

TEST REPORT
CBSD-SAS Interoperability

Applicant Name:
 Samsung Electronics Co., Ltd.
 129, Samsung-ro,
 Yeongtong-gu, Suwon-si
 Gyeonggi-do, 16677, Korea


Date of Testing:
 09/06/2022-09/20/2022
Test Report Issue Date:
 9/21/2022
Test Site/Location:
 Element lab. Columbia, MD, USA
Test Report Serial No.:
 1M2208170090-02.A3L

FCC ID:	A3LRT4423-48B
APPLICANT:	Samsung Electronis Co., Ltd.

Application Type: Certification
Model: RT4423-48B
EUT Type: LTE/NR Base Station
Frequency Range: 3550 – 3700 MHz
FCC Classification: Citizens Band Category B Devices (CBD)
FCC Rule Part(s): Part 96
Test Procedure(s): KDB 940660 D01v03, WINNF-TS-0122-V1.0.2, CBRSA-TS-9001 V.1.0.0, KDB 662911 D01 v02r01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in the test procedures listed above. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



RJ Ortanez
 Executive Vice President





FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 1 of 86

TABLE OF CONTENTS

1.0	INTRODUCTION.....	3
1.1	Scope.....	3
1.2	Element Test Location	3
1.3	Test Facility / Accreditations	3
2.0	PRODUCT INFORMATION	4
2.1	Equipment Description.....	4
2.2	Device Capabilities	4
2.3	Test Configuration	4
2.4	Modifications.....	4
3.0	TEST EQUIPMENT CALIBRATION DATA.....	5
4.0	ENVIRONMENTAL CONDITIONS	6
5.0	EVALUATION PROCEDURE	7
6.0	TEST Summary.....	8
6.1	Summary	8
7.0	CONCLUSION	10
APPENDIX A – TEST RESULT AND DATA		11
A1	[WINNF.FT.C.REG.1] MULTI-STEP REGISTRATION	11
A3	[WINNF.FT.C.REG.8] MISSING REQUIRED PARAMETERS (RESPONSECODE 102)	13
A4	[WINNF.FT.C.REG.10] PENDING REGISTRATION (RESPONSECODE 200)	15
A5	[WINNF.FT.C.REG.12] INVALID PARAMETER (RESPONSECODE 103)	17
A6	[WINNF.FT.C.REG.14] BLACKLISTED CBSD (RESPONSECODE 101)	19
A7	[WINNF.FT.C.REG.16] UNSUPPORTED SAS PROTOCOL VERSION (RESPONSECODE 100)	21
A8	[WINNF.FT.C.REG.18] GROUP ERROR (RESPONSECODE 201)	23
A9	[WINNF.FT.C.GRA.1] UNSUCCESSFUL GRANT RESPONSECODE=400 (INTERFERENCE)	25
A10	[WINNF.FT.C.GRA.2] UNSUCCESSFUL GRANT RESPONSECODE=401 (GRANT_CONFLICT)	27
A11	[WINNF.FT.C.HBT.1] HEARTBEAT SUCCESS CASE (FIRST HEARTBEAT RESPONSE).....	29
A12	[WINNF.FT.C.HBT.3] HEARTBEAT RESPONSECODE=105 (DEREGISTER)	33
A13	[WINNF.FT.C.HBT.4] HEARTBEAT RESPONSECODE=500 (TERMINATED_GRANT)	35
A14	[WINNF.FT.C.HBT.5] HEARTBEAT RESPONSECODE=501 (SUSPENDED_GRANT) IN FIRST HEARTBEAT RESPONSE	37
A15	[WINNF.FT.C.HBT.6] HEARTBEAT RESPONSECODE=501 (SUSPENDED_GRANT) IN SUBSEQUENT HEARTBEAT RESPONSE.....	39
A16	[WINNF.FT.C.HBT.7] HEARTBEAT RESPONSECODE=502 (UNSYNC_OP_PARAM).....	41
A17	[WINNF.FT.C.HBT.9] HEARTBEAT RESPONSE ABSENT (FIRST HEARTBEAT).....	43
A18	[WINNF.FT.C.HBT.10] HEARTBEAT RESPONSE ABSENT (SUBSEQUENT HEARTBEAT)	45
A19	[WINNF.FT.C.MES.1] REGISTRATION RESPONSE CONTAINS MEASREPORTCONFIG	47
A20	[WINNF.FT.C.RLQ.1] SUCCESSFUL RELINQUISHMENT	50
A21	[WINNF.FT.C.DRG.1] SUCCESSFUL DEREGISTRATION.....	51
A22	[WINNF.FT.C.SCS.1] SUCCESSFUL TLS CONNECTION BETWEEN UUT AND SAS TEST HARNESS.....	54
A23	[WINNF.FT.C.SCS.2] TLS FAILURE DUE TO REVOKED CERTIFICATE	59
A24	[WINNF.FT.C.SCS.3] TLS FAILURE DUE TO EXPIRED SERVER CERTIFICATE.....	62
A25	[WINNF.FT.C.SCS.4] TLS FAILURE WHEN SAS TEST HARNESS CERTIFICATE IS ISSUED BY AN UNKNOWN CA	65
A26	[WINNF.FT.C.SCS.5] TLS FAILURE WHEN CERTIFICATE AT THE SAS TEST HARNESS IS CORRUPTED	68
A27	[WINNF.PT.C.HBT.1] UUT RF TRANSMIT POWER MEASUREMENT.....	71
APPENDIX B – TEST LOGS		85
APPENDIX C – TEST SETUP		86

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 2 of 86

1.0 INTRODUCTION

1.1 Scope

Measurement and determination of compliance with the technical rules and regulations of the Federal Communications Commission.


1.2 Element Test Location

These measurement tests were conducted at the Element laboratory located at 7185 Oakland Mills Road, Columbia, MD 21046.

1.3 Test Facility / Accreditations

Measurements were performed at Element lab located in Columbia, MD 21046, U.S.A.

- Element is a CBRS Alliance (OnGo) Approved Test Lab
- Element is a WInnForum Approved Test Lab
- Element is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for CBRS Alliance Certification Test Plan and WInnForum Conformance and Performance Test Technical Standard.
- Element is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- Element TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- Element facility is a registered (2451B) test laboratory with the site description on file with ISED.

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 3 of 86

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung, LTE/NR Base Station FCC ID: A3LRT4423-48B**. The test data contained in this report pertains only to CBSD-SAS interoperability. The EUT is a category B CBSD. The EUT is powered by a 120V AC power supply.

Test Device Serial Number(s): S618627625, S61827594

Test Device Hardware Version: PCS01

Test Device Software Version: 22C

2.2 Device Capabilities

This device contains the following capabilities:

LTE Band 48, NR n48

This device supports the following conditional features:

	Conditional Test Case Definitions	Supported
C1	Mandatory for UUT which supports multi-step registration message	<input checked="" type="checkbox"/>
C2	Mandatory for UUT which supports single-step registration with no CPI-signed data in the registration message. By definition, this is a subset of Category A devices which determine all registration information, including location, without CPI intervention.	<input type="checkbox"/>
C3	Mandatory for UUT which supports single-step registration containing CPI-signed data in the registration message.	<input type="checkbox"/>
C4	Mandatory for UUT which supports RECEIVED_POWER_WITHOUT_GRANT measurement report type.	<input checked="" type="checkbox"/>
C5	Mandatory for UUT which supports RECEIVED_POWER_WITH_GRANT measurement report type.	<input type="checkbox"/>
C6	Mandatory for UUT which supports parameter change being made at the UUT and prior to sending a deregistration	<input type="checkbox"/>


Table 2-1. Conditional Features

2.3 Test Configuration

The EUT was connected to the SAS Test Harness developed by WINNF WG4-CBSD. The latest version of the SAS Test Harness (V1.0.0.2) provided by CBRS Alliance was used. The SAS Test Harness is synchronized to UTC time.

2.4 Modifications

No modifications were made to EUT during testing.


FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 4 of 86

3.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).


Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	N9020A	MXA Signal Analyzer	3/4/2022	Annual	3/4/2023	US46407561
Agilent HP	6032A	AutoRanging System Power Supply	N/A	N/A	N/A	N/A
Dell	Latitude 5580	Test Harness Laptop	N/A	N/A	N/A	N/A
AWOW	AK34	Mini PC	N/A	N/A	N/A	N/A
Aruba	2930F JL258A	Network switch	N/A	N/A	N/A	N/A

Table 3-1 Annual Test Equipment Calibration Schedule

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 5 of 86

4.0 ENVIRONMENTAL CONDITIONS


The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

FCC ID: A3LRT4423-48B	 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station Page 6 of 86

5.0 EVALUATION PROCEDURE

The measurement procedures described in KDB 940660 D01 v03, and WINNF-TS-0122-V1.0.2 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

FCC ID: A3LRT4423-48B	 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station
		Page 7 of 86

6.0 TEST SUMMARY

6.1 Summary


Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LRT4423-48B

Table 6-1. Summary of Test Results

FCC Part Section(s)	KDB940660 D01 Section 3.3 a)	Test Case Description	WinnForum Test Case	Test Result
96.39 (c)	1	Confirm that the device will only transmit after it receives authorization from a SAS	WINNF.FT.C.REG.1 WINNF.FT.C.REG.8 WINNF.FT.C.REG.10 WINNF.FT.C.REG.12 WINNF.FT.C.REG.14 WINNF.FT.C.REG.16 WINNF.FT.C.REG.18 WINNF.FT.C.GRA.1 WINNF.FT.C.GRA.2 WINNF.FT.C.HBT.5	Pass
96.39 (c)	2	Check the device registration and authorization with the SAS – determine if the device behaves appropriately for successful and unsuccessful registrations. The device should not be transmitting without authorization from the SAS.	WINNF.FT.C.REG.1 WINNF.FT.C.REG.8 WINNF.FT.C.REG.10 WINNF.FT.C.REG.12 WINNF.FT.C.REG.14 WINNF.FT.C.REG.16 WINNF.FT.C.REG.18	Pass
96.39(c)(1)	3	Confirm that the device changes its operating power and/or channel in response to a command from the SAS.	WINNF.FT.C.HBT.1	Pass
96.39	4	Confirm that the device correctly configures based on the different license classes	N/A	Pass
96.39(c)(1)	5	Confirm that the device transmits at a power level less than or equal to the maximum power level approved by the SAS.	WINNF.PT.C.HBT.1	Pass
96.39(b)(c)	6	Confirm that the device transmits with a bandwidth less than or equal to the SAS specified bandwidth.	WINNF.FT.C.HBT.1	Pass
96.39(c)(2)	7	Confirm that the device transmits on the SAS specified frequency.	WINNF.FT.C.HBT.1	Pass
96.39(c)(2)	8	Confirm that the device stops transmission in response to a command from the SAS, within a period as required by Part 96.	WINNF.FT.C.HBT.3 WINNF.FT.C.HBT.4 WINNF.FT.C.HBT.6 WINNF.FT.C.HBT.7 WINNF.FT.C.HBT.10 WINNF.FT.C.RLQ.1 WINNF.FT.C.DRG.1	Pass


Table 6-2. Summary of Test Results (continued)

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station		Page 8 of 86

96.39 (c)	9	Confirm that the device sends measurements data in response to the command from the SAS.	WINNF.FT.C.MES.1	Pass
96.39(a)	10	For devices with geo-location, confirm that it notifies the SAS of a new location when it is beyond the required distance parameter (± 50 m) within the required time frame.	N/A	N/A
96.39 (c)	11	Confirm that the device is capable of reporting the signal level (measurement data) and frequency to SAS.	WINNF.FT.C.MES.1	Pass
96 E	12	When CBSDs communicate through a management system, confirm compliance with all requirements.	N/A	Pass
96.39	13	When communication between the CBSD and SAS is lost: i) Describe how the CBSD would react if the communications between the device and the SAS is lost. Confirm that the CBSD stops transmission once it loses the link to the SAS. ii) Describe the process for re-establishment of the communications and confirm that the CBSD acts accordingly. iii) Confirm power-on restart process for registration (re-registration) occurs as expected. iv) Confirm the process for de-registration occurs as expected.	WINNF.FT.C.HBT.9 WINNF.FT.C.HBT.10	Pass
96.39(f)	KDB940660 D01 Section 4	SAS and Device Security Requirements	WINNF.FT.C.SCS.1 WINNF.FT.C.SCS.2 WINNF.FT.C.SCS.3 WINNF.FT.C.SCS.4 WINNF.FT.C.SCS.5	Pass


Notes:

- Test cases denoted as “N/A” in the table above are not applicable to the EUT and are either Optional or Conditional per Section 6 of WINNF-TS-0122.
- Please see Appendices for test data.

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station		Page 9 of 86

7.0 CONCLUSION


The data collected relate only to the item(s) tested and show that the **Samsung LTE/NR Base Station FCC ID: A3LRT4423-48B** has been tested to show compliance with Part 96 KDB 940660 D01 v03, and WINNF-TS-0122.

FCC ID: A3LRT4423-48B	 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station

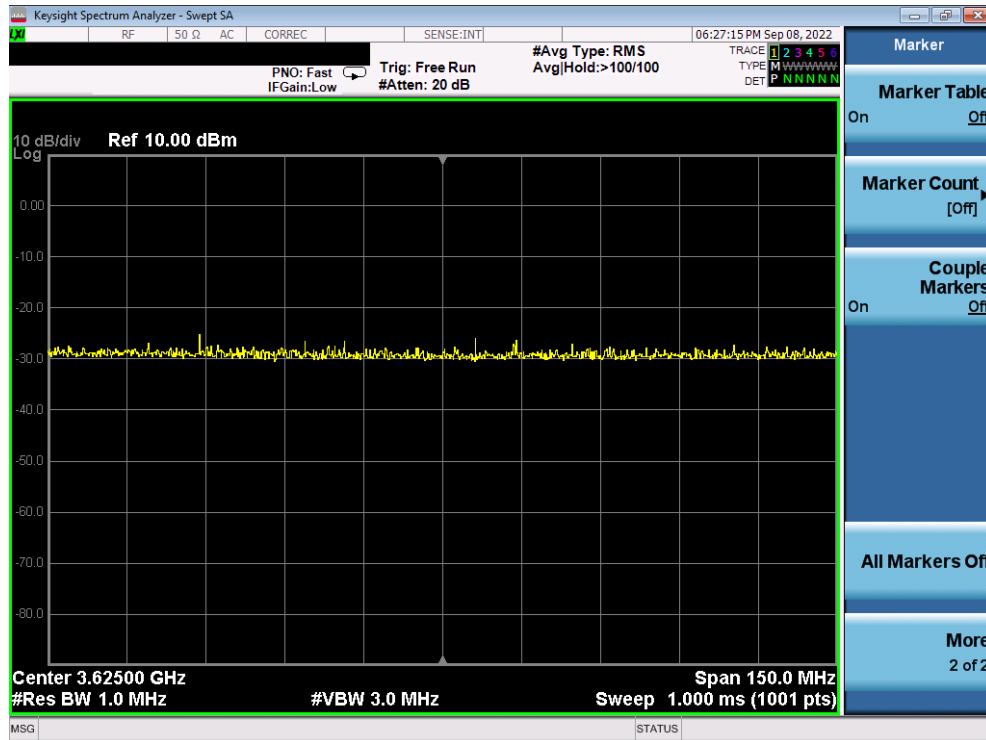
APPENDIX A – TEST RESULT AND DATA

A1 [WINNF.FT.C.REG.1] Multi-Step registration

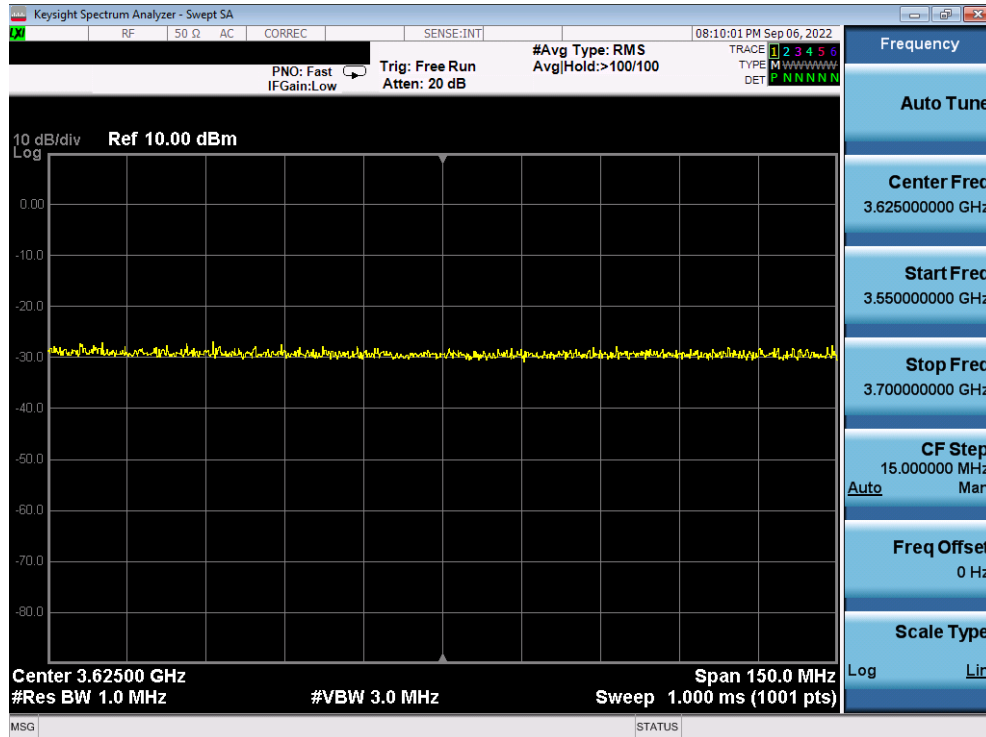
	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness • UUT is in the Unregistered state CBSD sends correct Registration request information, as specified in [n.5], to the SAS Test Harness:	--	--
2	<ul style="list-style-type: none"> • The required userId, fcId and cbsdSerialNumber registration parameters shall be sent from the CBSD and conform to proper format and acceptable ranges. • Any REG-conditional or optional registration parameters that may be included in the message shall be verified that they conform to proper format and are within acceptable ranges. Note: It is outside the scope of this document to test the Registration information that is supplied via another means.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<ul style="list-style-type: none"> • SAS Test Harness sends a CBSD Registration Response as follows: <ul style="list-style-type: none"> - cbsdId = Ci - measReportConfig shall not be included - responseCode = 0 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 11 of 86

Test Plots:



Plot 1. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time - LTE (WINNF.FT.C.REG.1)



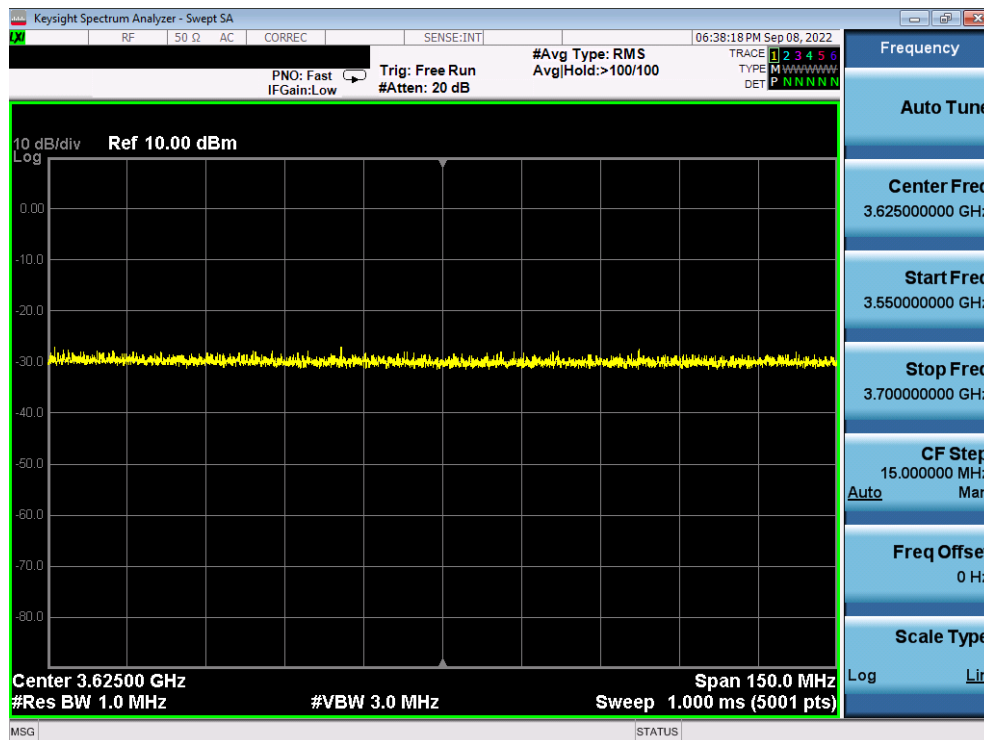
Plot 2. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time – NR (WINNF.FT.C.REG.1)

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 12 of 86


A2 [WINNF.FT.C.REG.8] Missing Required parameters (responseCode 102)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include cbsdId - responseCode = R 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:



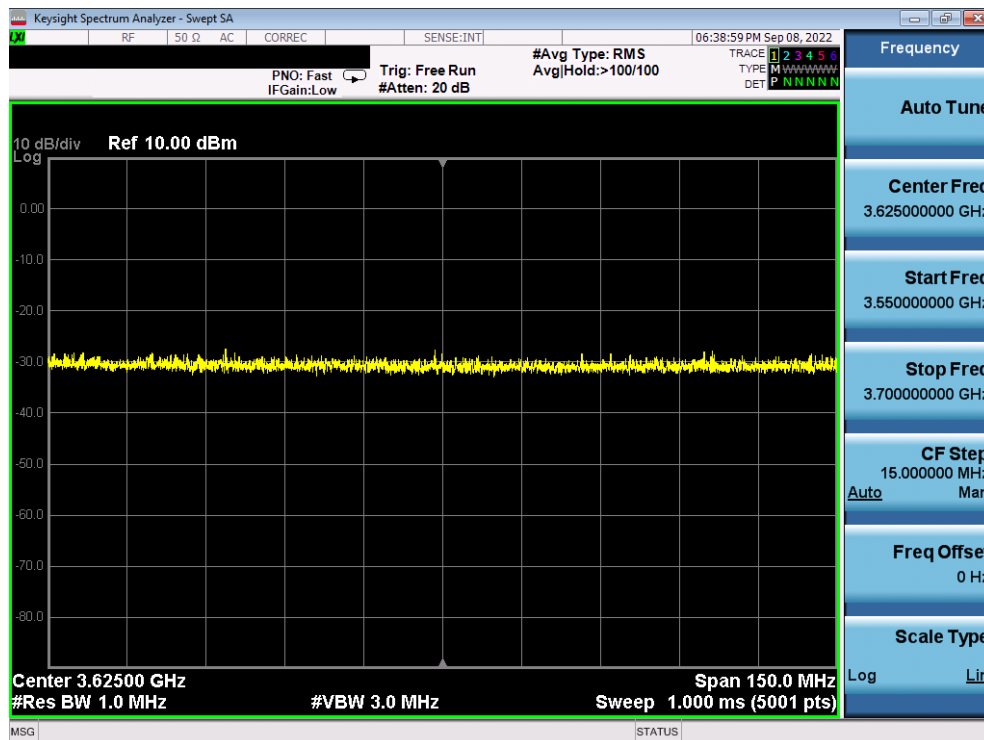
Plot 3. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time – LTE (WINNF.FT.C.REG.8)

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 13 of 86

A3 [WINNF.FT.C.REG.10] Pending registration (responseCode 200)

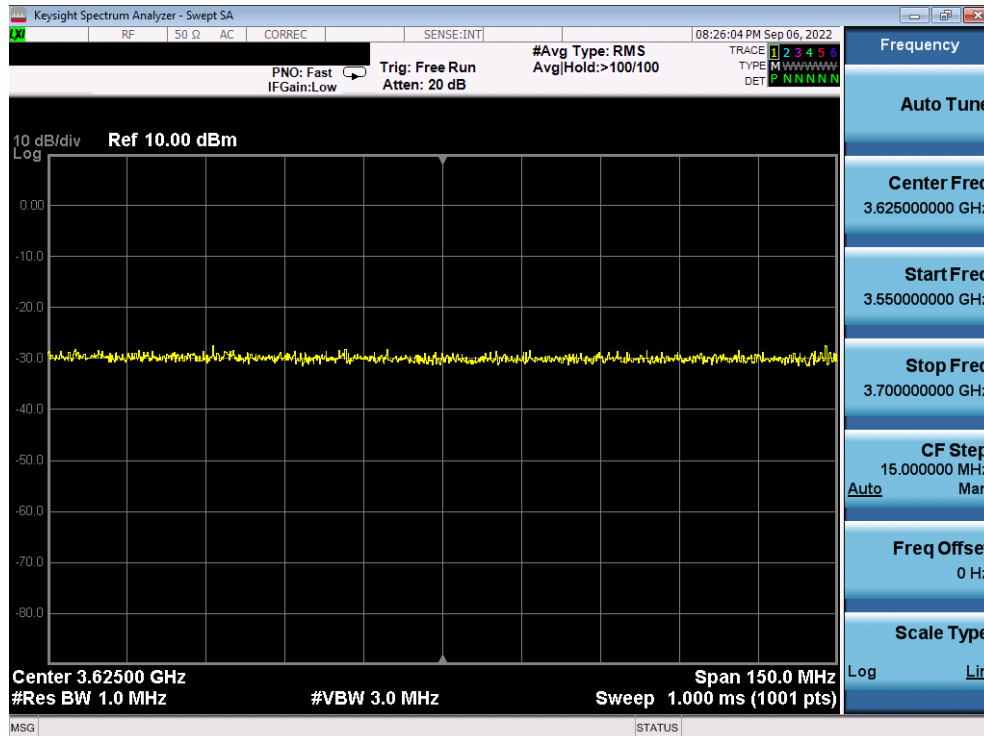
	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include cbsdId - responseCode = R 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:



Plot 5. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time – LTE (WINNF.FT.C.REG.10)

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 15 of 86



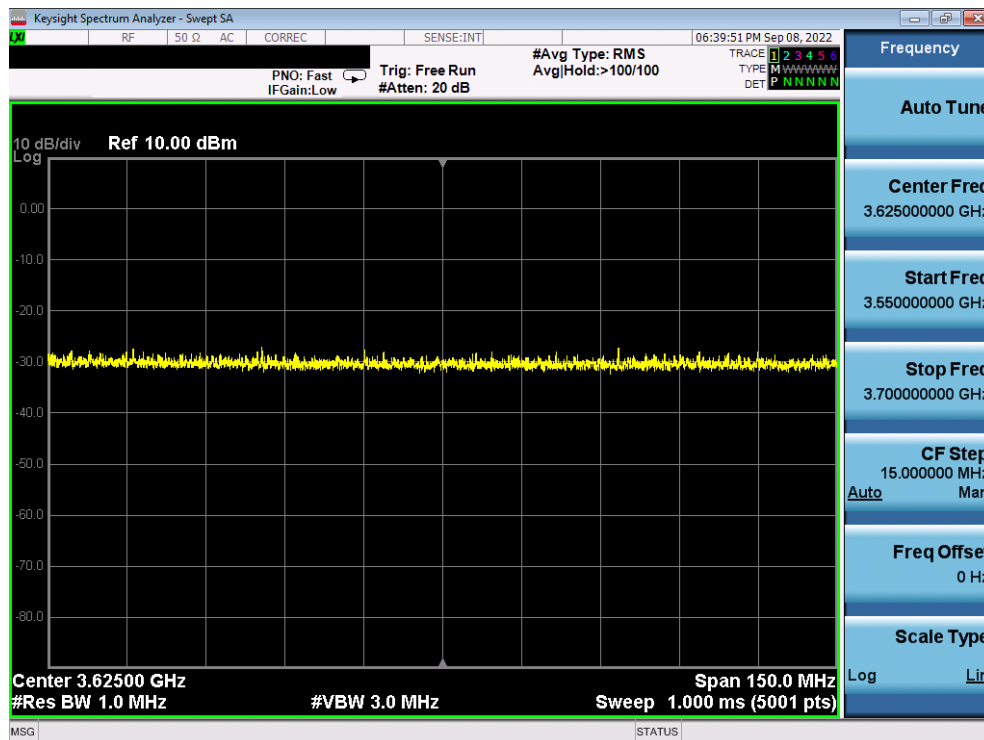
Plot 6. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time – NR (WINNF.FT.C.REG.10)

FCC ID: A3LRT4423-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 16 of 86

A4 [WINNF.FT.C.REG.12] Invalid parameter (responseCode 103)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include cbsdId - responseCode = R 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:



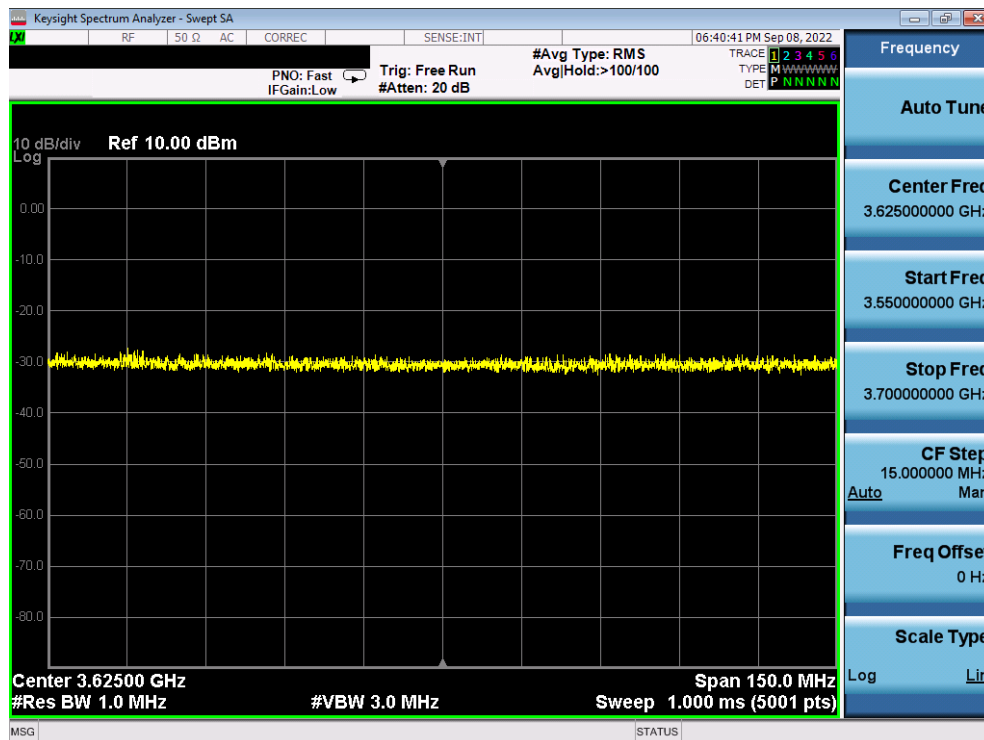
Plot 7. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time – LTE (WINNF.FT.C.REG.12)

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 17 of 86

A5 [WINNF.FT.C.REG.14] Blacklisted CBSD (responseCode 101)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include cbsdId - responseCode = R 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:



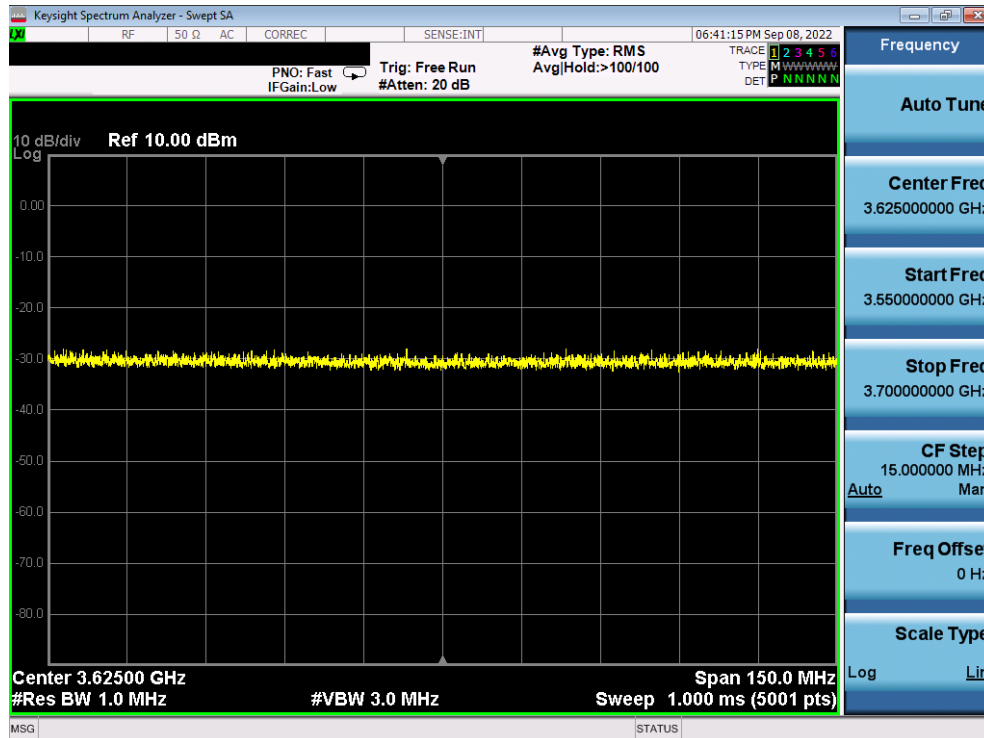
Plot 9. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time – LTE (WINNF.FT.C.REG.14)

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 19 of 86

A6 [WINNF.FT.C.REG.16] Unsupported SAS protocol version (responseCode 100)

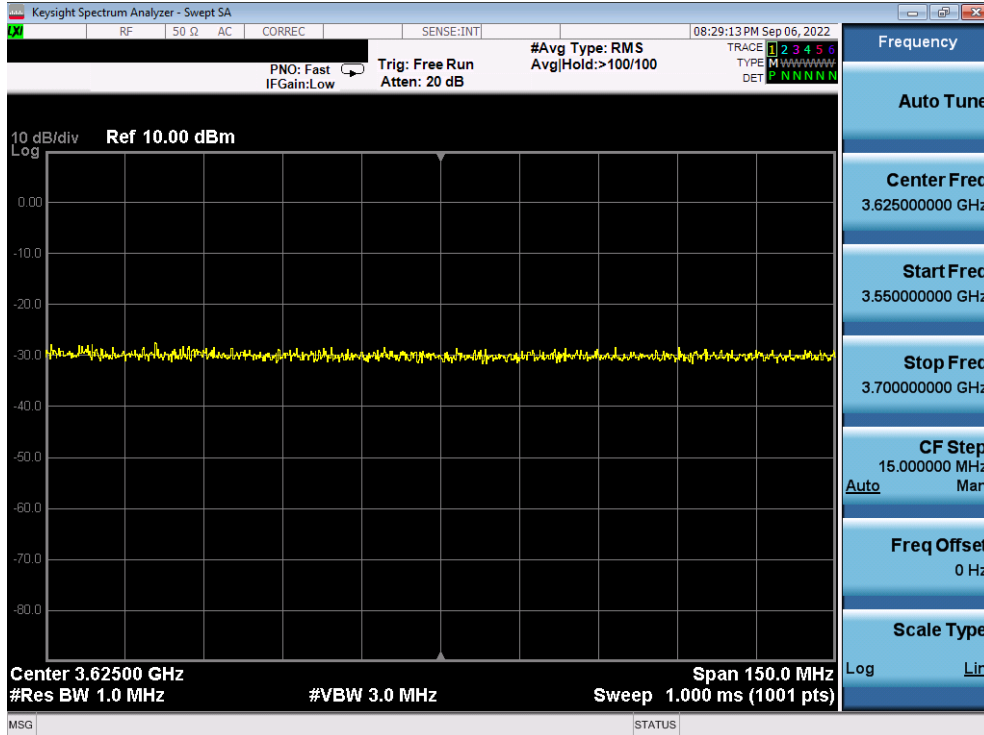
	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include cbsdId - responseCode = R 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:




Plot 11. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time – LTE (WINNF.FT.C.REG.16)

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 21 of 86



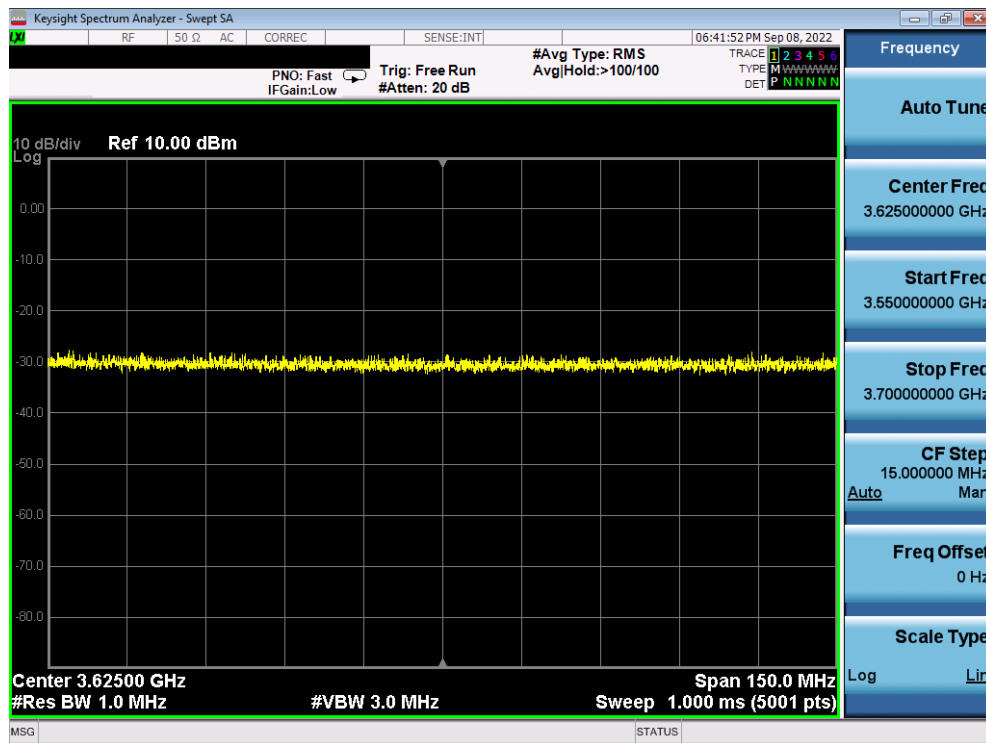
Plot 12. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time – NR (WINNF.FT.C.REG.16)

FCC ID: A3LRT4423-48B	 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L		Test Dates: 09/06/2022 – 09/20/2022

A7 [WINNF.FT.C.REG.18] Group Error (responseCode 201)

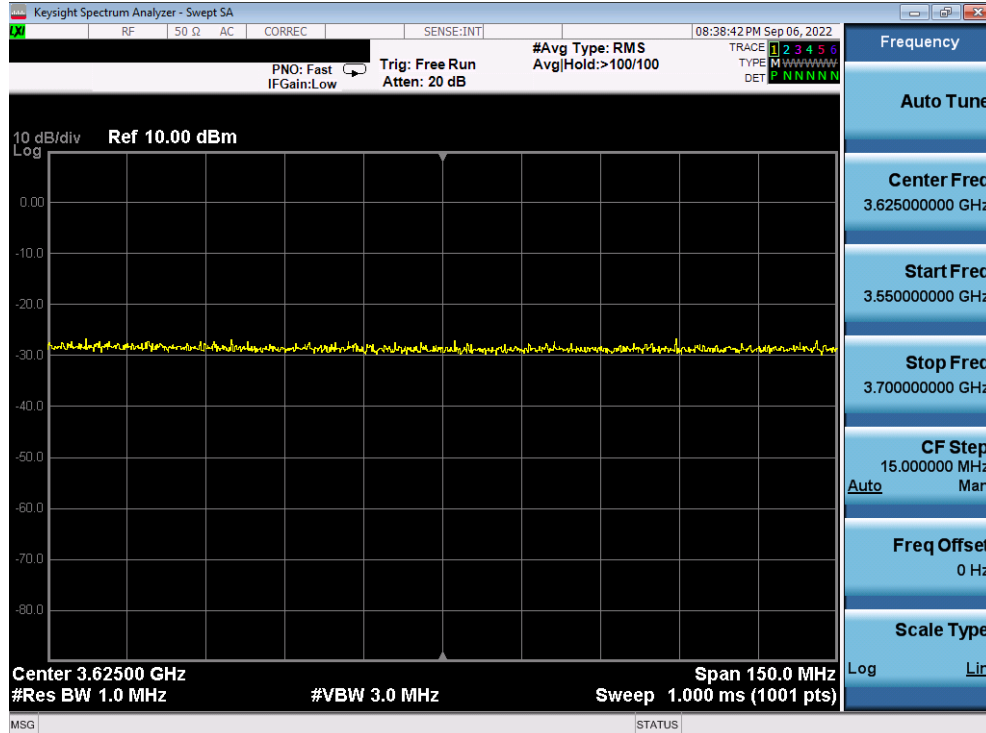
	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include cbsdId - responseCode = R 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:




Plot 13. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time – LTE (WINNF.FT.C.REG.18)

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 23 of 86



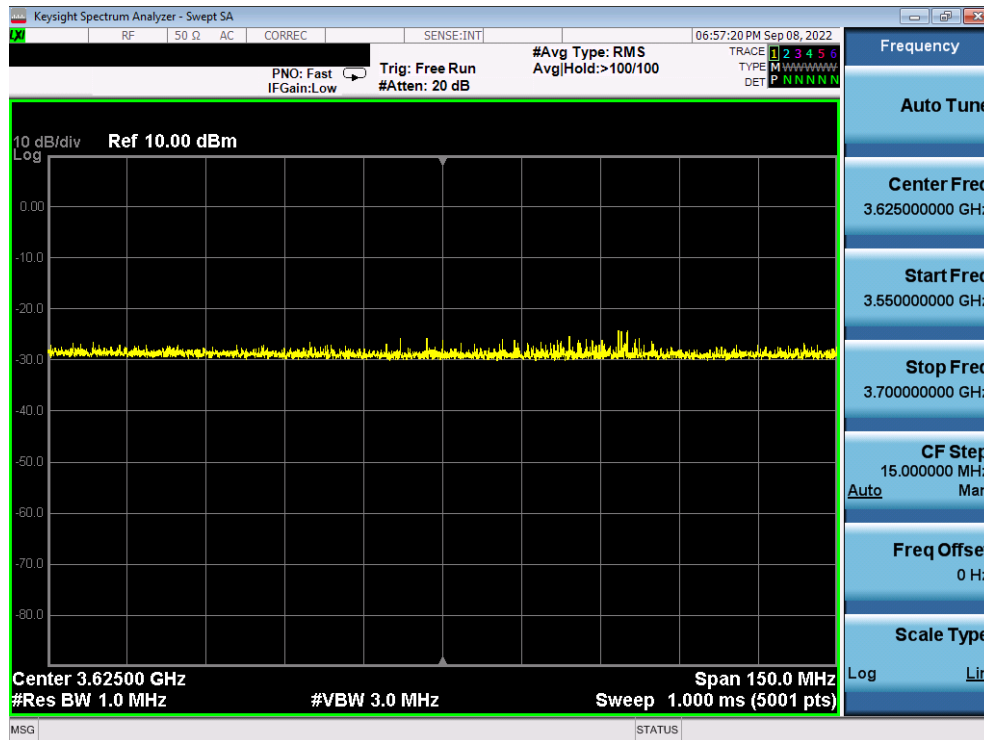
Plot 16. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time – NR (WINNF.FT.C.GRA.1)

FCC ID: A3LRT4423-48B	 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager	
Test Report S/N: 1M2208170090-02.A3L		Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station

A9 [WINNF.FT.C.GRA.2] Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has registered successfully with SAS Test Harness, with cbsdId = C	--	--
2	UUT sends valid Grant Request.	--	--
3	SAS Test Harness sends a Grant Response message, including • cbsdId=C • responseCode = R	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:




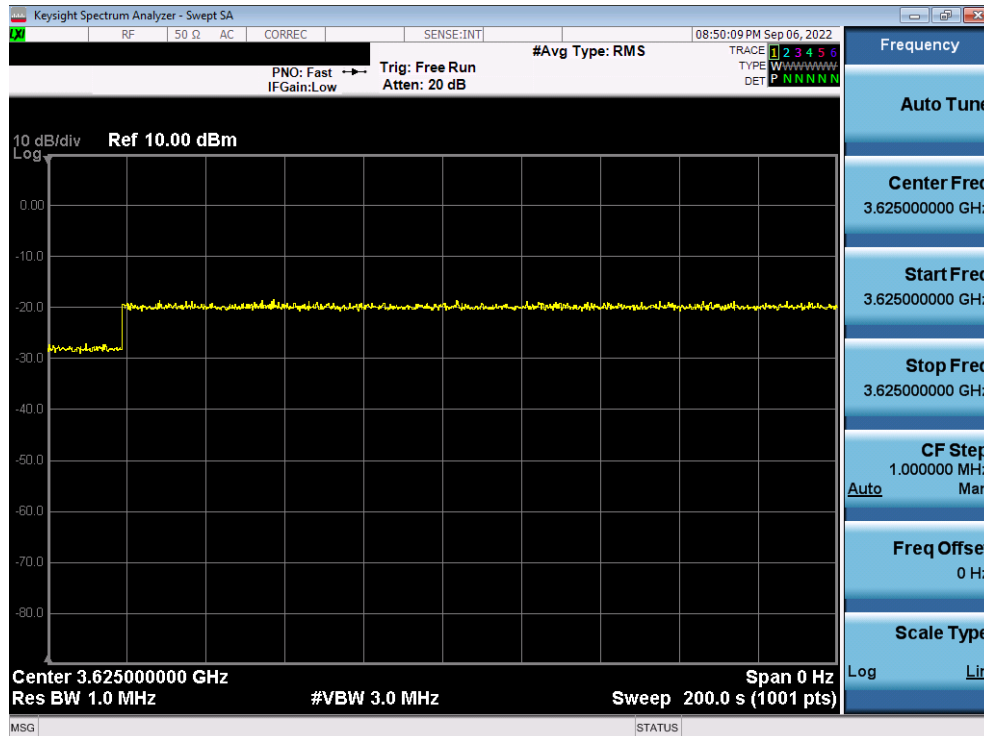
Plot 17. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time – LTE (WINNF.FT.C.GRA.2)

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 27 of 86

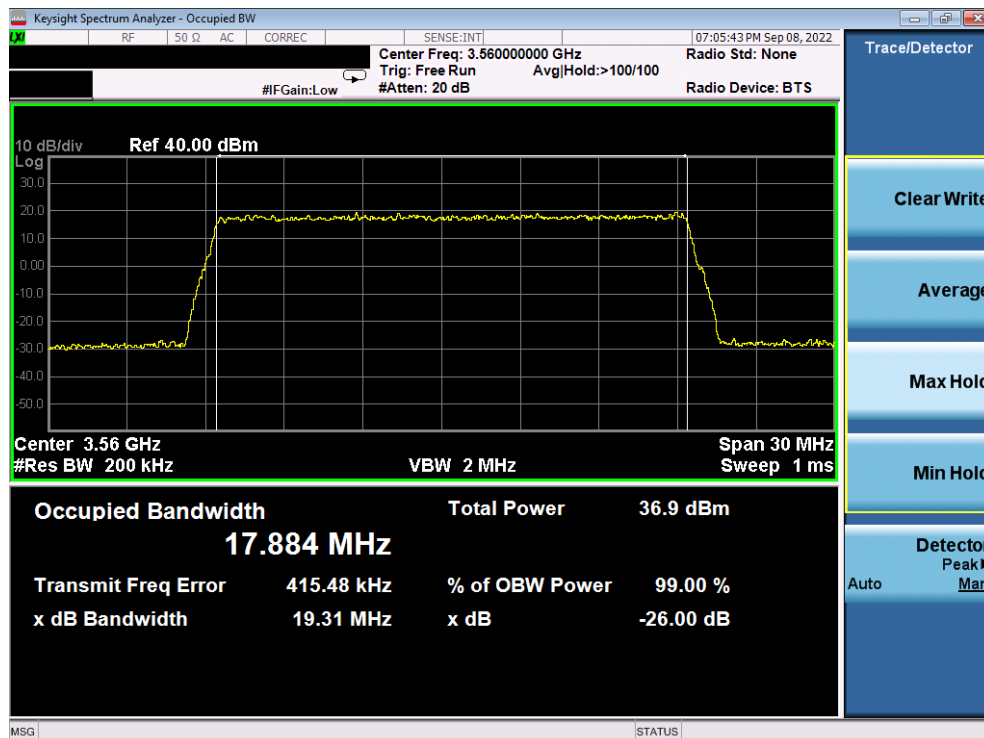
A10 [WINNF.FT.C.HBT.1] Heartbeat Success Case (first Heartbeat Response)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> UUT has registered successfully with SAS Test Harness, with cbsdId = C 	--	--
2	UUT sends a message: <ul style="list-style-type: none"> If message is type Spectrum Inquiry Request, go to step 3, or If message is type Grant Request, go to step 5 	--	--
3	UUT sends Spectrum Inquiry Request. Validate: <ul style="list-style-type: none"> cbsdId = C List of frequencyRange objects sent by UUT are within the CBRS frequency range 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: <ul style="list-style-type: none"> cbsdId = C availableChannel is an array of availableChannel objects responseCode = 0 	--	--
5	UUT sends Grant Request message. Validate: <ul style="list-style-type: none"> cbsdId = C maxEIRP is at or below the limit appropriate for CBSD category as defined by Part 96 operationFrequencyRange, F, sent by UUT is a valid range within the CBRS band 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	SAS Test Harness sends a Grant Response message, including the parameters: <ul style="list-style-type: none"> cbsdId = C grantId = G = a valid grant ID grantExpireTime = UTC time greater than duration of the test responseCode = 0 	--	--
7	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: <ul style="list-style-type: none"> cbsdId = C grantId = G operationState = "GRANTED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	SAS Test Harness sends a Heartbeat Response message, with the following parameters: <ul style="list-style-type: none"> cbsdId = C grantId = G transmitExpireTime = current UTC time + 200 seconds responseCode = 0 	--	--
9	For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeatInterval, and: <ul style="list-style-type: none"> cbsdId = C grantId = G operationState = "AUTHORIZED" and SAS Test Harness responds with a Heartbeat Response message including the following parameters: <ul style="list-style-type: none"> cbsdId = C 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 29 of 86

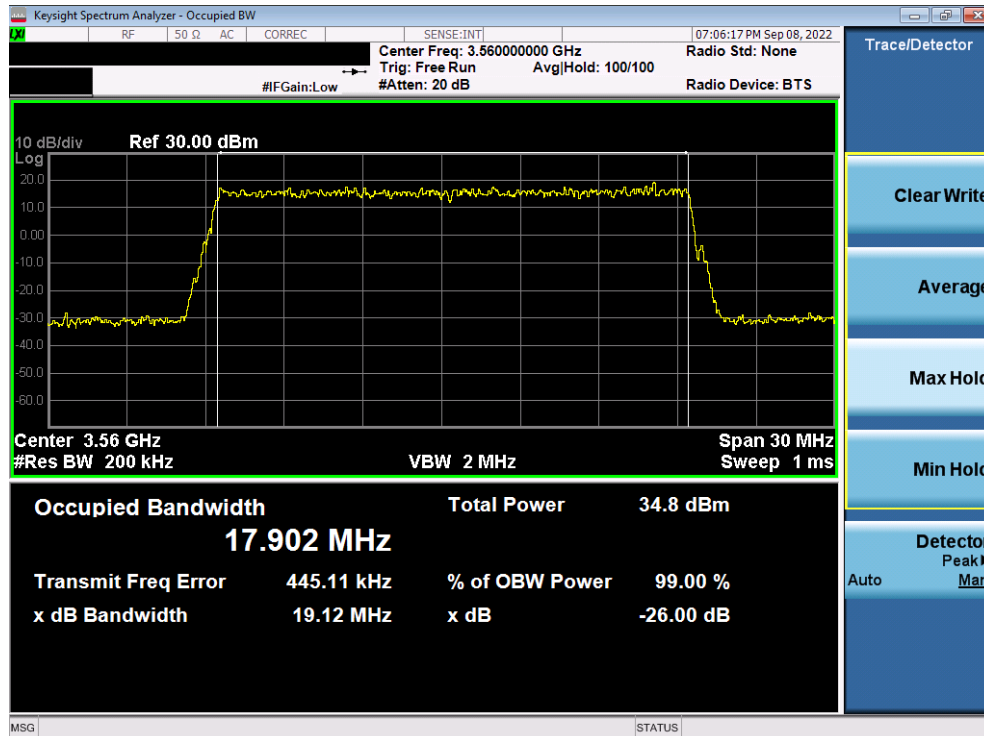


Plot 20. Conducted Measurement - RF transmission after SAS heartbeat response – NR (WINNF.FT.C.HBT.1)




Plot 21. Conducted Measurement Occupied Bandwidth for 20MHz – LTE (WINNF.FT.C.HBT.1)

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 31 of 86




Plot 22. Conducted Measurement Occupied Bandwidth for 20MHz – NR (WINNF.FT.C.HBT.1)

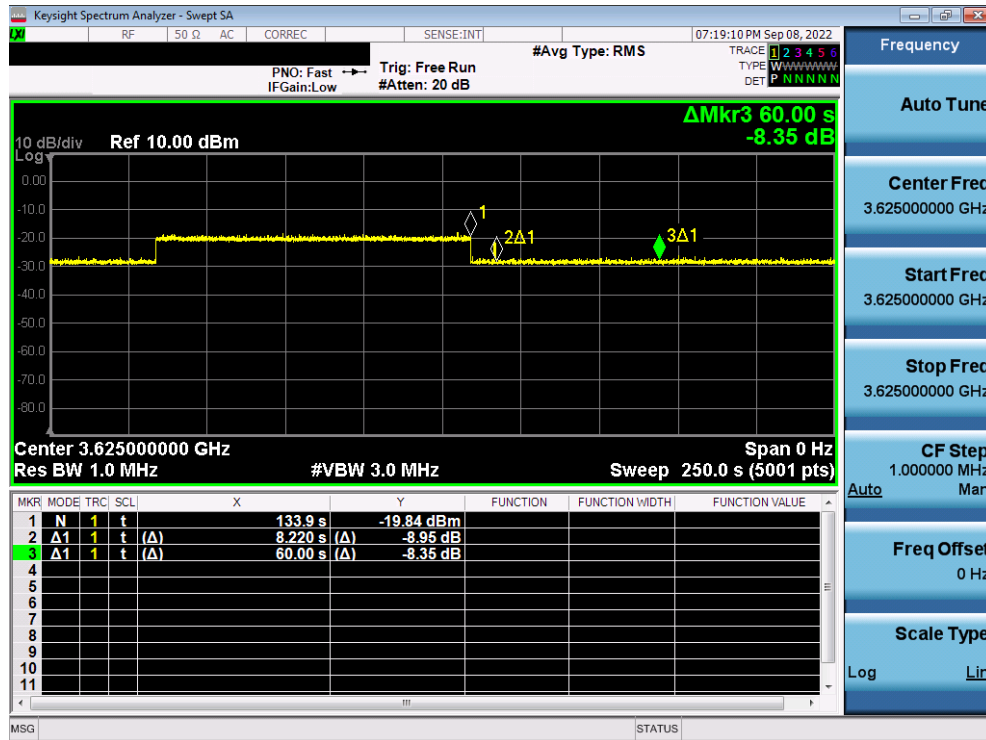
FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 32 of 86

A11 [WINNF.FT.C.HBT.3] Heartbeat responseCode=105 (DEREGISTER)

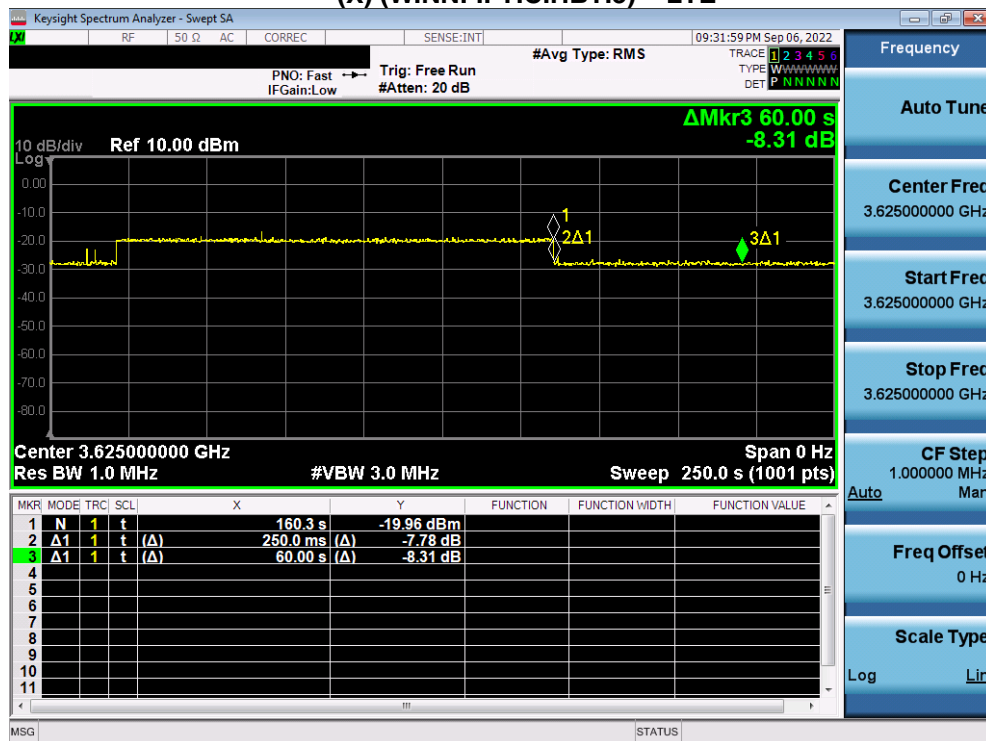
	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> o valid cbsdId = C o valid grantId = G o grant is for frequency range F, power P o grantExpireTime = UTC time greater than duration of the test • UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface 	--	--
2	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including: <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "AUTHORIZED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: <ul style="list-style-type: none"> • cbsdId = C • grantId = G • transmitExpireTime = T = Current UTC time • responseCode = 105 (DEREGISTER) 	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	Monitor the RF output of the UUT. Verify: <ul style="list-style-type: none"> • UUT shall stop transmission within (T + 60 seconds) of completion of step 3 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 33 of 86

Test Plots:



Plot 23. Conducted Measurement - RF transmission stops within 60s of SAS message indicated by Marker 1 (X) (WINNF.FT.C.HBT.3) – LTE




Plot 24. Conducted Measurement - RF transmission stops within 60s of SAS message indicated by Marker 1 (X) (WINNF.FT.C.HBT.3) – NR

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 34 of 86

A12 [WINNF.FT.C.HBT.4] Heartbeat responseCode=500 (TERMINATED_GRANT)

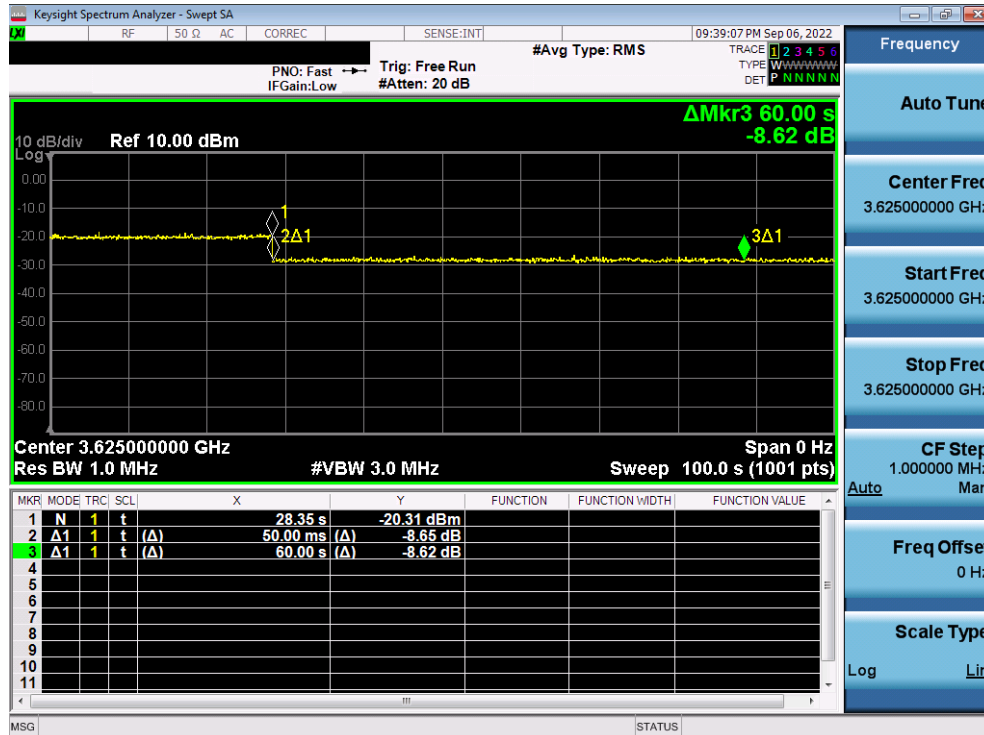
	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> o valid cbsdId = C o valid grantId = G o grant is for frequency range F, power P o grantExpireTime = UTC time greater than duration of the test • UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface 	--	--
2	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including: <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "AUTHORIZED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: <ul style="list-style-type: none"> • cbsdId = C • grantId = G • transmitExpireTime = T = Current UTC time • responseCode = 500 (TERMINATED_GRANT) 	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	Monitor the RF output of the UUT. Verify: <ul style="list-style-type: none"> • UUT shall stop transmission within (T + 60 seconds) of completion of step 3 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 35 of 86

Test Plots:



Plot 25. Conducted Measurement - RF transmission stops within 60s of SAS message indicated by Marker 1 (X) (WINNF.FT.C.HBT.4) – LTE




Plot 26. Conducted Measurement - RF transmission stops within 60s of SAS message indicated by Marker 1 (X) (WINNF.FT.C.HBT.4) – NR

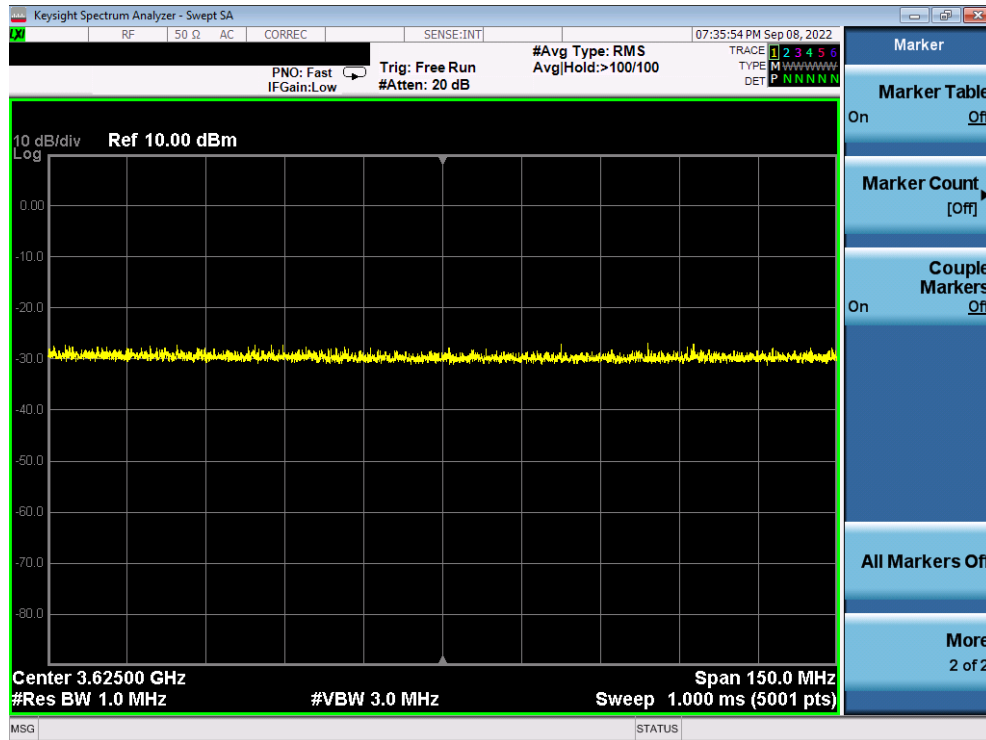
FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 36 of 86

[WINNF.FT.C.HBT.5] Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response

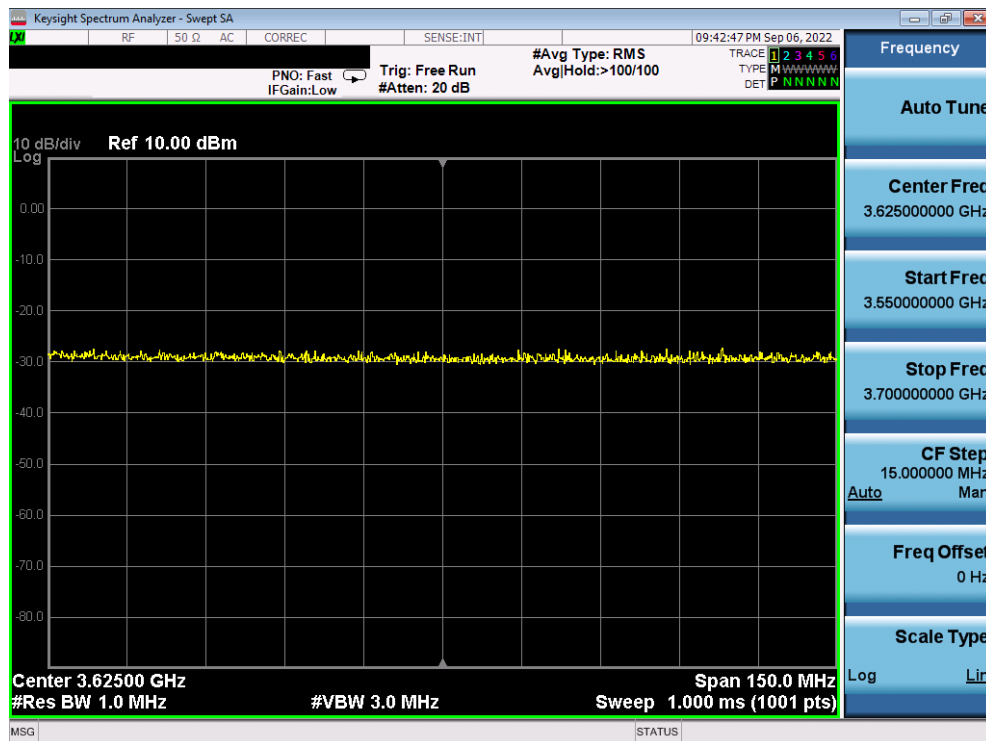
	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> o valid cbsdId = C o valid grantId = G o grant is for frequency range F, power P o grantExpireTime = UTC time greater than duration of the test • UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface 	--	--
2	<p>UUT sends a Heartbeat Request message.</p> <p>Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "GRANTED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • transmitExpireTime = T = Current UTC time • responseCode = 501 (SUSPENDED_GRANT) 	--	--
4	<p>After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.</p>	--	--
5	<p>Monitor the SAS-CBSD interface. Verify either A OR B occurs:</p> <p>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "GRANTED" <p>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> • UUT does not transmit at any time 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 37 of 86

Test Plots:



Plot 27. Conducted Measurement – No RF transmission in entire band (WINNF.FT.C.HBT.5) – LTE




Plot 28. Conducted Measurement – No RF transmission in entire band (WINNF.FT.C.HBT.5) – NR

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 38 of 86

A13 [WINNF.FT.C.HBT.6] Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response

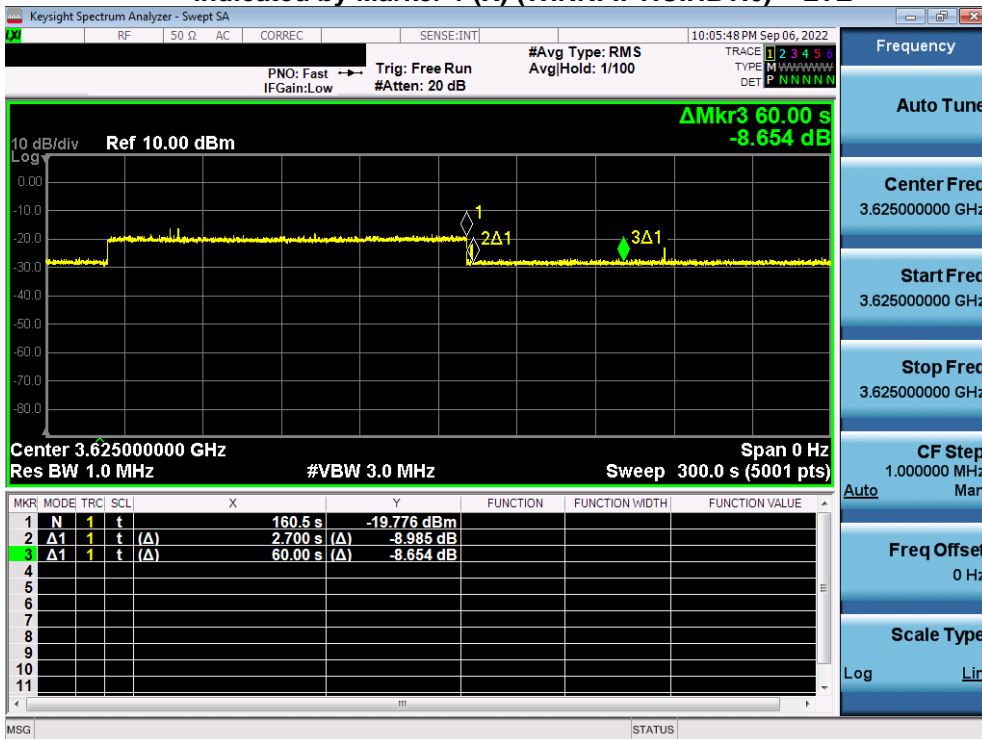
	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> o valid cbsdId = C o valid grantId = G o grant is for frequency range F, power P o grantExpireTime = UTC time greater than duration of the test • UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface 	--	--
2	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including: <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "AUTHORIZED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: <ul style="list-style-type: none"> • cbsdId = C • grantId = G • transmitExpireTime = T = Current UTC time • responseCode = 501 (SUSPENDED_GRANT) 	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	Monitor the SAS-CBSD interface. Verify either A OR B occurs: <p>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "GRANTED" <p>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G Monitor the RF output of the UUT. Verify: <ul style="list-style-type: none"> • UUT shall stop transmission within (T + 60 seconds) of completion of step 3 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 39 of 86

Test Plots:



Plot 29. Conducted Measurement - RF transmission stops within 60s of SAS message. The SAS message is indicated by Marker 1 (X) (WINNF.FT.C.HBT.6) – LTE




Plot 30. Conducted Measurement - RF transmission stops within 60s of SAS message. The SAS message is indicated by Marker 1 (X) (WINNF.FT.C.HBT.6) – NR

Note: The 'spike' after marker 3 is determined to not be transmission from the UUT.

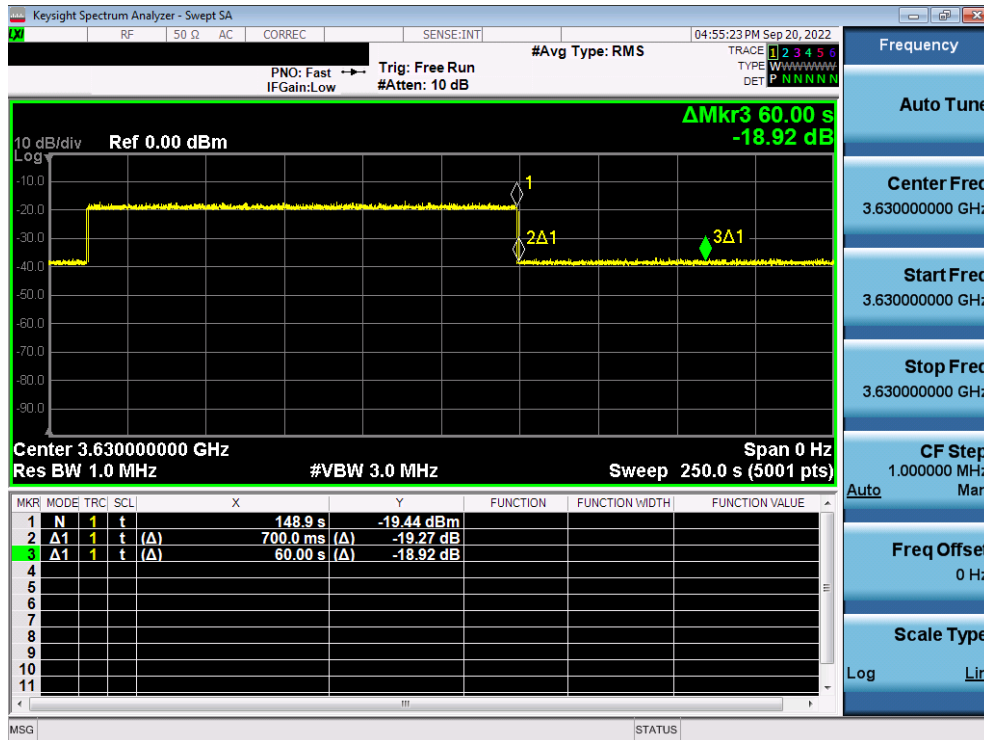
FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 40 of 86

A14 [WINNF.FT.C.HBT.7] Heartbeat responseCode=502 (UNSYNC_OP_PARAM)

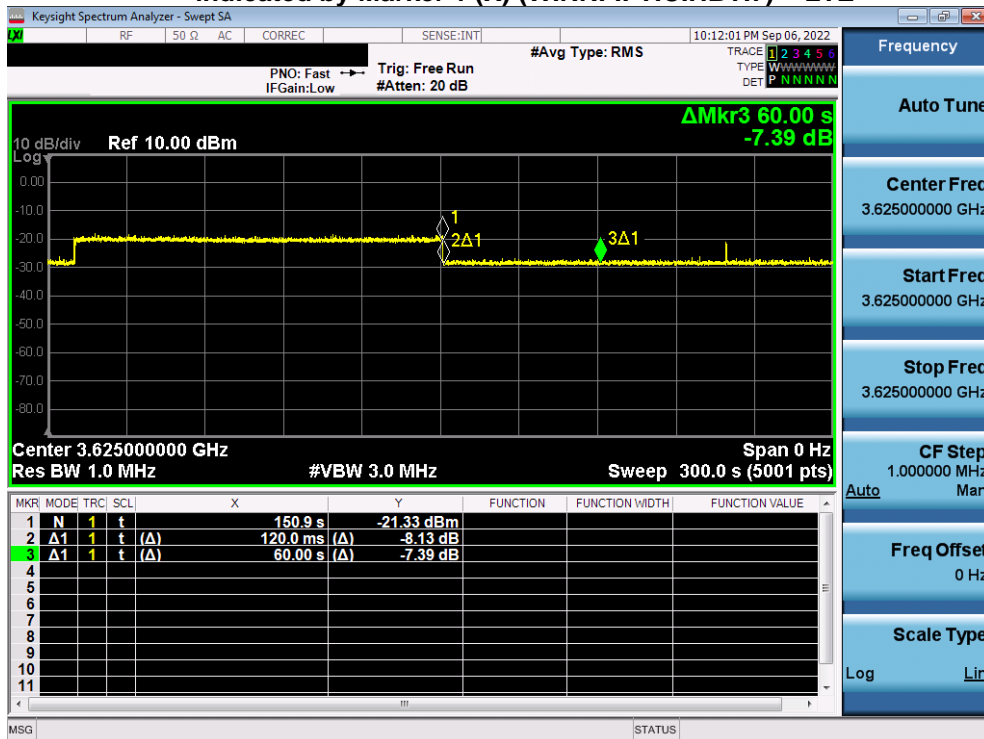
	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> o valid cbsdId = C o valid grantId = G o grant is for frequency range F, power P o grantExpireTime = UTC time greater than duration of the test • UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface 	--	--
2	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including: <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "AUTHORIZED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: <ul style="list-style-type: none"> • cbsdId = C • grantId = G • transmitExpireTime = T = Current UTC time • responseCode = 502 (UNSYNC_OP_PARAM) 	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	Monitor the SAS-CBSID interface. Verify: <ul style="list-style-type: none"> • UUT sends a Grant Relinquishment Request message. Verify message is correctly formatted with parameters: <ul style="list-style-type: none"> o cbsdId = C o grantId = G Monitor the RF output of the UUT. Verify: <ul style="list-style-type: none"> • UUT shall stop transmission within (T+60) seconds of completion of step 3. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 41 of 86

Test Plots:



Plot 31. Conducted Measurement - RF transmission stops within 60s of SAS message. The SAS message is indicated by Marker 1 (X) (WINNF.FT.C.HBT.7) – LTE




Plot 32. Conducted Measurement - RF transmission stops within 60s of SAS message. The SAS message is indicated by Marker 1 (X) (WINNF.FT.C.HBT.7) – NR

Note: The 'spike' after marker 3 is determined to not be transmission from the UUT.

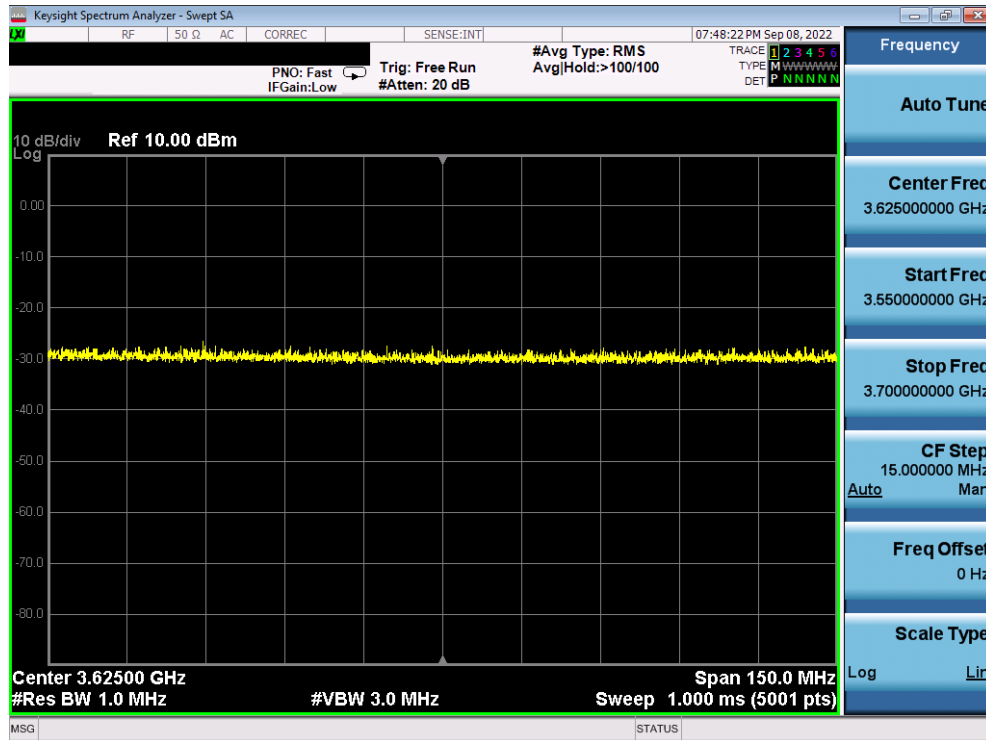
FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 42 of 86

A15 [WINNF.FT.C.HBT.9] Heartbeat Response Absent (First Heartbeat)

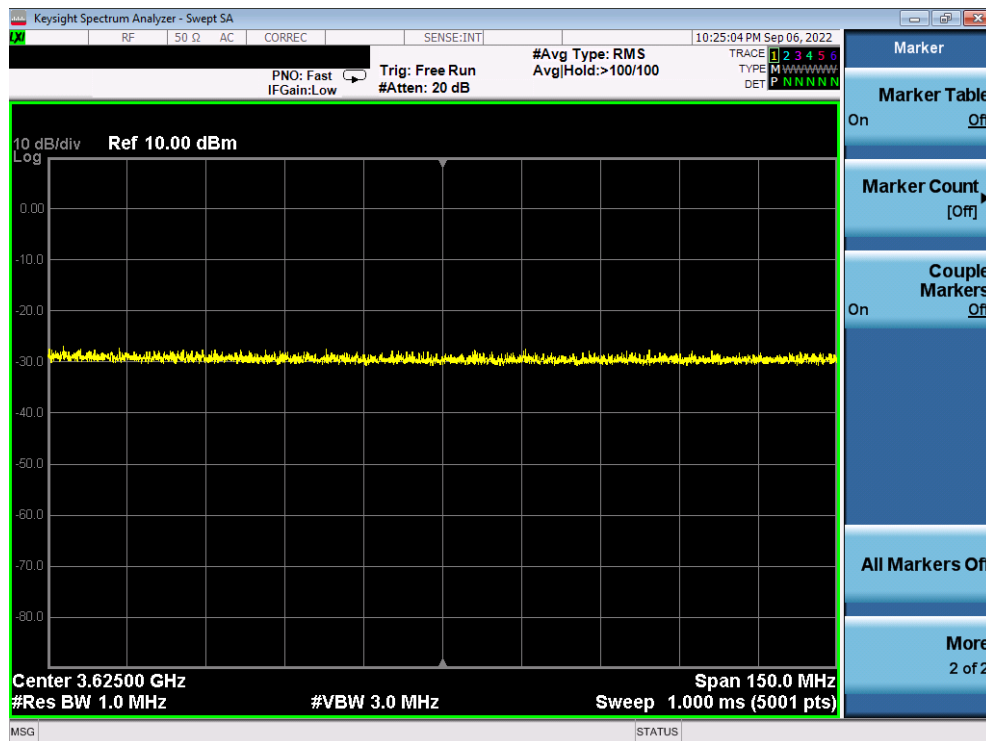
	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> o valid cbsId = C o valid grantId = G o grant is for frequency range F, power P o grantExpireTime = UTC time greater than duration of the test • UUT is in GRANTED, but not AUTHORIZED state (i.e. has not performed its first Heartbeat Request) 	--	--
2	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including: <ul style="list-style-type: none"> • cbsId = C • grantId = G • operationState = "GRANTED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	After completion of Step 2, SAS Test Harness does not respond to any further messages from UUT to simulate loss of network connection	--	--
4	Monitor the RF output of the UUT from start of test to 60 seconds after step 3. Verify: <ul style="list-style-type: none"> • At any time during the test, UUT shall not transmit on RF interface 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 43 of 86

Test Plots:



Plot 33. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.HBT.9) – LTE




Plot 34. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.HBT.9) – NR

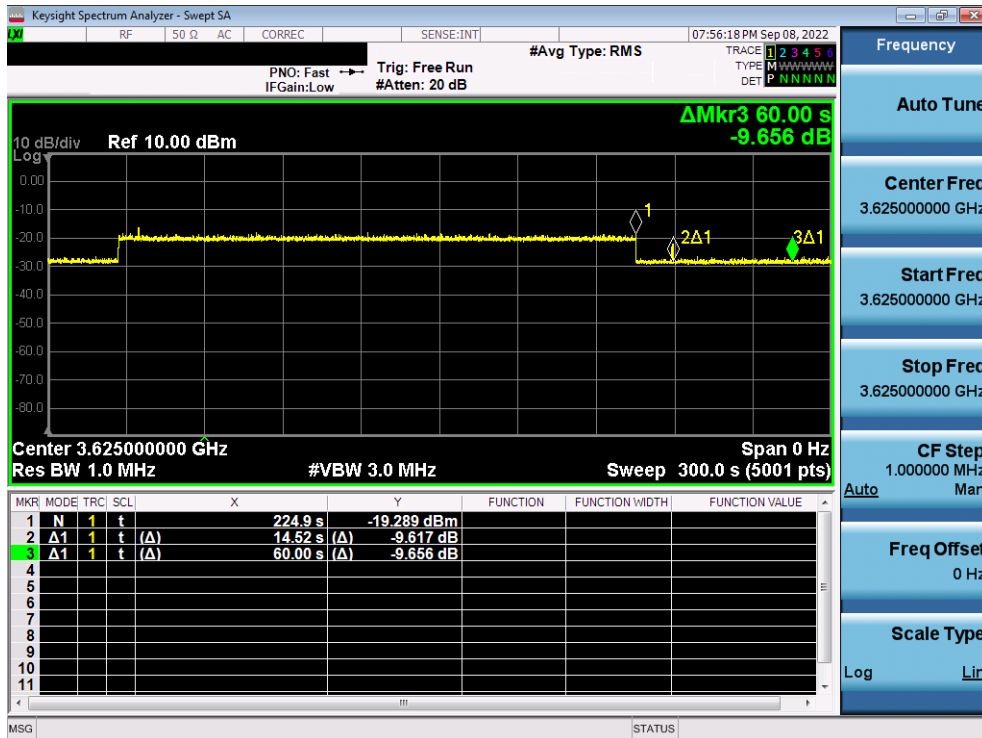
FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 44 of 86

A16 [WINNF.FT.C.HBT.10] Heartbeat Response Absent (Subsequent Heartbeat)

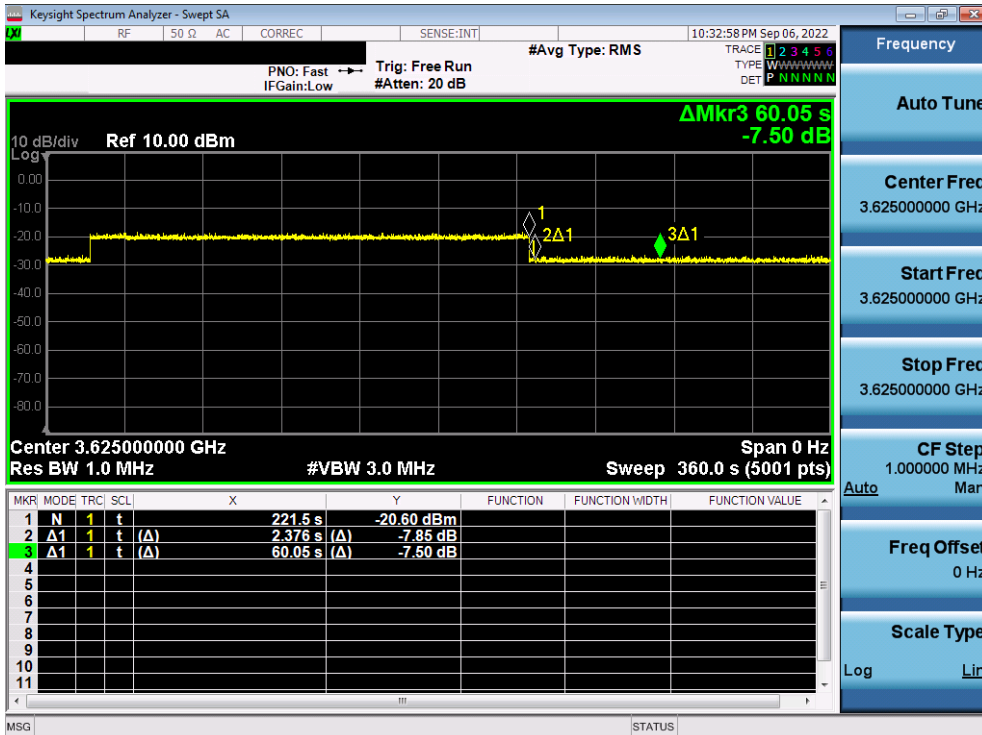
	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> o valid cbsdId = C o valid grantId = G o grant is for frequency range F, power P o grantExpireTime = UTC time greater than duration of the test • UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface 	--	--
2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is sent within the latest specified heartbeatInterval, and is formatted correctly, including: <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "AUTHORIZED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: <ul style="list-style-type: none"> • cbsdId = C • grantId = G • transmitExpireTime = current UTC time + 200 seconds • responseCode = 0 	--	--
4	After completion of Step 3, SAS Test Harness does not respond to any further messages from UUT	--	--
5	Monitor the RF output of the UUT. Verify: <ul style="list-style-type: none"> • UUT shall stop all transmission on RF interface within (transmitExpireTime + 60 seconds), using the transmitExpireTime sent in Step 3. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 45 of 86

Test Plots:



Plot 35. Conducted Measurement - RF transmission stops within transmitExpireTime + 60s. The last SAS heartbeat message is indicated by Marker 1 (X) (WINNF.FT.C.HBT.10) – LTE




Plot 36. Conducted Measurement - RF transmission stops within transmitExpireTime + 60s. The last SAS heartbeat message is indicated by Marker 1 (X) (WINNF.FT.C.HBT.10) – NR

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 46 of 86

A17 [WINNF.FT.C.MES.1] Registration Response contains measReportConfig

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness 	--	--
2	UUT sends a Registration Request message. Validate the Registration Request message is formatted correctly, including: <ul style="list-style-type: none"> • userId is present and correct • fcId is present and correct • cbsdSerialNumber is present and correct • measCapability = "RECEIVED_POWER_WITHOUT_GRANT" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	SAS Test Harness sends a Registration Response message, with the following parameters: <ul style="list-style-type: none"> • cbsdId = C = valid cbsdId for this UUT • measReportConfig= "RECEIVED_POWER_WITHOUT_GRANT" • responseCode = 0 	--	--
4	UUT sends a message: <ul style="list-style-type: none"> • If message is type Spectrum Inquiry Request, go to step 5, or • If message is type Grant Request, go to step 7 	--	--
5	UUT sends message type Spectrum Inquiry Request. Verify message contains all required parameters properly formatted, and specifically: <ul style="list-style-type: none"> • cbsdId = C • measReport is present, and is a properly formatted rcvdPowerMeasReport. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	SAS Test Harness sends a Spectrum Inquiry Response, with the following parameters: <ul style="list-style-type: none"> • cbsdId = C • availableChannel is an array of availableChannel objects • responseCode = 0 	--	--
7	UUT sends message type Grant Request message. Verify message contains all required parameters properly formatted, and specifically: <ul style="list-style-type: none"> • cbsdId = C • measReport is present, and is a properly formatted rcvdPowerMeasReport. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>


FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 47 of 86

```

"measReport": {
  "rcvdPowerMeasReports": [
    {
      "measBandwidth": 10000000,
      "measFrequency": 3550000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3560000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3570000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3580000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3590000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3600000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3610000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3620000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3630000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3640000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3650000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3660000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3670000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3680000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3690000000,
      "measRcvdPower": -100
    }
  ]
}

```

Plot 37.Measurement Report in Registration Response (WINNF.FT.C.MES.1) – LTE


FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 48 of 86


```

"measReport": {
  "rcvdPowerMeasReports": [
    {
      "measBandwidth": 10000000,
      "measFrequency": 3550000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3560000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3570000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3580000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3590000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3600000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3610000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3620000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3630000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3640000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3650000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3660000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3670000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3680000000,
      "measRcvdPower": -100
    },
    {
      "measBandwidth": 10000000,
      "measFrequency": 3690000000,
      "measRcvdPower": -100
    }
  ]
}


```

Plot 38.Measurement Report in Registration Response (WINNF.FT.C.MES.1) – NR

FCC ID: A3LRT4423-48B	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 49 of 86

A18 [WINNF.FT.C.RLQ.1] Successful Relinquishment

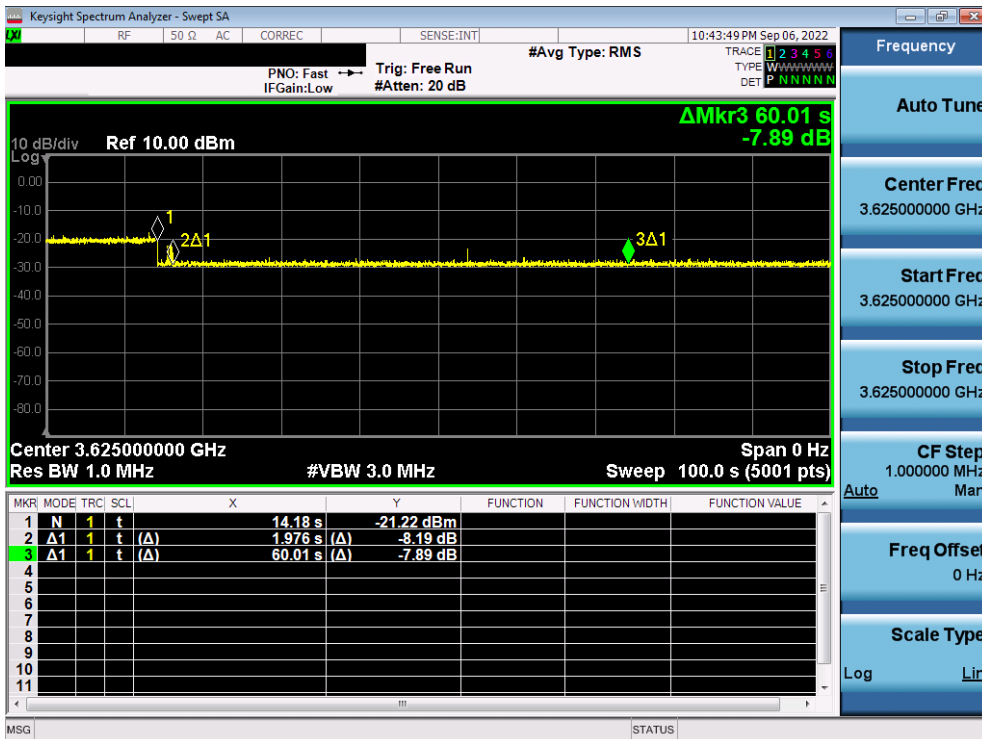
	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with cbsdId=C • UUT has received a valid grant with grantId = G • UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. <p>Invoke trigger to relinquish UUT Grant from the SAS Test Harness</p>	--	--
2	<p>UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<p>SAS Test Harness shall approve the request with a Relinquishment Response message with parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • responseCode = 0 	--	--
4	<p>After completion of step 3, SAS Test Harness will not provide any additional positive response (responseCode=0) to further request messages from the UUT.</p>	--	--
5	<p>Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:</p> <ul style="list-style-type: none"> • UUT shall stop RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 50 of 86

Test Plots:



Plot 39. Conducted Measurement - RF transmission stops (WINNF.FT.C.RLQ.1) – LTE




Plot 40. Conducted Measurement - RF transmission stops (WINNF.FT.C.RLQ.1) – NR

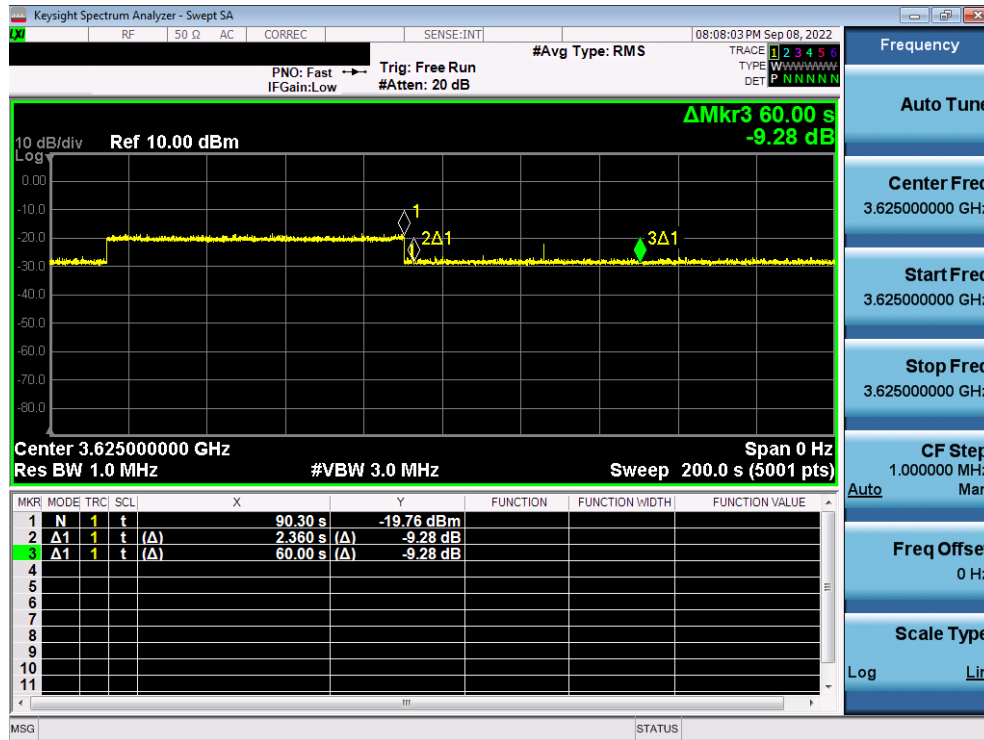
FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 51 of 86

A19 [WINNF.FT.C.DRG.1] Successful Deregistration

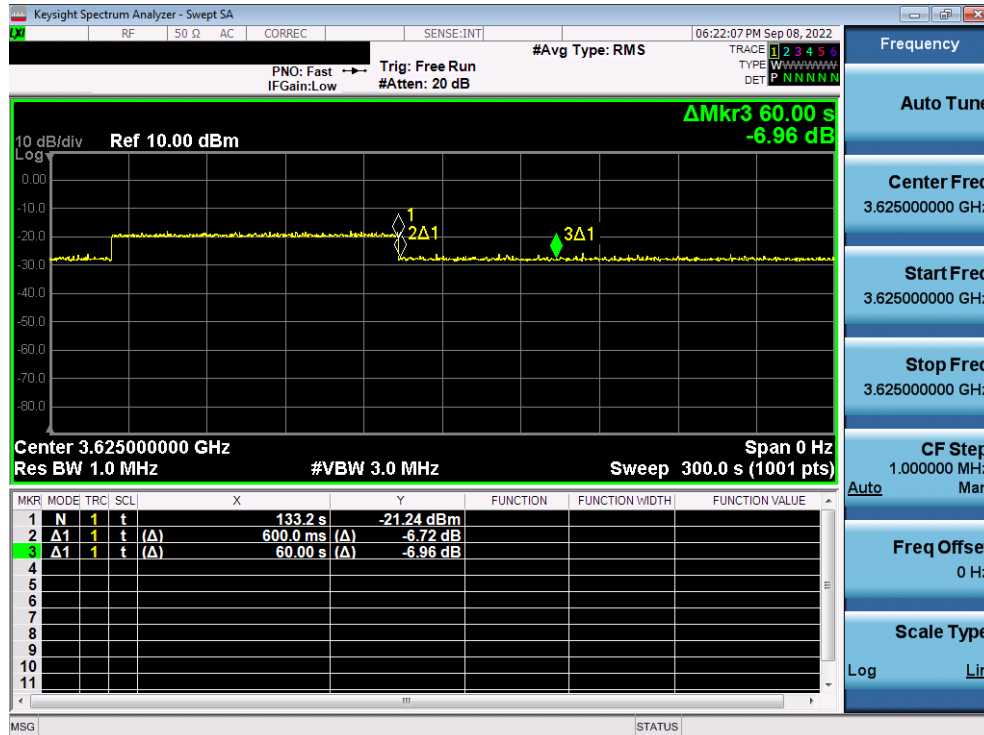
	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with cbsdId=C • UUT has received a valid grant with grantId = G • UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. Invoke trigger to deregister UUT from the SAS Test Harness	--	--
2	UUT sends a Relinquishment request and receives Relinquishment response with responseCode=0	--	--
3	UUT sends Deregistration Request to SAS Test Harness with cbsdId = C.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	SAS Test Harness shall approve the request with a Deregistration Response message with parameters: <ul style="list-style-type: none"> • cbsdId = C • responseCode = 0 	--	--
5	After completion of step 3, SAS Test Harness will not provide any additional positive response (responseCode=0) to further request messages from the UUT	--	--
6	Monitor the RF output of the UUT from start of test until 60 seconds after Step 4 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> • UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs: <ul style="list-style-type: none"> A. UUT sending a Registration Request message, as this is not mandatory B. UUT sending a Deregistration Request message 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 52 of 86

Test Plots:



Plot 41. Conducted Measurement - RF transmission stops within 60s. The SAS message is indicated by Marker 1 (X) (WINNF.FT.C.DRG.1) – LTE




Plot 42. Conducted Measurement - RF transmission stops within 60s. The SAS message is indicated by Marker 1 (X) (WINNF.FT.C.DRG.1) – NR

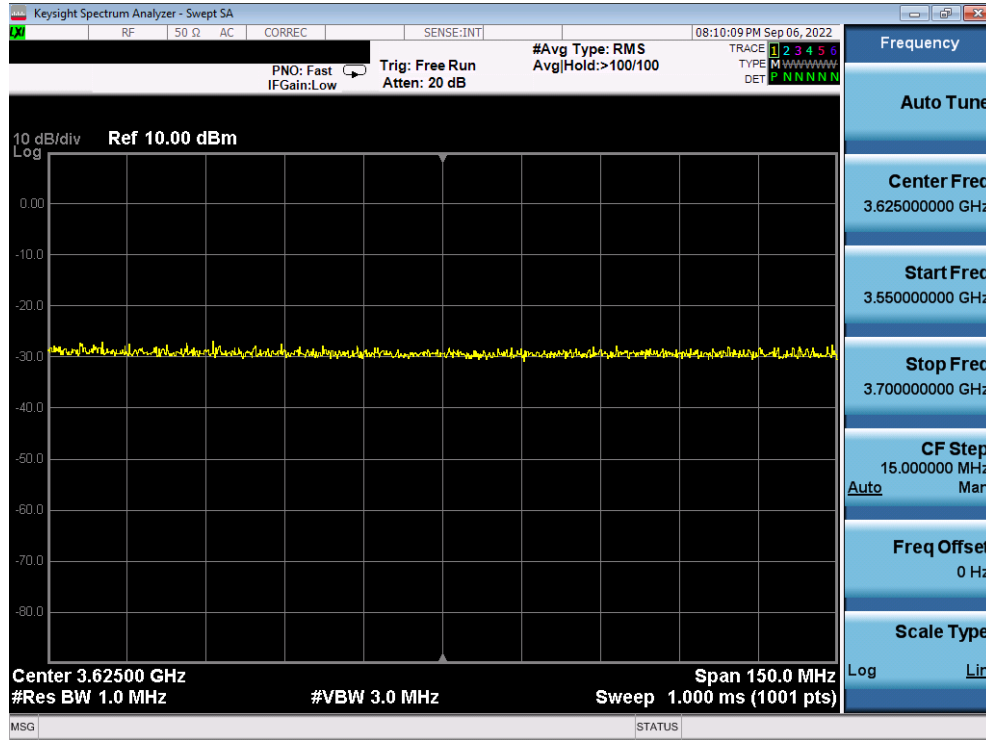
FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 53 of 86

A20 [WINNF.FT.C.SCS.1] Successful TLS connection between UUT and SAS Test Harness

	Test Execution Steps	PASS	FAIL
1	<ul style="list-style-type: none"> • UUT shall start CBSD-SAS communication with the security procedure • The UUT shall establish a TLS handshake with the SAS Test Harness using configured certificate. • Configure the SAS Test Harness to accept the security procedure and establish the connection 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	<ul style="list-style-type: none"> • Make sure that Mutual authentication happens between UUT and the SAS Test Harness. • Make sure that UUT uses TLS v1.2 • Make sure that cipher suites from one of the following is selected, • TLS_RSA_WITH_AES_128_GCM_SHA256 • TLS_RSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 • TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<p>A successful registration is accomplished using one of the test cases described in section 6.1.4.1, depending on CBSD capability.</p> <ul style="list-style-type: none"> • UUT sends a registration request to the SAS Test Harness and the SAS Test Harness sends a Registration Response with responseCode = 0 and cbsdId. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	<p>Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:</p> <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 54 of 86

Test Plots:



Plot 43. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.SCS.1) – LTE

No.	Time	Source	Destination	Protocol	Length	Info
14	2022-09-08 22:22:56.256041	4.71.13.195	173.59.230.213	TCP	74	8484 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=468659730 TSecr=0 WS=256
15	2022-09-08 22:22:56.256286	173.59.230.213	4.71.13.195	TCP	66	443 → 8484 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1480 WS=256 SACK_PERM=1
16	2022-09-08 22:22:56.299440	4.71.13.195	173.59.230.213	TCP	60	8484 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0
17	2022-09-08 22:22:56.302044	4.71.13.195	173.59.230.213	TLV1.2	367	Client Hello
18	2022-09-08 22:22:56.321398	173.59.230.213	4.71.13.195	TLV1.2	3447	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
19	2022-09-08 22:22:56.368807	4.71.13.195	173.59.230.213	TCP	60	8484 → 443 [ACK] Seq=314 Ack=3394 Win=35840 Len=0
20	2022-09-08 22:22:56.368807	4.71.13.195	173.59.230.213	TCP	1494	8484 → 443 [ACK] Seq=314 Ack=3394 Win=35840 Len=1440 [TCP segment of a reassembled PDU]
21	2022-09-08 22:22:56.368808	4.71.13.195	173.59.230.213	TLV1.2	1478	Certificate
22	2022-09-08 22:22:56.368876	173.59.230.213	4.71.13.195	TCP	54	443 → 8484 [ACK] Seq=3394 Ack=3170 Win=263424 Len=0
23	2022-09-08 22:22:56.369004	4.71.13.195	173.59.230.213	TLV1.2	129	Client Key Exchange
24	2022-09-08 22:22:56.372134	4.71.13.195	173.59.230.213	TLV1.2	323	Certificate Verify
25	2022-09-08 22:22:56.372137	4.71.13.195	173.59.230.213	TLV1.2	60	Change Cipher Spec
26	2022-09-08 22:22:56.372137	4.71.13.195	173.59.230.213	TLV1.2	99	Encrypted Handshake Message
27	2022-09-08 22:22:56.372176	173.59.230.213	4.71.13.195	TCP	54	443 → 8484 [ACK] Seq=3394 Ack=3565 Win=262912 Len=0
28	2022-09-08 22:22:56.375128	173.59.230.213	4.71.13.195	TLV1.2	105	Change Cipher Spec, Encrypted Handshake Message
29	2022-09-08 22:22:56.418036	4.71.13.195	173.59.230.213	TLV1.2	599	Application Data
30	2022-09-08 22:22:56.465196	173.59.230.213	4.71.13.195	TCP	54	443 → 8484 [ACK] Seq=3445 Ack=4110 Win=262400 Len=0
31	2022-09-08 22:22:56.487087	173.59.230.213	4.71.13.195	TLV1.2	100	Application Data
33	2022-09-08 22:22:56.575517	4.71.13.195	173.59.230.213	TCP	60	8484 → 443 [ACK] Seq=4110 Ack=3491 Win=35840 Len=0
34	2022-09-08 22:22:56.575584	173.59.230.213	4.71.13.195	TLV1.2	542	Application Data, Application Data, Application Data, Application Data, Application Data
35	2022-09-08 22:22:56.622986	4.71.13.195	173.59.230.213	TCP	60	8484 → 443 [ACK] Seq=4110 Ack=3979 Win=38656 Len=0

Plot 44. WireShark Screenshot – Successful Handshake (WINNF.FT.C.SCS.1) – LTE


FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 55 of 86

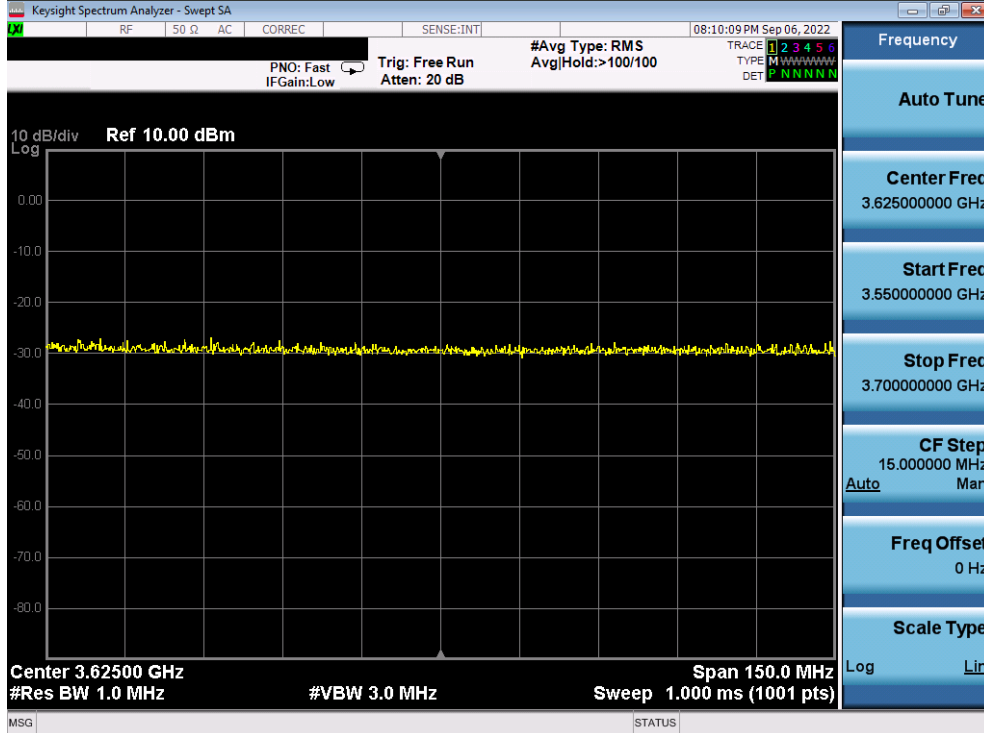
```

"registrationRequest": [
  {
    "airInterface": {
      "radioTechnology": "E_UTRA"
    },
    "callSign": "-",
    "cbsdCategory": "B",
    "cbsdSerialNumber": "S618627594",
    "fccId": "A3LRT4423-48A",
    "measCapability": [
      "RECEIVED_POWER_WITHOUT_GRANT"
    ],
    "userId": "Samsung_Networks"
  }
]
}
2022-09-08T22:22:56.490Z - INFO - engine sent successfully, the response to CBRS : {
  "registrationResponse": [
    {
      "cbsdId": "A3LRT4423-48AMock-SASS618627594",
      "response": {
        "responseCode": 0
      }
    }
  ]
}
}

```

Plot 45.SAS Log – Successful Handshake (WINNF.FT.C.SCS.1) – LTE

FCC ID: A3LRT4423-48B	 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station
		Page 56 of 86



Plot 46. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.SCS.1) – NR

No.	Time	Source	Destination	Protocol	Length	Info
176	2022-09-07 00:06:04.397638	4.71.13.195	173.59.230.213	TCP	74	10246 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 (SynI=382251817) (SynR=0) WS=256
179	2022-09-07 00:06:04.397731	173.59.230.213	4.71.13.195	TCP	66	443 → 10246 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
180	2022-09-07 00:06:04.439496	4.71.13.195	173.59.230.213	TCP	60	10246 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0
181	2022-09-07 00:06:04.442590	4.71.13.195	173.59.230.213	TLSv1.2	367	Client Hello
184	2022-09-07 00:06:04.463981	173.59.230.213	4.71.13.195	TLSv1.2	3447	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
185	2022-09-07 00:06:04.508396	4.71.13.195	173.59.230.213	TCP	60	10246 → 443 [ACK] Seq=314 Ack=2881 Win=34568 Len=0
186	2022-09-07 00:06:04.508397	4.71.13.195	173.59.230.213	TCP	60	10246 → 443 [ACK] Seq=314 Ack=3394 Win=37632 Len=0
187	2022-09-07 00:06:04.509496	4.71.13.195	173.59.230.213	TCP	1494	10246 → 443 [ACK] Seq=314 Ack=3394 Win=37632 Len=1440 [TCP segment of a reassembled PDU]
188	2022-09-07 00:06:04.509497	4.71.13.195	173.59.230.213	TLSv1.2	1470	Certificate
189	2022-09-07 00:06:04.509538	173.59.230.213	4.71.13.195	TCP	54	443 → 10246 [ACK] Seq=3394 Ack=3170 Win=263424 Len=0
190	2022-09-07 00:06:04.509572	4.71.13.195	173.59.230.213	TLSv1.2	129	Client Key Exchange
191	2022-09-07 00:06:04.512650	4.71.13.195	173.59.230.213	TLSv1.2	323	Certificate Verify
192	2022-09-07 00:06:04.512669	173.59.230.213	4.71.13.195	TCP	54	443 → 10246 [ACK] Seq=3394 Ack=3514 Win=263168 Len=0
193	2022-09-07 00:06:04.512729	4.71.13.195	173.59.230.213	TLSv1.2	68	Change Cipher Spec
194	2022-09-07 00:06:04.512855	4.71.13.195	173.59.230.213	TLSv1.2	99	Encrypted Handshake Message
195	2022-09-07 00:06:04.512944	173.59.230.213	4.71.13.195	TCP	54	443 → 10246 [ACK] Seq=3394 Ack=3565 Win=262912 Len=0
196	2022-09-07 00:06:04.516471	173.59.230.213	4.71.13.195	TLSv1.2	105	Change Cipher Spec, Encrypted Handshake Message
197	2022-09-07 00:06:04.559253	4.71.13.195	173.59.230.213	TLSv1.2	595	Application Data
198	2022-09-07 00:06:04.559278	173.59.230.213	4.71.13.195	TLSv1.2	100	Application Data
199	2022-09-07 00:06:04.675186	4.71.13.195	173.59.230.213	TCP	60	10246 → 443 [ACK] Seq=4106 Ack=3401 Win=37632 Len=0
200	2022-09-07 00:06:04.675165	173.59.230.213	4.71.13.195	TLSv1.2	542	Application Data, Application Data, Application Data, Application Data, Application Data, Application Data
201	2022-09-07 00:06:04.725634	4.71.13.195	173.59.230.213	TCP	60	10246 → 443 [ACK] Seq=4106 Ack=3979 Win=40448 Len=0

Plot 47. WireShark Screenshot – Successful Handshake (WINNF.FT.C.SCS.1) – NR


FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station		Page 57 of 86

```

"registrationRequest": [
  {
    "airInterface": {
      "radioTechnology": "NR"
    },
    "callSign": "-",
    "cbsdCategory": "B",
    "cbsdSerialNumber": "S618627594",
    "fccId": "A3LRT4423-48A",
    "measCapability": [
      "RECEIVED_POWER_WITHOUT_GRANT"
    ],
    "userId": "Samsung_Networks"
  }
]
}
2022-09-07T00:06:04.585Z - INFO - engine sent successfully, the response to CBRS : {
  "registrationResponse": [
    {
      "cbsdId": "A3LRT4423-48AMock-SASS618627594",
      "response": {
        "responseCode": 0
      }
    }
  ]
}
}


```

Plot 48.SAS Log – Successful Handshake (WINNF.FT.C.SCS.1) – NR

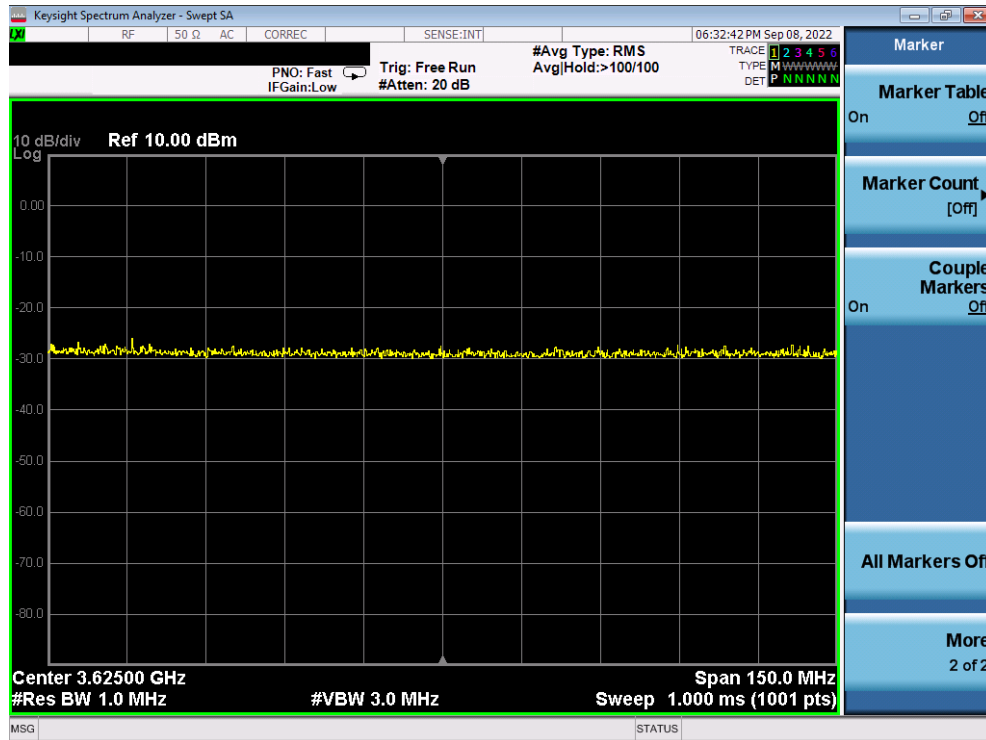
FCC ID: A3LRT4423-48B	 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station
		Page 58 of 86

A21 [WINNF.FT.C.SCS.2] TLS failure due to revoked certificate

	Test Execution Steps	PASS	FAIL
1	<ul style="list-style-type: none"> • UUT shall start CBSD-SAS communication with the security procedure 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	<ul style="list-style-type: none"> • Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate. • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	UUT may retry for the security procedure which shall fail	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	SAS Test-Harness shall not receive any Registration request or any application data.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 59 of 86

Test Plots:

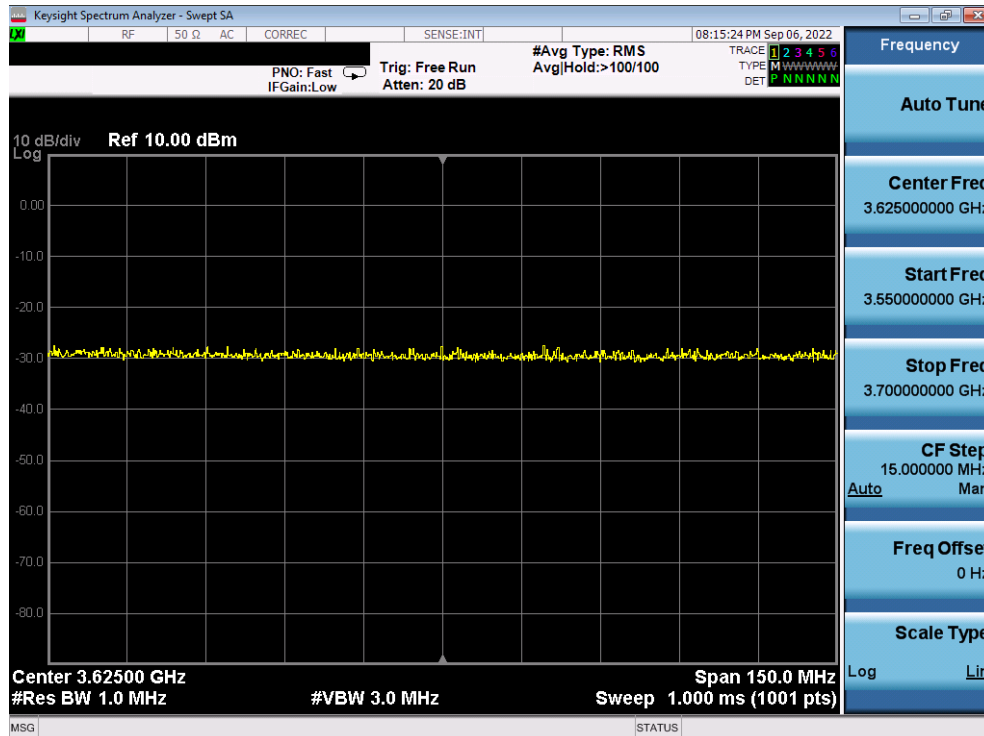


Plot 49. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.SCS.2) – LTE

No.	Time	Source	Destination	Protocol	Length	Info
265	2022-09-08 22:28:57.340254	4.71.13.195	173.59.230.213	TCP	74	8536 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=470220883 TSecr=0 WS=256
266	2022-09-08 22:28:57.340438	173.59.230.213	4.71.13.195	TCP	66	443 → 8536 [SYN, ACK] Seq=0 Ack=1 Min=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
267	2022-09-08 22:28:57.380995	4.71.13.195	173.59.230.213	TCP	60	8536 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0
268	2022-09-08 22:28:57.383239	4.71.13.195	173.59.230.213	TLSv1.2	367	Client Hello
269	2022-09-08 22:28:57.400761	173.59.230.213	4.71.13.195	TLSv1.2	3575	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
270	2022-09-08 22:28:57.449612	4.71.13.195	173.59.230.213	TCP	60	8536 → 443 [ACK] Seq=314 Ack=3522 Win=36096 Len=0
271	2022-09-08 22:28:57.451008	4.71.13.195	173.59.230.213	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Unknown)
272	2022-09-08 22:28:57.451009	4.71.13.195	173.59.230.213	TCP	60	8536 → 443 [RST, ACK] Seq=321 Ack=3522 Win=36096 Len=0

Plot 50. WireShark Screenshot 1 - Failed Handshake – 61 Fatal Alert – Revoked Certificate (WINNF.FT.C.SCS.2) – LTE

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 60 of 86



Plot 51. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.SCS.2) – NR


No.	Time	Source	Destination	Protocol	Length	Info
54	2022-09-07 00:11:21.917690	4.71.13.195	173.59.230.213	TCP	74	9707 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=303569341 TSecr=0 WS=256
55	2022-09-07 00:11:21.917943	173.59.230.213	4.71.13.195	TCP	66	443 → 9707 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
56	2022-09-07 00:11:21.965476	4.71.13.195	173.59.230.213	TCP	66	9707 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0
57	2022-09-07 00:11:21.967832	4.71.13.195	173.59.230.213	TLSv1.2	367	Client Hello
58	2022-09-07 00:11:21.987589	173.59.230.213	4.71.13.195	TLSv1.2	3575	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
60	2022-09-07 00:11:22.033781	4.71.13.195	173.59.230.213	TCP	66	9707 → 443 [ACK] Seq=314 Ack=3522 Win=36896 Len=0
61	2022-09-07 00:11:22.047353	4.71.13.195	173.59.230.213	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Unknown)
62	2022-09-07 00:11:22.047354	4.71.13.195	173.59.230.213	TCP	66	9707 → 443 [RST, ACK] Seq=321 Ack=3522 Win=36896 Len=0

Plot 52. WireShark Screenshot 1 - Failed Handshake– 61 Fatal Alert – Revoked Certificate (WINNF.FT.C.SCS.2) – NR

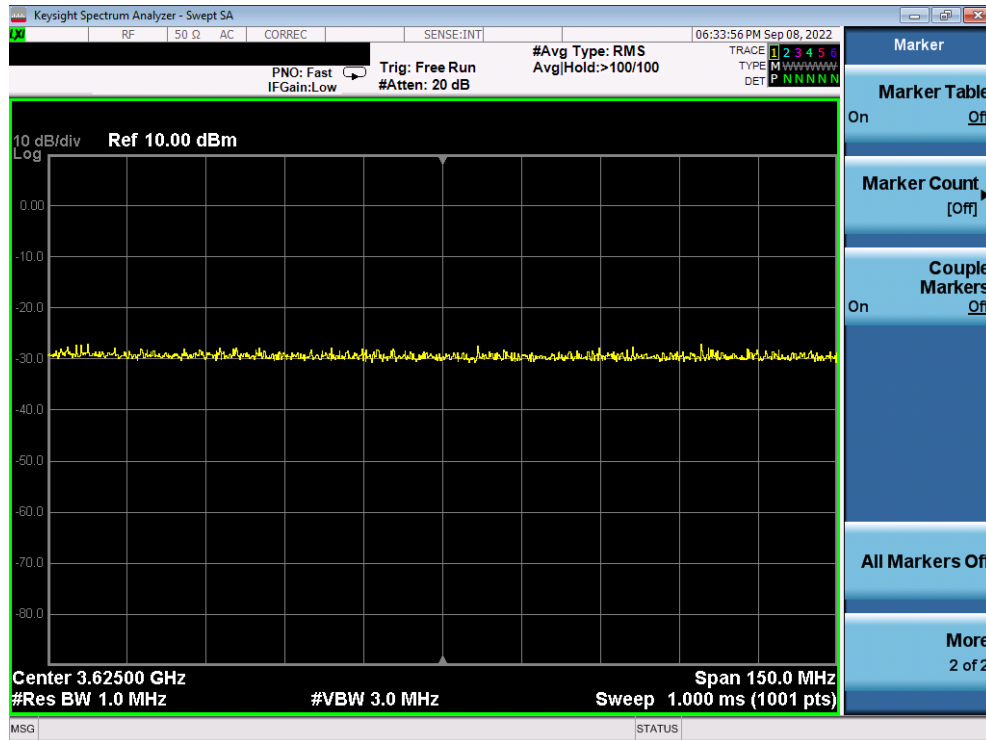
FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 61 of 86

A22 [WINNF.FT.C.SCS.3] TLS failure due to expired server certificate

	Test Execution Steps	PASS	FAIL
1	<ul style="list-style-type: none"> • UUT shall start CBSD-SAS communication with the security procedure 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	<ul style="list-style-type: none"> • Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate. • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	UUT may retry for the security procedure which shall fail	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	SAS Test-Harness shall not receive any Registration request or any application data.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 62 of 86

Test Plots:

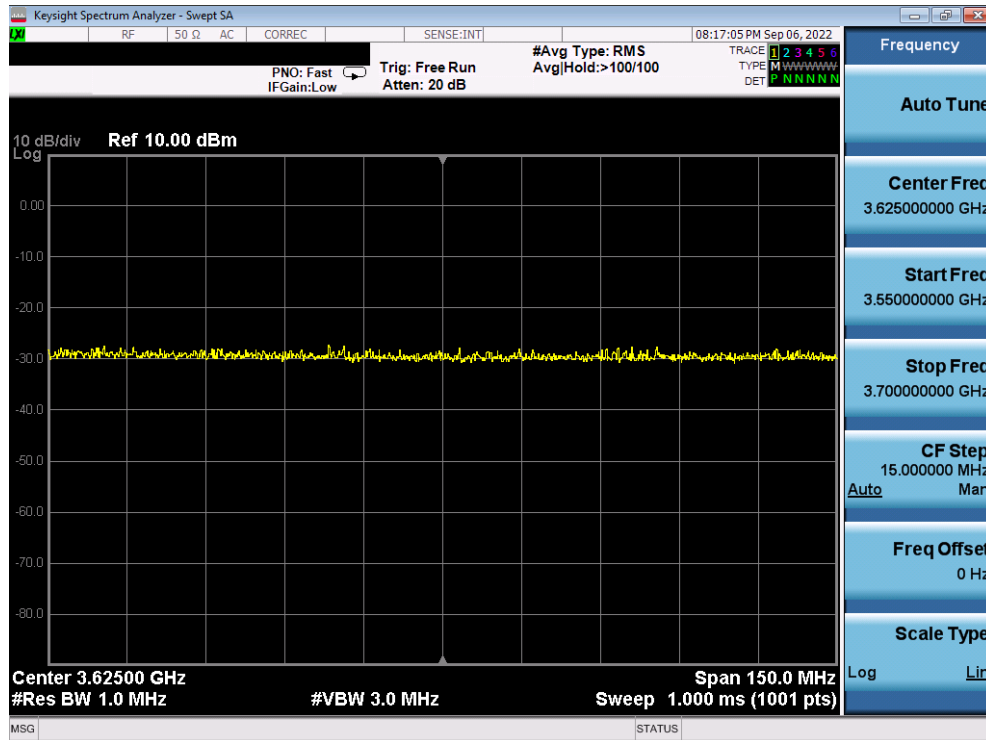


Plot 53. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.SCS.3) – LTE

No.	Time	Source	Destination	Protocol	Length	Info
2	2022-09-08 22:30:24.754237	4.71.13.195	173.59.230.213	TCP	74	8527 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1448 SACK_PERM=1 TSval=47838217 TSecr=0 WS=256
3	2022-09-08 22:30:24.754449	173.59.230.213	4.71.13.195	TCP	66	443 → 8527 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
4	2022-09-08 22:30:24.805367	4.71.13.195	173.59.230.213	TCP	60	8527 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0
5	2022-09-08 22:30:24.807876	4.71.13.195	173.59.230.213	TLSv1.2	367	Client Hello
6	2022-09-08 22:30:24.828953	173.59.230.213	4.71.13.195	TLSv1.2	3465	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
7	2022-09-08 22:30:24.875951	4.71.13.195	173.59.230.213	TCP	60	8527 → 443 [ACK] Seq=314 Ack=2881 Win=34568 Len=0
8	2022-09-08 22:30:24.875952	4.71.13.195	173.59.230.213	TCP	60	8527 → 443 [ACK] Seq=314 Ack=3412 Win=37632 Len=0
9	2022-09-08 22:30:24.875388	4.71.13.195	173.59.230.213	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Unknown)
10	2022-09-08 22:30:24.875388	4.71.13.195	173.59.230.213	TCP	60	8527 → 443 [RST, ACK] Seq=321 Ack=3412 Win=37632 Len=0

Plot 54. WireShark Screenshot - Failed Handshake – 61 Fatal Alert – Expired Certificate (WINNF.FT.C.SCS.3) – LTE

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 63 of 86



Plot 55. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.SCS.3) – NR


No.	Time	Source	Destination	Protocol	Length	Info
35	2022-09-07 00:13:28.792073	4.71.13.195	173.59.230.213	TCP	74	9715 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=303696213 TSecr=0 WS=256
36	2022-09-07 00:13:28.792319	173.59.230.213	4.71.13.195	TCP	66	443 → 9715 [SYN, ACK] Seq=0 Ack=1 Win=5535 Len=0 MSS=1460 WS=256 SACK_PERM=1
37	2022-09-07 00:13:28.836124	4.71.13.195	173.59.230.213	TCP	66	9715 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0
38	2022-09-07 00:13:28.836953	4.71.13.195	173.59.230.213	TLSv1.2	367	Client Hello
39	2022-09-07 00:13:28.858929	173.59.230.213	4.71.13.195	TLSv1.2	3465	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
41	2022-09-07 00:13:28.904892	4.71.13.195	173.59.230.213	TCP	66	9715 → 443 [ACK] Seq=514 Ack=2412 Win=35840 Len=0
42	2022-09-07 00:13:28.905164	4.71.13.195	173.59.230.213	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Unknown)
43	2022-09-07 00:13:28.905441	4.71.13.195	173.59.230.213	TCP	66	9715 → 443 [RST, ACK] Seq=321 Ack=3412 Win=35840 Len=0

Plot 56. WireShark Screenshot - Failed Handshake - 61 Fatal Alert – Expired Certificate (WINNF.FT.C.SCS.3) – NR

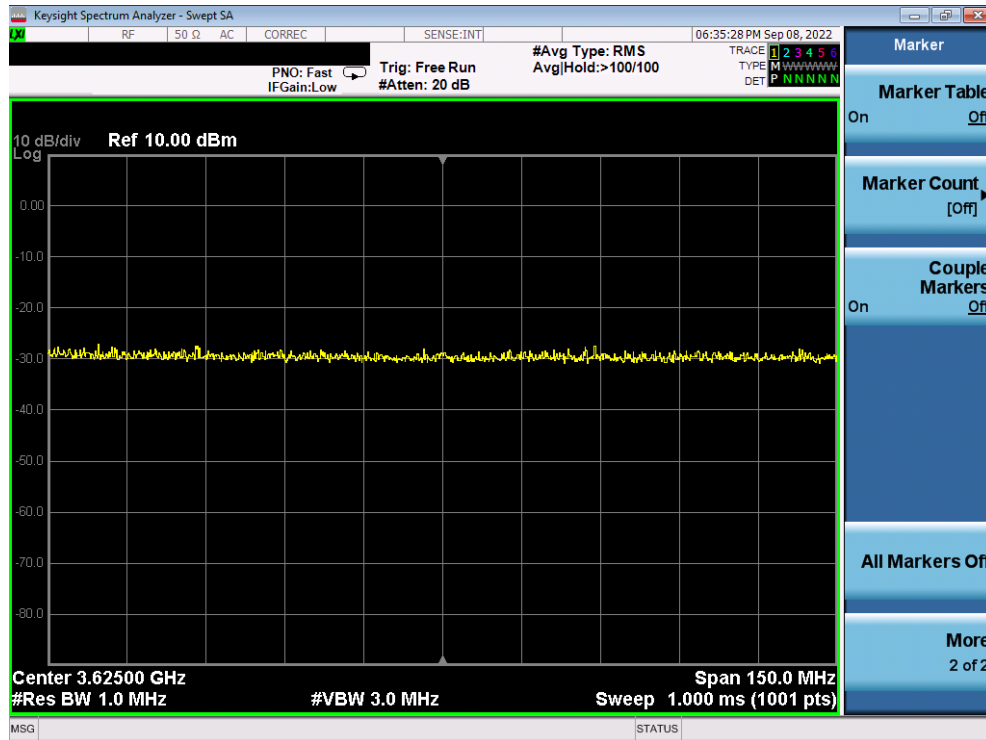
FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 64 of 86

[WINNF.FT.C.SCS.4] TLS failure when SAS Test Harness certificate is issued by an unknown CA

	Test Execution Steps	PASS	FAIL
1	<ul style="list-style-type: none"> • UUT shall start CBSD-SAS communication with the security procedure 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	<ul style="list-style-type: none"> • Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate. • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	UUT may retry for the security procedure which shall fail	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	SAS Test-Harness shall not receive any Registration request or any application data.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 65 of 86

Test Plots:

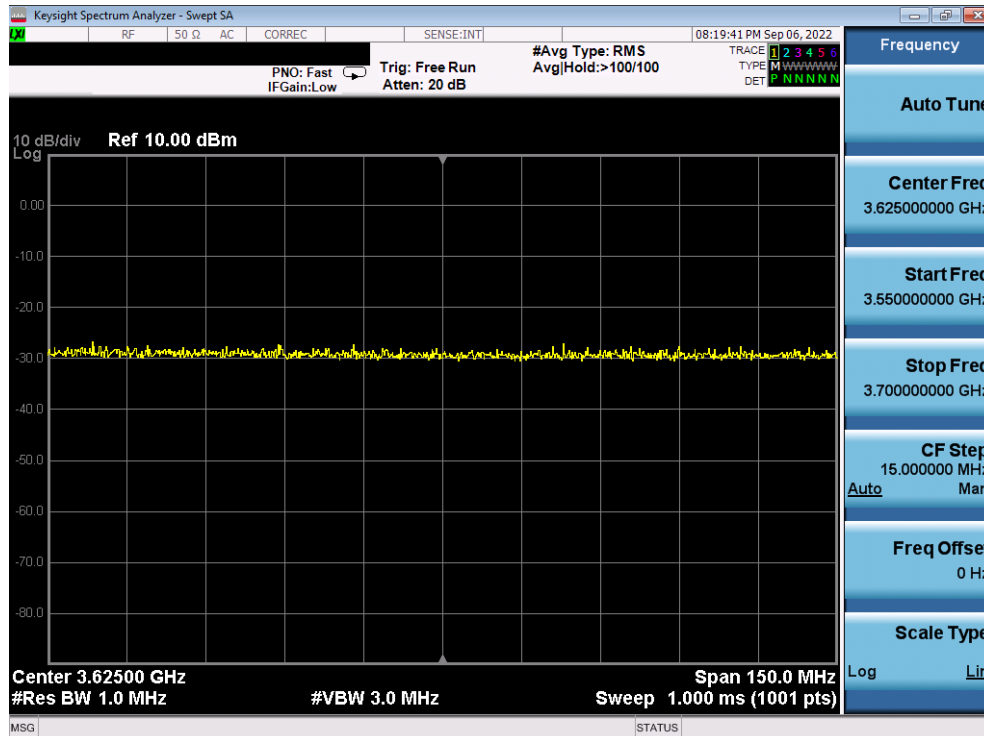


Plot 57. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.SCS.4) – LTE

No.	Time	Source	Destination	Protocol	Length	Info
35	2022-09-07 00:15:16.043371	4.71.13.195	173.59.230.213	TCP	74	10344 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=383803456 TSecr=0 WS=256
36	2022-09-07 00:15:16.043687	173.59.230.213	4.71.13.195	TCP	66	443 → 10344 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
37	2022-09-07 00:15:16.080441	4.71.13.195	173.59.230.213	TCP	66	10344 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0
38	2022-09-07 00:15:16.088859	4.71.13.195	173.59.230.213	TLSh1.2	367	Client Hello
39	2022-09-07 00:15:16.107267	173.59.230.213	4.71.13.195	TLSh1.2	3467	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
40	2022-09-07 00:15:16.154679	4.71.13.195	173.59.230.213	TCP	60	10344 → 443 [ACK] Seq=314 Ack=3414 Win=35840 Len=0
41	2022-09-07 00:15:16.155773	4.71.13.195	173.59.230.213	TLSh1.2	61	Alert (Level: Fatal, Description: Certificate Unknown)
42	2022-09-07 00:15:16.155774	4.71.13.195	173.59.230.213	TCP	60	10344 → 443 [RST, ACK] Seq=323 Ack=3414 Win=35840 Len=0

Plot 58. WireShark Screenshot - Failed Handshake - 61 Fatal Alert – Unknown CA (WINNF.FT.C.SCS.4) – LTE

FCC ID: A3LRT4423-48B			MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station		Page 66 of 86



Plot 59. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.SCS.4) – NR


No.	Time	Source	Destination	Protocol	Length	Info
11	2022-09-08 22:31:54.973478	4.71.13.195	173.59.230.213	TCP	74	8530 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=470398431 TSecr=0 WS=256
12	2022-09-08 22:31:54.973595	173.59.230.213	4.71.13.195	TCP	66	443 → 8530 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
13	2022-09-08 22:31:55.018537	4.71.13.195	173.59.230.213	TCP	66	8530 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0
14	2022-09-08 22:31:55.022212	4.71.13.195	173.59.230.213	TLSv1.2	367	Client Hello
15	2022-09-08 22:31:55.041307	173.59.230.213	4.71.13.195	TLSv1.2	3467	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
16	2022-09-08 22:31:55.089348	4.71.13.195	173.59.230.213	TCP	66	8530 → 443 [ACK] Seq=314 Ack=3414 Win=35840 Len=0
17	2022-09-08 22:31:55.089771	4.71.13.195	173.59.230.213	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Unknown)
18	2022-09-08 22:31:55.089771	4.71.13.195	173.59.230.213	TCP	66	8530 → 443 [RST, ACK] Seq=321 Ack=3414 Win=35840 Len=0

Plot 60. WireShark Screenshot - Failed Handshake- 61 Fatal Alert – Unknown CA (WINNF.FT.C.SCS.4) – NR

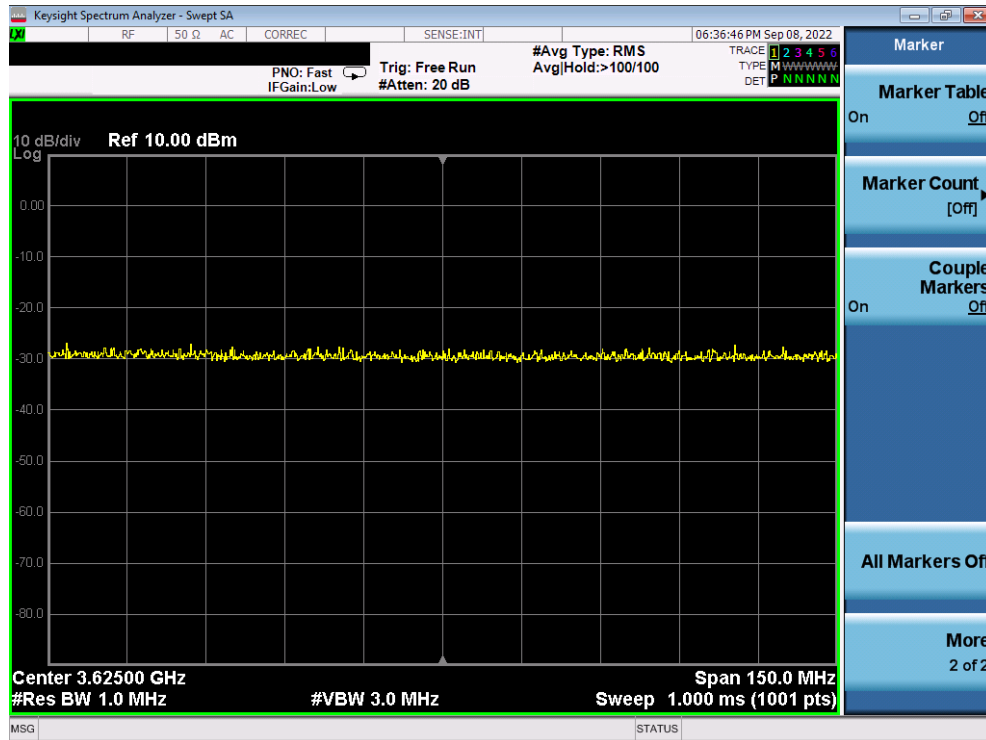
FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 67 of 86

A23 [WINNF.FT.C.SCS.5] TLS failure when certificate at the SAS Test Harness is corrupted

	Test Execution Steps	PASS	FAIL
1	<ul style="list-style-type: none"> • UUT shall start CBSD-SAS communication with the security procedure 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	<ul style="list-style-type: none"> • Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate. • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	UUT may retry for the security procedure which shall fail	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	SAS Test-Harness shall not receive any Registration request or any application data.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 68 of 86

Test Plots:

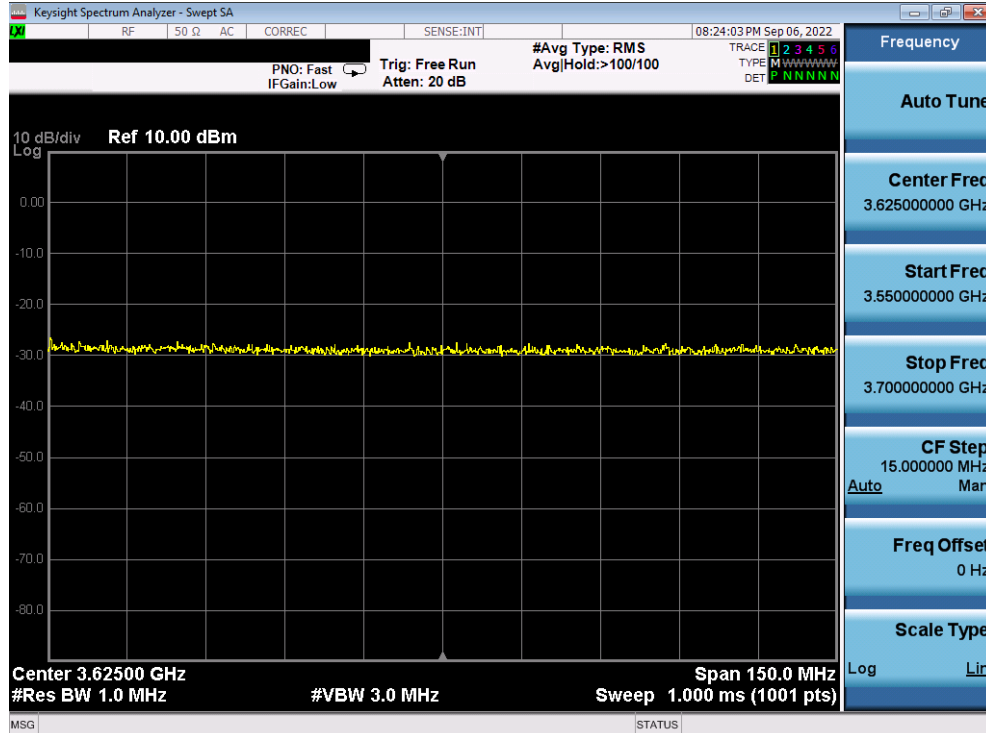


Plot 61. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.SCS.5) – LTE

No.	Time	Source	Destination	Protocol	Length	Info
2	2022-09-08 22:33:12.163293	4.71.13.195	173.59.230.213	TCP	74	6022 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=470475631 TSecr=0 IS=256
3	2022-09-08 22:33:12.163492	173.59.230.213	4.71.13.195	TCP	66	443 → 6022 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 IS=256 SACK_PERM=1
4	2022-09-08 22:33:12.225048	4.71.13.195	173.59.230.213	TCP	66	6022 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0
5	2022-09-08 22:33:12.225568	4.71.13.195	173.59.230.213	TLSv1.2	367	Client Hello
6	2022-09-08 22:33:12.247796	173.59.230.213	4.71.13.195	TLSv1.2	3447	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
7	2022-09-08 22:33:12.290662	4.71.13.195	173.59.230.213	TCP	66	6022 → 443 [ACK] Seq=314 Ack=1441 Win=31744 Len=0
8	2022-09-08 22:33:12.290662	4.71.13.195	173.59.230.213	TCP	66	6022 → 443 [ACK] Seq=314 Ack=3394 Win=35840 Len=0
9	2022-09-08 22:33:12.292353	4.71.13.195	173.59.230.213	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Unknown)
10	2022-09-08 22:33:12.292354	4.71.13.195	173.59.230.213	TCP	66	6022 → 443 [RST, ACK] Seq=321 Ack=3394 Win=35840 Len=0

Plot 62. WireShark Screenshot - Failed Handshake - 61 Fatal Alert – Corrupted Certificate (WINNF.FT.C.SCS.5) – LTE

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 69 of 86



Plot 63. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.SCS.5) – NR


No.	Time	Source	Destination	Protocol	Length	Info
15	2022-09-07 08:20:26.548114	4.71.13.195	173.59.230.213	TCP	74	10255 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=384113964 TSecr=0 WS=256
16	2022-09-07 08:20:26.548215	173.59.230.213	4.71.13.195	TCP	66	443 → 10255 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
17	2022-09-07 08:20:26.594460	4.71.13.195	173.59.230.213	TCP	66	10255 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0
18	2022-09-07 08:20:26.596658	4.71.13.195	173.59.230.213	TLSv1.2	362	Client Hello
19	2022-09-07 08:20:26.614751	173.59.230.213	4.71.13.195	TLSv1.2	3447	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
20	2022-09-07 08:20:26.664881	4.71.13.195	173.59.230.213	TCP	66	10255 → 443 [ACK] Seq=314 Ack=3394 Win=35840 Len=0
21	2022-09-07 08:20:26.667889	4.71.13.195	173.59.230.213	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Unknown)
22	2022-09-07 08:20:26.667900	4.71.13.195	173.59.230.213	TCP	66	10255 → 443 [RST, ACK] Seq=321 Ack=3394 Win=35840 Len=0

Plot 64. WireShark Screenshot - Failed Handshake - 61 Fatal Alert – Corrupted Certificate (WINNF.FT.C.SCS.5) – NR

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station		Page 70 of 86

A24 [WINNF.PT.C.HBT.1] UUT RF Transmit Power Measurement

	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness • UUT has registered with the SAS, with CBSID ID = C • UUT has a single valid grant G with parameters {lowFrequency = FL, highFrequency = FH, maxEirp = Pi}, with grant in AUTHORIZED state, and grantExpireTime set to a value far past the duration of this test case <p><i>Note: in order for the UUT to request a grant with the parameters {lowFrequency, highFrequency, maxEirp}, the SAS Test Harness may need to provide appropriate guidance in the availableChannel object of the spectrumInquiry response message, and the operationParam object of the grant response message. Alternately, the UUT vendor may provide the ability to set those parameters on the UUT so that the UUT will request a grant with those parameters.</i></p>	--	--
2	<p>UUT and SAS Test Harness perform a series of Heartbeat Request/Response cycles, which continues until the other test steps are complete. Messaging for each cycle is as follows:</p> <ul style="list-style-type: none"> • UUT sends Heartbeat Request, including: <ul style="list-style-type: none"> o cbsdId = C o grantId = G • SAS Test Harness responds with Heartbeat Response, including: <ul style="list-style-type: none"> o cbsdId = C o grantId = G o transmitExpireTime = current UTC time + 200 seconds o responseCode = 0 	--	--
3	<p>Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfil the requirements of the power measurement method.</p> <p><i>Note: it may be required for the vendor to provide a method or configuration to bring the UUT to a mode which is required by the measurement methodology. Any such mode is vendor-specific and depends upon UUT behavior and the measurement methodology.</i></p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 71 of 86



RF Power Measurements:

Testing is performed per KDB 971168 D01 and KDB 662911 D01 and across the transmit dynamic range of 37dBm/MHz to 23dBm/MHz for 20MHz Bandwidth. Per manufacturer, Tx0, Tx1, Tx2, and Tx3 produce correlated signals per KDB 662911 D01, with Tx0 and Tx2 cross-polarized with Tx1 and Tx3. The PSD of each transmitter was measured and summed in linear terms and then the antenna gain was added to yield the maxEIRP.

The summed maxEIRP is calculated per the following formula:

$$\text{Directional Gain (AntGain(Tx1+Tx3) and AntGain(Tx2+Tx4))} = G + 10\log(\text{NAnt}) = 17.8 + 10\log(2) = 20.8\text{dBi}$$

$$\text{Summed maxEIRP} = \text{ConductedPower(Tx1+Tx3)} + \text{AntGain(Tx1+Tx3)} + \text{ConductedPower(Tx2+Tx4)} + \text{AntGain(Tx2+Tx4)}$$

Frequency [MHz]	Bandwidth [Mhz]	SAS Granted max EIRP [dBm / MHz]	Tx1 Conducted PSD [dBm / MHz]	Tx2 Conducted PSD [dBm / MHz]	Tx3 Conducted PSD [dBm / MHz]	Tx4 Conducted PSD [dBm / MHz]	Directional Antenna Gain [dBi]	EIRP Tx1 + Tx3 [dBm / MHz]	EIRP Tx2 + Tx4 [dBm / MHz]	Summed max EIRP [dBm/MHz]	Margin [dB]
3630	20	37	9.75	9.73	10.09	10.28	20.70	33.63	33.72	36.69	-0.31
3630	20	36	8.83	8.80	9.05	9.16	20.70	32.65	32.69	35.68	-0.32
3630	20	35	7.83	7.80	8.04	8.11	20.70	31.65	31.67	34.67	-0.33

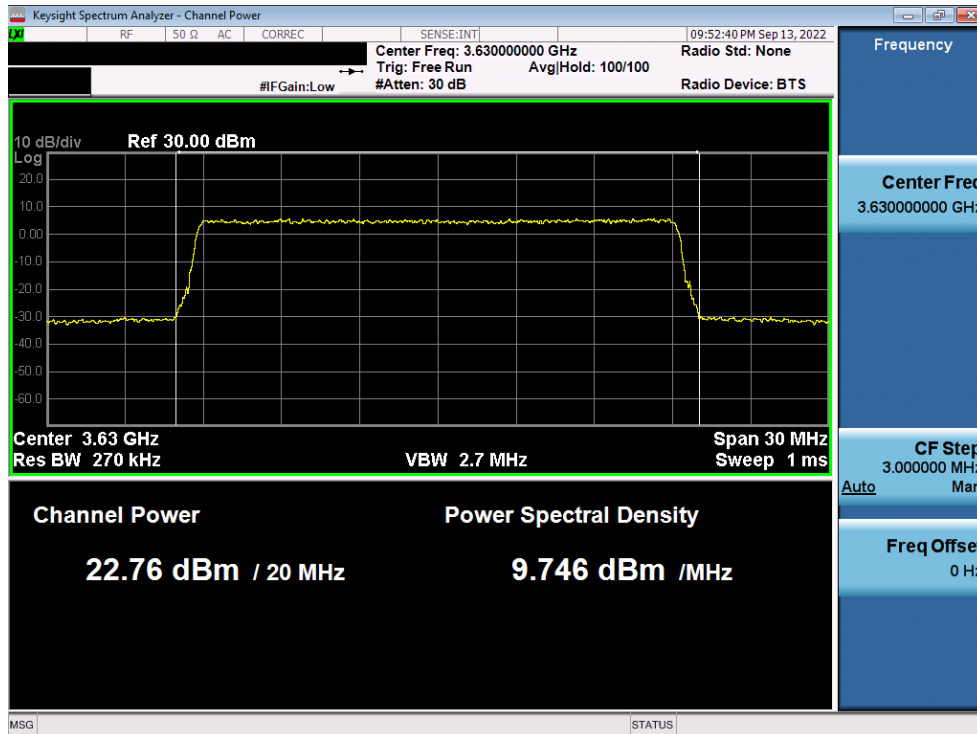
Table 7-1 RF Output Power Measurements (WINNF.PT.C.HBT.1) – NR

Frequency [MHz]	Bandwidth [Mhz]	SAS Granted max EIRP [dBm / MHz]	Tx1 Conducted PSD [dBm]	Tx2 Conducted PSD [dBm]	Tx3 Conducted PSD [dBm]	Tx4 Conducted PSD [dBm]	Directional Antenna Gain [dBi]	EIRP Tx1 + Tx3 [dBm / MHz]	EIRP Tx2 + Tx4 [dBm / MHz]	Summed max EIRP [dBm/MHz]	Margin [dB]
3630	20	37	9.77	9.81	9.76	10.12	20.70	33.48	33.68	36.59	-0.41
3630	20	36	8.63	8.78	9.04	8.94	20.70	32.55	32.57	35.57	-0.43
3630	20	35	7.7	7.90	7.97	8.08	20.70	31.55	31.70	34.64	-0.36

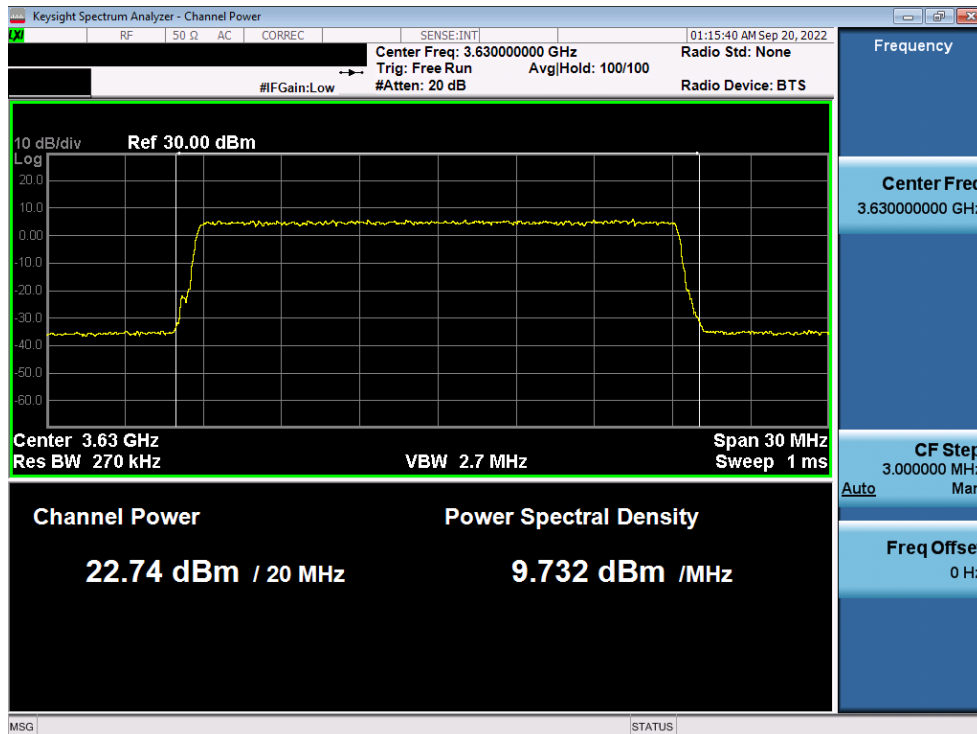
Table 7-2 RF Output Power Measurements (WINNF.PT.C.HBT.1) – LTE

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station		Page 72 of 86

Test Plots - NR:

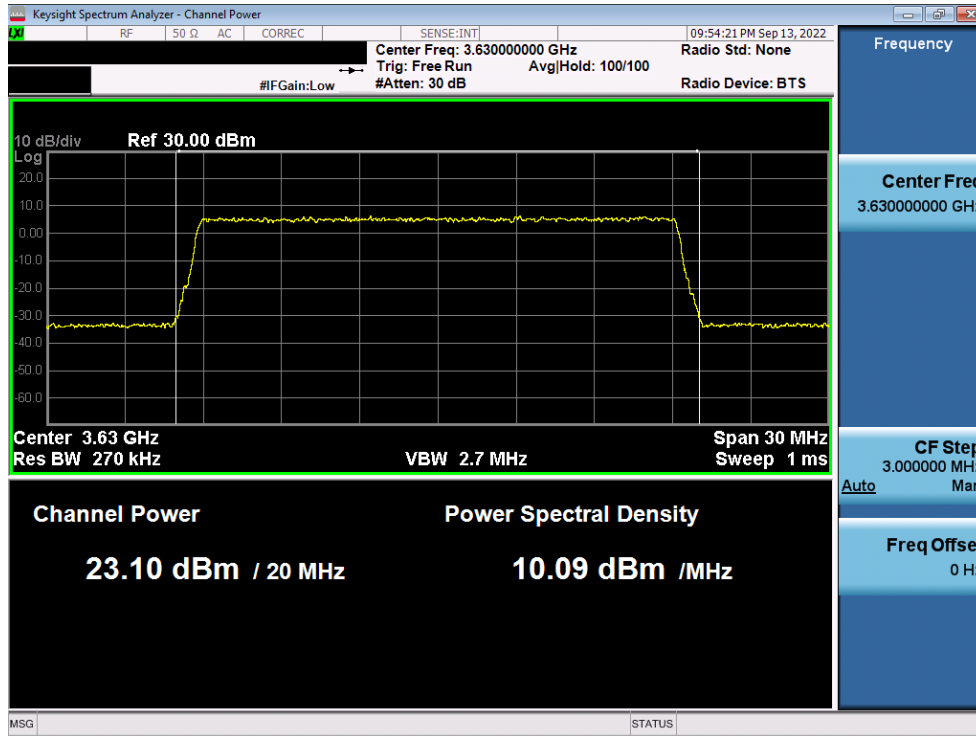


Plot 65. Conducted PSD, Mid-Channel SAS Granted maxEIRP 37 – ANT1

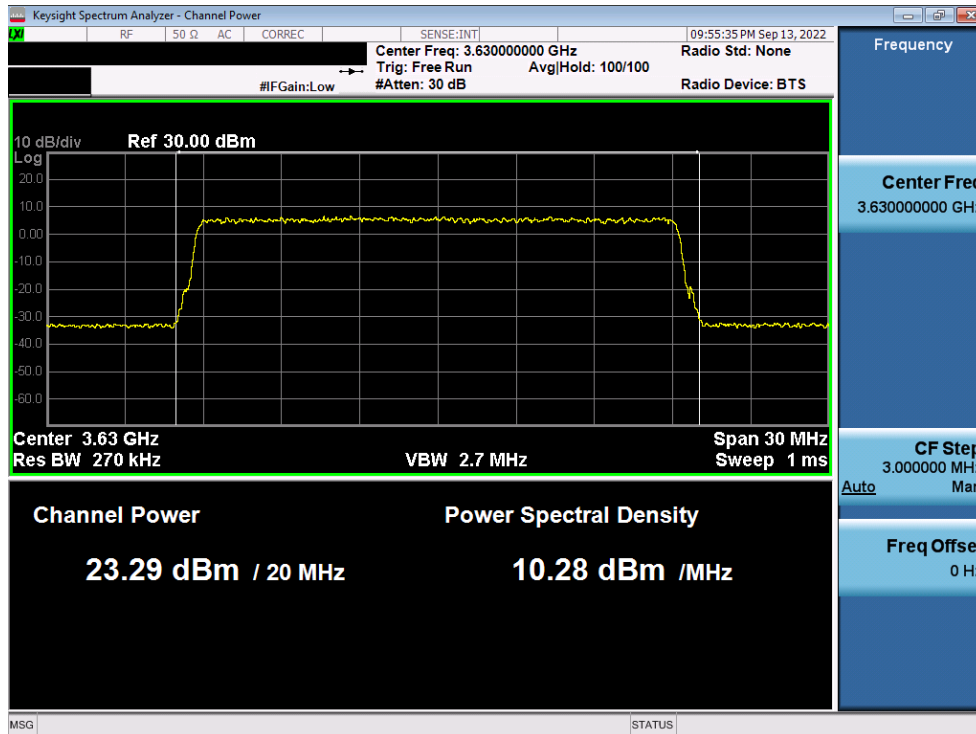


Plot 66. Conducted PSD, Mid-Channel SAS Granted maxEIRP 37 – ANT2

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 73 of 86

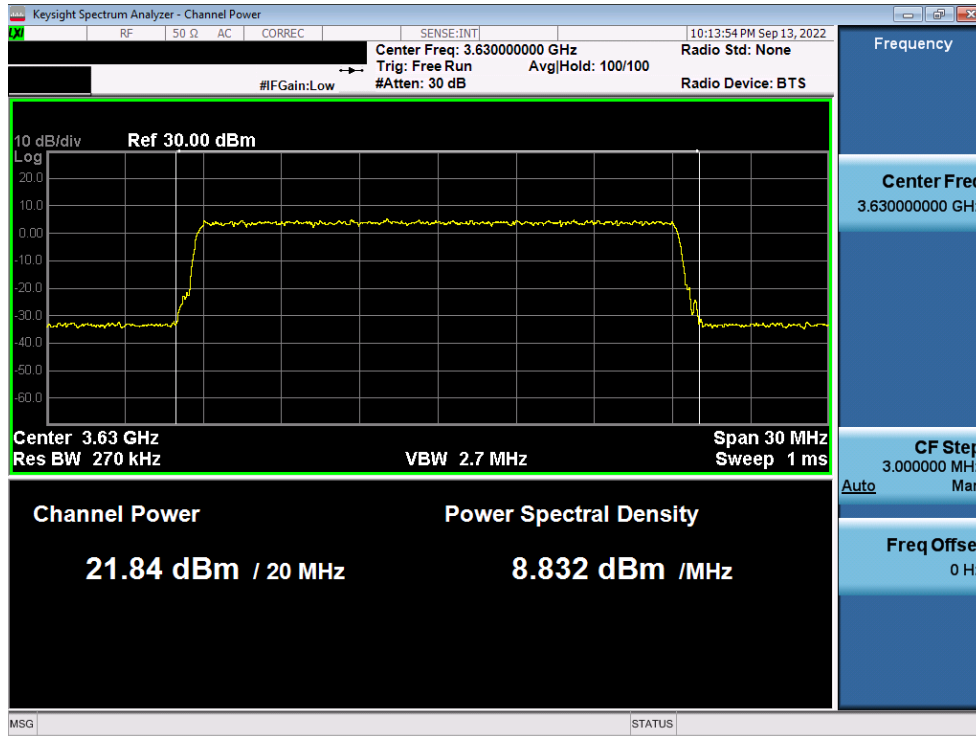


Plot 67. Conducted PSD, Mid-Channel SAS Granted maxEIRP 37 – ANT3

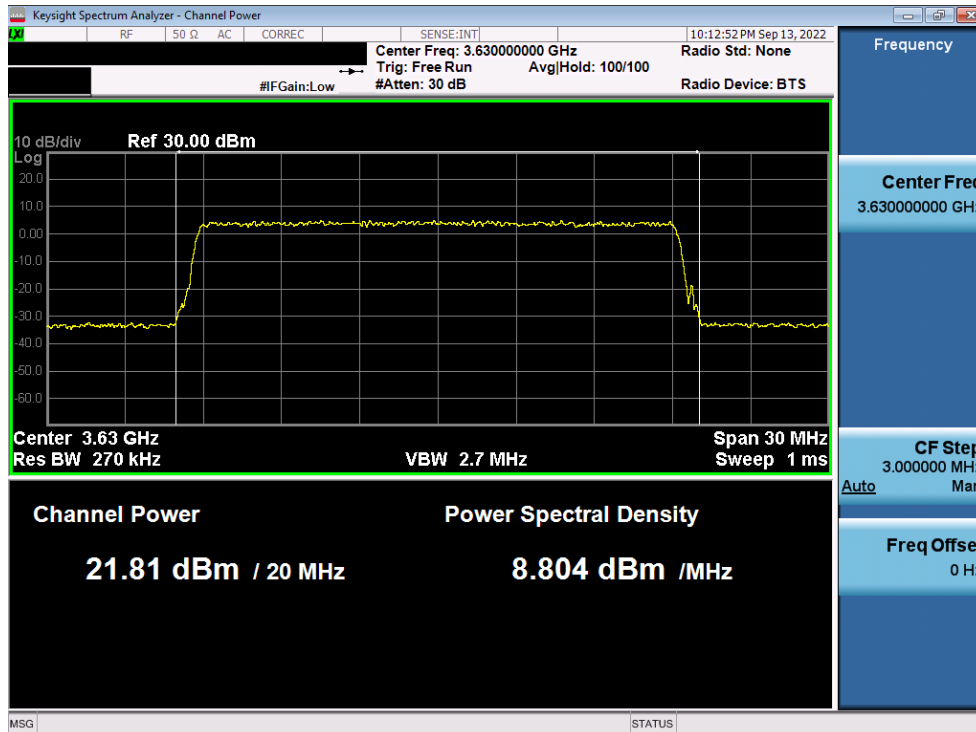


Plot 68. Conducted PSD, Mid-Channel SAS Granted maxEIRP 37 – ANT4

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 74 of 86

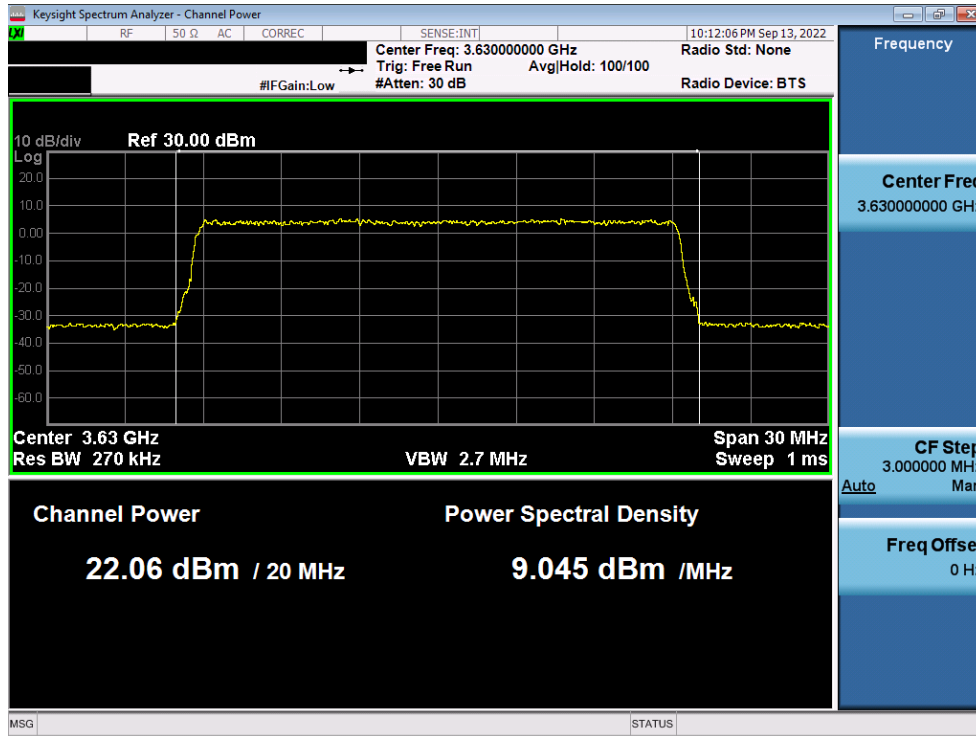


Plot 69. Conducted PSD, Mid-Channel SAS Granted maxEIRP 36 – ANT1

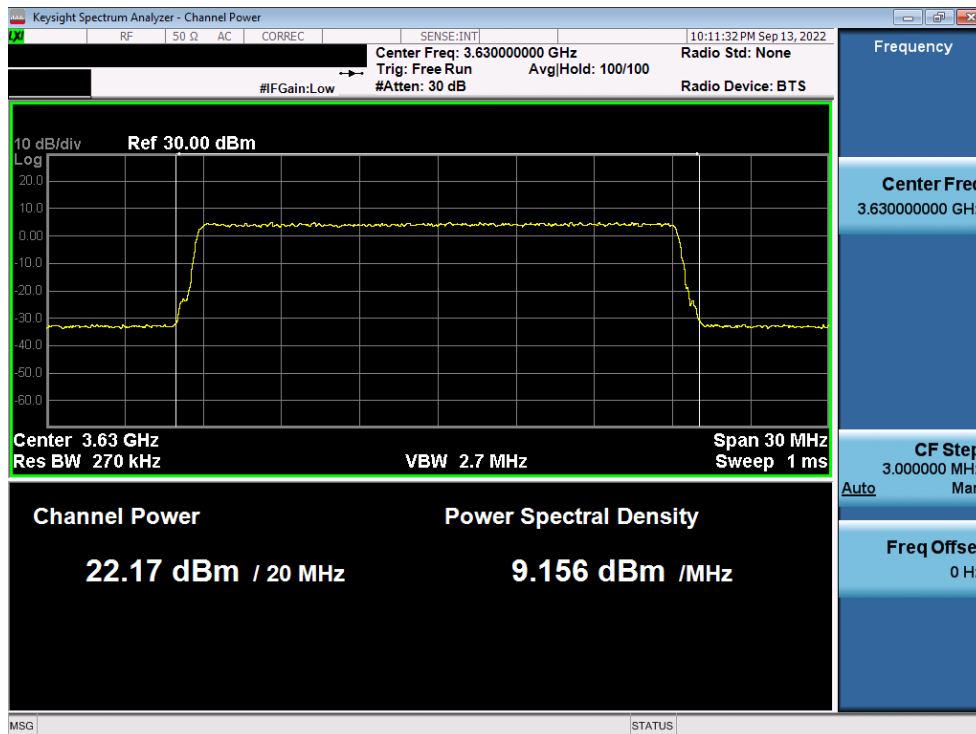


Plot 70. Conducted PSD, Mid-Channel SAS Granted maxEIRP 36 – ANT2

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 75 of 86

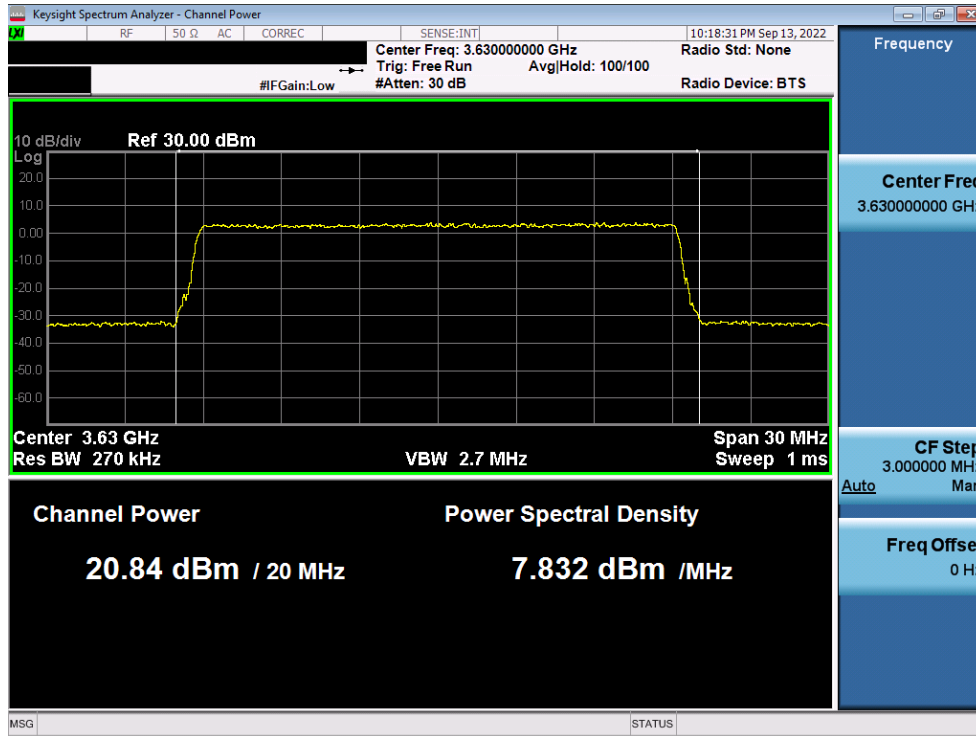


Plot 71. Conducted PSD, Mid-Channel SAS Granted maxEIRP 36 – ANT3

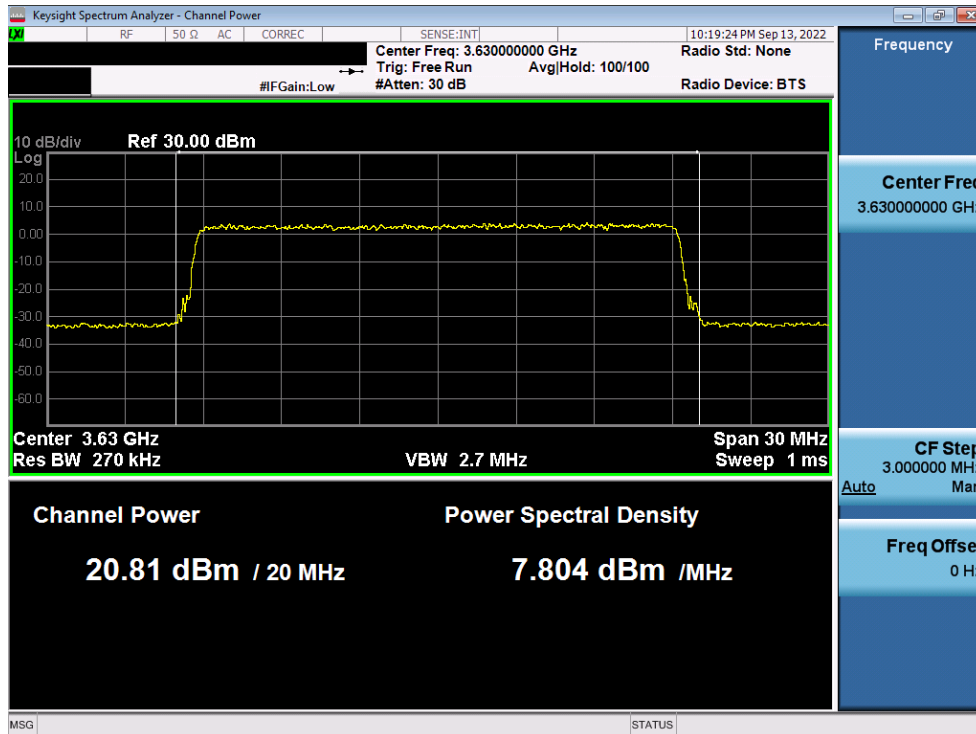


Plot 72. Conducted PSD, Mid-Channel SAS Granted maxEIRP 36 – ANT4

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 76 of 86

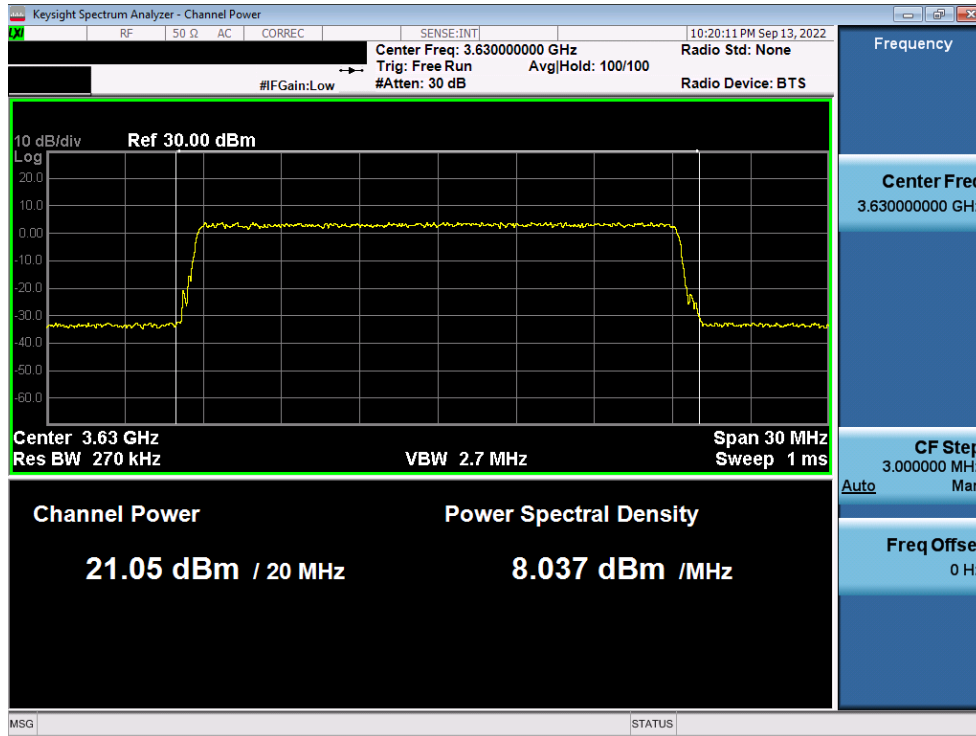


Plot 73. Conducted PSD, Mid-Channel SAS Granted maxEIRP 35 – ANT1

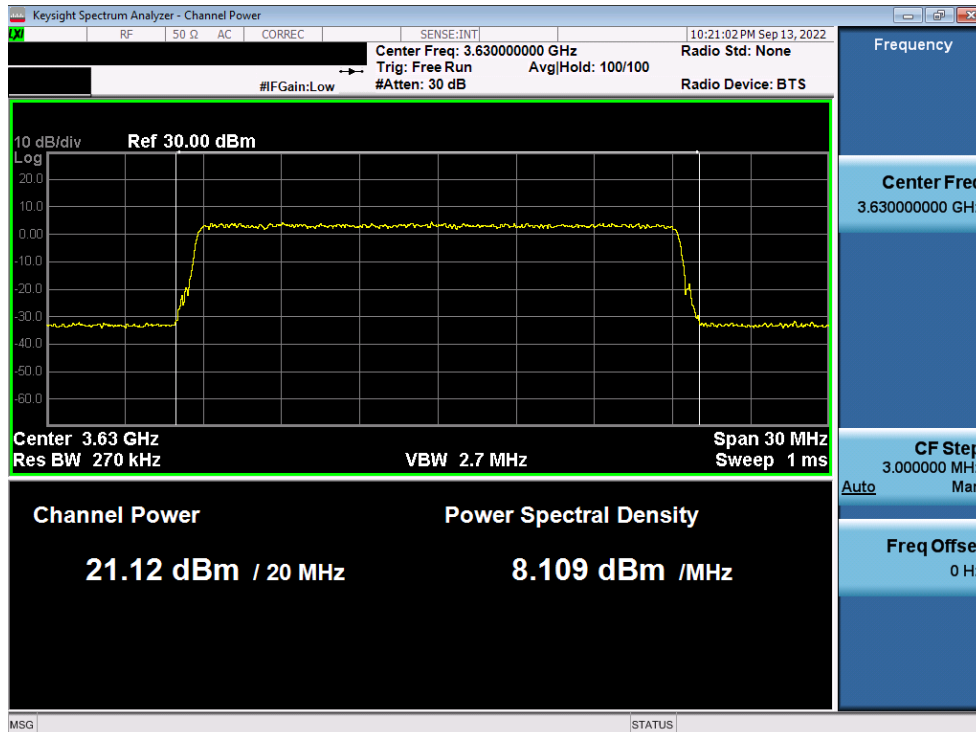


Plot 74. Conducted PSD, Mid-Channel SAS Granted maxEIRP 35 – ANT2

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 77 of 86



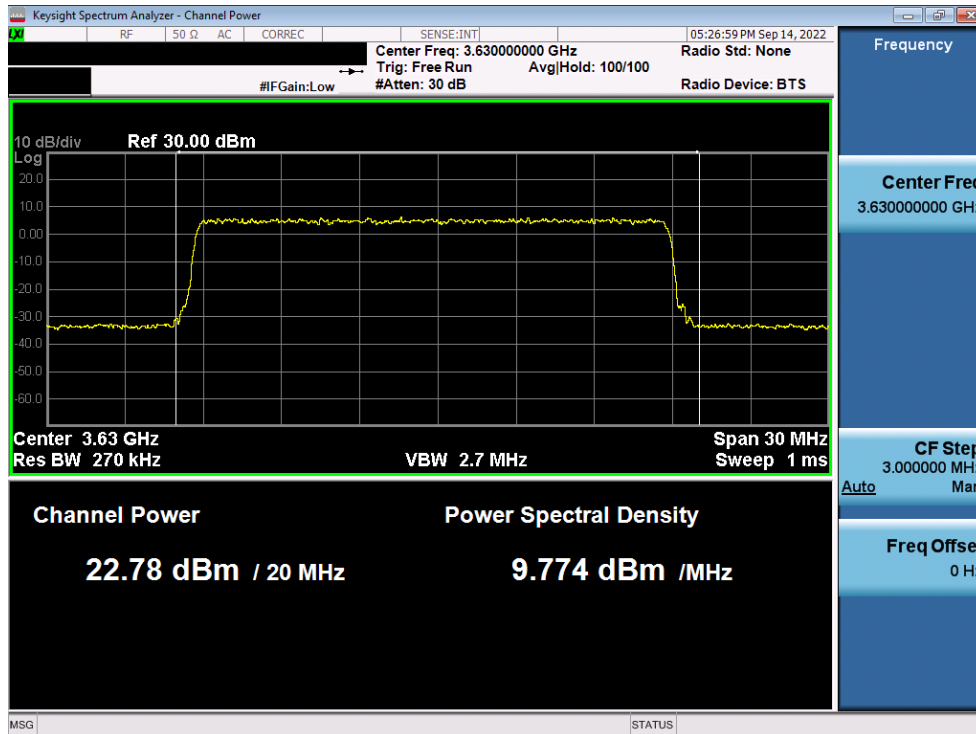
Plot 75. Conducted PSD, Mid-Channel SAS Granted maxEIRP 35 – ANT3



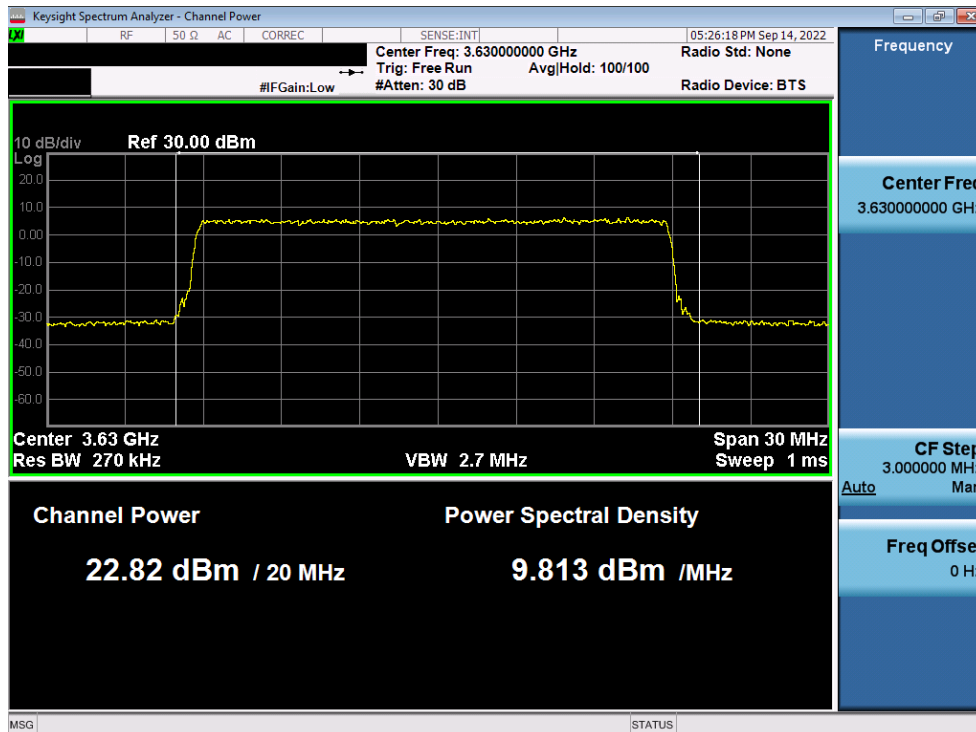
Plot 76. Conducted PSD, Mid-Channel SAS Granted maxEIRP 35 – ANT4

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 78 of 86

Test Plots - LTE:

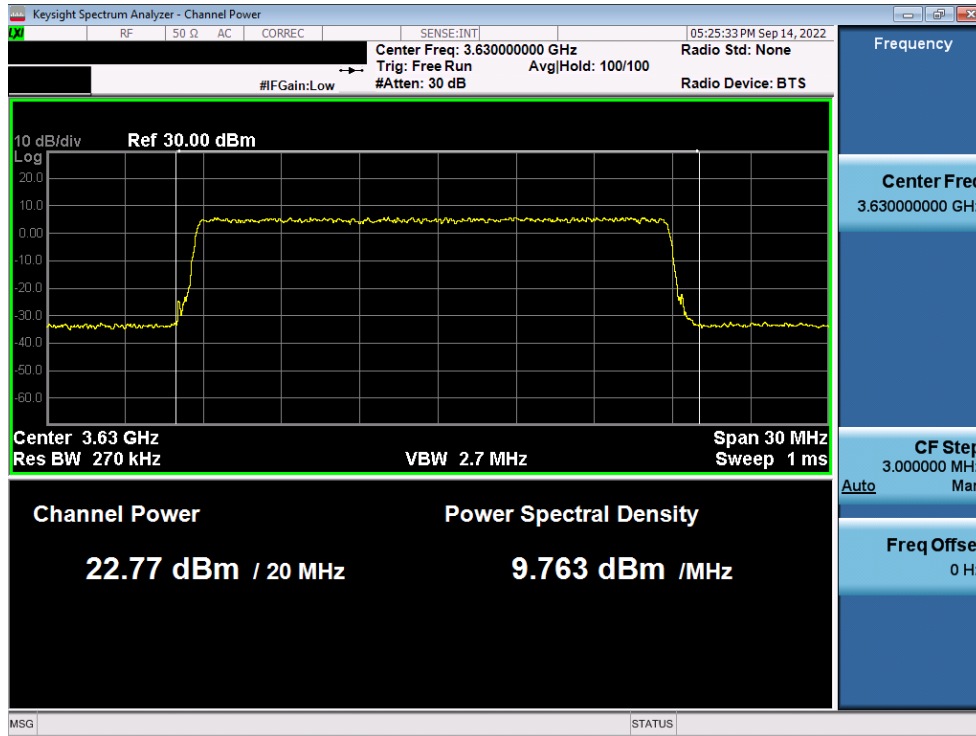


Plot 77. Conducted PSD, Mid-Channel SAS Granted maxEIRP 37 – ANT1

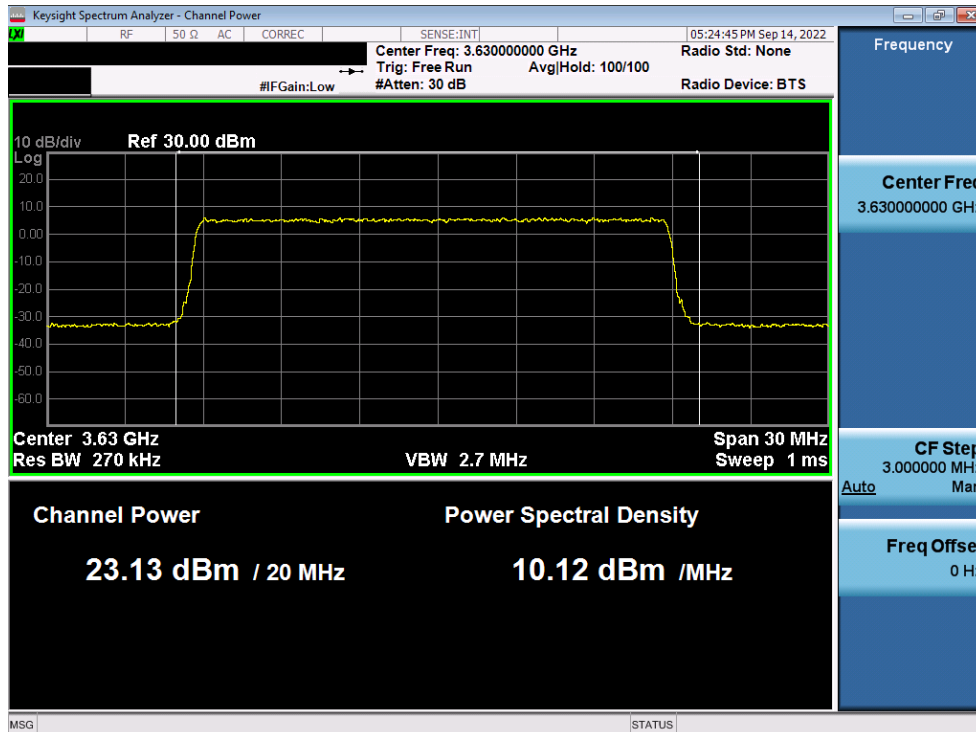


Plot 78. Conducted PSD, Mid-Channel SAS Granted maxEIRP 37 – ANT2

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 79 of 86

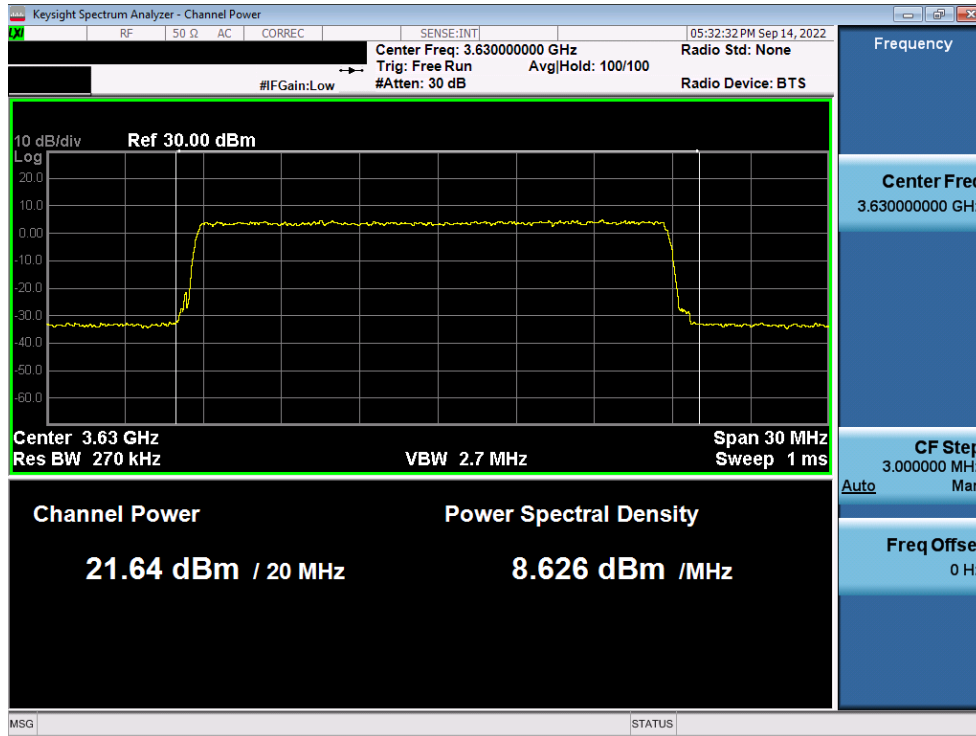


Plot 79. Conducted PSD, Mid-Channel SAS Granted maxEIRP 37 – ANT3

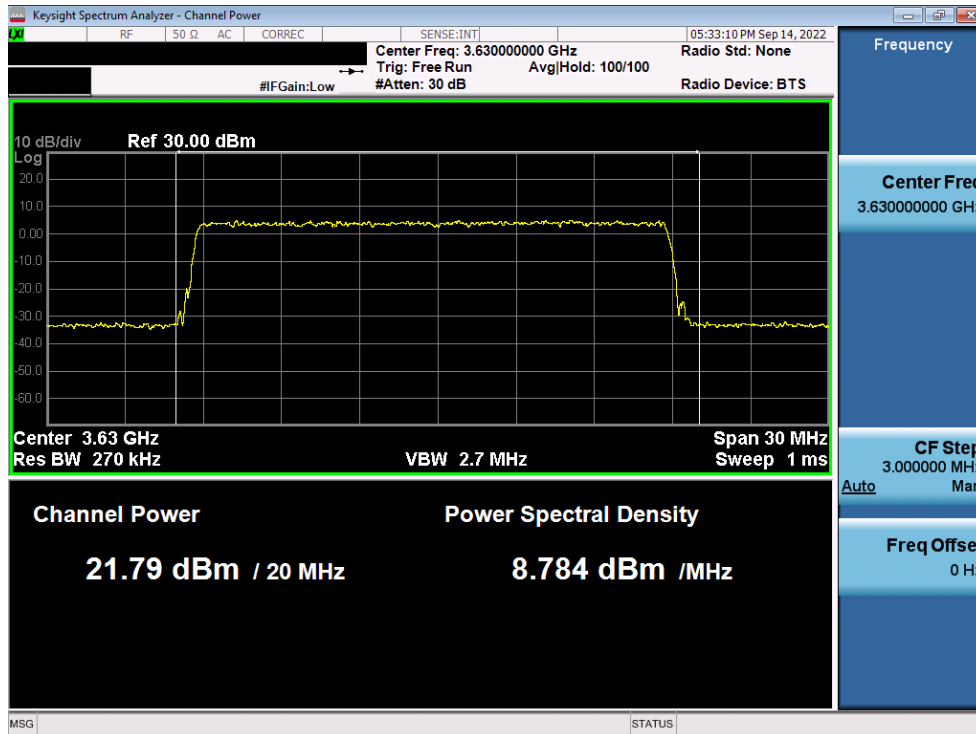


Plot 80. Conducted PSD, Mid-Channel SAS Granted maxEIRP 37 – ANT4

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 80 of 86

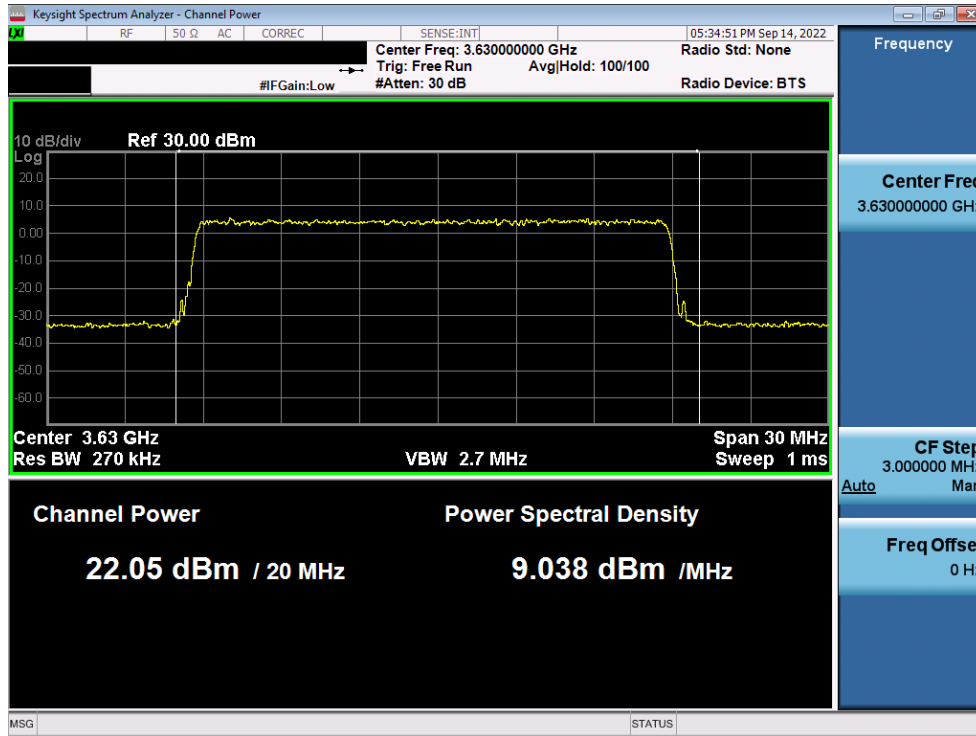


Plot 81. Conducted PSD, Mid-Channel SAS Granted maxEIRP 36 – ANT1

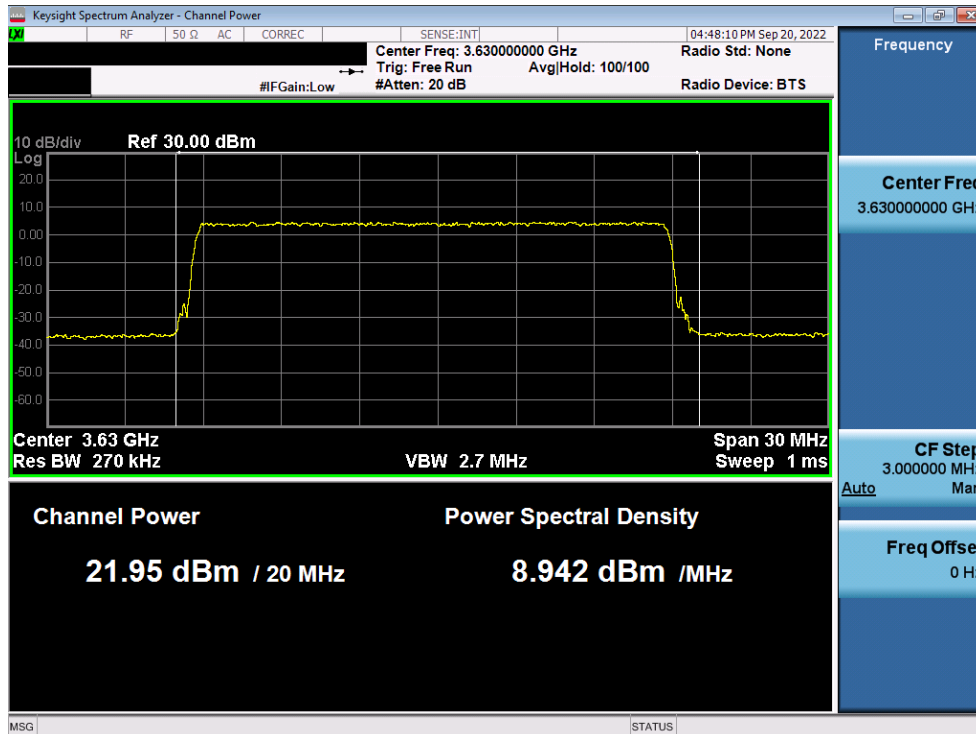


Plot 82. Conducted PSD, Mid-Channel SAS Granted maxEIRP 36 – ANT2


FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 81 of 86

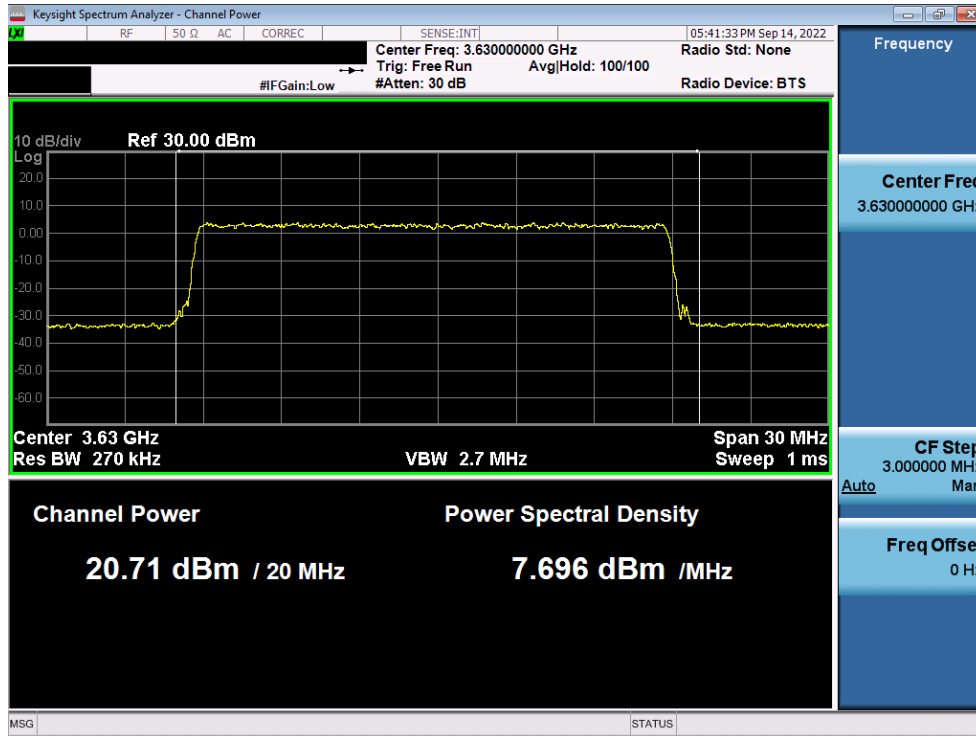


Plot 83. Conducted PSD, Mid-Channel SAS Granted maxEIRP 36 – ANT3

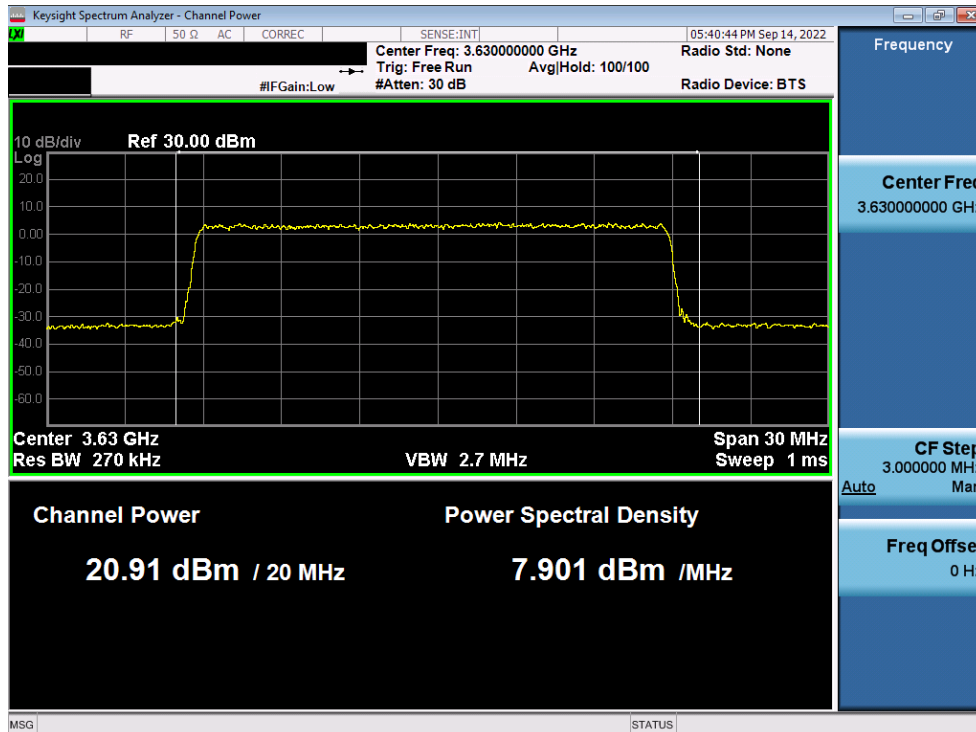


Plot 84. Conducted PSD, Mid-Channel SAS Granted maxEIRP 36 – ANT4

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 82 of 86

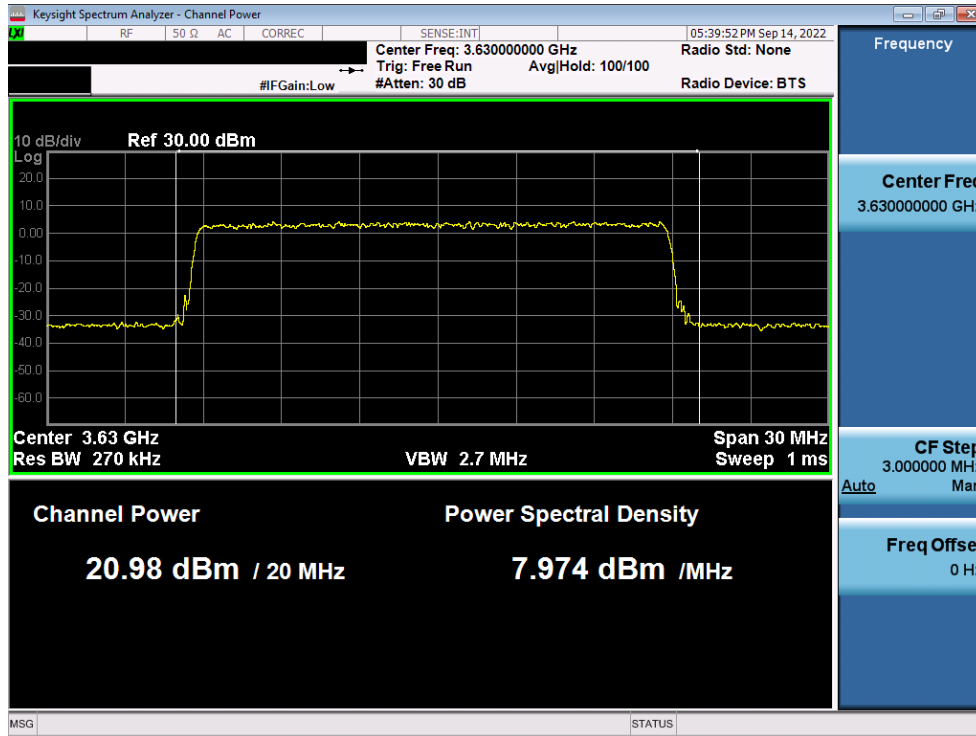


Plot 85. Conducted PSD, Mid-Channel SAS Granted maxEIRP 35 – ANT1

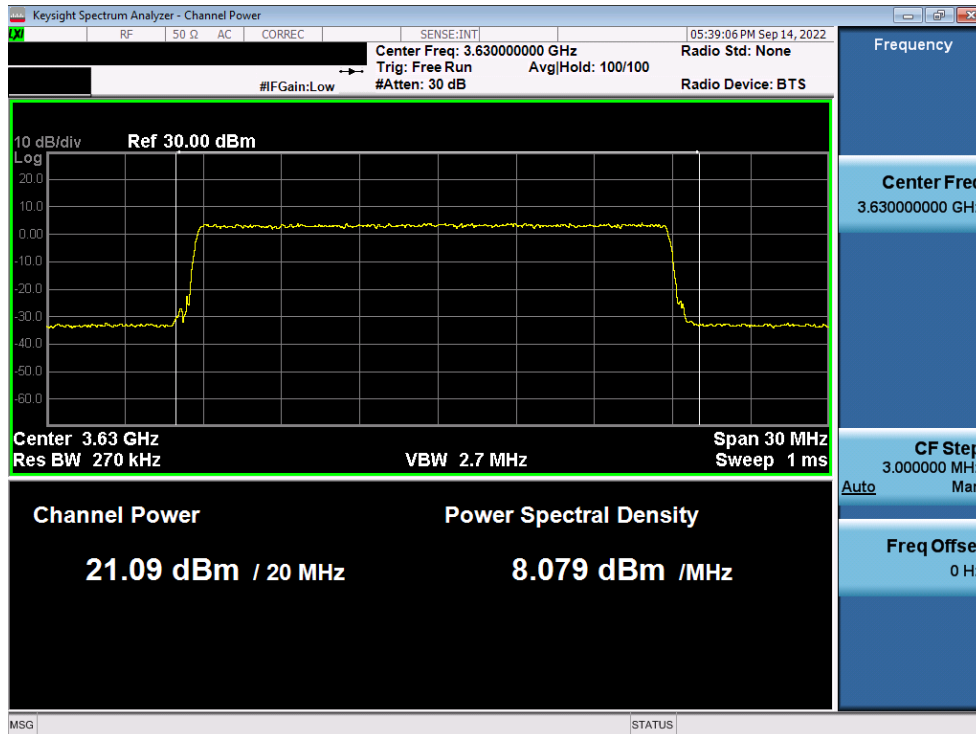


Plot 86. Conducted PSD, Mid-Channel SAS Granted maxEIRP 35 – ANT2

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 83 of 86



Plot 87. Conducted PSD, Mid-Channel SAS Granted maxEIRP 35 – ANT3


















































Plot 88. Conducted PSD, Mid-Channel SAS Granted maxEIRP 35 – ANT4

FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 84 of 86

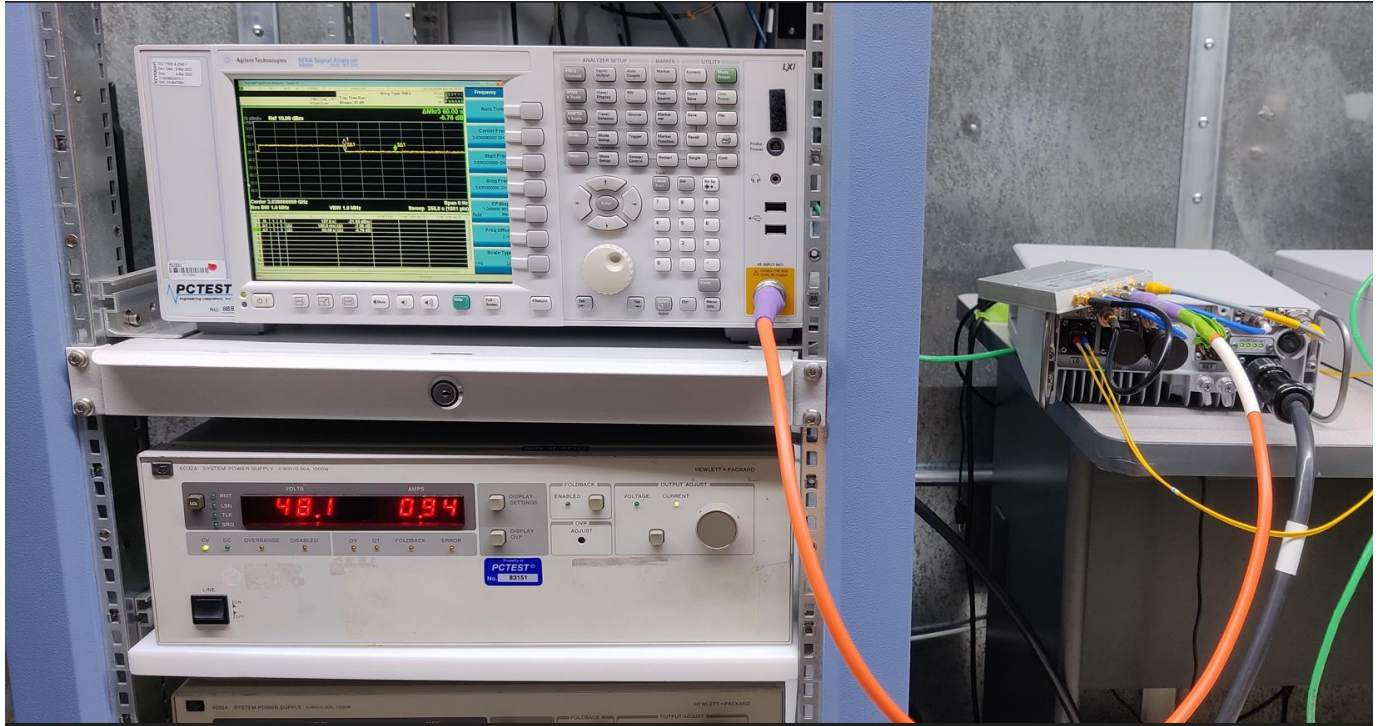
APPENDIX B – TEST LOGS


Logs are available upon request

-  WINNF.FT.C.DRG.1_2022-09-07T02.44.27Z
-  WINNF.FT.C.GRA.1_2022-09-07T00.34.16Z
-  WINNF.FT.C.GRA.2_2022-09-07T00.38.54Z
-  WINNF.FT.C.HBT.1_2022-09-07T01.11.46Z
-  WINNF.FT.C.HBT.3_2022-09-07T01.23.44Z
-  WINNF.FT.C.HBT.4_2022-09-07T01.29.13Z
-  WINNF.FT.C.HBT.5_2022-09-07T01.37.26Z
-  WINNF.FT.C.HBT.6_2022-09-07T01.56.38Z
-  WINNF.FT.C.HBT.9_2022-09-07T02.17.51Z
-  WINNF.FT.C.HBT.10_2022-09-07T02.22.34Z
-  WINNF.FT.C.MES.1_2022-09-07T02.30.44Z
-  WINNF.FT.C.REG.1_2022-09-07T00.05.33Z
-  WINNF.FT.C.REG.8_2022-09-07T00.21.58Z
-  WINNF.FT.C.REG.10_2022-09-07T00.22.45Z
-  WINNF.FT.C.REG.12_2022-09-07T00.23.20Z
-  WINNF.FT.C.REG.14_2022-09-07T00.24.45Z
-  WINNF.FT.C.REG.16_2022-09-07T00.25.46Z
-  WINNF.FT.C.REG.18_2022-09-07T00.26.33Z
-  WINNF.FT.C.RLQ.1_2022-09-07T02.32.58Z
-  PowerMeasTest_2022-09-14T01.27.14Z
-  PowerMeasTest_2022-09-14T02.02.25Z
-  PowerMeasTest_2022-09-14T02.12.39Z
-  WINNF.FT.C.HBT.7_2022-09-14T01.14.20Z
-  PowerMeasTest_2022-09-14T21.12.45Z
-  PowerMeasTest_2022-09-14T21.26.12Z
-  PowerMeasTest_2022-09-14T21.33.59Z
-  WINNF.FT.C.DRG.1_2022-09-09T00.00.34Z
-  WINNF.FT.C.GRA.1_2022-09-08T22.49.44Z
-  WINNF.FT.C.GRA.2_2022-09-08T22.53.46Z
-  WINNF.FT.C.HBT.1_2022-09-08T22.56.06Z
-  WINNF.FT.C.HBT.3_2022-09-08T23.10.57Z
-  WINNF.FT.C.HBT.4_2022-09-08T23.20.59Z
-  WINNF.FT.C.HBT.5_2022-09-08T23.31.22Z
-  WINNF.FT.C.HBT.6_2022-09-08T23.34.29Z
-  WINNF.FT.C.HBT.7_2022-09-14T21.40.59Z
-  WINNF.FT.C.HBT.9_2022-09-08T23.40.53Z
-  WINNF.FT.C.HBT.10_2022-09-08T23.46.29Z
-  WINNF.FT.C.MES.1_2022-09-09T00.05.19Z
-  WINNF.FT.C.REG.1_2022-09-08T22.22.43Z
-  WINNF.FT.C.REG.8_2022-09-08T22.34.45Z
-  WINNF.FT.C.REG.10_2022-09-08T22.35.44Z
-  WINNF.FT.C.REG.12_2022-09-08T22.36.15Z
-  WINNF.FT.C.REG.14_2022-09-08T22.37.06Z
-  WINNF.FT.C.REG.16_2022-09-08T22.37.55Z
-  WINNF.FT.C.REG.18_2022-09-08T22.38.28Z
-  WINNF.FT.C.RLQ.1_2022-09-08T23.55.15Z

FCC ID: A3LRT4423-48B	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022	EUT Type: LTE/NR Base Station	Page 85 of 86

APPENDIX C – TEST SETUP



FCC ID: A3LRT4423-48B		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2208170090-02.A3L	Test Dates: 09/06/2022 – 09/20/2022		EUT Type: LTE/NR Base Station