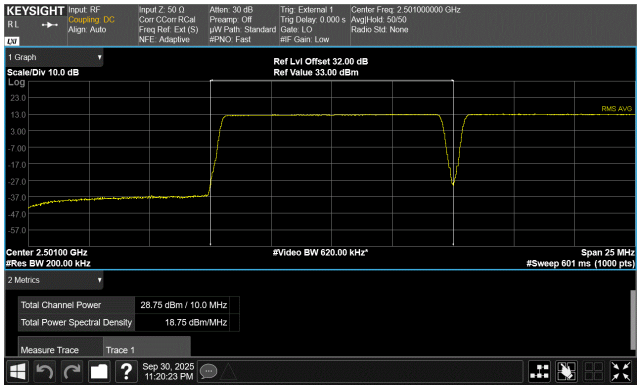
Port 1
QPSK Modulation
Test Case D
2614.98 MHz, NR50



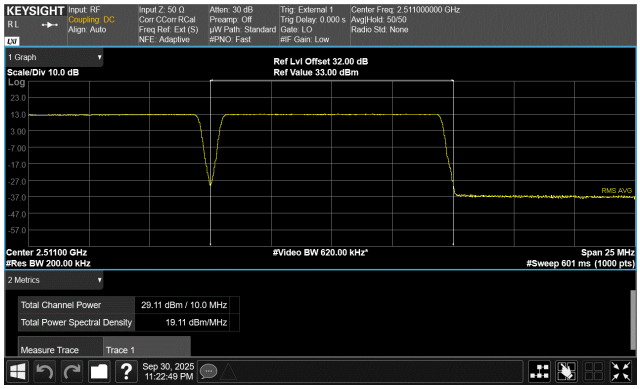
Port 1
QPSK Modulation
Test Case D
2580.00 MHz, LTE20



Port 1
QPSK Modulation
Test Case D
2560.00 MHz, LTE50



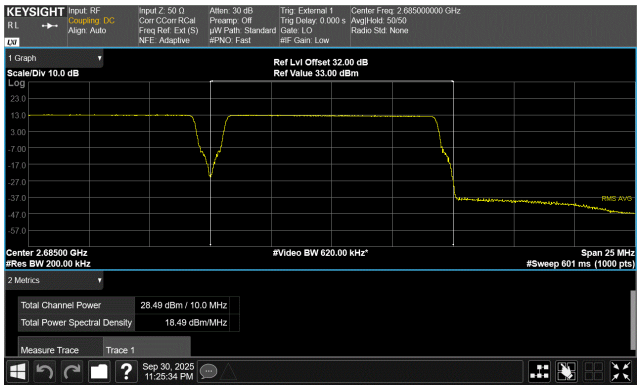
Port 1
QPSK Modulation
Test Case E
2501.00 MHz, LTE10



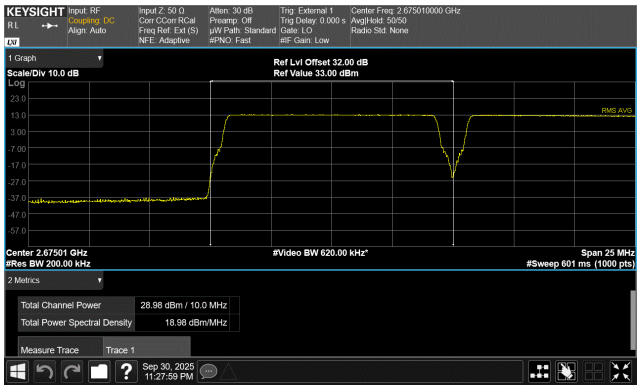
Port 1
QPSK Modulation
Test Case E
2511.00 MHz, LTE10

AVERAGE POWER - MULTI-RAT

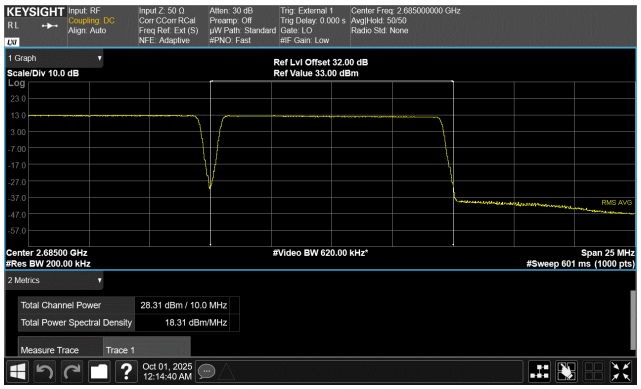
element
TbtTx 2025.05.09.1
WTD.2025.07.14.0



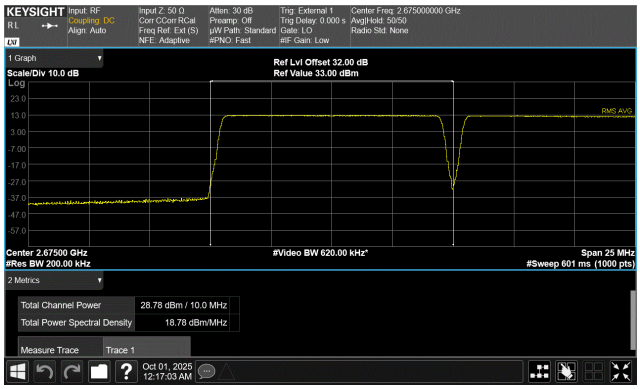
Port 1
QPSK Modulation
Test Case E
2685.00 MHz, NR10



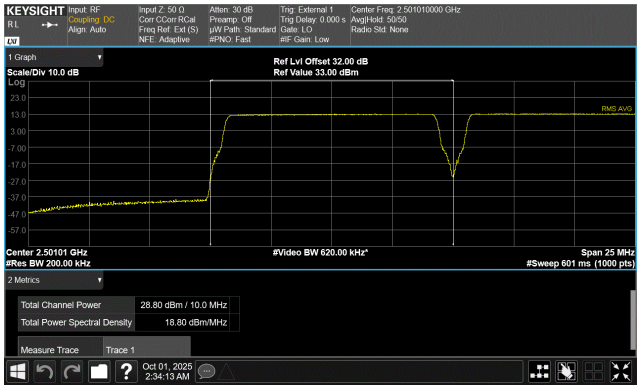
Port 1
QPSK Modulation
Test Case E
2675.01 MHz, NR10



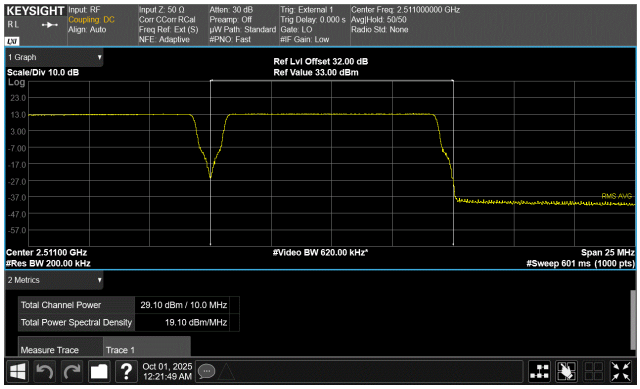
Port 1
QPSK Modulation
Test Case F
2685.00 MHz, LTE10



Port 1
QPSK Modulation
Test Case F
2675.00 MHz, LTE10



Port 1
QPSK Modulation
Test Case F
2501.01 MHz, NR10



Port 1
QPSK Modulation
Test Case F
2511.00 MHz, NR10

OCCUPIED BANDWIDTH

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

TEST DESCRIPTION

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

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

The AVHA antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the "Output Power- All Ports" report section of this report). Antenna port 1 was selected to perform this testing as allowed by ANSI C63.26 paragraphs 5.2.5.3, 5.7.2i and 6.4.

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. Measurements shall be performed with the transmitter at full power on the middle channel (also Bottom & Top for 256QAM) for all single carrier bandwidths and modulation types.

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

FCC 4G LTE Emission Designators for BRS/EBS Band (2496MHz to 2690MHz)					
Channel Bandwidth	**Radio Channel**	**4G LTE: QPSK**	**4G LTE: 16QAM**	**4G LTE: 64QAM**	**4G LTE: 256QAM**
10MHz	Low	9M67F9W			
	Mid	9M69F9W	9M64F9W	9M69F9W	9M69F9W
	High	9M69F9W			
15MHz	Low	14M5F9W			
	Mid	14M5F9W	14M4F9W	14M5F9W	14M5F9W
	High	14M5F9W			
20MHz	Low	19M4F9W			
	Mid	19M4F9W	19M4F9W	19M4F9W	19M4F9W
	High	19M3F9W			
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 Technologies	N9030B	AGA	2025-06-09	2026-06-09
Block - DC	Centric RF	C0140	ANJ	NCR	NCR
Generator - Signal	Agilent	N5173B	TIW	2023-08-07	2026-08-07

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

OCCUPIED BANDWIDTH

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

EUT:	Airscale Base Transceiver Station Radio Unit AVHA	Work Order:	NOKI0088
Serial Number:	L1252603387	Date:	2025-09-29
Customer:	Nokia Solutions and Networks	Temperature:	28.5°C
Attendees:	David Le, Mitch Hill	Relative Humidity:	31.8%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Jarrod Brenden	Job Site:	PT14
Power:	54VDC	Configuration:	NOKI0088-2

COMMENTS

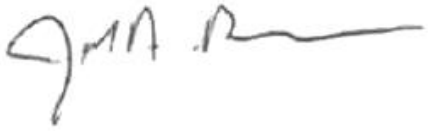
All losses in the measurement path were accounted for in the reference level offset; attenuators, filters, cables, and DC blocks. Carriers were enabled at maximum power levels.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



Tested By

TEST RESULTS

	Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
Port 1				
10 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 2501.00 MHz	8.972 MHz	9.669 MHz	Within Band	Pass
Middle Channel, 2593.00 MHz	8.973 MHz	9.686 MHz	Within Band	Pass
High Channel, 2685.00 MHz	8.965 MHz	9.693 MHz	Within Band	Pass
16QAM Modulation				
Middle Channel, 2593.00 MHz	8.984 MHz	9.642 MHz	Within Band	Pass
64QAM Modulation				
Middle Channel, 2593.00 MHz	8.981 MHz	9.687 MHz	Within Band	Pass
256QAM Modulation				
Middle Channel, 2593.00 MHz	8.974 MHz	9.693 MHz	Within Band	Pass
15 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 2503.50 MHz	13.428 MHz	14.499 MHz	Within Band	Pass
Middle Channel, 2593.00 MHz	13.44 MHz	14.485 MHz	Within Band	Pass
High Channel, 2682.50 MHz	13.447 MHz	14.489 MHz	Within Band	Pass
16QAM Modulation				
Middle Channel, 2593.00 MHz	13.459 MHz	14.436 MHz	Within Band	Pass
64QAM Modulation				
Middle Channel, 2593.00 MHz	13.473 MHz	14.541 MHz	Within Band	Pass
256QAM Modulation				
Middle Channel, 2593.00 MHz	13.451 MHz	14.514 MHz	Within Band	Pass

OCCUPIED BANDWIDTH

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

	Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
20 MHz Channel Bandwidth				
QPSK Modulation				
Low Channel, 2506.00 MHz	17.917 MHz	19.395 MHz	Within Band	Pass
Middle Channel, 2593.00 MHz	17.924 MHz	19.368 MHz	Within Band	Pass
High Channel, 2680.00 MHz	17.932 MHz	19.3 MHz	Within Band	Pass
16QAM Modulation				
Middle Channel, 2593.00 MHz	17.968 MHz	19.362 MHz	Within Band	Pass
64QAM Modulation				
Middle Channel, 2593.00 MHz	17.969 MHz	19.387 MHz	Within Band	Pass
256QAM Modulation				
Middle Channel, 2593.00 MHz	17.952 MHz	19.357 MHz	Within Band	Pass

OCCUPIED BANDWIDTH

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

Port 1
10 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 2501.00 MHz

Port 1
10 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 2593.00 MHz

Port 1
10 MHz Channel Bandwidth
QPSK Modulation
High Channel, 2685.00 MHz

Port 1
10 MHz Channel Bandwidth
16QAM Modulation
Middle Channel, 2593.00 MHz

Port 1
10 MHz Channel Bandwidth
64QAM Modulation
Middle Channel, 2593.00 MHz

Port 1
10 MHz Channel Bandwidth
256QAM Modulation
Middle Channel, 2593.00 MHz

OCCUPIED BANDWIDTH

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

Port 1
15 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 2503.50 MHz

Port 1
15 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 2593.00 MHz

Port 1
15 MHz Channel Bandwidth
QPSK Modulation
High Channel, 2682.50 MHz

Port 1
15 MHz Channel Bandwidth
16QAM Modulation
Middle Channel, 2593.00 MHz

Port 1
15 MHz Channel Bandwidth
64QAM Modulation
Middle Channel, 2593.00 MHz

Port 1
15 MHz Channel Bandwidth
256QAM Modulation
Middle Channel, 2593.00 MHz

OCCUPIED BANDWIDTH

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

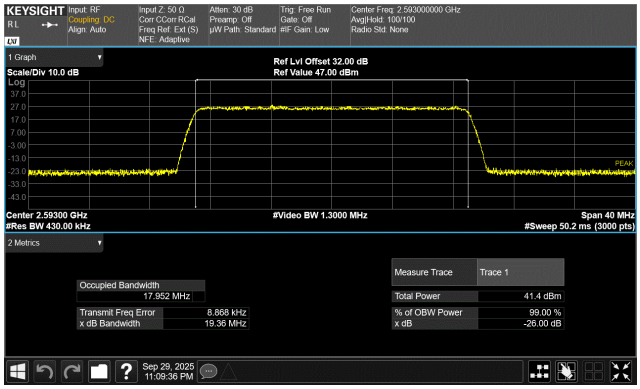
Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Low Channel, 2506.00 MHz

Port 1
20 MHz Channel Bandwidth
QPSK Modulation
Middle Channel, 2593.00 MHz

Port 1
20 MHz Channel Bandwidth
QPSK Modulation
High Channel, 2680.00 MHz

Port 1
20 MHz Channel Bandwidth
16QAM Modulation
Middle Channel, 2593.00 MHz

Port 1
20 MHz Channel Bandwidth
64QAM Modulation
Middle Channel, 2593.00 MHz



Port 1
20 MHz Channel Bandwidth
256QAM Modulation
Middle Channel, 2593.00 MHz

PEAK AND AVERAGE (PAPR) CCDF - LTE

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

TEST DESCRIPTION

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

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

The AVHA antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the "Output Power - All Ports" report section of this report). Antenna port 1 was selected to perform this testing as allowed by ANSI C63.26 paragraphs 5.2.5.3, 5.7.2i and 6.4.

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

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

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

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

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

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

TEST EQUIPMENT

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

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

PEAK AND AVERAGE (PAPR) CCDF - LTE

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

EUT:	Airscale Base Transceiver Station Radio Unit AVHA	Work Order:	NOKI0088
Serial Number:	L1252603387	Date:	2025-09-29
Customer:	Nokia Solutions and Networks	Temperature:	28.6°C
Attendees:	David Le, Mitch Hill	Relative Humidity:	32%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Jarrod Brenden	Job Site:	PT14
Power:	54VDC	Configuration:	NOKI0088-2

COMMENTS

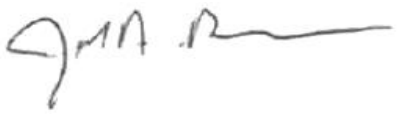
All losses in the measurement path were accounted for in the reference level offset; attenuators, filters, cables, and DC blocks. Carriers were enabled at maximum power levels.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



Tested By

TEST RESULTS

	0.1% PAPR Value (dB)	0.1% PAPR Limit (dB)	Results
Port 1			
10 MHz Channel Bandwidth			
QPSK Modulation			
Low Channel, 2501.00 MHz	7.41	13	Pass
Middle Channel, 2593.00 MHz	7.42	13	Pass
High Channel, 2685.00 MHz	7.45	13	Pass
15 MHz Channel Bandwidth			
QPSK Modulation			
Low Channel, 2503.50 MHz	7.43	13	Pass
Middle Channel, 2593.00 MHz	7.43	13	Pass
High Channel, 2682.50 MHz	7.51	13	Pass
20 MHz Channel Bandwidth			
QPSK Modulation			
Low Channel, 2506.00 MHz	7.53	13	Pass
Middle Channel, 2593.00 MHz	7.4	13	Pass
High Channel, 2680.00 MHz	7.47	13	Pass
16QAM Modulation			
Middle Channel, 2593.00 MHz	7.41	13	Pass
64QAM Modulation			
Middle Channel, 2593.00 MHz	7.46	13	Pass
256QAM Modulation			
Middle Channel, 2593.00 MHz	7.43	13	Pass