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TEST REPORT
DP/CBSD-SAS Interoperability

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

Date of Testing:
3/21/2019 – 4/5/2019
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M1902080023-01.A3L

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

Application Type:	Certification
Model:	RT4401-48A
EUT Type:	LTE Base Station
Frequency Range:	3550 – 3700 MHz
FCC Classification:	Citizens Band Category A and B Devices (CBD)
FCC Rule Part(s):	Part 96
Test Procedure(s):	KDB 940660 D01 v01, WINNF-TS-0122-V1.0.0, CBRSA-TS-9001 V.1.0.0

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 Engineering Laboratory, Inc. 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 17025-2005 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 17025-2005 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 LTE Base Station FCC ID: A3LRT4401-48A.** The test data contained in this report pertains only to DP/CBSD-SAS interoperability. The EUT is a Domain Proxy.

Test Device Serial Number(s): SLS-BR0542EAEX S614C24824 and SLS-BR0542EAEX S6114C24817.

2.2 Device Capabilities

This device contains the following capabilities:

LTE Band 48

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 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	4/24/2018	Annual	4/24/2019	US46470561
Tektronix	RSA306B	Real-Time Spectrum Analyzer	N/A	N/A	N/A	B034473
Dell	Latitude 5580	Test Harness Laptop	N/A	N/A	N/A	N/A
Mini-Circuits	ZN4PD1-63W-S+	250-6000 MHz Power Splitter	2/20/2019	Annual	2/20/2020	SF990901110
Mini-Circuits	ZN4PD1-63W-S+	250-6000 MHz Power Splitter	2/20/2019	Annual	2/20/2020	SF121101139
AA-MCS	PWD-2W-0.5-6G-10W-SF	2-Way Power Divider/Combiner	2/20/2019	Annual	2/20/2020	1020 - 004
Weinschel	4T-20	20dB Attenuator	2/20/2019	Annual	2/20/2020	N/A
Seekonk	NC-100	Torque Wrench	5/4/2018	2 year	5/4/2020	N/A
Agilent HP	6032A	AutoRanging System Power Supply	N/A	N/A	N/A	N/A

Table 3-1 Annual Test Equipment Calibration Schedule

4.0 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).

5.0 EVALUATION PROCEDURE

The measurement procedure described in KDB 940660 D01 v01 and WINNF-TS-0122-V1.0.0 was used in the measurement of the EUT**.**

Deviation from measurement procedure…….....None

6.0 TEST SUMMARY

6.1 Summary

Company Name: Samsung Electronics Co. Ltd.

FCC ID: A3LRT4401-48A

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.D.REG.2 WINNF.FT.D.REG.9 WINNF.FT.D.REG.11 WINNF.FT.D.REG.13 WINNF.FT.D.REG.15 WINNF.FT.D.REG.17 WINNF.FT.D.REG.19 WINNF.FT.D.GRA.1 WINNF.FT.C.GRA.2 WINNF.FT.C.HBT.11	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.D.REG.2 WINNF.FT.D.REG.9 WINNF.FT.D.REG.11 WINNF.FT.D.REG.13 WINNF.FT.D.REG.15 WINNF.FT.D.REG.17 WINNF.FT.D.REG.19	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.D.HBT.2	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	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.D.HBT.2	Pass
96.39(c)(2)	7	Confirm that the device transmits on the SAS specified frequency.	WINNF.FT.D.HBT.2	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.5 WINNF.FT.C.HBT.6 WINNF.FT.C.HBT.7 WINNF.FT.D.HBT.8 WINNF.FT.C.HBT.10 WINNF.FT.D.RLQ.2 WINNF.FT.D.RLQ.4 WINNF.FT.D.RLQ.6 WINNF.FT.D.DRG.2 WINNF.FT.D.DRG.4 WINNF.FT.C.DRG.5	Pass

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

96.39 (c)	9	Confirm that the device sends measurements data in response to the command from the SAS.	WINNF.FT.D.MES.2	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.D.MES.2	Pass
	12	For a device that operates as a Category A CBSD and then desires to operate as a Category B CBSD (or vice versa), confirm that it re-registers with the SAS for the updated authorization status.	N/A	Pass
96 E	13	When CBSDs communicate through a management system, confirm compliance with all requirements.	N/A	Pass
96.39	14	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 Appendix for test data.

7.0 RF POWER MEASUREMENTS

Testing is performed per KDB 971168 D01 and across the transmit dynamic range of 37dBm/MHz to 23dBm/MHz for 20MHz Bandwidth. Per manufacturer, Tx1, Tx2, Tx3, and Tx4 produce correlated signals per KDB 662911 D01. The PSD of each transmitter was measured and summed in linear term. Then the antenna gain was added to yield the maxEIRP.

The summed maxEIRP is calculated per the following formula:

Summed maxEIRP = ConductedPower(Port1+Port3) + AntGain(Port1+Port3) + ConductedPower(Port2+Port4) + AntGain(Port2+Port4)

Frequency [MHz]	Bandwidth [MHz]	SAS Granted maxEIRP [dBm/MHz]	Tx1 Conducted PSD [dBm/MHz]	Tx2 Conducted PSD [dBm/MHz]	Tx3 Conducted PSD [dBm/MHz]	Tx4 Conducted PSD [dBm/MHz]	Antenna Gain [dBi]	EIRP Tx1+Tx3 [dBm/MHz]	EIRP Tx2+Tx4 [dBm/MHz]	Summed maxEIRP [dBm/MHz]	Margin [dB]
3620	20	37	14.53	13.64	14.15	14.58	13.00	33.35	33.15	36.26	-0.74
3620	20	27	4.99	3.02	3.66	4.62	13.00	23.38	22.90	26.16	-0.84
3620	20	23	0.63	0.61	0.59	0.81	13.00	19.62	19.72	22.68	-0.32
3560 (low)	20	37	14.49	14.11	15.33	14.69	13.00	33.94	33.42	36.70	-0.30
3690 (High)	20	37	14.40	12.49	13.58	14.13	13.00	33.02	32.40	35.73	-1.27

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

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung LTE Base Station FCC ID: A3LRT4401-48A** has been tested to show compliance with Part 96 and KDB 940660 D01 v01.

APPENDIX A – TEST LOGS