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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:
2/28/2022 – 3/2/2022
Test Report Issue Date:
3/7/2022
Test Site/Location:
PCTest Engineering Lab. Columbia, MD, USA
Test Report Serial No.:
1M2201310005-01.A3L

FCC ID:	**A3LRT4401-48A**
APPLICANT:	**Samsung Electronics Co., Ltd.**

Application Type:	Class II Permissive Change
Model:	RT4401-48A
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 D01 v03, WINNF-TS-0122-V1.0.2, CBRSA-TS-9001 V.1.0.0, KDB 662911 D01 v02r01
Class II Permissive Change:	Please see change document
Original Grant Date:	4/18/2019

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.

Randy Ortanez
President

Authorized Test Lab

ACCREDITED
TESTING CERT#2041.01

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1.0 INTRODUCTION

1.1 Scope

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

1.2 PCTest Test Location

These measurement tests were conducted at the PCTest Engineerin Laboratory, LLC facility located at 7185 Oakland Mills Road, Columbia, MD 21046.

1.3 Test Facility / Accreditations

Measurements were performed at PCTest Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTest is a CBRS Alliance (OnGo) Approved Test Lab
- PCTest is a WInnForum Approved Test Lab
- PCTest 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.
- PCTest 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.
- PCTest 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).
- PCTest facility is a registered (2451B) test laboratory with the site description on file with ISED.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Electronics Co., Ltd., NR Base Station FCC ID: A3LRT4401-48A.** The test data contained in this report pertains only to CBSD-SAS interoperability. The EUT is a CBSD.

Test Device Serial Number(s): S527A86741
Test Device Hardware Version: PCS01
Test Device Software Version: 21D
CBSD Category: B

2.2 Device Capabilities

This device contains the following capabilities:

LTE Band 48, 5G NR n48

This device supports the following conditional features:

	Conditional Test Case Definitions	Supported
C1	Mandatory for UUT which supports multi-step registration message	☒
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.	☐
C3	Mandatory for UUT which supports single-step registration containing CPI-signed data in the registration message.	☐
C4	Mandatory for UUT which supports RECEIVED_POWER_WITHOUT_GRANT measurement report type.	☒
C5	Mandatory for UUT which supports RECEIVED_POWER_WITH_GRANT measurement report type.	☐
C6	Mandatory for UUT which supports parameter change being made at the UUT and prior to sending a deregistration	☐

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.

3.0 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

4.0 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
Keysight	N9030A	PXA Signal Analyzer	2/14/2022	Annual	2/14/2023	MY54490576
Dell	Latitude 5580	Test Harness Laptop	N/A	N/A	N/A	N/A
Agilent HP	6032A	AutoRanging System Power Supply	N/A	N/A	N/A	N/A
Ubiquiti	EdgeRouterX	Ethernet Router	N/A	N/A	N/A	N/A
Aruba	2930F JL258A	Network switch	N/A	N/A	N/A	N/A

Table 4-1 Annual Test Equipment Calibration Schedule

5.0 ENVIRONMENTAL CONDITIONS

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

6.0 TEST SUMMARY

6.1 Summary

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LRT4401-48A

FCC Part Section(s)	KDB940660 D01 Section 3.3 a)	Test Case Description	WInnForum Test Case	Test Result
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

Table 6-1. Summary of Test Results

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
- Since this device is adding a new air interface (NR) to an existing filing, then, per Section 5.3.4 of WINNF-TS-0122, only the WINNF.PT.C.HBT.1 test case is required.
- Please see Appendices for test data.

7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Electronics Co., Ltd., LTE/NR Base Station FCC ID: A3LRT4401-48A** has been tested to show compliance with Part 96 and KDB 940660 D01 v03 for NR operation.

WINNF.PT.C.HBT.1 - 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.

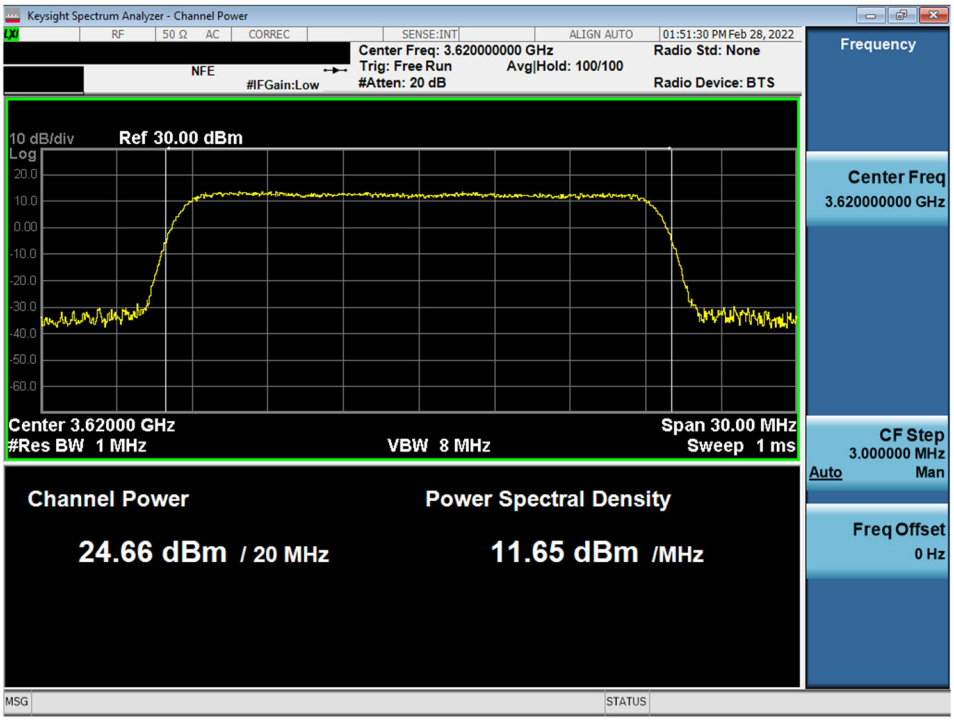
The summed maxEIRP is calculated per the following formula:

Summed maxEIRP = ConductedPower(Tx0+Tx2) + AntGain(Tx0+Tx2) +
ConductedPower(Tx1+Tx3) + AntGain(Tx1+Tx3)

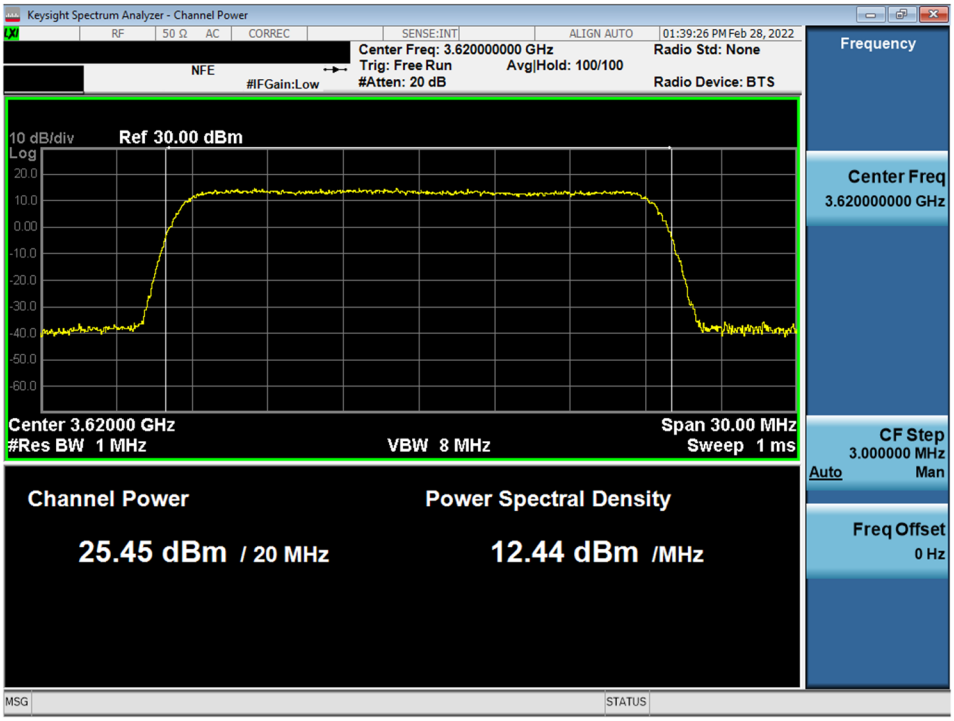
Frequency [MHz]	Bandwidth [Mhz]	SAS Granted max EIRP [dbm/MHz]	Tx0 Conducted PSD	Tx1 Conducted PSD	Tx2 Conducted PSD	Tx3 Conducted PSD	Directional Antenna Gain [dBi]	EIRP Tx0 + Tx2 [dBm/Mhz]	EIRP Tx1 + Tx3 [dBm/Mhz]	Summed max EIRP [dBm/MHz	Margin [dB]
3620	20	37	11.65	12.44	12.74	11.77	11.50	26.74	26.63	29.69	-7.31
3620	20	27	3.82	4.86	4.03	3.98	11.50	18.44	18.95	21.71	-5.29
3620	20	23	0.19	1.09	0.53	0.78	11.50	14.87	15.45	18.18	-4.82

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

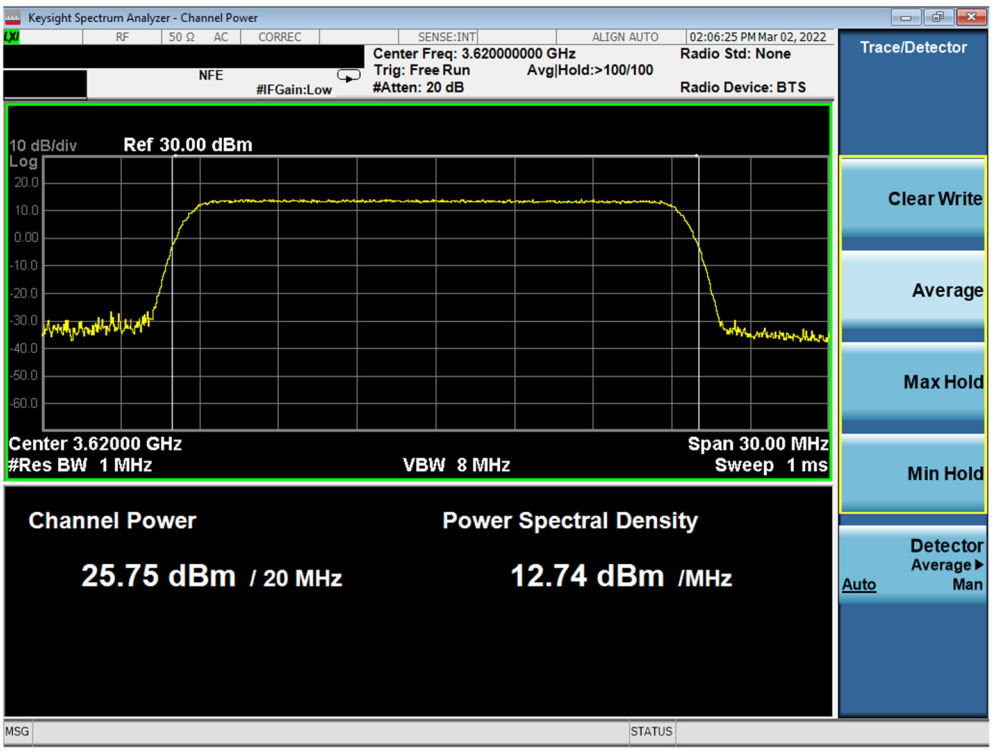
Test Plots



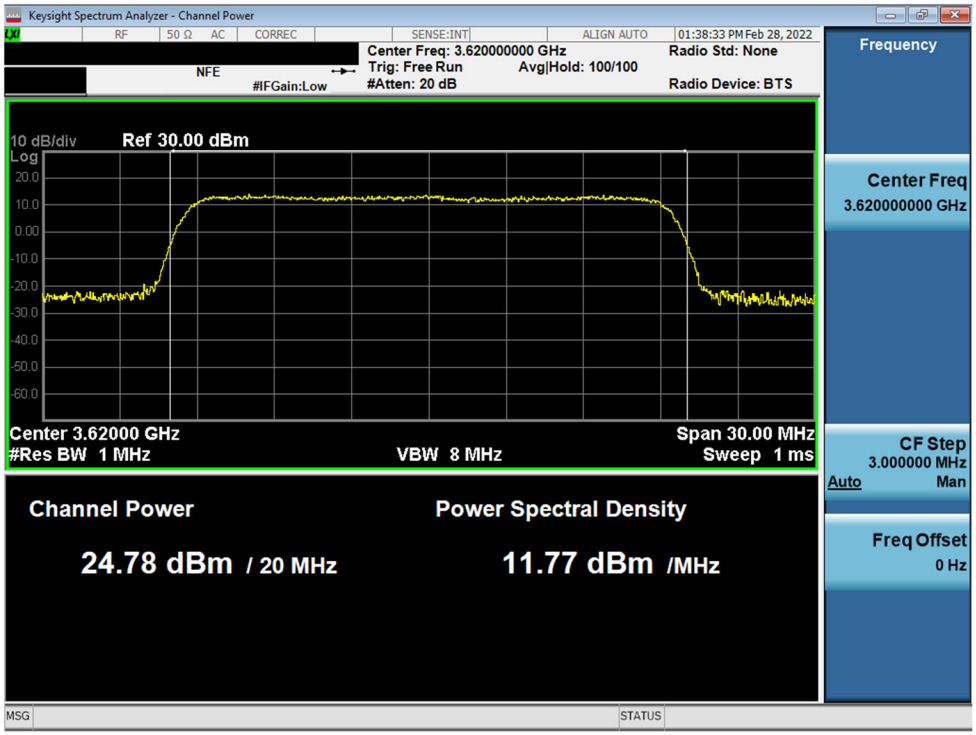
Plot 1. Conducted PSD, Mid-Channel SAS Granted maxEIRP 37 – ANT0



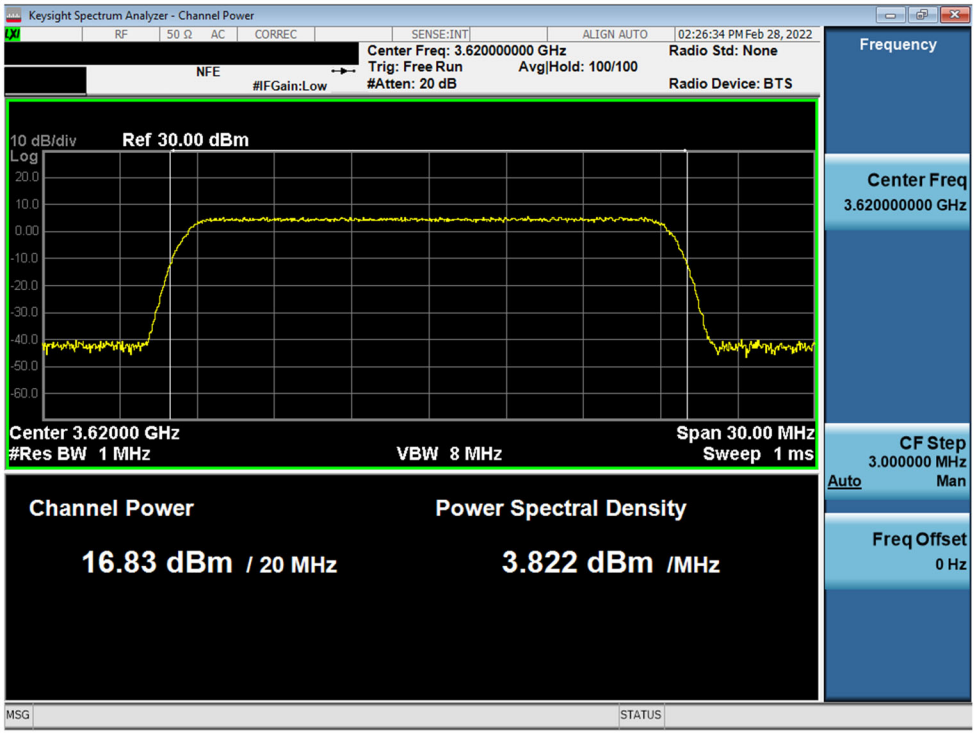
Plot 2. Conducted PSD, Mid-Channel SAS Granted maxEIRP 37 – ANT1



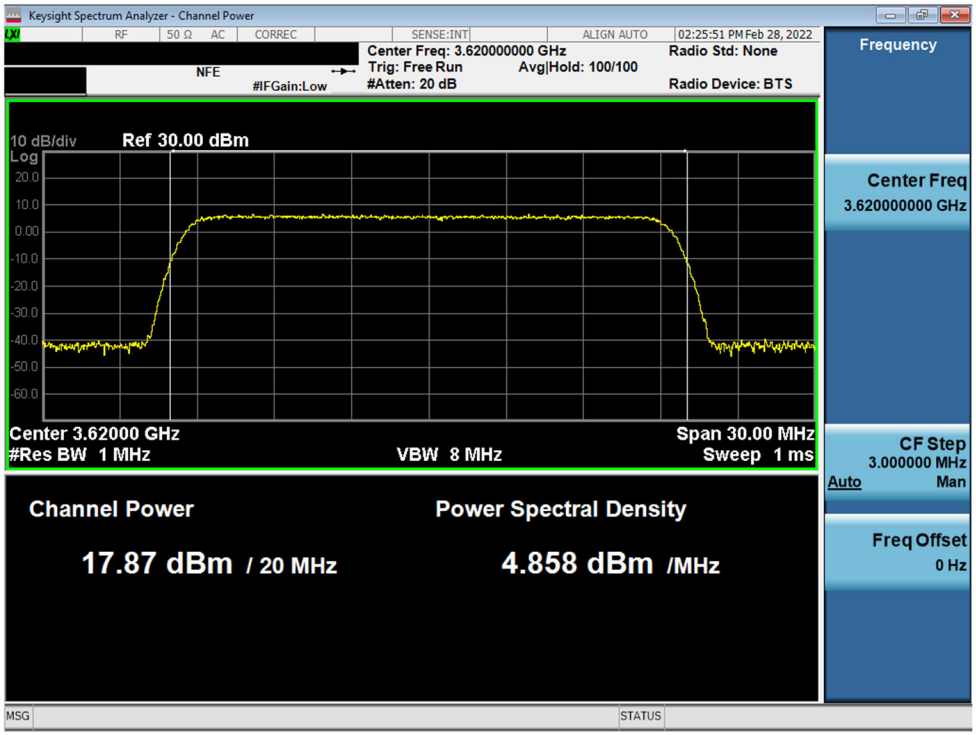
Plot 3. Conducted PSD, Mid-Channel SAS Granted maxEIRP 37 – ANT2



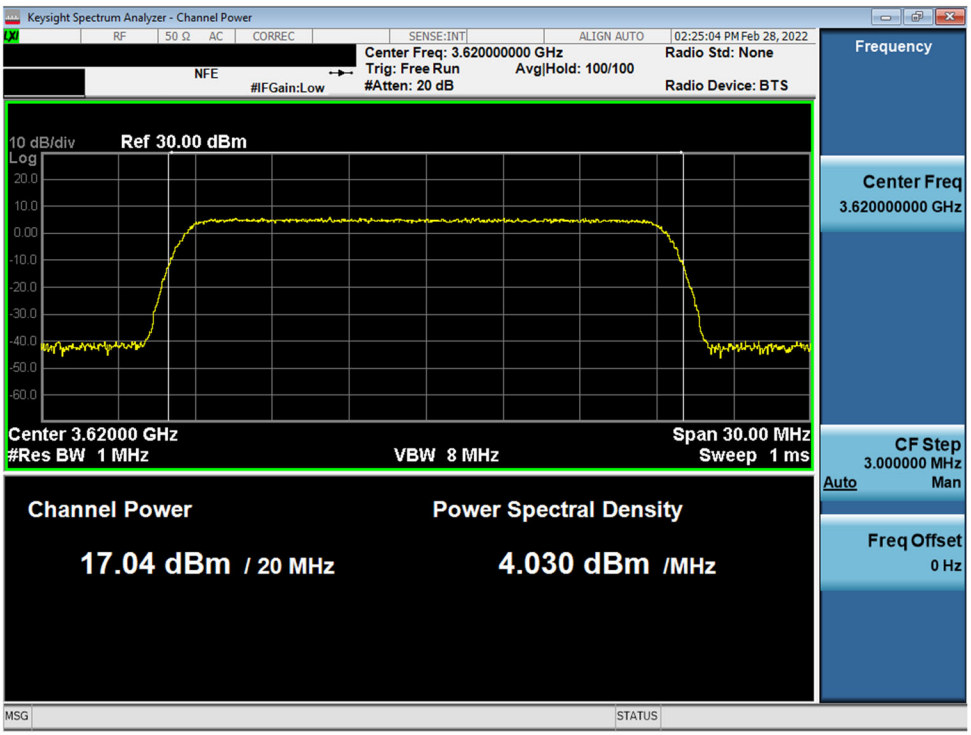
Plot 4. Conducted PSD, Mid-Channel SAS Granted maxEIRP 37 – ANT3



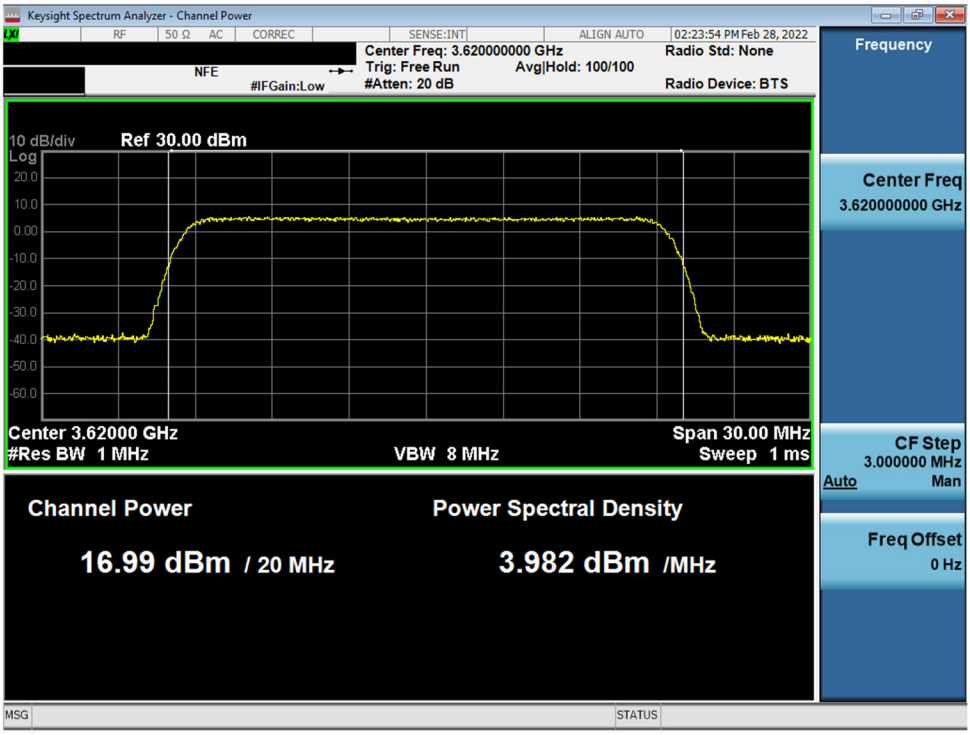
Plot 5. Conducted PSD, Mid-Channel SAS Granted maxEIRP 27 – ANT0



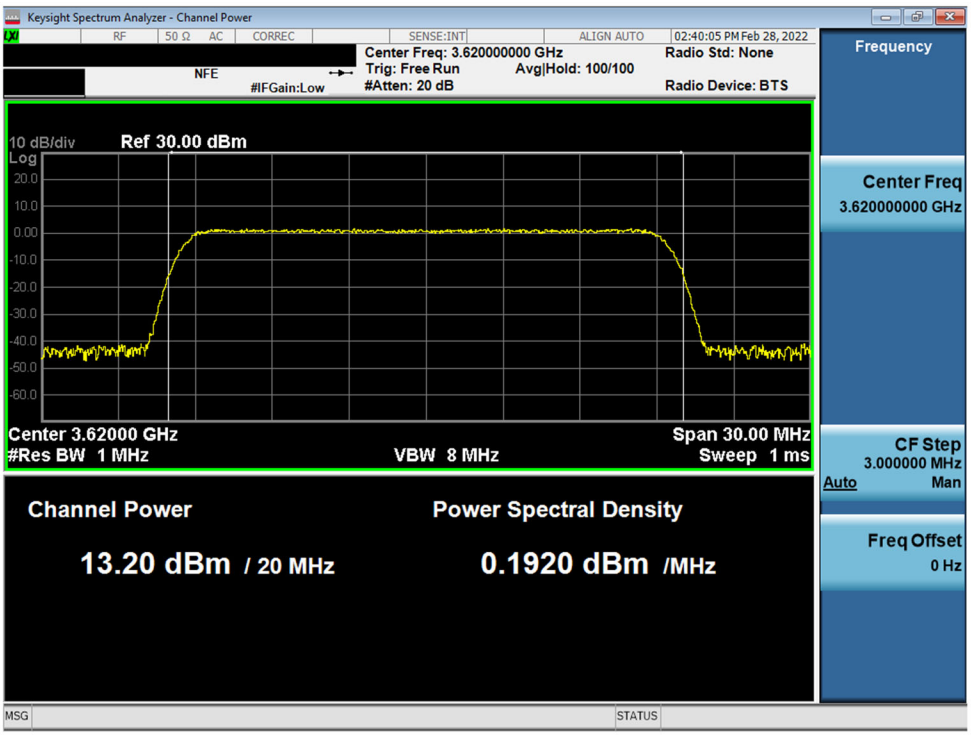
Plot 6. Conducted PSD, Mid-Channel SAS Granted maxEIRP 27 – ANT1



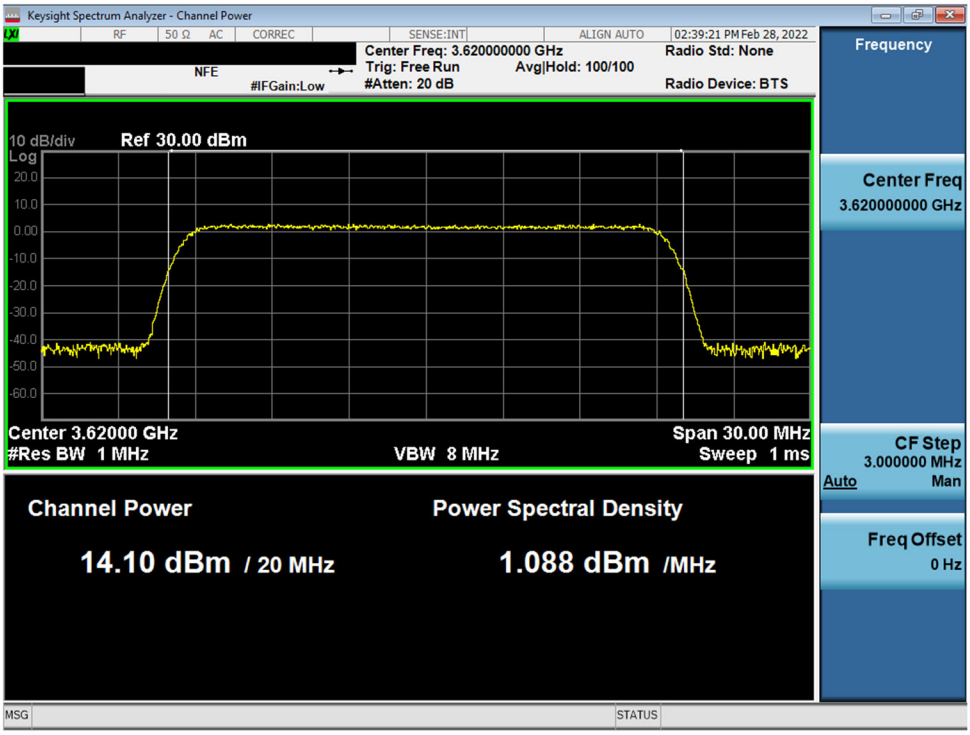
Plot 7. Conducted PSD, Mid-Channel SAS Granted maxEIRP 27 – ANT2



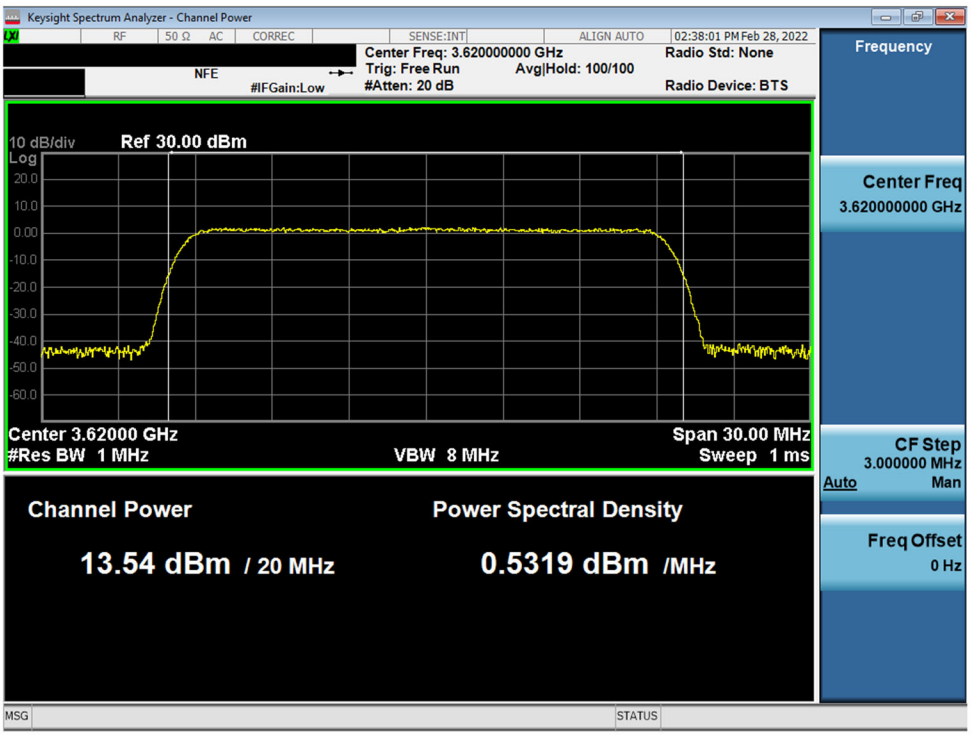
Plot 8. Conducted PSD, Mid-Channel SAS Granted maxEIRP 27 – ANT3



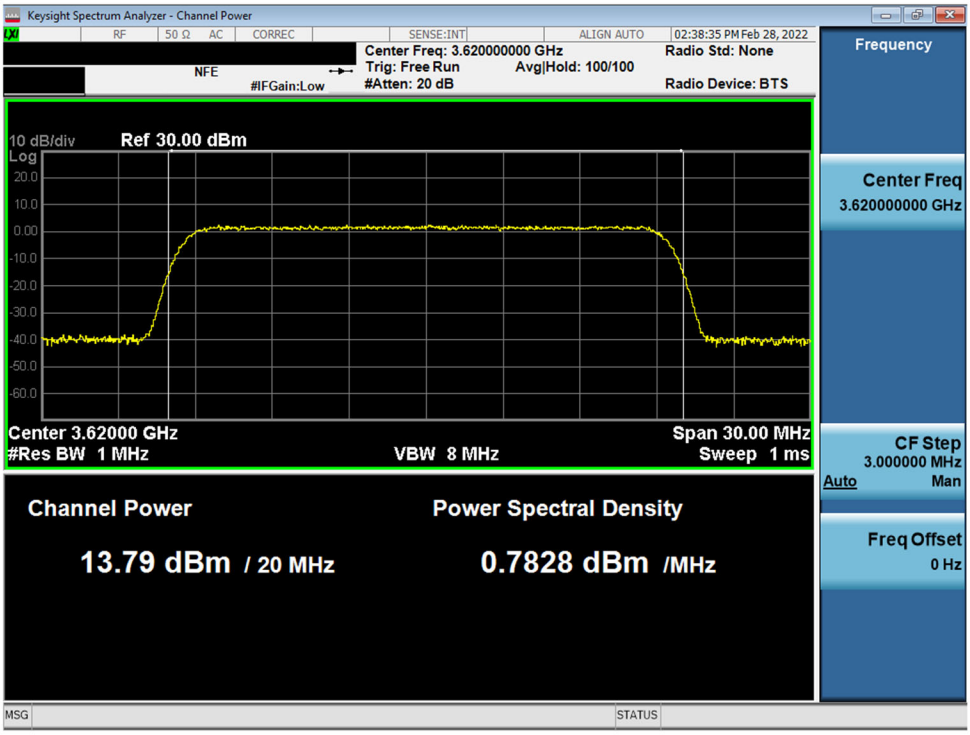
Plot 9. Conducted PSD, Mid-Channel SAS Granted maxEIRP 23 – ANT0



Plot 10. Conducted PSD, Mid-Channel SAS Granted maxEIRP 23 – ANT1



Plot 11. Conducted PSD, Mid-Channel SAS Granted maxEIRP 23 – ANT2



Plot 12. Conducted PSD, Mid-Channel SAS Granted maxEIRP 23 – ANT3

APPENDIX B – TEST LOGS

Logs are available upon request