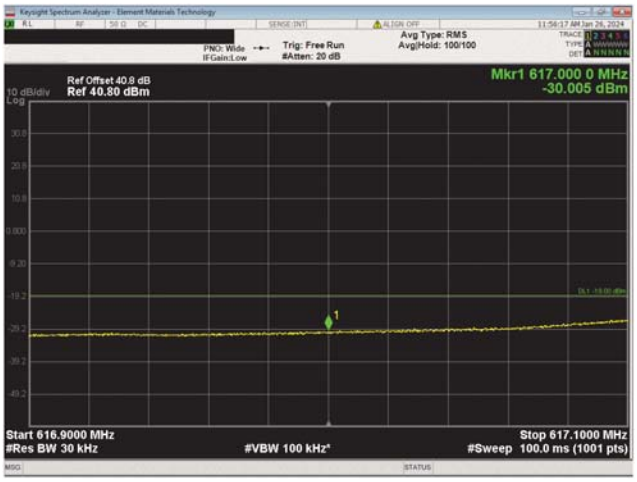
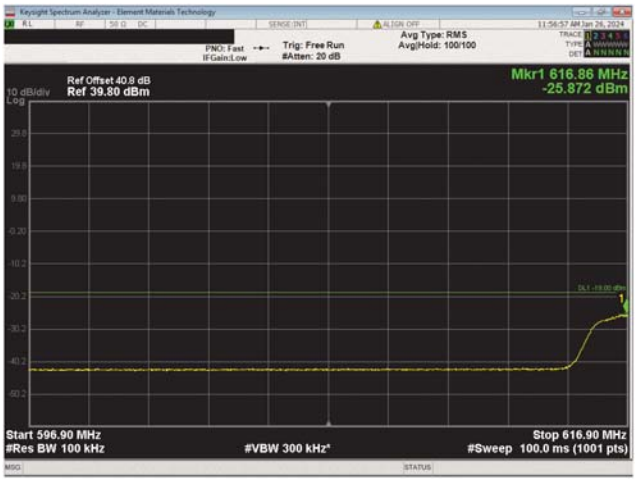
BAND EDGE COMPLIANCE

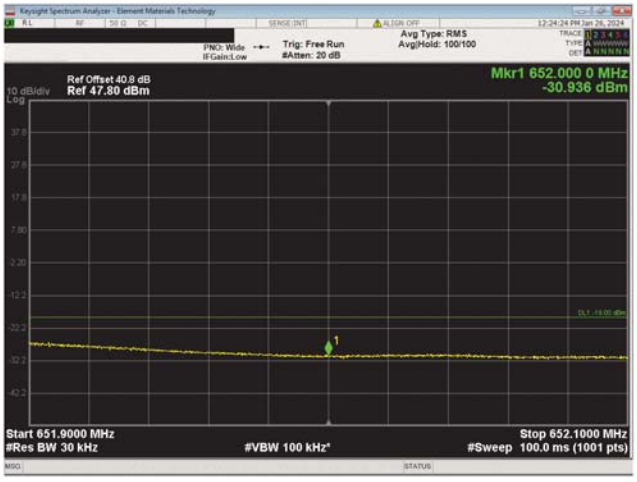
element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



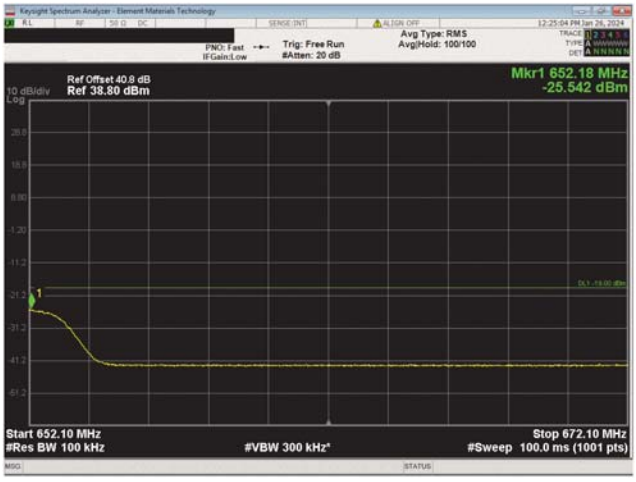
Port 1
NR 30 MHz Channel Bandwidth
256QAM
Low Ch, 632.0 MHz



Port 1
NR 30 MHz Channel Bandwidth
256QAM
Low Ch, 632.0 MHz



Port 1
NR 30 MHz Channel Bandwidth
256QAM
High Ch, 637.0 MHz



Port 1
NR 30 MHz Channel Bandwidth
256QAM
High Ch, 637.0 MHz

SPURIOUS CONDUCTED EMISSIONS

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0

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 antenna port spurious emissions were measured at the RF output terminal of the EUT through 3 different attenuation configurations which continues through to the RF input of the spectrum analyzer. Analyzer plots utilizing a resolution bandwidth called out by the client's test approach were made for each modulation type from 9 kHz to 8 GHz. The conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, were investigated to ensure they were less than the limits also called out by the client's test plan shown below.

The measurement methods are detailed in KDB 971168 D01v03 section 6 and ANSI C63.26-2015.
Per FCC 2.1057(a)(1) and RSS Gen 6.13, the upper level of measurement is the 10th harmonic of the highest fundamental frequency.

These measurements are for the frequency band after the first 1.0 MHz bands immediately outside and adjacent to the frequency block.

RF conducted emissions testing was performed only on one port. The AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the original 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.
Per section 27.53(g) and RSS 130 4.7, the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. The limit is adjusted to -19 dBm [-13 dBm -10 log (4)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 4 port MIMO transmitter.

The limit for the 9kHz to 150kHz frequency range was adjusted to –39dBm to correct for a spectrum analyzer RBW of 1kHz versus required RBW of 100kHz [i.e.: -39dBm = -19dBm -10log(100kHz/1kHz)]. The limit for the 150kHz to 20MHz frequency range was adjusted to –29dBm to correct for a spectrum analyzer RBW of 10kHz versus required RBW of 100kHz [i.e.: -29dBm = -19dBm -10log(100kHz/10kHz)]. The required limit of -19dBm with a RBW of > 100kHz was used for all other frequency ranges.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2023-03-17	2024-03-17
Block - DC	Fairview Microwave	SD3235-2148	ANF	2023-05-24	2024-05-24
Generator - Signal	Agilent	N5173B	TIW	2023-08-07	2026-08-07

SPURIOUS CONDUCTED EMISSIONS

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0

EUT:	Airscale Base Transceiver Station Remote Radio Head Model AHLOB	Work Order:	NOKI0073
Serial Number:	YK220900029	Date:	2024-01-26
Customer:	Nokia Solutions and Networks	Temperature:	21.7°C
Attendees:	David Le, John Rattanavong	Relative Humidity:	41.1%
Customer Project:	None	Bar. Pressure (PMSL):	1024 mbar
Tested By:	Jarrod Brenden	Job Site:	TX07
Power:	54 VDC	Configuration:	NOKI0073-1 NOKI0073-2 NOKI0073-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 27:2024	ANSI C63.26:2015
RSS-130 Issue 2:2019	ANSI C63.26:2015

COMMENTS

All losses in the measurement path were accounted for: attenuators, cables, DC block, and filters where used. The carriers were enables at maximum power.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

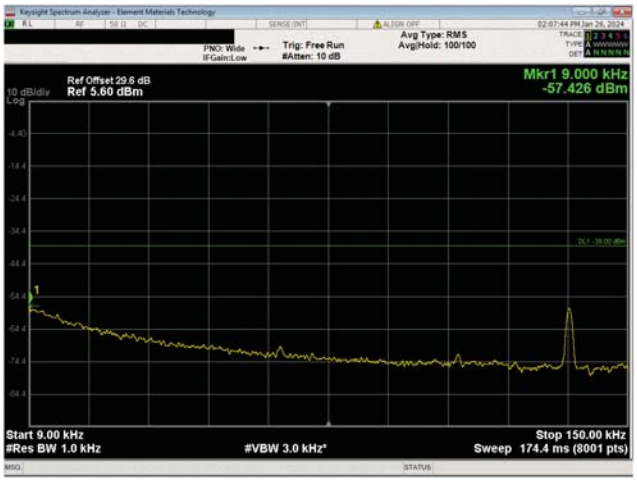
Tested By

TEST RESULTS

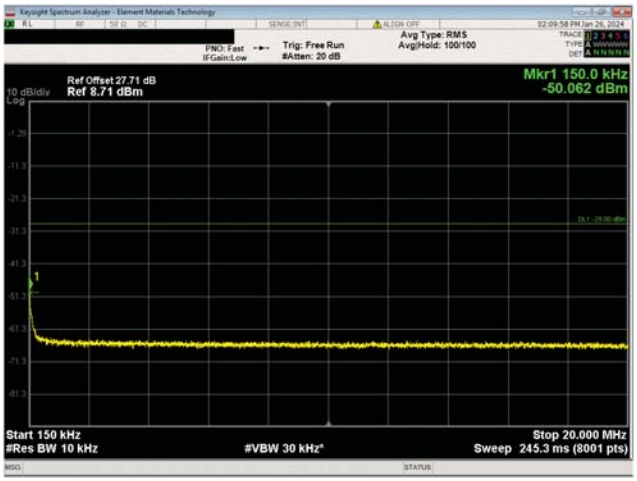
		Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result
Band n71 617 MHz - 652 MHz, 5G NR						
NR 30 MHz Channel Bandwidth						
QPSK						
	Mid Ch, 634.5 MHz	9 kHz - 150 kHz	0.01	-57.43	-39	Pass
		150 kHz - 20 MHz	0.15	-50.06	-29	Pass
		20 MHz - 1.2 GHz	737.28	-24.22	-19	Pass
		1.2 GHz - 8 GHz	3798.5	-41.361	-19	Pass
16QAM						
	Mid Ch, 634.5 MHz	9 kHz - 150 kHz	0.01	-57.58	-39	Pass
		150 kHz - 20 MHz	0.15	-50.07	-29	Pass
		20 MHz - 1.2 GHz	737.28	-23.55	-19	Pass
		1.2 GHz - 8 GHz	3798.05	-41.42	-19	Pass
64QAM						
	Mid Ch, 634.5 MHz	9 kHz - 150 kHz	0.01	-57.248	-39	Pass
		150 kHz - 20 MHz	0.15	-50.75	-29	Pass
		20 MHz - 1.2 GHz	737.28	-23.57	-19	Pass
		1.2 GHz - 8 GHz	3803.04	-41.41	-19	Pass
256QAM						
	Mid Ch, 634.5 MHz	9 kHz - 150 kHz	0.01	-58.12	-39	Pass
		150 kHz - 20 MHz	0.15	-50.38	-29	Pass
		20 MHz - 1.2 GHz	737.28	-24.01	-19	Pass
		1.2 GHz - 8 GHz	3796.69	-41.4	-19	Pass

SPURIOUS CONDUCTED EMISSIONS

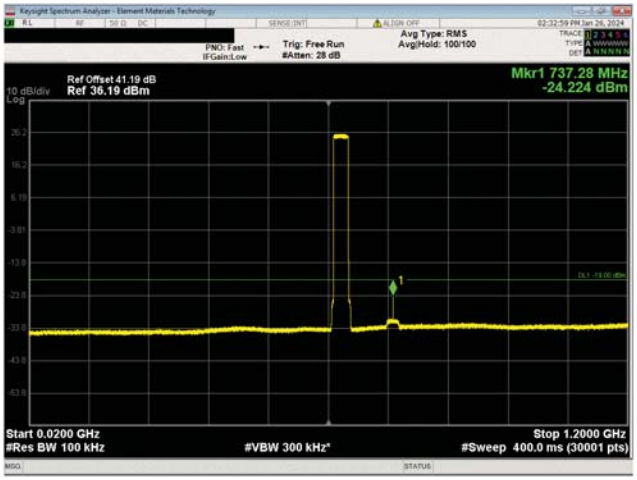
element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



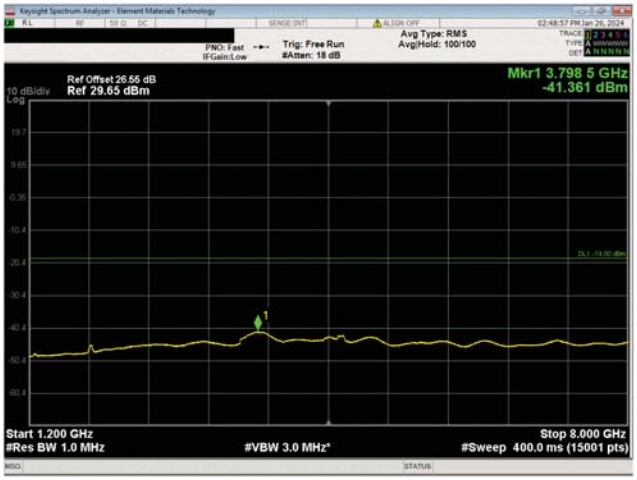
Port 1
NR 30 MHz Channel Bandwidth
QPSK
Mid Ch, 634.5 MHz



Port 1
NR 30 MHz Channel Bandwidth
QPSK
Mid Ch, 634.5 MHz



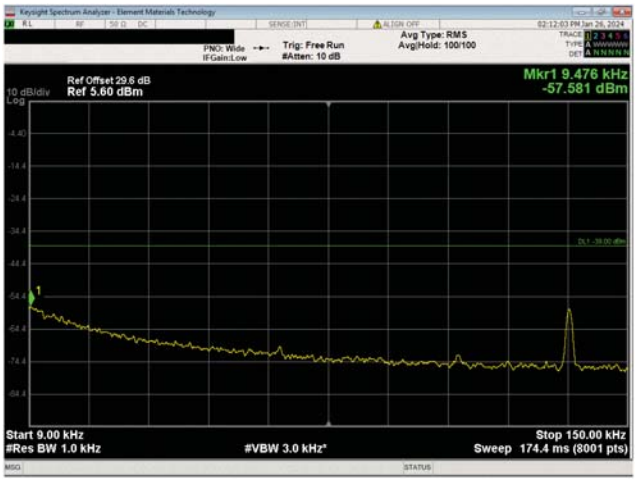
Port 1
NR 30 MHz Channel Bandwidth
QPSK
Mid Ch, 634.5 MHz



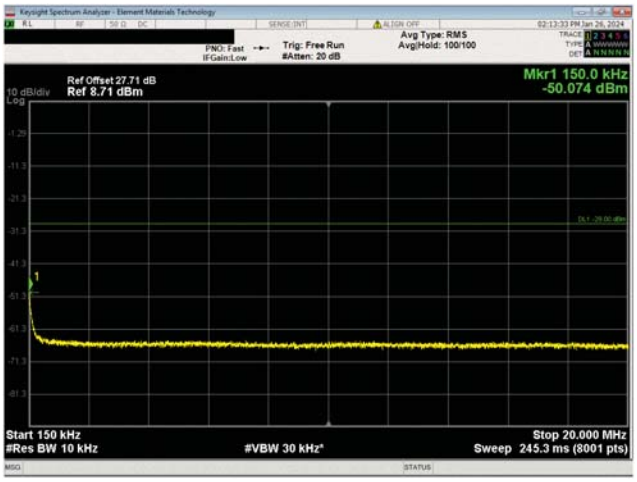
Port 1
NR 30 MHz Channel Bandwidth
QPSK
Mid Ch, 634.5 MHz

SPURIOUS CONDUCTED EMISSIONS

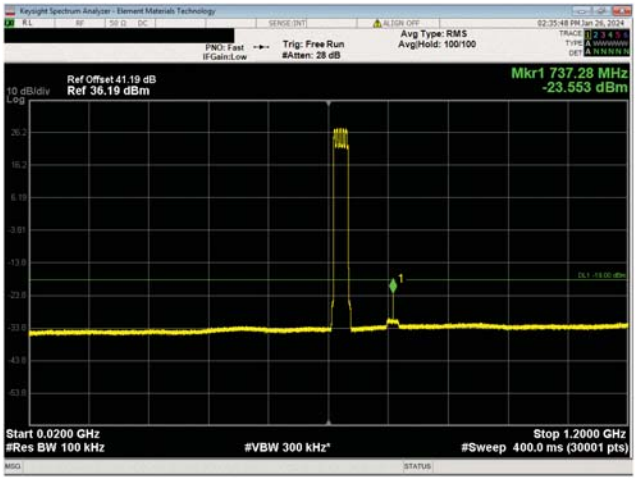
element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



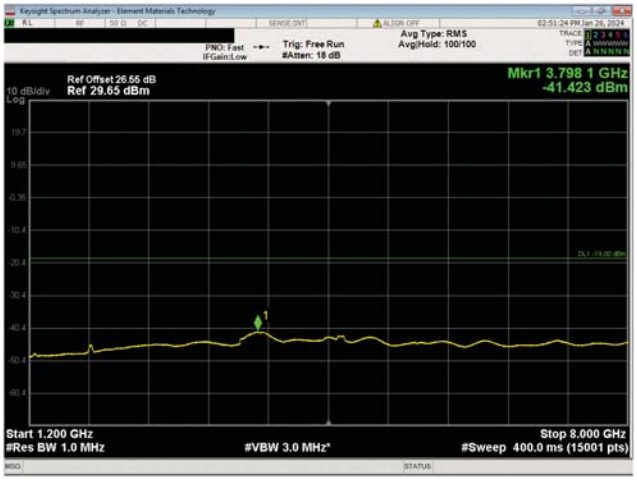
Port 1
NR 30 MHz Channel Bandwidth
16QAM
Mid Ch, 634.5 MHz



Port 1
NR 30 MHz Channel Bandwidth
16QAM
Mid Ch, 634.5 MHz



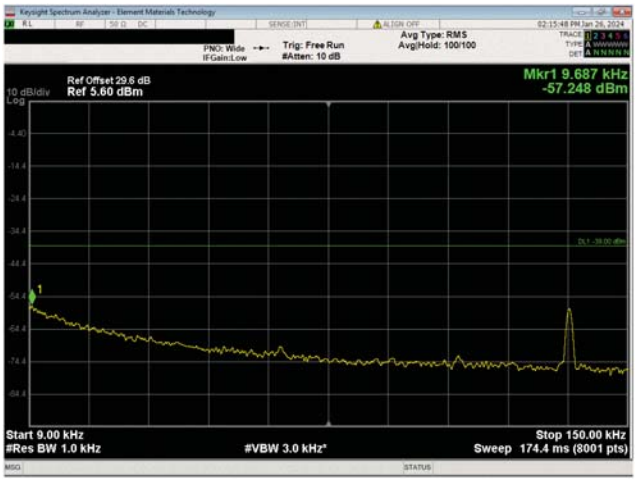
Port 1
NR 30 MHz Channel Bandwidth
16QAM
Mid Ch, 634.5 MHz



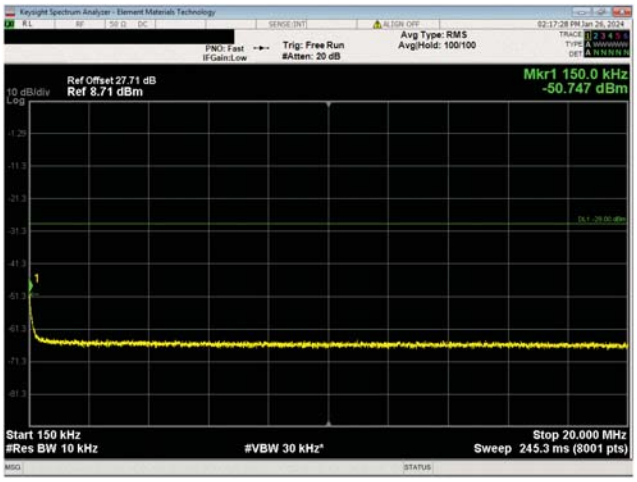
Port 1
NR 30 MHz Channel Bandwidth
16QAM
Mid Ch, 634.5 MHz

SPURIOUS CONDUCTED EMISSIONS

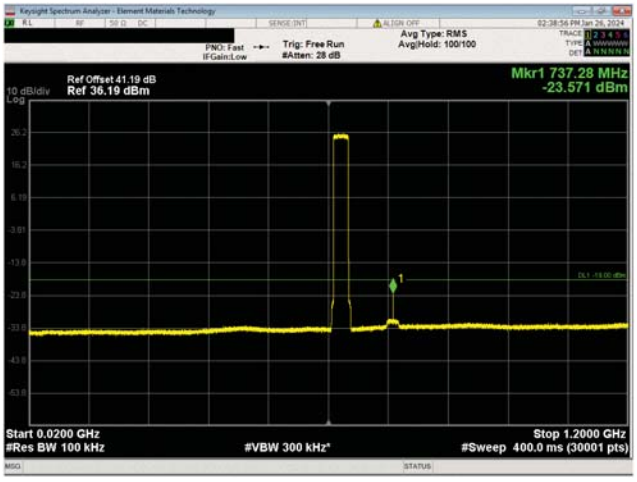
element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



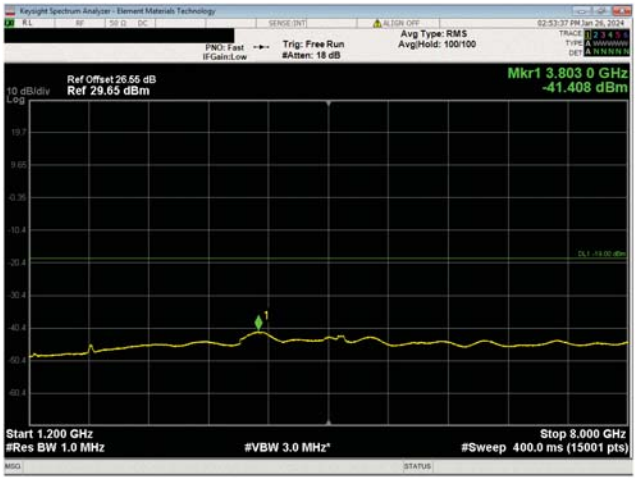
Port 1
NR 30 MHz Channel Bandwidth
64QAM
Mid Ch, 634.5 MHz



Port 1
NR 30 MHz Channel Bandwidth
64QAM
Mid Ch, 634.5 MHz



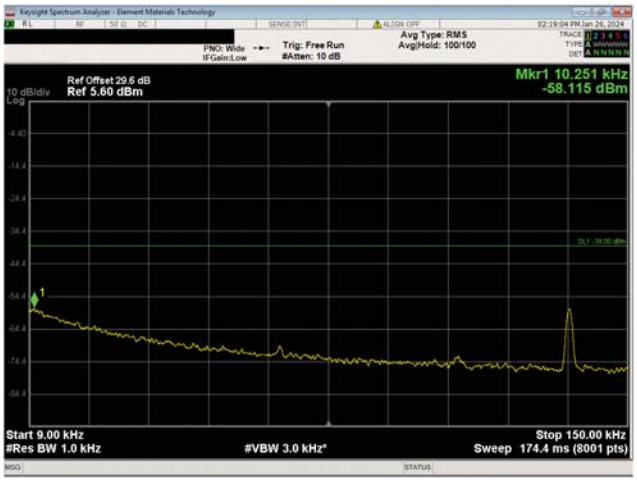
Port 1
NR 30 MHz Channel Bandwidth
64QAM
Mid Ch, 634.5 MHz



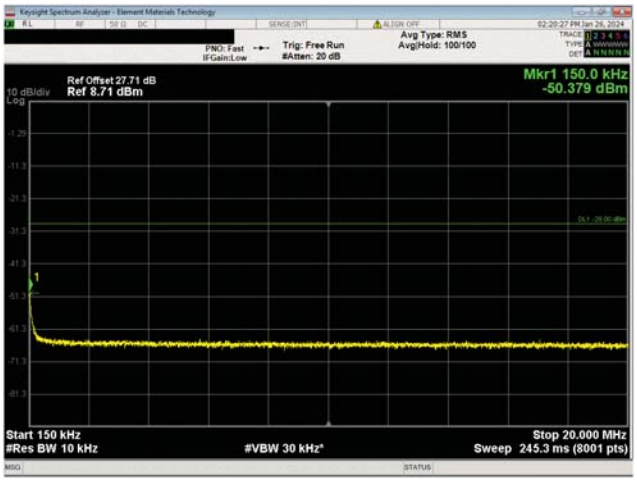
Port 1
NR 30 MHz Channel Bandwidth
64QAM
Mid Ch, 634.5 MHz

SPURIOUS CONDUCTED EMISSIONS

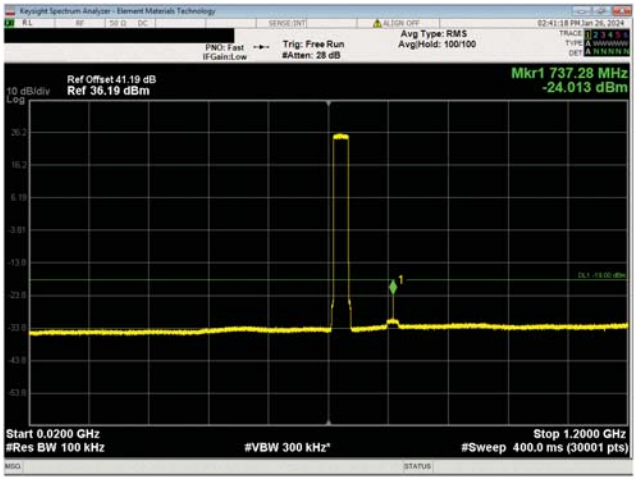
element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



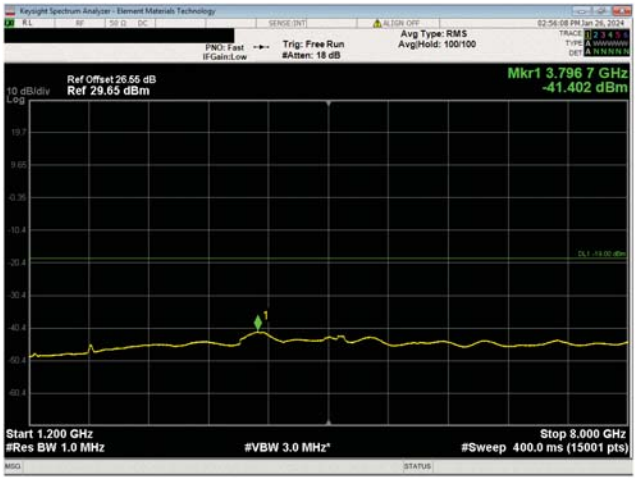
Port 1
NR 30 MHz Channel Bandwidth
256QAM
Mid Ch, 634.5 MHz



Port 1
NR 30 MHz Channel Bandwidth
256QAM
Mid Ch, 634.5 MHz



Port 1
NR 30 MHz Channel Bandwidth
256QAM
Mid Ch, 634.5 MHz



Port 1
NR 30 MHz Channel Bandwidth
256QAM
Mid Ch, 634.5 MHz

OCCUPIED BANDWIDTH

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0

TEST DESCRIPTION

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

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

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHLOB) as the original certification test. The AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the original 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.

FCC 27.53(H)(3) defines the 26dB emission bandwidth requirement.

RSS GEN Section 6.7 defines the 99% emission bandwidth requirement.

FCC and ISED Emission Designators for Band n71 (617MHz to 652MHz)									
Ch BW	Radio Channel	5G-NR: QPSK		5G-NR: 16QAM		5G-NR: 64QAM		5G-NR: 256QAM	
		FCC	ISED	FCC	ISED	FCC	ISED	FCC	ISED
30MHz	Low	30M2G7W	28M6G7W	30M1G7W	28M4G7W	30M2G7W	28M6G7W	30M3G7W	28M6G7W
	Mid	30M3G7W	28M6G7W	30M1G7W	28M4G7W	30M2G7W	28M6G7W	30M2G7W	28M6G7W
	High	30M2G7W	28M6G7W	30M0G7W	28M3G7W	30M2G7W	28M6G7W	30M2G7W	28M6G7W
Note: FCC emission designators are based on 26dB emission bandwidth. ISED emission designators are based on 99% emission bandwidth.									

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2023-03-17	2024-03-17
Block - DC	Fairview Microwave	SD3235-2148	ANF	2023-05-24	2024-05-24
Generator - Signal	Agilent	N5173B	TIW	2023-08-07	2026-08-07

OCCUPIED BANDWIDTH

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0

EUT:	Airscale Base Transceiver Station Remote Radio Head Model AHLOB	Work Order:	NOKI0073
Serial Number:	YK220900029	Date:	2024-01-26
Customer:	Nokia Solutions and Networks	Temperature:	21.7°C
Attendees:	David Le, John Rattanavong	Relative Humidity:	42.7%
Customer Project:	None	Bar. Pressure (PMSL):	1023 mbar
Tested By:	Jarrod Brenden	Job Site:	TX07
Power:	54 VDC	Configuration:	NOKI0073-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 27:2024	ANSI C63.26:2015
RSS-130 Issue 2:2019	ANSI C63.26:2015

COMMENTS

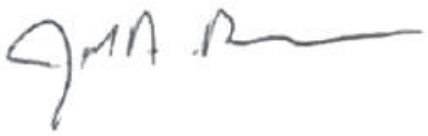
All losses in the measurement path were accounted for: attenuators, cables, DC block, and filters where used. The carriers were enables at maximum power.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



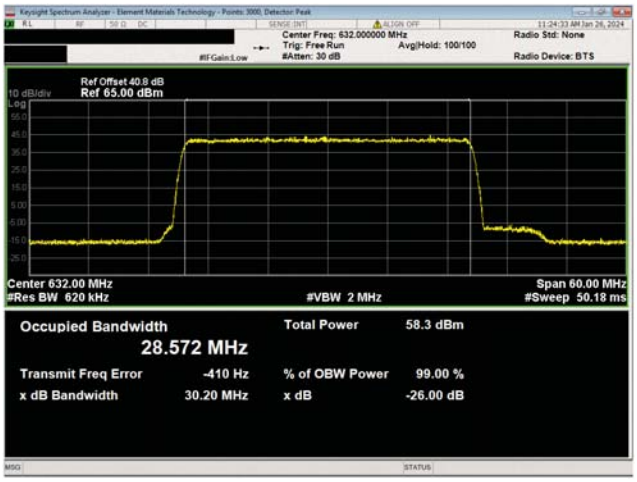
Tested By

TEST RESULTS

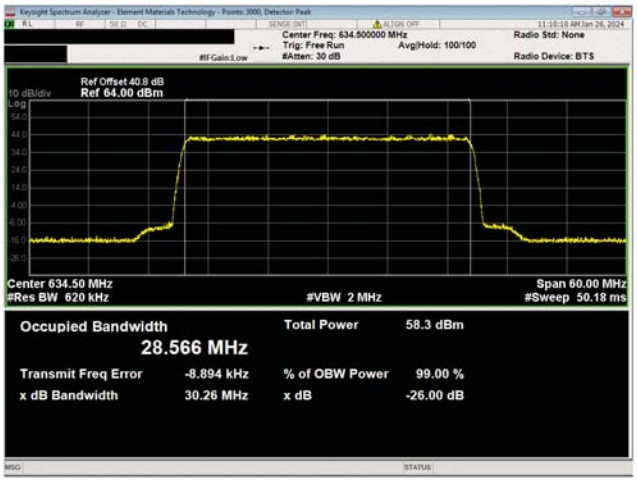
		Value 99% (MHz)	Value 26dB (MHz)	Limit (>)	Result
Band n71, 617 MHz - 652 MHz					
NR 30 MHz Channel Bandwidth					
QPSK					
	Low Ch, 632.0 MHz	28.572 MHz	30.195 MHz	Within Band	Pass
	Mid Ch, 634.5 MHz	28.566 MHz	30.259 MHz	Within Band	Pass
	High Ch, 637.0 MHz	28.568 MHz	30.225 MHz	Within Band	Pass
16QAM					
	Low Ch, 632.0 MHz	28.382 MHz	30.059 MHz	Within Band	Pass
	Mid Ch, 634.5 MHz	28.381 MHz	30.067 MHz	Within Band	Pass
	High Ch, 637.0 MHz	28.348 MHz	30.044 MHz	Within Band	Pass
64QAM					
	Low Ch, 632.0 MHz	28.552 MHz	30.198 MHz	Within Band	Pass
	Mid Ch, 634.5 MHz	28.585 MHz	30.217 MHz	Within Band	Pass
	High Ch, 637.0 MHz	28.563 MHz	30.194 MHz	Within Band	Pass
256QAM					
	Low Ch, 632.0 MHz	28.579 MHz	30.298 MHz	Within Band	Pass
	Mid Ch, 634.5 MHz	28.594 MHz	30.243 MHz	Within Band	Pass
	High Ch, 637.0 MHz	28.571 MHz	30.163 MHz	Within Band	Pass

OCCUPIED BANDWIDTH

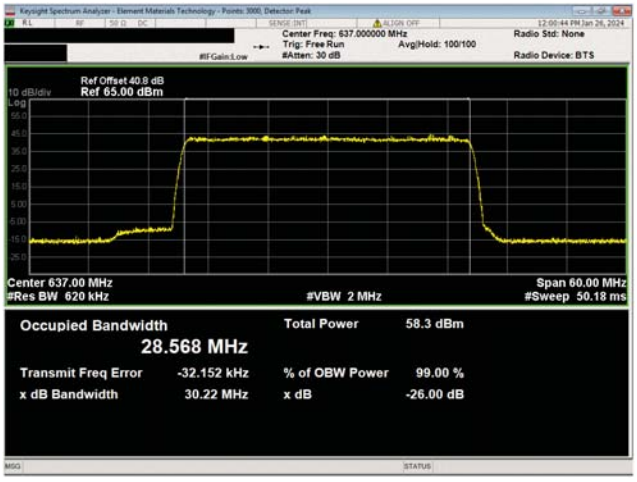
element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



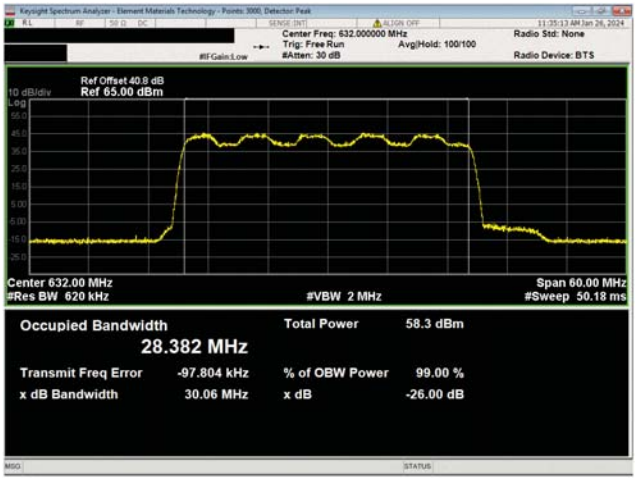
Port 1
NR 30 MHz Channel Bandwidth
QPSK
Low Ch, 632.0 MHz



Port 1
NR 30 MHz Channel Bandwidth
QPSK
Mid Ch, 634.5 MHz



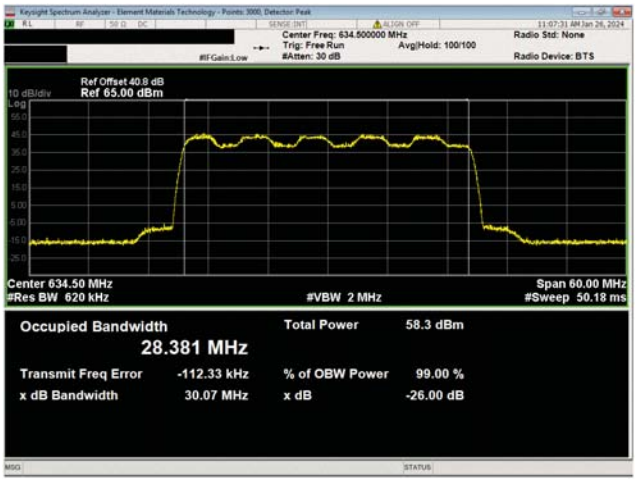
Port 1
NR 30 MHz Channel Bandwidth
QPSK
High Ch, 637.0 MHz



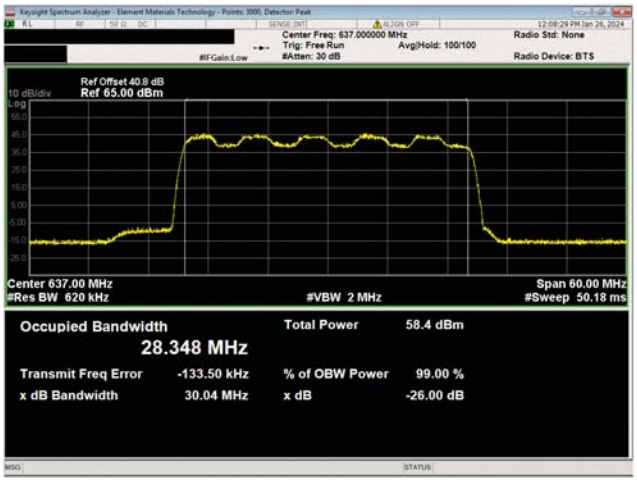
Port 1
NR 30 MHz Channel Bandwidth
16QAM
Low Ch, 632.0 MHz

OCCUPIED BANDWIDTH

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



Port 1
NR 30 MHz Channel Bandwidth
16QAM
Mid Ch, 634.5 MHz



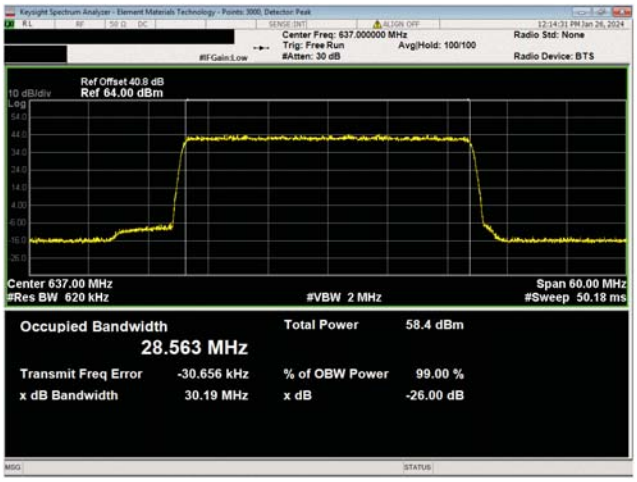
Port 1
NR 30 MHz Channel Bandwidth
16QAM
High Ch, 637.0 MHz

Port 1
NR 30 MHz Channel Bandwidth
64QAM
Low Ch, 632.0 MHz

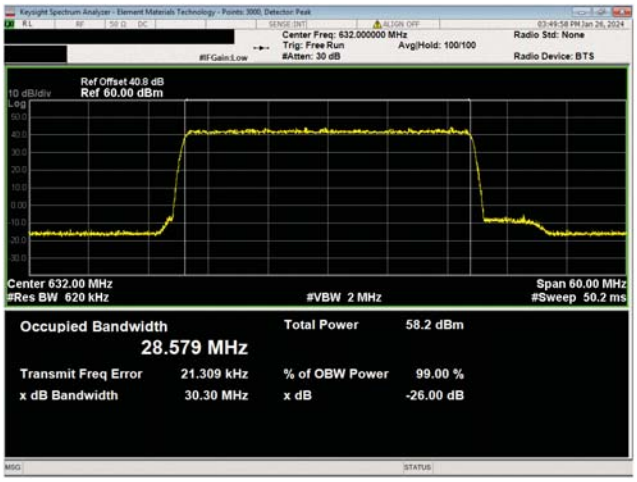
Port 1
NR 30 MHz Channel Bandwidth
64QAM
Mid Ch, 634.5 MHz

OCCUPIED BANDWIDTH

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



Port 1
NR 30 MHz Channel Bandwidth
64QAM
High Ch, 637.0 MHz



Port 1
NR 30 MHz Channel Bandwidth
256QAM
Low Ch, 632.0 MHz

Port 1
NR 30 MHz Channel Bandwidth
256QAM
Mid Ch, 634.5 MHz

Port 1
NR 30 MHz Channel Bandwidth
256QAM
High Ch, 637.0 MHz

PEAK AND AVERAGE (PAPR) CCDF

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0

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.

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.

Per RSS-130 section 4.6 and FCC part 27.50(d)(5), the PAPR shall not exceed 13 dB for more than 0.1% of the time.

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHLOB) as the original certification test. The AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the original 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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9030B	R336	2023-10-03	2024-10-03
Block - DC	Fairview Microwave	SD3235-2148	ANF	2023-05-24	2024-05-24
Generator - Signal	Agilent	N5173B	TIW	2023-08-07	2026-08-07

PEAK AND AVERAGE (PAPR) CCDF

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0

EUT:	Airscale Base Transceiver Station Remote Radio Head Model AHLOB	Work Order:	NOKI0073
Serial Number:	YK220900029	Date:	2024-01-26
Customer:	Nokia Solutions and Networks	Temperature:	21.8°C
Attendees:	David Le, John Rattanavong	Relative Humidity:	40.5%
Customer Project:	None	Bar. Pressure (PMSL):	1023 mbar
Tested By:	Jarrod Brenden	Job Site:	TX07
Power:	54 VDC	Configuration:	NOKI0073-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 27:2024	ANSI C63.26:2015
RSS-130 Issue 2:2019	ANSI C63.26:2015

COMMENTS

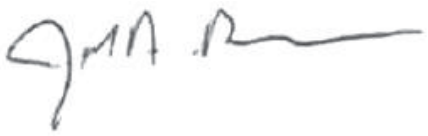
All losses in the measurement path were accounted for: attenuators, cables, DC block, and filters where used. The carriers were enables at maximum power.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



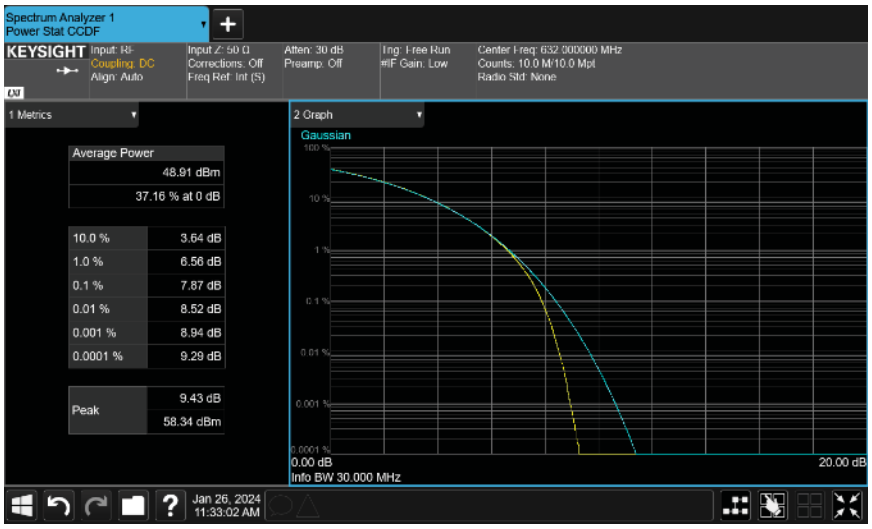
Tested By

TEST RESULTS

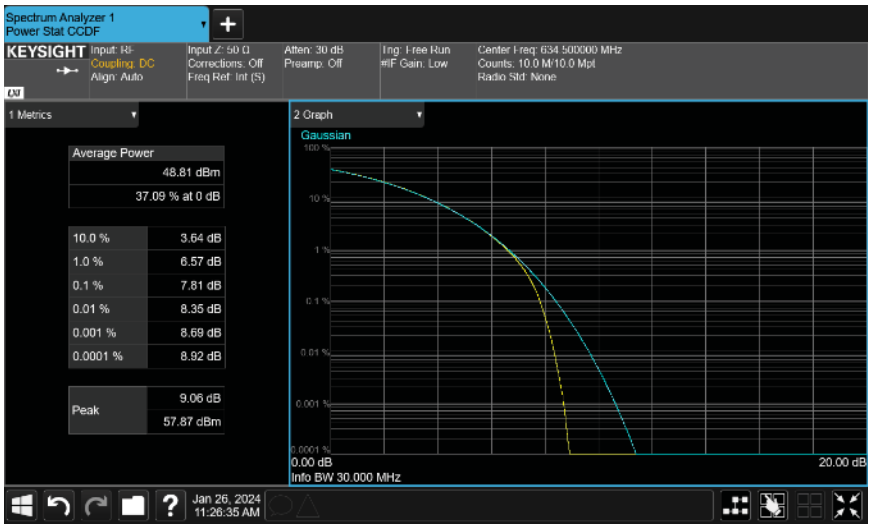
			0.1% PAPR Value (dB)	0.1% PAPR Limit (dB)	Result
Band n71 617 MHz - 652 MHz					
	NR 30 MHz Channel Bandwidth				
		QPSK			
		Low Ch, 632.0 MHz	7.87	13	Pass
		Mid Ch, 634.5 MHz	7.81	13	Pass
		High Ch, 637.0 MHz	7.88	13	Pass
		16QAM			
		Low Ch, 632.0 MHz	7.91	13	Pass
		Mid Ch, 634.5 MHz	7.76	13	Pass
		High Ch, 637.0 MHz	7.84	13	Pass
		64QAM			
		Low Ch, 632.0 MHz	7.83	13	Pass
		Mid Ch, 634.5 MHz	7.76	13	Pass
		High Ch, 637.0 MHz	7.89	13	Pass
		256QAM			
		Low Ch, 632.0 MHz	7.84	13	Pass
		Mid Ch, 634.5 MHz	7.77	13	Pass
		High Ch, 637.0 MHz	7.89	13	Pass

PEAK AND AVERAGE (PAPR) CCDF

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



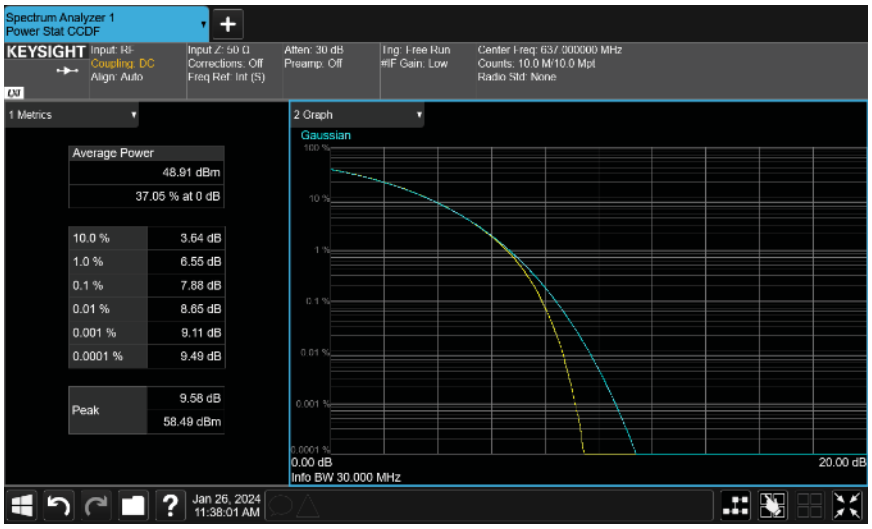
NR 30 MHz Channel Bandwidth
QPSK
Low Ch, 632.0 MHz



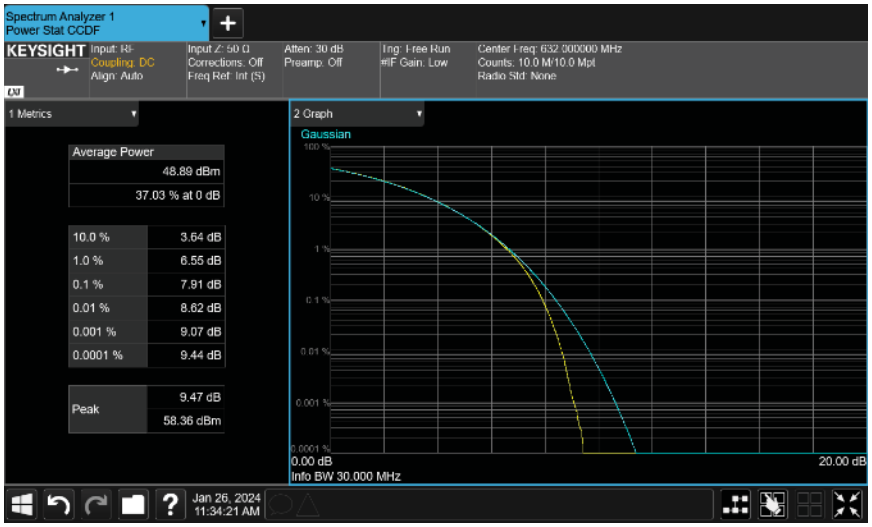
NR 30 MHz Channel Bandwidth
QPSK
Mid Ch, 634.5 MHz

PEAK AND AVERAGE (PAPR) CCDF

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



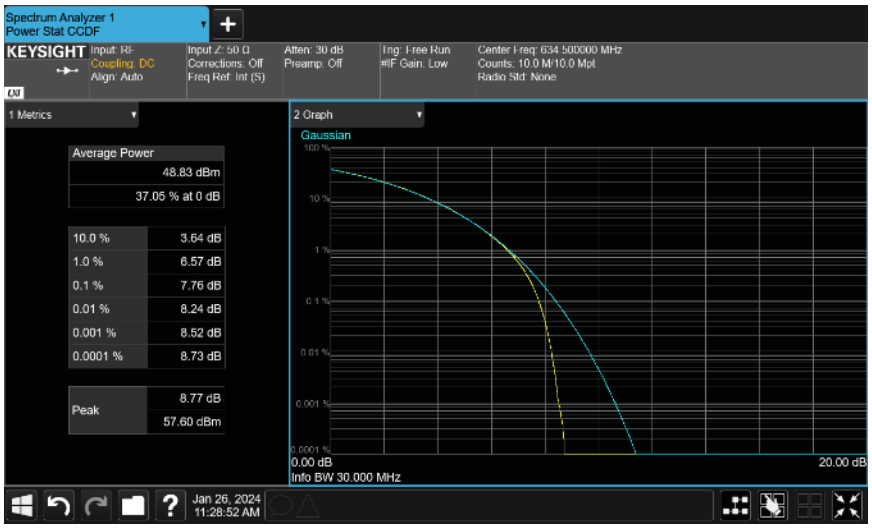
NR 30 MHz Channel Bandwidth
QPSK
High Ch, 637.0 MHz



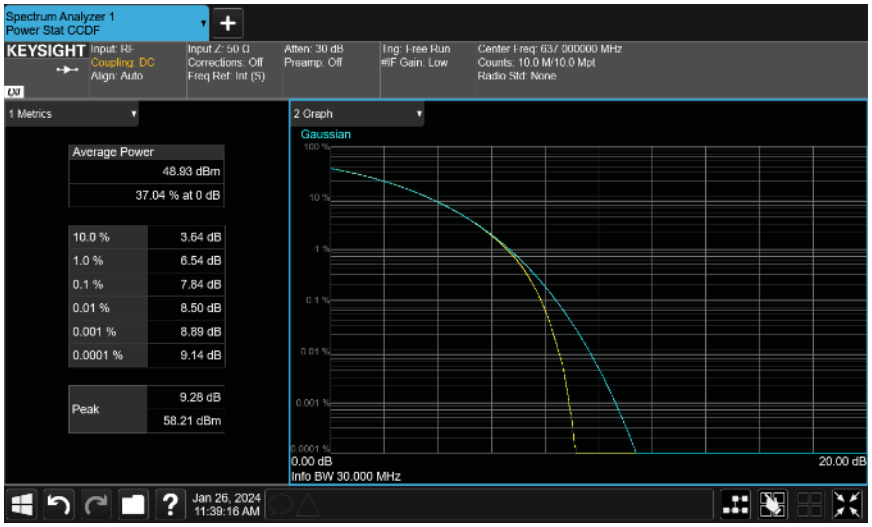
NR 30 MHz Channel Bandwidth
16QAM
Low Ch, 632.0 MHz

PEAK AND AVERAGE (PAPR) CCDF

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



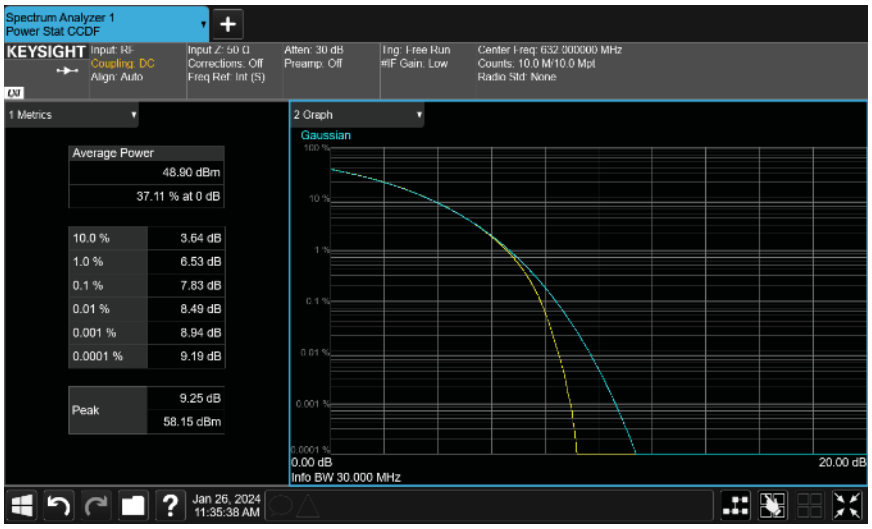
NR 30 MHz Channel Bandwidth
16QAM
Mid Ch, 634.5 MHz



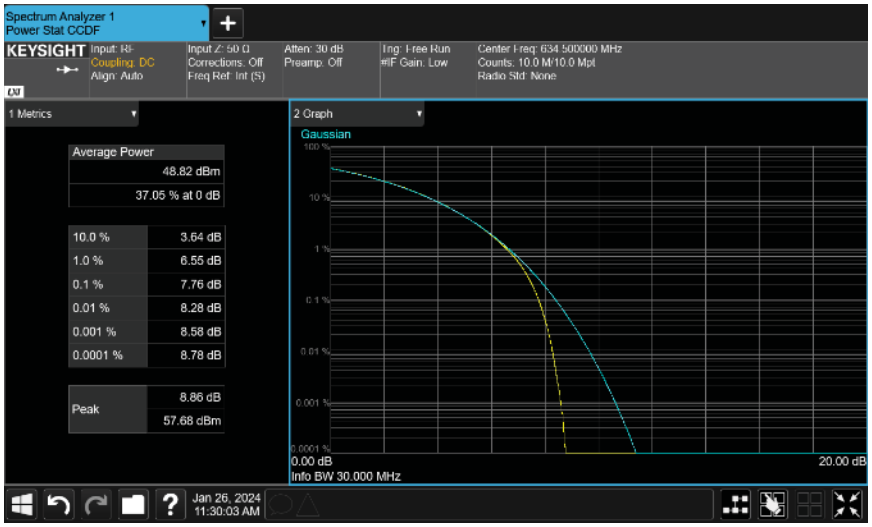
NR 30 MHz Channel Bandwidth
16QAM
High Ch, 637.0 MHz

PEAK AND AVERAGE (PAPR) CCDF

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



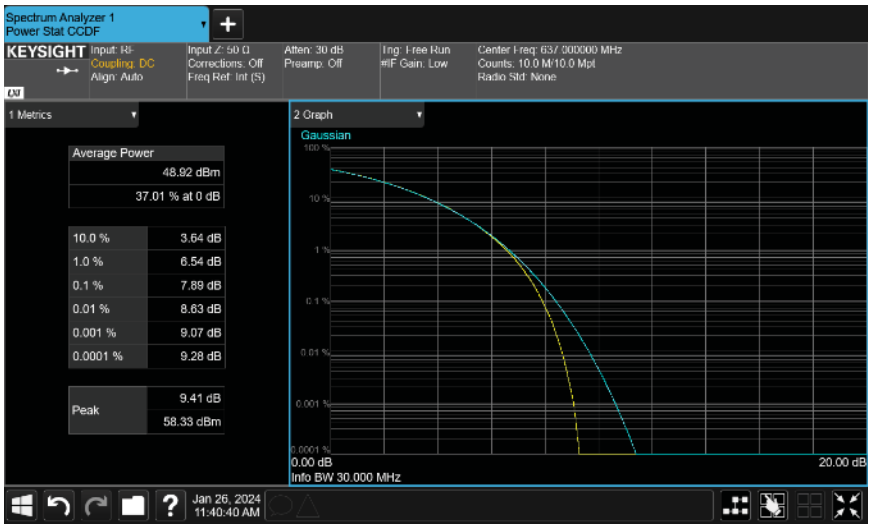
NR 30 MHz Channel Bandwidth
64QAM
Low Ch, 632.0 MHz



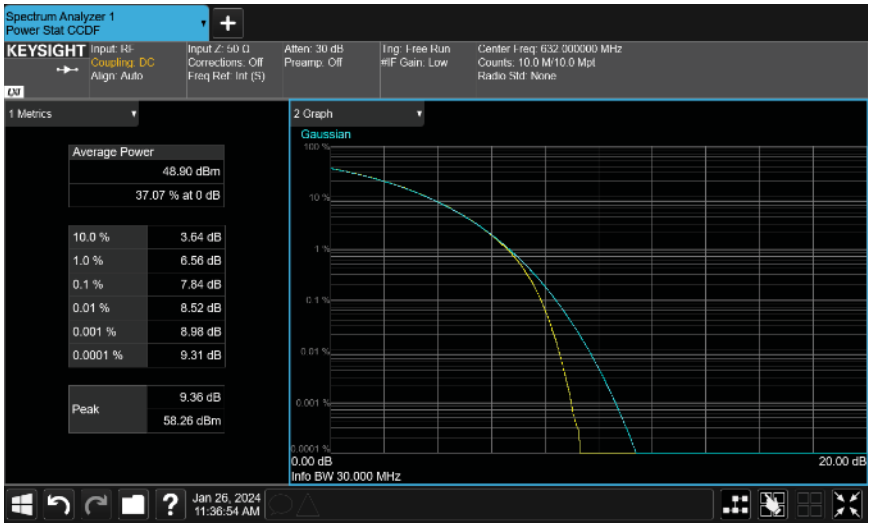
NR 30 MHz Channel Bandwidth
64QAM
Mid Ch, 634.5 MHz

PEAK AND AVERAGE (PAPR) CCDF

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



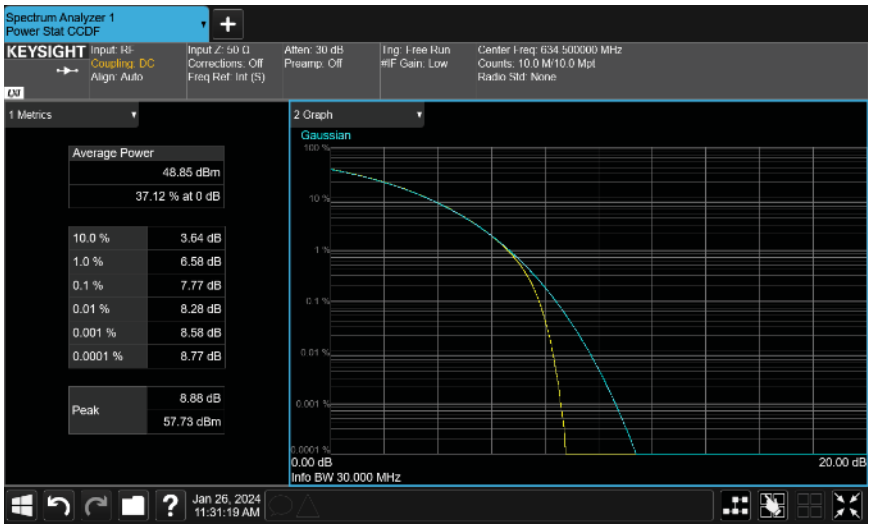
NR 30 MHz Channel Bandwidth
64QAM
High Ch, 637.0 MHz



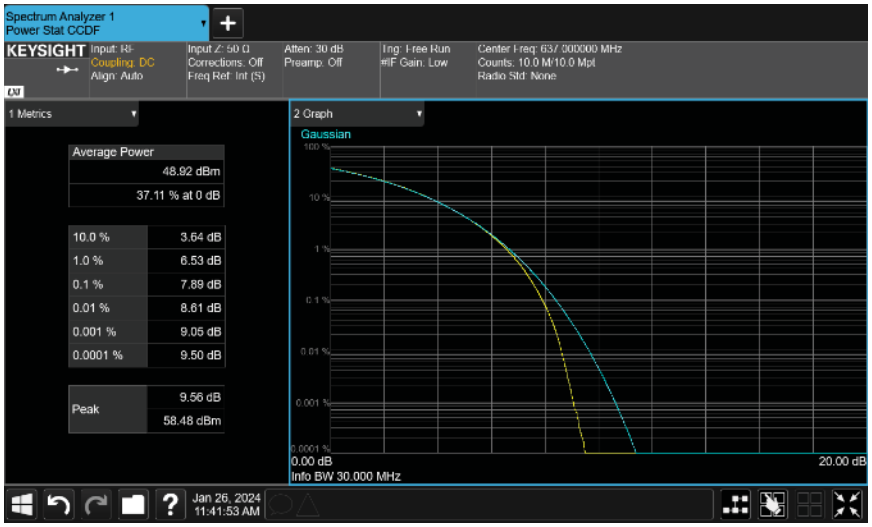
NR 30 MHz Channel Bandwidth
256QAM
Low Ch, 632.0 MHz

PEAK AND AVERAGE (PAPR) CCDF

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



NR 30 MHz Channel Bandwidth
256QAM
Mid Ch, 634.5 MHz



Port 1
NR 30 MHz Channel Bandwidth
256QAM
High Ch, 637.0 MHz

POWER SPECTRAL DENSITY AND EIRP CALCULATIONS

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0

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 power spectral density was measured using the channels and modes as called out on the following data sheets.

The RF conducted emission testing was performed on one port. The AHLOB antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in the original 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 total PSD for all antenna ports (at the radio output) were determined per ANSI C63.26-2015 paragraph 6.4.3.2.4. The EIRP calculations are based upon ANSI C63.26-2015 paragraphs 6.4 for a four port MIMO base station.

FCC Requirements:

FCC 27.50(c) (3) Fixed and base stations transmitting a signal with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of this section;

FCC 27.50(c) (4) Fixed and base stations located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal with an emission bandwidth greater than 1 MHz must not exceed an ERP of 2000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts/MHz ERP in accordance with Table 4 of this section.

Note: EIRP = ERP + 2.15dB

1000 watts = 60.00 dBm, EIRP = (60 dBm + 2.15dB) /MHz = 62.15dBm/MHz or 1640W/MHz
2000 watts = 63.01 dBm, EIRP = (63 dBm + 2.15dB) /MHz = 65.16dBm/MHz or 3280W/MHz

ISED Requirements RSS-130 Section 4.6/SRSP-518 section 5.1:

SRSP-518 section 5.1 Radiated power and antenna height limits for fixed and base stations

21. For fixed and base stations transmitting in accordance with section 4, the maximum permissible equivalent isotropically radiated power (e.i.r.p.) is 1640 watts and 1640 watts/MHz for a channel bandwidth less than or equal to 1 MHz and greater than 1 MHz, respectively. These e.i.r.p. limits apply for stations with an antenna height above average terrain (HAAT) up to 305 metres.

22. Fixed and base stations located in geographical areas at a distance greater than 26 km from large or medium population centres and transmitting in accordance with section 4, may increase their e.i.r.p. up to a maximum of 3280 watts/MHz (i.e. no more than 3280 watts e.i.r.p. in any 1 MHz band segment), with an antenna HAAT up to 305 metres.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2023-03-17	2024-03-17
Block - DC	Fairview Microwave	SD3235-2148	ANF	2023-05-24	2024-05-24
Generator - Signal	Agilent	N5173B	TIW	2023-08-07	2026-08-07

POWER SPECTRAL DENSITY AND EIRP CALCULATIONS

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0

EIRP Calculations

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 (from maximum) by base station setup parameters. Base station antennas are selected by the customer.

The base station antenna is selected by the customer and this EIRP calculation is based upon a sample worst case antenna. The EIRP calculation is based upon Commscope antenna assembly model "FF-65C-R1". The maximum Band n71 gain (15.7dBi) for this antenna was used for the EIRP calculation. This antenna assembly has a pair of +/-45° cross-polarized radiators. The four antenna RF inputs on the antenna assembly are labeled as R1 +45°, R1 -45°, R2 +/-45° and R2 -45°. The four AHLOB transmitter outputs are connected to the antenna assembly RF inputs.

Equivalent Isotropically Radiated Power (EIRP) is calculated for four port MIMO (as specified in ANSI C63.26-2015 section 6.4 for uncorrelated output signals) from the results of power measurements (highest measured PSD for each channel bandwidth type). The maximum antenna gain was used for this calculation. The cable loss between the antenna and transmitter is site dependent (will not be 0 dB) but for this worst case EIRP calculation 0 dB was used. Calculations of worst-case EIRP for four port MIMO are as follows:

Parameter	30 MHz Ch BW
Worst Case PSD/Antenna Port	36.5dBm/MHz
Number of Ant Ports per Polarization	2
Total PSD per Polarization 10*Log (2) = +3dB	39.5dBm/MHz
Cable Loss (site dependent)	0 dB
Dir Gain = Maximum Antenna Gain (G_{Ant}) See Note 1	15.7 dBi
EIRP per Polarization	55.2dBm/MHz
Number of Polarizations	2
EIRP Total = R1 +/- 45°and R2 +/- 45° See Note 2	55.2dBm/MHz
Passing FCC and ISED EIRP Limits	62.15 & 65.16 dBm/MHz

Note 1: The directional gain is equal to antenna gain since the transmit signals are completely uncorrelated. See ANSI C63.26 sections 6.4.5.2.3b) and 6.4.5.3.1b) for guidance.
Note 2: 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).

EIRP Calculation Summary

The worst case AHLOB Band n71 four port MIMO EIRP levels using antenna assembly model "FF-65C-R1" are:

(1) Less than the ISED (3280 W/MHz or 65.16 dBm/MHz) EIRP Regulatory Limits for 30MHz channel bandwidths
(2) Less than the ISED (1640 W/MHz or 62.15 dBm/MHz) EIRP Regulatory Limits for 30MHz channel bandwidths

POWER SPECTRAL DENSITY AND EIRP CALCULATIONS

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0

EUT:	Airscale Base Transceiver Station Remote Radio Head Model AHLOB	Work Order:	NOKI0073
Serial Number:	YK220900029	Date:	2024-01-26
Customer:	Nokia Solutions and Networks	Temperature:	21.8°C
Attendees:	David Le, John Rattanavong	Relative Humidity:	40.5%
Customer Project:	None	Bar. Pressure (PMSL):	1023 mbar
Tested By:	Jarrod Brenden	Job Site:	TX07
Power:	54 VDC	Configuration:	NOKI0073-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 27:2024	ANSI C63.26:2015
RSS-130 Issue 2:2019	ANSI C63.26:2015

COMMENTS

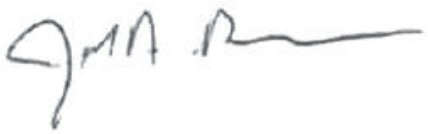
All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. The PSD was measured while transmitting one carrier on Port 1. The total PSD for multiport (2x2, 4x4 MIMO) operation was determined based upon ANSI 63.26 clause 6.4.3.2.4 (10 Log Nout). The total PSD for two port operation is single port PSD +3dB [i.e. 10 Log(2)]. The total PSD for four port operation is single port PSD +6dB [i.e. 10 Log(4)]. The carriers were enabled at maximum power.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



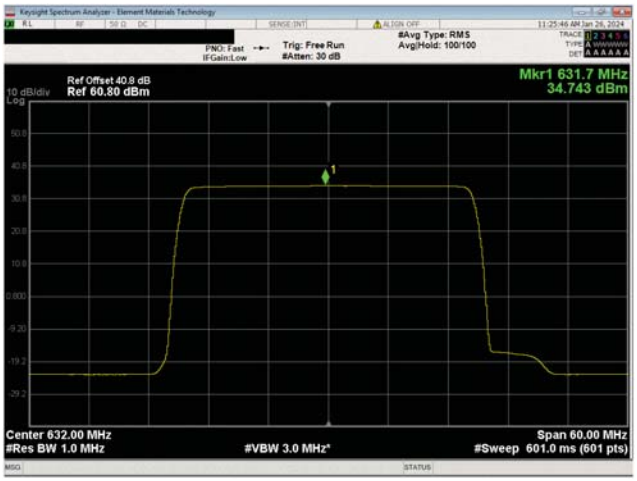
Tested By

TEST RESULTS

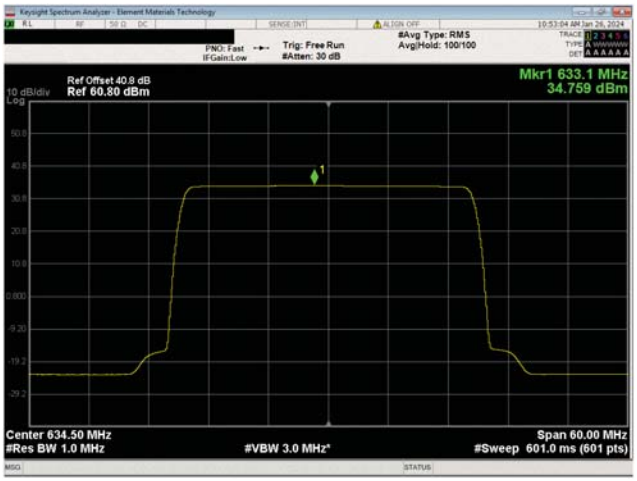
		Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Two Port (2x2 MIMO) dBm/MHz == PSD	Two Port (4x4 MIMO) dBm/MHz == PSD
Band n71 617 MHz - 652 MHz						
NR 30 MHz Channel Bandwidth						
QPSK						
	Low Ch, 632.0 MHz	34.743	0	34.7	37.7	40.7
	Mid Ch, 634.5 MHz	34.759	0	34.8	37.8	40.8
	High Ch, 637.0 MHz	34.735	0	34.7	37.7	40.7
16QAM						
	Low Ch, 632.0 MHz	36.545	0	36.5	39.5	42.5
	Mid Ch, 634.5 MHz	36.457	0	36.5	39.5	42.5
	High Ch, 637.0 MHz	36.525	0	36.5	39.5	42.5
64QAM						
	Low Ch, 632.0 MHz	34.764	0	34.8	37.8	40.8
	Mid Ch, 634.5 MHz	34.681	0	34.7	37.7	40.7
	High Ch, 637.0 MHz	34.779	0	34.8	37.8	40.8
256QAM						
	Low Ch, 632.0 MHz	34.802	0	34.8	37.8	40.8
	Mid Ch, 634.5 MHz	34.732	0	34.7	37.7	40.7
	High Ch, 637.0 MHz	34.777	0	34.8	37.8	40.8

POWER SPECTRAL DENSITY AND EIRP CALCULATIONS

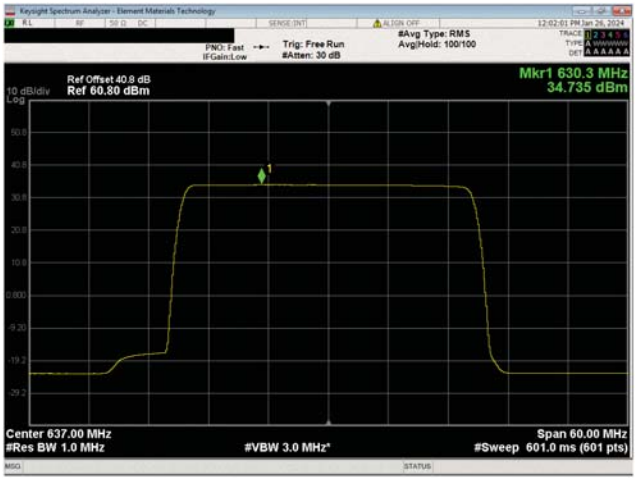
element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



Port 1
NR 30 MHz Channel Bandwidth
QPSK
Low Ch, 632.0 MHz



Port 1
NR 30 MHz Channel Bandwidth
QPSK
Mid Ch, 634.5 MHz

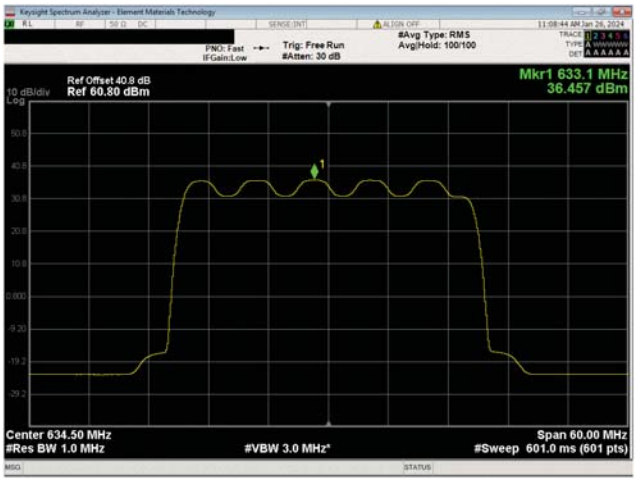


Port 1
NR 30 MHz Channel Bandwidth
QPSK
High Ch, 637.0 MHz

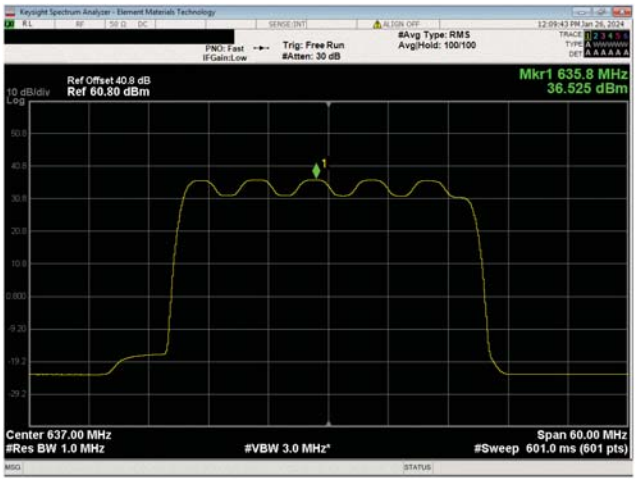
Port 1
NR 30 MHz Channel Bandwidth
16QAM
Low Ch, 632.0 MHz

POWER SPECTRAL DENSITY AND EIRP CALCULATIONS

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



Port 1
NR 30 MHz Channel Bandwidth
16QAM
Mid Ch, 634.5 MHz



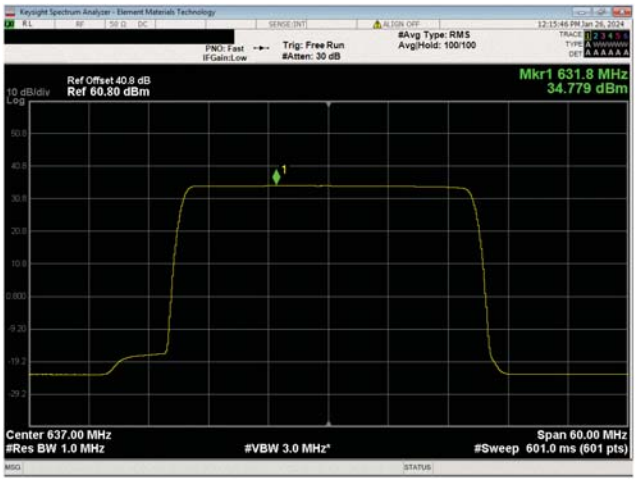
Port 1
NR 30 MHz Channel Bandwidth
16QAM
High Ch, 637.0 MHz

Port 1
NR 30 MHz Channel Bandwidth
64QAM
Low Ch, 632.0 MHz

Port 1
NR 30 MHz Channel Bandwidth
64QAM
Mid Ch, 634.5 MHz

POWER SPECTRAL DENSITY AND EIRP CALCULATIONS

element
TbtTx 2023.12.05.0
WTD.2023.11.13.0



Port 1
NR 30 MHz Channel Bandwidth
64QAM
High Ch, 637.0 MHz

Port 1
NR 30 MHz Channel Bandwidth
256QAM
Low Ch, 632.0 MHz

Port 1
NR 30 MHz Channel Bandwidth
256QAM
Mid Ch, 634.5 MHz

Port 1
NR 30 MHz Channel Bandwidth
256QAM
High Ch, 637.0 MHz

End of Test Report