SPURIOUS RADIATED EMISSIONS

element
WTD.2023.11.13.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

TEST DESCRIPTION

At an approved test site, the transmitter was place on a remotely controlled turntable, and the measurement antenna was placed 3 meters from the transmitter. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis. The turntable azimuth was varied to maximize the level of spurious emissions. The height of the measurement antenna was also varied from 1 to 4 meters. A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity. The amplitude and frequency of the highest emissions was noted.

The transmitter was then replaced with a ½ wave dipole that was successively tuned to each of the highest spurious emissions for emissions below 1 GHz, and a horn antenna for emissions above 1 GHz. A signal generator was connected to the dipole (horn antenna for frequencies above 1 GHz), and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded, and by factoring in the cable loss to the antenna and its gain, the power (dBm) was determined for each radiated spurious emission.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Biconilog	ETS Lindgren	3143B	AYF	2023-05-03	2025-05-03
Cable	Northwest EMC	RE 9kHz - 1GHz	TXB	2023-05-25	2024-05-25
Amplifier - Pre-Amplifier	Fairview Microwave	FMAM63001	PAS	2023-04-11	2024-04-11
Filter - Low Pass	Micro-Tronics	LPM50004	HHV	2023-07-21	2024-07-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2023-02-09	2024-02-09
Antenna - Double Ridge	ETS Lindgren	3115	AJL	2022-10-21	2024-10-21
Cable	Northwest EMC	1-8.2 GHz	TXC	2023-04-11	2024-04-11
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAJ	2023-04-11	2024-04-11
Antenna - Standard Gain	ETS Lindgren	3160-07	AJF	NCR	NCR
Cable	Northwest EMC	8-18GHz	TXD	2023-04-11	2024-04-11
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	PAK	2023-08-29	2024-08-29
Antenna - Standard Gain	ETS Lindgren	3160-08	AJG	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	PAL	2023-08-29	2024-08-29

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.1 dB	-5.1 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 40 GHz

POWER INVESTIGATED

54VDC

CONFIGURATIONS INVESTIGATED

NOKI0072-5
NOKI0072-6

MODES INVESTIGATED

PCS and BRS (at 60W/carrier) & AWS (at 40W/carrier)
AWS and BRS (at 60W/carrier) & PCS (at 40W/carrier)
AWS and PCS (at 60W/carrier) & BRS (at 40W/carrier)
AWS and PCS (at 60W/ per port) & BRS (at 40W/carrier)
AWS and BRS (at 60W/per port) & PCS (at 40W/carrier)

Frequency Band	Ant Port	RF BW	5G NR-ARFCN	Transmit Frequency	Carrier Power
PCS	1	10MHz	(Bottom Channel 387000)	1935 MHz	60 Watts
PCS	2	10MHz	(Middle Channel 392500)	1962.5 MHz	60 Watts
PCS	3	10MHz	(Top Channel 398000)	1990 MHz	60 Watts
PCS	4	10MHz	(Top Channel 398000)	1990 MHz	60 Watts
AWS	1	5MHz	(Bottom Channel 422500)	2112.5 MHz	40 Watts
AWS	2	5MHz	(Middle Channel 431000)	2155.0 MHz	40 Watts
AWS	3	5MHz	(Middle Channel 431000)	2155.5 MHz	40 Watts
AWS	4	5MHz	(Top Channel 439500)	2197.5 MHz	40 Watts
BRS	1	10MHz	(Bottom Channel 525000)	2625 MHz	60 Watts
BRS	2	10MHz	(Bottom Channel 525000)	2625 MHz	60 Watts
BRS	3	10MHz	(Middle Channel 531000)	2655 MHz	60 Watts
BRS	4	10MHz	(Top Channel 537000)	2685 MHz	60 Watts

Table 7 *PCS and BRS (at 60W/carrier) & AWS (at 40W/carrier)*
NR Carriers Enabled Simultaneously

Frequency Band	Ant Port	RF BW	5G NR-ARFCN	Transmit Frequency	Carrier Power
PCS	1	5MHz	(Bottom Channel 386500)	1932.5 MHz	40 Watts
PCS	2	5MHz	(Middle Channel 392500)	1962.5 MHz	40 Watts
PCS	3	5MHz	(Top Channel 398500)	1992.5 MHz	40 Watts
PCS	4	5MHz	(Top Channel 398500)	1992.5MHz	40 Watts
AWS	1	10MHz	(Bottom Channel 423000)	2115 MHz	60 Watts
AWS	2	10MHz	(Middle Channel 431000)	2155 MHz	60 Watts
AWS	3	10MHz	(Middle Channel 431000)	2155 MHz	60 Watts
AWS	4	10MHz	(Top Channel 439000)	2195 MHz	60 Watts
BRS	1	10MHz	(Bottom Channel 525000)	2625 MHz	60 Watts
BRS	2	10MHz	(Bottom Channel 525000)	2625 MHz	60 Watts
BRS	3	10MHz	(Middle Channel 531000)	2655 MHz	60 Watts
BRS	4	10MHz	(Top Channel 537000)	2685 MHz	60 Watts

Table 8 *AWS and BRS (at 60W/carrier) & PCS (at 40W/carrier)*
NR Carriers Enabled Simultaneously

Frequency Band	Ant Port	RF BW	5G NR-ARFCN	Transmit Frequency	Carrier Power
PCS	1	10MHz	(Bottom Channel 387000)	1935 MHz	60 Watts
PCS	2	10MHz	(Middle Channel 392500)	1962.5 MHz	60 Watts
PCS	3	10MHz	(Top Channel 398000)	1990 MHz	60 Watts
PCS	4	10MHz	(Top Channel 398000)	1990 MHz	60 Watts
AWS	1	10MHz	(Bottom Channel 423000)	2115 MHz	60 Watts
AWS	2	10MHz	(Middle Channel 431000)	2155 MHz	60 Watts
AWS	3	10MHz	(Middle Channel 431000)	2155 MHz	60 Watts
AWS	4	10MHz	(Top Channel 439000)	2195 MHz	60 Watts
BRS	1	5MHz	(Bottom Channel 524500)	2622.5 MHz	40 Watts
BRS	2	5MHz	(Bottom Channel 524500)	2622.5 MHz	40 Watts
BRS	3	5MHz	(Middle Channel 521000)	2655 MHz	40 Watts
BRS	4	5MHz	(Top Channel 537500)	2687.5 MHz	40 Watts

Table 9 *AWS and PCS (at 60W/carrier) & BRS (at 40W/carrier)*
NR Carriers Enabled Simultaneously

Frequency Band	Ant Port	RF BW	4G LTE E-ARFCN	Transmit Frequency	Carrier Power
PCS	1	5MHz	(Middle Channel 8365)	1962.5 MHz	20 Watts
PCS	2	5MHz	(Middle Channel 8365)	1962.5 MHz	20 Watts
PCS	3	5MHz	(Middle Channel 8365)	1962.5 MHz	20 Watts
PCS	4	5MHz	(Middle Channel 8365)	1962.5 MHz	20 Watts
PCS	1	NB-IoT SA	(Bottom Channel 8042)	1930.2 MHz	20 Watts
PCS	2	NB-IoT SA	(Bottom Channel 8042)	1930.2 MHz	20 Watts
PCS	3	NB-IoT SA	(Bottom Channel 8042)	1930.2 MHz	20 Watts
PCS	4	NB-IoT SA	(Bottom Channel 8042)	1930.2 MHz	20 Watts
PCS	1	NB-IoT SA	(Top Channel 8688)	1994.8 MHz	20 Watts
PCS	2	NB-IoT SA	(Top Channel 8688)	1994.8 MHz	20 Watts
PCS	3	NB-IoT SA	(Top Channel 8688)	1994.8 MHz	20 Watts
PCS	4	NB-IoT SA	(Top Channel 8688)	1994.8 MHz	20 Watts
AWS	1	5MHz	(Top Channel 67111)	2177.5 MHz	40 Watts
AWS	2	5MHz	(Top Channel 57111)	2177.5 MHz	40 Watts
AWS	3	5MHz	(Top Channel 67111)	2177.5 MHz	40 Watts
AWS	4	5MHz	(Top Channel 67111)	2177.5 MHz	40 Watts
AWS	1	NB-IoT SA	(Bottom Channel 66438)	2110.2 MHz	20 Watts
AWS	2	NB-IoT SA	(Bottom Channel 66438)	2110.2 MHz	20 Watts
AWS	3	NB-IoT SA	(Bottom Channel 66438)	2110.2 MHz	20 Watts
AWS	4	NB-IoT SA	(Bottom Channel 66438)	2110.2 MHz	20 Watts
BRS	1	5MHz	(Middle Channel 3100)	2655.0MHz	40 Watts
BRS	2	5MHz	(Middle Channel 3100)	2655.0MHz	40 Watts
BRS	3	5MHz	(Middle Channel 3100)	2655.0MHz	40 Watts
BRS	4	5MHz	(Middle Channel 3100)	2655.0MHz	40 Watts

Table 10 *AWS and PCS (at 60W/ per port) & BRS (at 40W/carrier)*
LTE and NB-IoT SA Carriers Enabled Simultaneously

Frequency Band	Ant Port	RF BW	4G LTE E-ARFCN	Transmit Frequency	Carrier Power
PCS	1	5MHz	(Middle Channel 8365)	1962.5 MHz	40 Watts
PCS	2	5MHz	(Middle Channel 8365)	1962.5 MHz	40 Watts
PCS	3	5MHz	(Middle Channel 8365)	1962.5 MHz	40 Watts
PCS	4	5MHz	(Middle Channel 8365)	1962.5 MHz	40 Watts
AWS	1	5MHz	(Bottom Channel 66461)	2112.5 MHz	40 Watts
AWS	2	5MHz	Bottom Channel 66461)	2112.5 MHz	40 Watts
AWS	3	5MHz	Bottom Channel 66461)	2112.5 MHz	40 Watts
AWS	4	5MHz	Bottom Channel 66461)	2112.5 MHz	40 Watts
AWS	1	NB-IoT SA	(Top Channel 66884)	2154.8 MHz	20 Watts
AWS	2	NB-IoT SA	(Top Channel 66884)	2154.8 MHz	20 Watts
AWS	3	NB-IoT SA	(Top Channel 66884)	2154.8 MHz	20 Watts
AWS	4	NB-IoT SA	(Top Channel 66884)	2154.8 MHz	20 Watts
BRS	1	5MHz	(Middle Channel 3100)	2655.0MHz	20 Watts
BRS	2	5MHz	(Middle Channel 3100)	2655.0MHz	20 Watts
BRS	3	5MHz	(Middle Channel 3100)	2655.0MHz	20 Watts
BRS	4	5MHz	(Middle Channel 3100)	2655.0MHz	20 Watts
BRS	1	NB-IoT SA	(Bottom Channel 2752)	2620.2 MHz	20 Watts
BRS	2	NB-IoT SA	(Bottom Channel 2752)	2620.2 MHz	20 Watts
BRS	3	NB-IoT SA	(Bottom Channel 2752)	2620.2 MHz	20 Watts
BRS	4	NB-IoT SA	(Bottom Channel 2752)	2620.2 MHz	20 Watts
BRS	1	NB-IoT SA	(Top Channel 3448)	2689.8 MHz	20 Watts
BRS	2	NB-IoT SA	(Top Channel 3448)	2689.8 MHz	20 Watts
BRS	3	NB-IoT SA	(Top Channel 3448)	2689.8 MHz	20 Watts
BRS	4	NB-IoT SA	(Top Channel 3448)	2689.8 MHz	20 Watts

Table 11 *AWS and BRS (at 60W/per port) & PCS (at 40W/carrier)*
LTE and NB-IoT SA Carriers Enabled Simultaneously

SPURIOUS RADIATED EMISSIONS

element
WTD.2023.11.13.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

EUT:	AirScale Base Transceiver Station Remote Radio Head Model AHFIHA	Work Order:	NOKI0071
Serial Number:	RW233403199	Date:	2023-10-25
Customer:	Nokia Solutions and Networks	Temperature:	20.4°C
Attendees:	John Rattanavong, Mitch Hill	Relative Humidity:	59.4%
Customer Project:	None	Bar. Pressure (PMSL):	1016 mb
Tested By:	Jarrod Brenden	Job Site:	TX02
Power:	54VDC	Configuration:	NOKI0072-5

TEST SPECIFICATIONS

Specification:	Method:
FCC 24E:2024	ANSI C63.26:2015
FCC 27:2024	ANSI C63.26:2015
RSS-133 Issue 6:2013 +A1:2018	ANSI C63.26:2015
RSS-199 Issue 4:2023	ANSI C63.26:2015
RSS-139 Issue 4:2022	ANSI C63.26:2015

TEST PARAMETERS

Run #:	45	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

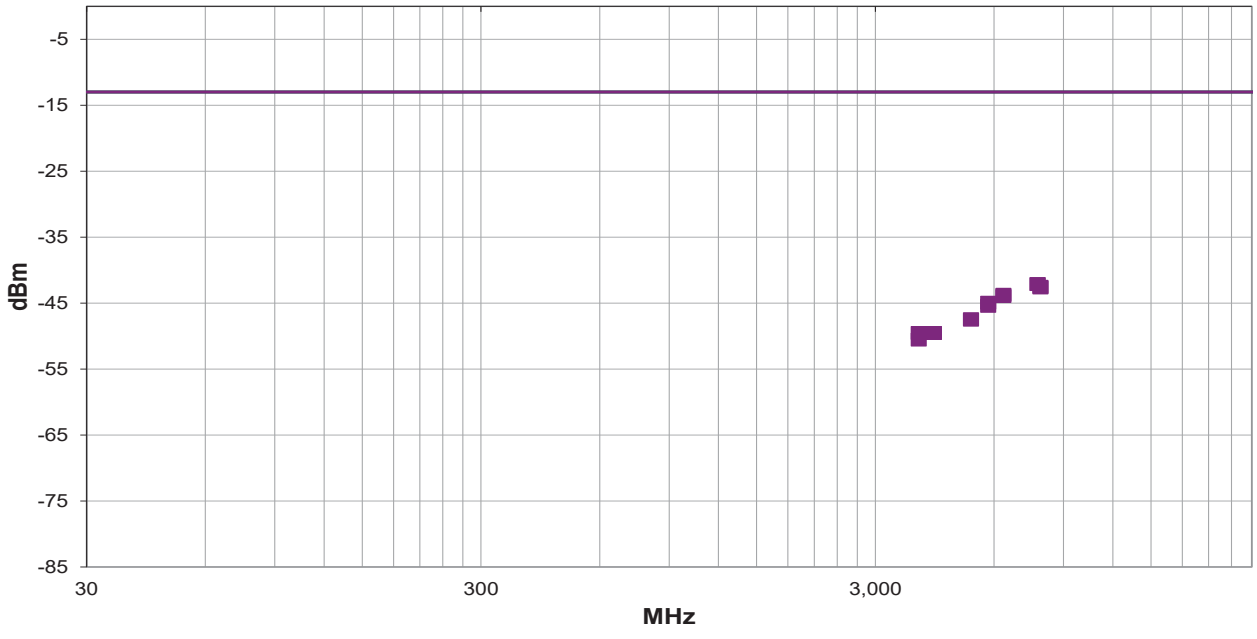
Multi Mode. NR Carriers Enabled Simultaneously per Table 7 (see test description).

EUT OPERATING MODES

PCS and BRS (at 60W/carrier) & AWS (at 40W/carrier)

DEVIATIONS FROM TEST STANDARD

None



Run #: 45 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2023.11.13.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

RESULTS - Run #45

Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
7732.673	1.5	58.9	Horz	PK	61.3E-9	-42.1	-13.0	-29.1
7731.073	1.5	308.0	Vert	PK	61.3E-9	-42.1	-13.0	-29.1
7869.900	1.5	40.9	Horz	PK	55.9E-9	-42.5	-13.0	-29.5
7868.867	1.5	213.9	Vert	PK	54.6E-9	-42.6	-13.0	-29.6
6335.330	1.5	244.9	Horz	PK	42.4E-9	-43.7	-13.0	-30.7
6335.790	1.5	207.0	Vert	PK	40.5E-9	-43.9	-13.0	-30.9
5798.363	1.89	106.9	Vert	PK	32.1E-9	-44.9	-13.0	-31.9
5798.770	1.5	237.0	Horz	PK	28.6E-9	-45.4	-13.0	-32.4
5245.377	1.5	237.0	Horz	PK	18.1E-9	-47.4	-13.0	-34.4
5246.067	1.5	37.0	Vert	PK	17.7E-9	-47.5	-13.0	-34.5
3865.790	3.08	345.0	Horz	PK	11.1E-9	-49.5	-13.0	-36.5
4224.577	1.5	309.9	Horz	PK	11.1E-9	-49.5	-13.0	-36.5
4223.273	1.5	252.0	Vert	PK	11.1E-9	-49.5	-13.0	-36.5
3866.320	1.85	213.9	Vert	PK	8.9E-9	-50.5	-13.0	-37.5

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2023.11.13.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

EUT:	AirScale Base Transceiver Station Remote Radio Head Model AHFIHA	Work Order:	NOKI0071
Serial Number:	RW233403199	Date:	2023-10-25
Customer:	Nokia Solutions and Networks	Temperature:	20.4°C
Attendees:	John Rattanavong, Mitch Hill	Relative Humidity:	59.4%
Customer Project:	None	Bar. Pressure (PMSL):	1016 mb
Tested By:	Jarrod Brenden	Job Site:	TX02
Power:	54VDC	Configuration:	NOKI0072-5

TEST SPECIFICATIONS

Specification:	Method:
FCC 24E:2024	ANSI C63.26:2015
FCC 27:2024	ANSI C63.26:2015
RSS-133 Issue 6:2013 +A1:2018	ANSI C63.26:2015
RSS-199 Issue 4:2023	ANSI C63.26:2015
RSS139 Issue 4:2022	ANSI C63.26:2015

TEST PARAMETERS

Run #:	51	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

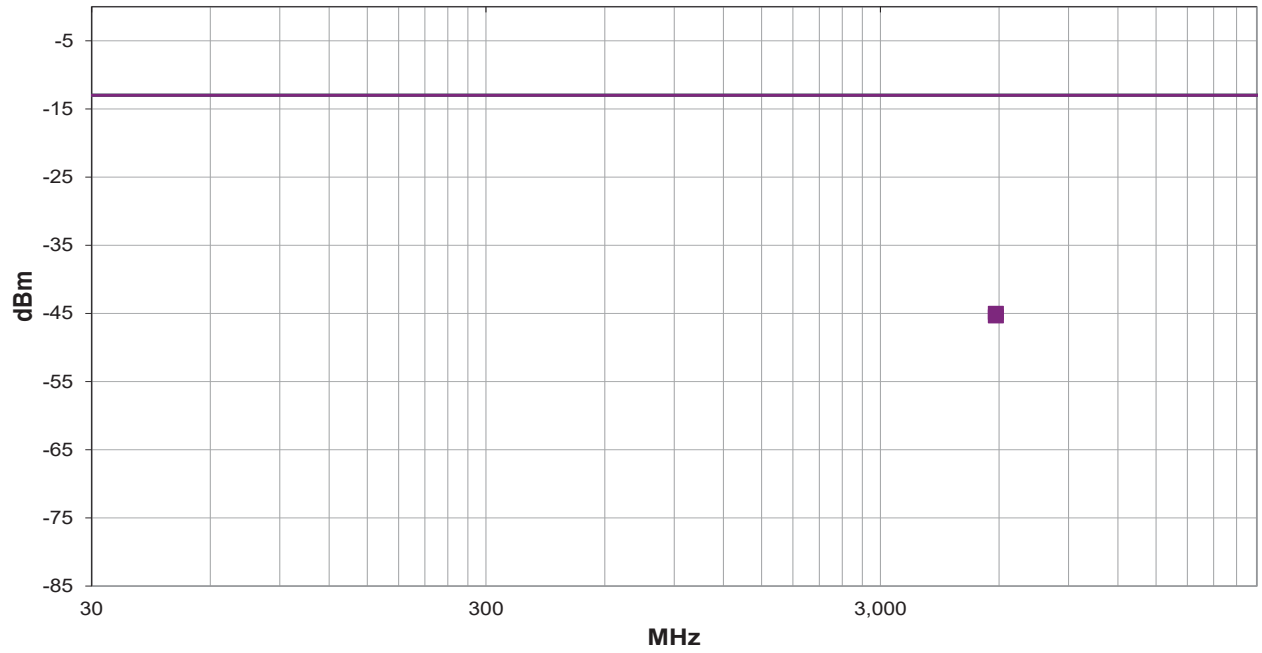
Multi Mode. NR Carriers Enabled Simultaneously per Table 8 (see test description).

EUT OPERATING MODES

AWS and BRS (at 60W/carrier) & PCS (at 40W/carrier)

DEVIATIONS FROM TEST STANDARD

None



Run #: 51 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2023.11.13.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

RESULTS - Run #51

Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
5886.625	1.5	252.0	Vert	PK	32.1E-9	-44.9	-13.0	-31.9
5890.842	1.5	212.0	Horz	PK	28.6E-9	-45.4	-13.0	-32.4

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2023.11.13.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

EUT:	AirScale Base Transceiver Station Remote Radio Head Model AHFIHA	Work Order:	NOKI0071
Serial Number:	RW233403199	Date:	2023-10-25
Customer:	Nokia Solutions and Networks	Temperature:	20.6°C
Attendees:	John Rattanavong, Mitch Hill	Relative Humidity:	59.9%
Customer Project:	None	Bar. Pressure (PMSL):	1013 mb
Tested By:	Jarrod Brenden	Job Site:	TX02
Power:	54VDC	Configuration:	NOKI0072-5

TEST SPECIFICATIONS

Specification:	Method:
FCC 24E:2024	ANSI C63.26:2015
FCC 27:2024	ANSI C63.26:2015
RSS-133 Issue 6:2013 +A1:2018	ANSI C63.26:2015
RSS-199 Issue 4:2023	ANSI C63.26:2015
RSS139 Issue 4:2022	ANSI C63.26:2015

TEST PARAMETERS

Run #:	55	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

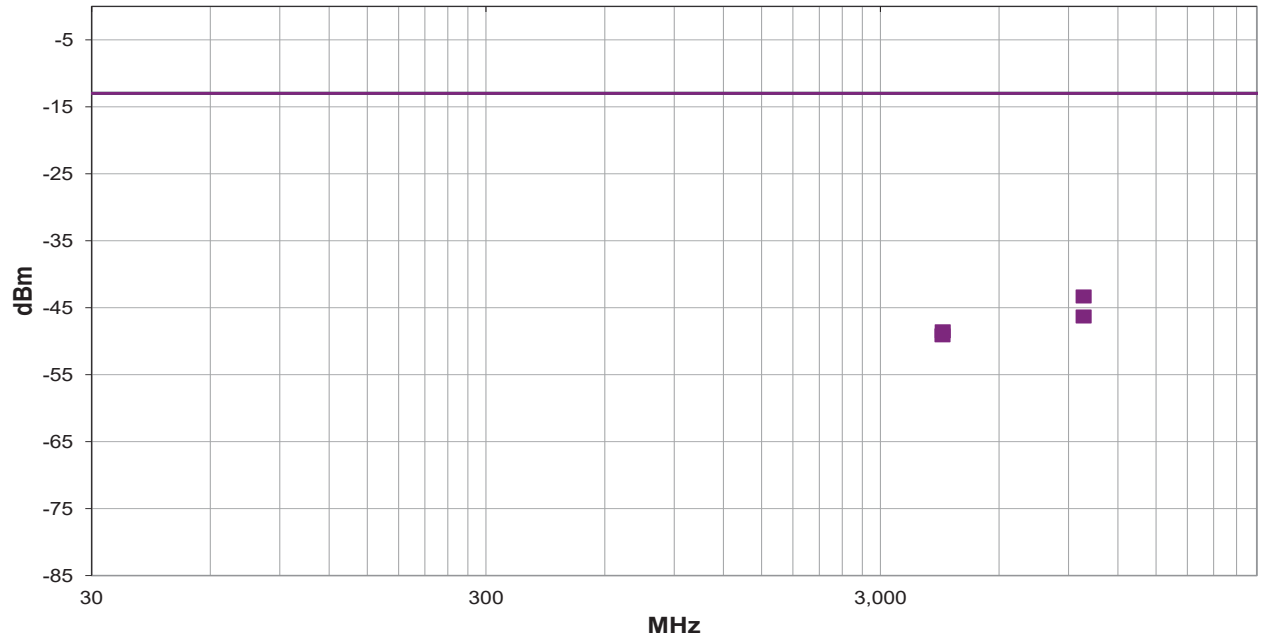
Single Mode. NR Carriers Enabled Simultaneously per Table 9 (see test description).

EUT OPERATING MODES

AWS and PCS (at 60W/carrier) & BRS (at 40W/carrier)

DEVIATIONS FROM TEST STANDARD

None



Run #: 55 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

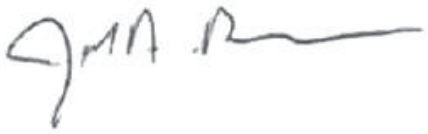
element
WTD.2023.11.13.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

RESULTS - Run #55

Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
9830.392	3.8	27.9	Vert	PK	46.5E-9	-43.3	-13.0	-30.3
9830.483	3.0	231.0	Horz	PK	23.3E-9	-46.3	-13.0	-33.3
4317.425	1.5	158.0	Horz	PK	14.0E-9	-48.5	-13.0	-35.5
4313.600	1.5	105.9	Vert	PK	12.2E-9	-49.1	-13.0	-36.1

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2023.11.13.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

EUT:	AirScale Base Transceiver Station Remote Radio Head Model AHFIHA	Work Order:	NOKI0071
Serial Number:	RW233403199	Date:	2023-10-25
Customer:	Nokia Solutions and Networks	Temperature:	20.6°C
Attendees:	John Rattanavong, Mitch Hill	Relative Humidity:	59.9%
Customer Project:	None	Bar. Pressure (PMSL):	1013 mb
Tested By:	Jarrod Brenden	Job Site:	TX02
Power:	54VDC	Configuration:	NOKI0072-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 24E:2024	ANSI C63.26:2015
FCC 27:2024	ANSI C63.26:2015
RSS-133 Issue 6:2013 +A1:2018	ANSI C63.26:2015
RSS-199 Issue 4:2023	ANSI C63.26:2015
RSS139 Issue 4:2022	ANSI C63.26:2015

TEST PARAMETERS

Run #:	59	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

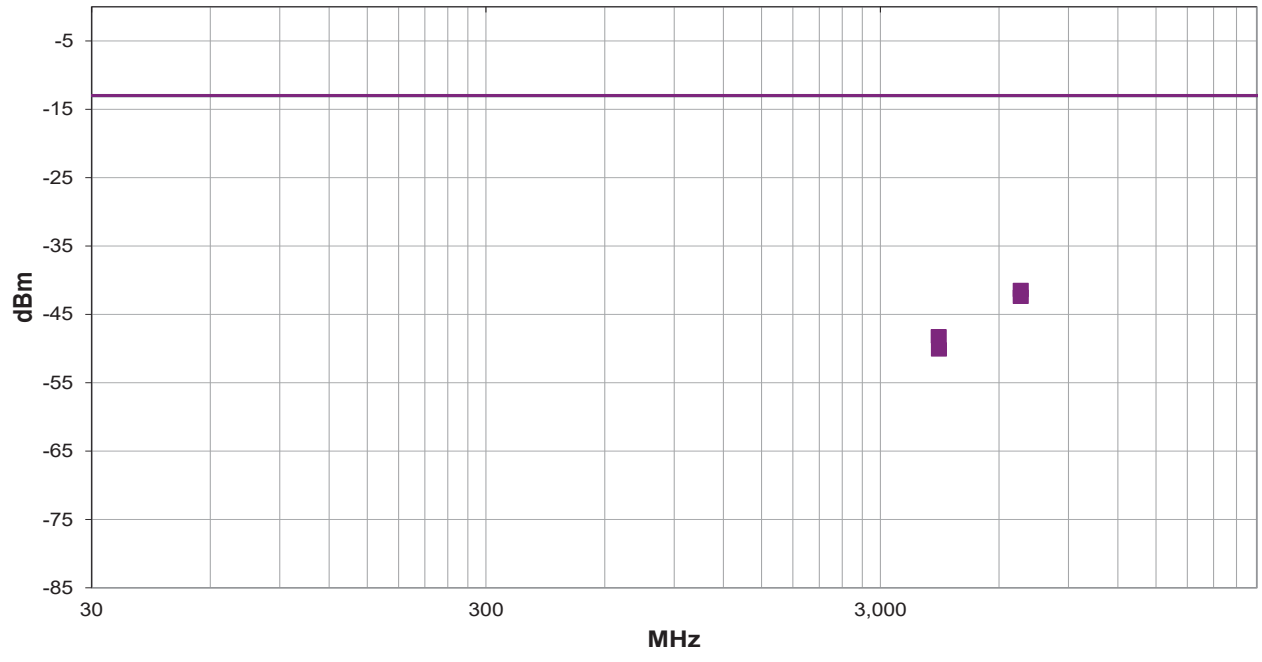
Multi Mode. LTE and NB-IoT SA Carriers Enabled Simultaneously per Table 10 (see test description).

EUT OPERATING MODES

AWS and PCS (at 60W/ per port) & BRS (at 40W/carrier)

DEVIATIONS FROM TEST STANDARD

None



Run #: 59 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

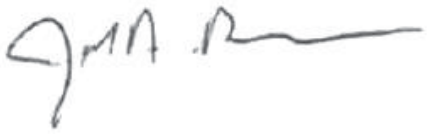
element
WTD.2023.11.13.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

RESULTS - Run #59

Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
6812.175	1.5	16.9	Vert	PK	72.0E-9	-41.4	-13.0	-28.4
6812.167	1.03	42.0	Horz	PK	57.2E-9	-42.4	-13.0	-29.4
4220.208	1.5	42.0	Horz	PK	15.0E-9	-48.2	-13.0	-35.2
4220.917	2.57	1.0	Vert	PK	9.7E-9	-50.1	-13.0	-37.1

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2023.11.13.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

EUT:	AirScale Base Transceiver Station Remote Radio Head Model AHFIHA	Work Order:	NOKI0071
Serial Number:	RW233403199	Date:	2023-10-25
Customer:	Nokia Solutions and Networks	Temperature:	20.6°C
Attendees:	John Rattanavong, Mitch Hill	Relative Humidity:	59.9%
Customer Project:	None	Bar. Pressure (PMSL):	1013 mb
Tested By:	Jarrod Brenden	Job Site:	TX02
Power:	54VDC	Configuration:	NOKI0072-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 24E:2024	ANSI C63.26:2015
FCC 27:2024	ANSI C63.26:2015
RSS-133 Issue 6:2013 +A1:2018	ANSI C63.26:2015
RSS-199 Issue 4:2023	ANSI C63.26:2015
RSS139 Issue 4:2022	ANSI C63.26:2015

TEST PARAMETERS

Run #:	63	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

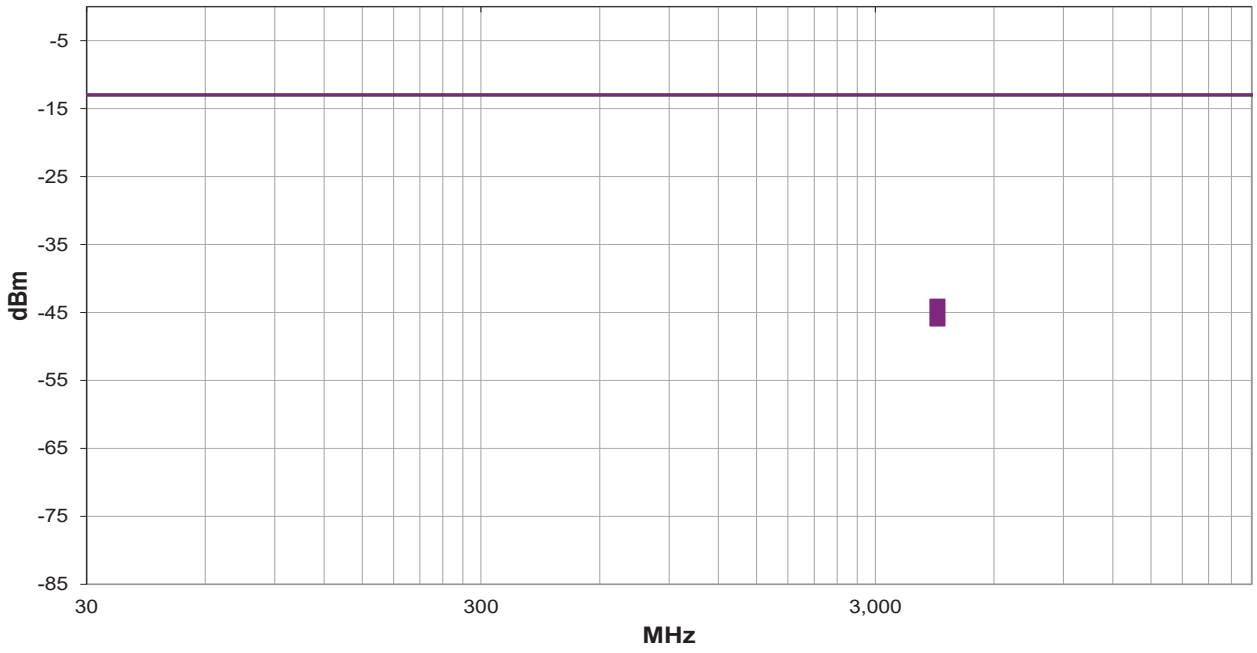
Multi Mode. LTE and NB-IoT SA Carriers Enabled Simultaneously per Table 11 (see test description).

EUT OPERATING MODES

AWS and BRS (at 60W/per port) & PCS (at 40W/carrier)

DEVIATIONS FROM TEST STANDARD

None



Run #: 63 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2023.11.13.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

RESULTS - Run #63

Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
4309.667	2.09	100.9	Horz	PK	39.5E-9	-44.0	-13.0	-31.0
4309.933	1.31	13.0	Vert	PK	25.0E-9	-46.0	-13.0	-33.0

CONCLUSION

Pass

Tested By

FREQUENCY STABILITY

element
TbtTx 2023.11.27.0
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 spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

Measurements were made on the single transmit frequency as called out on the data sheets. Testing was done while the EUT was continuously operating.

The primary supply voltage was varied from 85 % to 115% of the nominal voltage while at ambient temperature. Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range of -30 ° to +50° C and at 10°C intervals.

FCC Part 27.54 defines the frequency deviation limit as follows: “The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation."

FCC Part 24.235 defines the frequency deviation limit as follows: “The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block."

RSS 133 6.3 frequency stability requirement for base stations is 1.0 ppm. In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS Gen.

RSS-139 5.4 and RSS-199 5.4 defines frequency stability as follows: “The frequency stability shall be sufficient to ensure that the occupied/emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen”.

Results with a frequency error of less than 1000 Hz will show the carrier to be operating within the band. The frequency stability/accuracy radio design is the same for all radio technologies and modulation types. The radio was configured for 5GNR to show compliance.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9030B	R336	2023-10-03	2024-10-03
Thermometer	Omega Engineering, Inc.	HH311	DUI	2023-03-02	2024-03-02
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-8-2-SCT/AC	TBH	NCR	NCR
Meter - Multimeter	Fluke	77 IV	MLT	2024-01-29	2025-01-29

FREQUENCY STABILITY

element
TbtTx 2023.11.27.0
WTD.2023.11.13.0

EUT:	AirScale Base Transceiver Station Remote Radio Head Model AHFIHA	Work Order:	NOKI0072
Serial Number:	RW233403199	Date:	2023-10-27
Customer:	Nokia Solutions and Networks	Temperature:	23.4°C
Attendees:	John Rattanavong, Mitch Hill	Relative Humidity:	38.6%
Customer Project:	None	Bar. Pressure (PMSL):	1017 mbar
Tested By:	Jarrod Brenden	Job Site:	TX07
Power:	48VDC	Configuration:	NOKI0072-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 24E:2024	ANSI C63.26:2015
FCC 27:2024	ANSI C63.26:2015
RSS-133 Issue 6:2013 +A1:2018	ANSI C63.26:2015
RSS-199 Issue 4:2023	ANSI C63.26:2015
RSS-139 Issue 4:2022	ANSI C63.26:2015

COMMENTS

Losses in the measurement path were accounted for: DC Block, attenuators, cables, and filters where used. The EUT temperature was stabilized to each temperature step (for a minimum of 30 minutes) prior to measurements. Sample plots are provided.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

Tested By

TEST RESULTS

	Value Δ (mHz)	Limit Abs Δ (Hz)	Result
Port 1			
PCS Band n25, 1930 MHz - 1995 MHz			
5 MHz Bandwidth, QPSK			
Nominal Temperature, 20˚C			
Low Voltage, 40.8 VDC, Mid Channel 1962.5 MHz	21.6	1000	Pass
High Voltage, 55.2 VDC, Mid Channel, 1962.5 MHz	48.1	1000	Pass
Nominal Voltage, 48 VDC			
Extreme Temperature, -30˚C, Mid Channel, 1962.5 MHz	-81	1000	Pass
Extreme Temperature, -20˚C, Mid Channel, 1962.5 MHz	1.1	1000	Pass
Extreme Temperature, -10˚C, Mid Channel, 1962.5 MHz	-2	1000	Pass
Extreme Temperature, 0˚C, Mid Channel, 1962.5 MHz	-147	1000	Pass
Extreme Temperature, 10˚C, Mid Channel, 1962.5 MHz	-200.2	1000	Pass
Extreme Temperature, 20˚C, Mid Channel, 1962.5 MHz	-53.2	1000	Pass
Extreme Temperature, 30˚C, Mid Channel, 1962.5 MHz	-70	1000	Pass
Extreme Temperature, 40˚C, Mid Channel, 1962.5 MHz	34.4	1000	Pass
Extreme Temperature, 50˚C, Mid Channel, 1962.5 MHz	100.1	1000	Pass

FREQUENCY STABILITY

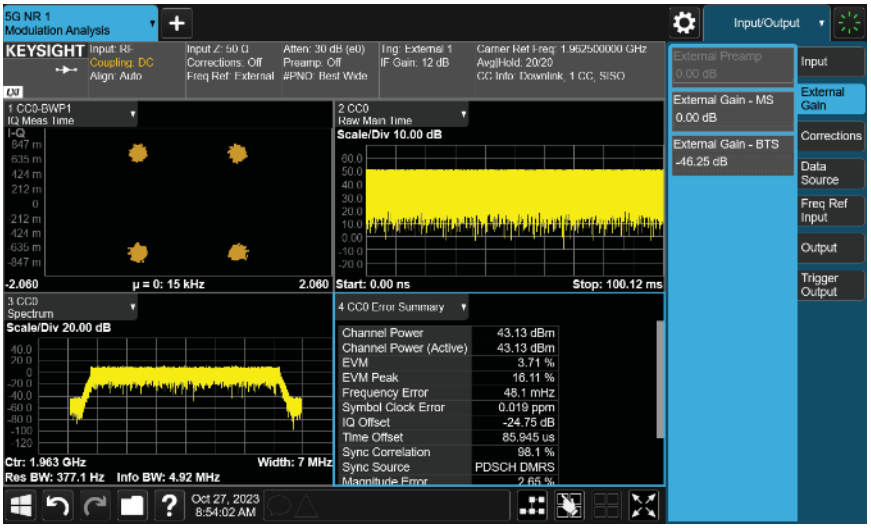
element
TbtTx 2023.11.27.0
WTD.2023.11.13.0

	Value Δ (mHz)	Limit Abs Δ (Hz)	Result
AWS Band n66, 2110 MHz - 2200 MHz			
5 MHz Bandwidth, QPSK			
Nominal Temperature, 20˚C			
Low Voltage, 40.8 VDC, Mid Channel 2155.0 MHz	-1.8	1000	Pass
High Voltage, 55.2 VDC, Mid Channel, 2155.0 MHz	265.3	1000	Pass
Nominal Voltage, 48 VDC			
Extreme Temperature, -30˚C, Mid Channel, 2155.0 MHz	71.3	1000	Pass
Extreme Temperature, -20˚C, Mid Channel, 2155.0 MHz	-195	1000	Pass
Extreme Temperature, -10˚C, Mid Channel, 2155.0 MHz	-42.9	1000	Pass
Extreme Temperature, 0˚C, Mid Channel, 2155.0 MHz	-71	1000	Pass
Extreme Temperature, 10˚C, Mid Channel, 2155.0 MHz	19.4	1000	Pass
Extreme Temperature, 20˚C, Mid Channel, 2155.0 MHz	63.3	1000	Pass
Extreme Temperature, 30˚C, Mid Channel, 2155.0 MHz	-65	1000	Pass
Extreme Temperature, 40˚C, Mid Channel, 2155.0 MHz	-77.3	1000	Pass
Extreme Temperature, 50˚C, Mid Channel, 2155.0 MHz	-21.3	1000	Pass
BRS Band n7, 2620 MHz - 2690 MHz			
5 MHz Bandwidth, QPSK			
Nominal Temperature, 20˚C			
Low Voltage, 40.8 VDC, Mid Channel 2655.0 MHz	-374.7	1000	Pass
High Voltage, 55.2 VDC, Mid Channel, 2655.0 MHz	29.8	1000	Pass
Nominal Voltage, 48 VDC			
Extreme Temperature, -30˚C, Mid Channel, 2655.0 MHz	-101.1	1000	Pass
Extreme Temperature, -20˚C, Mid Channel, 2655.0 MHz	-38.7	1000	Pass
Extreme Temperature, -10˚C, Mid Channel, 2655.0 MHz	98.7	1000	Pass
Extreme Temperature, 0˚C, Mid Channel, 2655.0 MHz	-135.9	1000	Pass
Extreme Temperature, 10˚C, Mid Channel, 2655.0 MHz	-206.4	1000	Pass
Extreme Temperature, 20˚C, Mid Channel, 2655.0 MHz	-87.4	1000	Pass
Extreme Temperature, 30˚C, Mid Channel, 2655.0 MHz	268.1	1000	Pass
Extreme Temperature, 40˚C, Mid Channel, 2655.0 MHz	131.5	1000	Pass
Extreme Temperature, 50˚C, Mid Channel, 2655.0 MHz	-94.5	1000	Pass

FREQUENCY STABILITY

Sample Plots

PCS Band n25, 1930 MHz - 1995 MHz
5 MHz Bandwidth, QPSK
Nominal Temperature, 20˚C, Low Voltage, 40.8 VDC, Mid Channel 1962.5 MHz



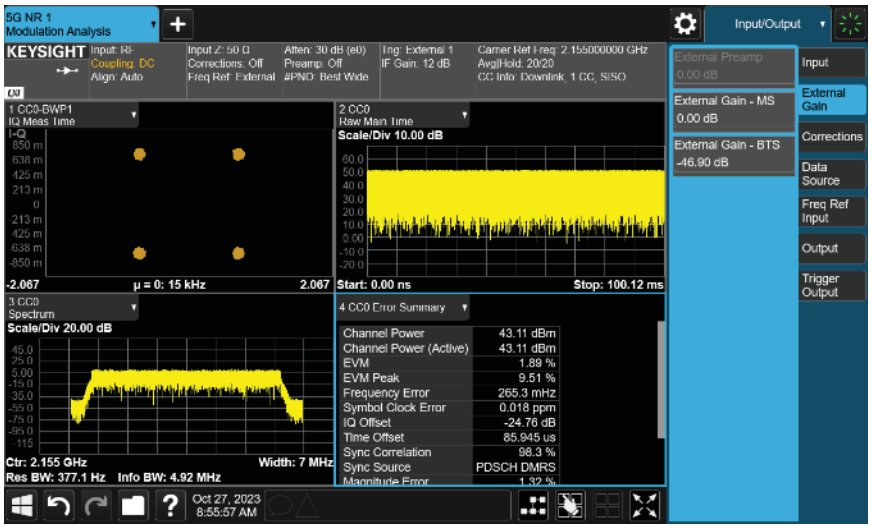
PCS Band n25, 1930 MHz - 1995 MHz
5 MHz Bandwidth, QPSK
Nominal Temperature, 20˚C, High Voltage, 55.2 VDC, Mid Channel, 1962.5 MHz

FREQUENCY STABILITY

PCS Band n25, 1930 MHz - 1995 MHz
5 MHz Bandwidth, QPSK
Nominal Voltage, 48 VDC, Extreme Temperature, 20˚C, Mid Channel, 1962.5 MHz

AWS Band n66, 2110 MHz - 2200 MHz
5 MHz Bandwidth, QPSK
Nominal Temperature, 20˚C, Low Voltage, 40.8 VDC, Mid Channel 2155.0 MHz

FREQUENCY STABILITY



AWS Band n66, 2110 MHz - 2200 MHz
5 MHz Bandwidth, QPSK
Nominal Temperature, 20˚C, High Voltage, 55.2 VDC, Mid Channel, 2155.0 MHz

AWS Band n66, 2110 MHz - 2200 MHz
5 MHz Bandwidth, QPSK
Nominal Voltage, 48 VDC, Extreme Temperature, 20˚C, Mid Channel, 2155.0 MHz

FREQUENCY STABILITY

BRS Band n7, 2620 MHz - 2690 MHz
5 MHz Bandwidth, QPSK
Nominal Temperature, 20˚C, Low Voltage, 40.8 VDC, Mid Channel 2655.0 MHz

BRS Band n7, 2620 MHz - 2690 MHz
5 MHz Bandwidth, QPSK
Nominal Temperature, 20˚C, High Voltage, 55.2 VDC, Mid Channel, 2655.0 MHz

FREQUENCY STABILITY

element
TbtTx 2023.11.27.0
WTD.2023.11.13.0

BRS Band n7, 2620 MHz - 2690 MHz
5 MHz Bandwidth, QPSK
Nominal Voltage, 48 VDC, Extreme Temperature, 20˚C, Mid Channel, 2655.0 MHz

End of Test Report