CERTIFICATION TEST REPORT

Report Number. : 12678287-E1V2

Applicant	:	Samsung Electronics Co., Ltd. 129 Samsung-Ro, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 16677, Korea
Model	:	SM-A305G/DS and SM-A305G
FCC ID	:	A3LSMA305G
EUT Description	:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac and ANT+
Test Standard(s)	:	FCC CFR47 PART 22 SUBPART H FCC CFR47 PART 24 SUBPART E FCC CFR47 PART 27 SUBPART F, H, L, and M FCC CFR47 PART 15 SUBPART B

Date Of Issue:
FEBRUARY 25, 2019

Prepared by:
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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2/20/2019	Initial Review	--
V2	2/25/2019	Updated Section 2.1, 2.2 & 2.4	--

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1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	SM-A305G/DS AND SM-A305G
FCC ID	A3LSMA305G
EUT Description	GSM/WCDMA/LTE PHONE WITH BT, DTS/UNII A/B/G/N/AC AND ANT+
Serial Number	R38KC08WKCB (CONDUCTED) R38KC08WJSN (RADIATED) – Original R38KC0KSQAH (RADIATED) – Spot Check
Date Tested	JANUARY 14, 2019 to FEBRUARY 07, 2019 – Original FEBRUARY 04, 2019 to FEBRUARY 12, 2019 – Spot Check
Applicable Standards	FCC CFR 47 PART 22H, 24E, 27F,H,L,and M
Test Results	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

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Approved & Released For UL Verification Services Inc. By:	Reviewed By:
Dan Coronia Operations Leader Consumer Technology Division UL Verification Services Inc.	Kiya Kedida Senior Project Engineer Consumer Technology Division UL Verification Services Inc.

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2. INTRODUCTION OF TEST DATA REUSE

2.1. INTRODUCTION

According to the manufacturer, FCC ID: A3LSMA305GN and FCC ID: A3LSMA305G licensed radio is electrically identical. WCDMA Band 4 and LTE Band 2/4/12/13/17/66 test data of FCC ID: A3LSMA305GN and GSM850/1900, WCDMA Band 2/5 and LTE Band 5/41 test data of FCC ID: A3LSMA305F shall remain representative of FCC ID: A3LSMA305G.

The applicant takes full responsibility that the test data as referenced in this section represents compliance for this FCC ID.

2.2. DIFFERENCE

Difference between A3LSMA305GN and A3LSMA305G:

Samsung Electronics Co. Ltd. declares that A3LSMA305G does not support NFC function.

The FCC ID: A3LSMA305GN, shares the same enclosure and circuit board as FCC ID: A3LSMA305G. The WWAN antennas and surrounding circuitry and layout are identical between two models.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMG305GN remains representative of FCC ID: A3LSMA305G. The test data of FCC ID: A3LSMG305GN and FCC ID: A3LSMA305F being submitted for this application to cover WWAN features.

2.3. SPOT CHECK VERIFICATION RESULTS SUMMARY

Spot check verification has been done on device A3LSMA305G for radiated harmonic spurious. The data from the application has been verified through appropriate spot checks to demonstrate compliance for this device in accordance to FCC public KDB 484596 D01 as shown in the summary below.

Comparison of two models, upper deviation is within 3dB range and all tests are under FCC Technical Limits.

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SPOT CHECK DATA

A3LSMA305G SPOT CHECK RESULTS							
Technology	Mode	Test Item	Channel	Measured Frequency GHz	A3LSMA305GN Peak (dBm)	A3LSMA305G Peak (dBm)	Delta (dB)
GSM	GPRS 850	RSE	High	3.396	-59.08	-57.73	1.35
	GPRS 1900	RSE	High	7.612	-53.79	-54.56	-0.77
	EGPRS 850	RSE	Low	3.297	-57.97	-55.77	2.2
	EGPRS 1900	RSE	Low	5.55	-49.67	-55.93	-6.26
WCDMA	REL99 B4	RSE	High	3.508	-47.34	-49.98	-2.64
	REL99 B5	RSE	Low	1.651	-54.36	-53.29	1.07
	REL99 B2	RSE	Mid	7.51	-53.52	-53.97	-0.45
	HSDPA B4	RSE	Low	3.427	-46.18	-48.28	-2.1
	HSDPA B5	RSE	High	2.506	-56.07	-57.68	-1.61
	HSDPA B2	RSE	High	7.631	-52.96	-53.89	-0.93

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A3LSMA305G SPOT CHECK RESULTS							
Technology	Mode	Test Item	Channel	Measured Frequency GHz	A3LSMA305GN Peak (dBm)	A3LSMA305G Peak (dBm)	Delta (dB)
LTE 2	QPSK @ highest BW	RSE	Low	3.702	-49.34	-52.15	-2.81
	16QAM @ highest BW	RSE	Low	3.702	-49.72	-51.48	-1.76
LTE 5	QPSK @ 20MHz BW	RSE	Low	2.474	-47.48	-46.29	1.19
	16QAM @ 20MHz BW	RSE	Low	2.474	-46.23	-49.6	-3.37
LTE 12	QPSK @ highest BW	RSE	Mid	1.406	-52.63	-54.51	-1.88
	16QAM @ highest BW	RSE	Low	2.099	-53.83	-55.33	-1.5
LTE 13	QPSK @ highest BW	RSE	Mid	1.555	-51.5	-53.05	-1.55
	16QAM @ highest BW	RSE	Mid	1.555	-50.65	-54.77	-4.12
LTE 41	QPSK @ highest BW	RSE	Mid	7.752	-40.26	-39.17	1.09
	16QAM @ highest BW	RSE	Low	7.491	-44.17	-41.51	2.66
LTE 66	QPSK @ highest BW	RSE	Low	3.422	-44.63	-42.06	2.57
	16QAM @ highest BW	RSE	Low	3.422	-45.57	-42.79	2.78

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SPOT CHECK DATA

HARMONICS AND SPURIOUS EMISSIONS

GSM

Company:	Samsung
Project #:	12678287
Date:	2/6/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	GPRS 850
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	848.8MHz											
1	3.395	-68.03	Pk	32.6	-33.4	11.1	-57.73	-13	-44.73	0-360	150	H
2	3.395	-67.99	Pk	32.6	-33.4	11.2	-57.59	-13	-44.59	0-360	150	V

Company:	Samsung
Project #:	12678287
Date:	2/6/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	EGPRS 850
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	824.2MHz											
2	3.298	-68.74	Pk	32.8	-33.4	10.5	-58.84	-13	-45.84	0-360	150	H
1	3.297	-65.97	Pk	32.8	-33.4	10.8	-55.77	-13	-42.77	0-360	150	V

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Company:	Samsung
Project #:	12678287
Date:	2/6/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	GPRS 1900
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1909.8MHz											
2	7.612	-75.07	Pk	35.6	-26.6	10.4	-55.67	-13	-42.67	0-360	150	H
1	7.612	-74.16	Pk	35.6	-26.6	10.6	-54.56	-13	-41.56	0-360	150	V

Company:	Samsung
Project #:	12678287
Date:	2/6/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	EGPRS 1900
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1852.2MHz											
2	5.551	-71.72	Pk	34.6	-29.9	10.7	-56.32	-13	-43.32	0-360	150	H
1	5.551	-71.53	Pk	34.6	-29.9	10.9	-55.93	-13	-42.93	0-360	150	V

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WCDMA

Company:	Samsung
Project #:	12678287
Date:	2/6/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	REL99 B5
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	826.4MHz											
1	1.65	-56.39	Pk	28.5	-35.5	10.1	-53.29	-13	-40.29	0-360	150	H
2	1.651	-59.14	Pk	28.5	-35.5	11	-55.14	-13	-42.14	0-360	150	V

Company:	Samsung
Project #:	12678287
Date:	2/6/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	HSDPA B5
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	836.6MHz											
2	2.508	-67.31	Pk	32.3	-35.3	10.1	-60.21	-13	-47.21	0-360	150	H
1	2.509	-66.18	Pk	32.3	-35.3	11.5	-57.68	-13	-44.68	0-360	150	V

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Company:	Samsung
Project #:	12678287
Date:	2/6/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	REL99 B2
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1880MHz											
2	7.512	-72.73	Pk	35.6	-26.8	10.5	-53.43	-13	-40.43	0-360	150	H
1	7.512	-73.57	Pk	35.6	-26.8	10.8	-53.97	-13	-40.97	0-360	150	V

Company:	Samsung
Project #:	12678287
Date:	2/6/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	HSDPA B2
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1907.6MHz											
2	7.636	-73.63	Pk	35.6	-26.6	10.4	-54.23	-13	-41.23	0-360	150	H
1	7.637	-73.49	Pk	35.6	-26.6	10.6	-53.89	-13	-40.89	0-360	150	V

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Company:	Samsung
Project #:	12678287
Date:	2/7/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	REL99 B4
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1752.6MHz											
1	3.507	-60.38	Pk	32.7	-33.2	10.9	-49.98	-13	-36.98	0-360	150	H
2	3.508	-62.56	Pk	32.7	-33.2	10.7	-52.36	-13	-39.36	0-360	150	V

Company:	Samsung
Project #:	12678287
Date:	2/7/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	HSDPA B4
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1712.4MHz											
1	3.423	-58.48	Pk	32.6	-33.4	11	-48.28	-13	-35.28	0-360	150	H
2	3.423	-62.05	Pk	32.6	-33.4	11.2	-51.65	-13	-38.65	0-360	150	V

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LTE BAND 2

Company:	Samsung
Project #:	12678287
Date:	2/7/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	LTE 2 QPSK 20MHz
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1860MHz											
1	3.702	-63.55	Pk	33.2	-32.5	10.7	-52.15	-13	-39.15	0-360	150	H
2	3.702	-66.22	Pk	33.2	-32.5	11	-54.52	-13	-41.52	0-360	150	V

Company:	Samsung
Project #:	12678287
Date:	2/7/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	LTE 2 16QAM 20MHz
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1860MHz											
1	3.702	-62.88	Pk	33.2	-32.5	10.7	-51.48	-13	-38.48	0-360	150	H
2	3.701	-65.91	Pk	33.2	-32.5	11	-54.21	-13	-41.21	0-360	150	V

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LTE BAND 5

Company:	Samsung
Project #:	12678287
Date:	2/6/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	LTE 5 QPSK 10MHz
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	829 MHz											
1	2.474	-54.19	Pk	32.3	-35.3	10.9	-46.29	-13	-33.29	0-360	150	H
2	2.474	-56.93	Pk	32.3	-35.3	11	-48.93	-13	-35.93	0-360	150	V

Company:	Samsung
Project #:	12678287
Date:	2/6/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	LTE 5 16QAM 10MHz
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	829 MHz											
1	2.474	-57.5	Pk	32.3	-35.3	10.9	-49.6	-13	-36.6	0-360	150	H
2	2.473	-60.93	Pk	32.3	-35.3	11	-52.93	-13	-39.93	0-360	150	V

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LTE BAND 12

Company:	Samsung
Project #:	12678287
Date:	2/7/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	LTE 12 QPSK 10MHz
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	707.5 MHz											
1	1.406	-58.71	Pk	28.8	-35.4	10.8	-54.51	-13	-41.51	0-360	150	H
2	1.406	-66.5	Pk	28.8	-35.4	11.2	-61.9	-13	-48.9	0-360	150	V

Company:	Samsung
Project #:	12678287
Date:	2/7/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	LTE 12 16QAM 10MHz
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	704 MHz											
2	2.099	-61.73	Pk	31.6	-35.4	10.2	-55.33	-13	-42.33	0-360	150	H
1	2.099	-65.21	Pk	31.6	-35.4	11.4	-57.61	-13	-44.61	0-360	150	V

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LTE BAND 13

Company:	Samsung
Project #:	12678287
Date:	2/7/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	LTE 13 QPSK 10MHz
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	782 MHz											
2	1.555	-57.45	Pk	28.1	-35.5	11.8	-53.05	-13	-40.05	0-360	150	H
1	1.555	-63.72	Pk	28.1	-35.5	11.5	-59.62	-13	-46.62	0-360	150	V

Company:	Samsung
Project #:	12678287
Date:	2/7/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	LTE 13 16QAM 10MHz
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	782 MHz											
2	1.555	-59.17	Pk	28.1	-35.5	11.8	-54.77	-13	-41.77	0-360	150	H
1	1.555	-65.24	Pk	28.1	-35.5	11.5	-61.14	-13	-48.14	0-360	150	V

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LTE BAND 41

Company:	Samsung
Project #:	12678287
Date:	2/7/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	LTE 41 QPSK 20MHz
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	2593 MHz											
2	7.752	-58.87	Pk	35.7	-26.4	10.4	-39.17	-25	-14.17	0-360	150	H
1	7.752	-59.99	Pk	35.7	-26.4	10.6	-40.09	-25	-15.09	0-360	150	V

Company:	Samsung
Project #:	12678287
Date:	2/7/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	LTE 41 16QAM 20MHz
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	2506 MHz											
1	7.491	-60.62	Pk	35.6	-26.8	10.4	-41.42	-25	-16.42	0-360	150	H
2	7.491	-60.91	Pk	35.6	-26.8	10.6	-41.51	-25	-16.51	0-360	150	V

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LTE BAND 66

Company:	Samsung
Project #:	12678287
Date:	2/12/2019
Test Engineer:	16069
Configuration:	EUT+ Support Equipment
Mode:	LTE 66 QPSK 20MHz
Chamber #:	Chamber J

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1720 MHz											
1	3.422	-51.96	Pk	32.7	-34.7	11.9	-42.06	-13	-29.06	0-360	148	H
2	3.422	-50.81	Pk	32.7	-34.7	11.8	-41.01	-13	-28.01	0-360	148	V

Company:	Samsung
Project #:	12678287
Date:	2/12/2019
Test Engineer:	16069
Configuration:	EUT+ Support Equipment
Mode:	LTE 66 16QAM 20MHz
Chamber #:	Chamber J

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1720 MHz											
1	3.422	-52.69	Pk	32.7	-34.7	11.9	-42.79	-13	-29.79	0-360	148	H
2	3.422	-48.48	Pk	32.7	-34.7	11.8	-38.68	-13	-25.68	0-360	148	V

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2.4. REFERENCE DETAIL

Reference application that contains the reused reference data.

Equipment Class	Reference FCC ID	Type Grant/ Permissive Change	Reference Application	Folder Test/RF Exposure	Report Title/Section
PCE	A3LSMA305F	Grant	12678282-E1	Test	FCC Report WWAN all except Appendix A
PCE	A3LSMA305GN	Grant	12678284-E1	Test	FCC Report WWAN / All except Appendix A

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3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.26:2015, ANSI C63.4:2014, TIA-603-E, FCC CFR 47 Part 2, Part 15, Part 22, Part 24, Part 27, Part 15B, FCC KDB 971168 D01 v3r1.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd
☐ Chamber A (ISED:2324B-1)	☐ Chamber D (ISED:22541-1)	☒ Chamber I (ISED:2324A-5)
☒ Chamber B (ISED:2324B-2)	☐ Chamber E (ISED:22541-2)	☒ Chamber J (ISED:2324A-6)
☐ Chamber C (ISED:2324B-3)	☐ Chamber F (ISED:22541-3)	☒ Chamber K (ISED:2324A-1)
	☐ Chamber G (ISED:22541-4)	☐ Chamber L (ISED:2324A-3)
	☐ Chamber H (ISED:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

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5. CALIBRATION AND UNCERTAINTY

5.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5.2. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

Uncertainty figures are valid to a confidence level of 95%.

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6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac and ANT+.

6.2. MAXIMUM OUTPUT POWER

ERP/EIRP LIMIT

FCC: §2.1046, §22.913, §24.232, and §27.50

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015/ TIA-603-E Clause 2.2.17
KDB 971168 D01Section 5.6
KDB 412172 D01

ERP/EIRP = PMeas + GT − LC
where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas = measured transmitter output power or PSD, in dBm or dBW;
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

The transmitter has a maximum average conducted and ERP / EIRP output powers as follows:

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GSM MODES

Part 22 850MHz								
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	Limit (W)	ERP		99% BW (kHz)	Emission Designator
					(dBm)	(W)		
824.2-848.8	GPRS	32.7	-2.20	7.0	28.35	0.684	237.05	237KGXW
	EGPRS	26.5			22.15	0.164	238.78	239KG7W
Part 24 1900MHz								
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	Limit (W)	EIRP		99% BW (kHz)	Emission Designator
					(dBm)	(W)		
1850.2-1909.8	GPRS	29.9	1.30	2.0	31.20	1.318	238.44	238KGXW
	EGPRS	26.3			27.60	0.575	242.01	242KG7W

WCDMA MODES

Part 22 Band 5								
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	Limit (W)	ERP		99% BW (kHz)	Emission Designator
					(dBm)	(W)		
826.4-846.6	REL 99	24.7	-2.20	7.0	20.35	0.108	4170	4M17F9W
	HSDPA	23.4			19.05	0.080	4140	4M14F9W
Part 24 Band 2								
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	Limit (W)	ERP		99% BW (kHz)	Emission Designator
					(dBm)	(W)		
1852.4-1907.6	REL 99	25.2	1.30	2.0	26.50	0.447	4140	4M14F9W
	HSDPA	25.3			26.60	0.457	4140	4M14F9W
Part 27 Band 4								
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	Limit (W)	EIRP		99% BW (kHz)	Emission Designator
					(dBm)	(W)		
1712.4-1752.6	REL 99	23.5	-2.80	1.0	20.70	0.117	4170	4M17F9W
	HSDPA	23.4			20.60	0.115	4160	4M16F9W

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LTE BAND 2

Part 24	
EIRP Limit (W)	2.00
Antenna Gain (dBi)	1.30

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
1.4	QPSK	1850.7	1909.3	24.2	25.50	0.355	1090	1M09G7W
	16QAM			23.0	24.30	0.269	1080	1M08D7W
3.0	QPSK	1851.5	1908.5	24.2	25.50	0.355	2700	2M70G7W
	16QAM			23.1	24.40	0.275	2700	2M70D7W
5.0	QPSK	1852.5	1907.5	24.1	25.40	0.347	4500	4M50G7W
	16QAM			23.1	24.40	0.275	4520	4M52D7W
10.0	QPSK	1855.0	1905.0	24.2	25.50	0.355	8960	8M96G7W
	16QAM			23.0	24.30	0.269	8970	8M97D7W
15.0	QPSK	1857.5	1902.5	24.2	25.50	0.355	13420	13M4G7W
	16QAM			23.1	24.40	0.275	13420	13M4D7W
20.0	QPSK	1860.0	1900.0	24.1	25.40	0.347	17910	17M9G7W
	16QAM			22.9	24.20	0.263	17880	17M9D7W

LTE BAND 5

Part 22H	
ERP Limit (W)	7.00
Antenna Gain (dBi)	-2.20

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)	99% BW (kHz)	Emission Designator
1.4	QPSK	824.7	848.3	23.8	19.45	0.088	1090	1M09G7W
	16QAM			22.6	18.25	0.067	1080	1M08D7W
3.0	QPSK	825.5	847.5	23.9	19.55	0.090	2690	2M69G7W
	16QAM			23.0	18.65	0.073	2700	2M70D7W
5.0	QPSK	826.5	846.5	23.8	19.45	0.088	4510	4M51G7W
	16QAM			22.8	18.45	0.070	4510	4M51D7W
10.0	QPSK	829.0	844.0	24.5	20.15	0.104	8960	8M96G7W
	16QAM			23.5	19.15	0.082	8970	8M97D7W

LTE BAND 12

Part 27	
ERP Limit (W)	3.00
Antenna Gain (dBi)	-5.00

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)	99% BW (kHz)	Emission Designator
1.4	QPSK	699.7	715.3	23.8	16.65	0.046	1090	1M09G7W
	16QAM			22.7	15.55	0.036	1080	1M08D7W
3.0	QPSK	700.5	714.5	23.7	16.55	0.045	2680	2M68G7W
	16QAM			22.8	15.65	0.037	2680	2M68D7W
5.0	QPSK	701.5	713.5	23.8	16.65	0.046	4510	4M51G7W
	16QAM			22.8	15.65	0.037	4500	4M50D7W
10.0	QPSK	704.0	711.0	24.7	17.55	0.057	8940	8M94G7W
	16QAM			23.4	16.25	0.042	8920	8M92D7W

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LTE BAND 13

Part 27	
ERP Limit (W)	3.00
Antenna Gain (dBi)	-5.30

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)	99% BW (kHz)	Emission Designator
5.0	QPSK	779.5	784.5	24.4	16.95	0.050	4500	4M50G7W
	16QAM			23.2	15.75	0.038	4510	4M51D7W
10.0	QPSK	782.0	782.0	24.4	16.95	0.050	8960	8M96G7W
	16QAM			23.3	15.85	0.038	8950	8M95D7W

LTE BAND 41

Part 27	
EIRP Limit (W)	2.00
Antenna Gain (dBi)	-1.40

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
5.0	QPSK	2498.5	2687.5	23.5	22.10	0.162	4530	4M53G7W
	16QAM			22.8	21.40	0.138	4490	4M49D7W
10.0	QPSK	2501.0	2685.0	23.5	22.10	0.162	8970	8M97G7W
	16QAM			22.6	21.20	0.132	8960	8M96D7W
15.0	QPSK	2503.5	2682.5	23.5	22.10	0.162	13440	13M4G7W
	16QAM			22.7	21.30	0.135	13440	13M4D7W
20.0	QPSK	2506.0	2680.0	23.5	22.10	0.162	17820	17M8G7W
	16QAM			22.9	21.50	0.141	17850	17M9D7W

LTE BAND 66

Part 27	
EIRP Limit (W)	1.00
Antenna Gain (dBi)	-2.80

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
1.4	QPSK	1710.7	1779.3	23.8	21.00	0.126	1090	1M09G7W
	16QAM			22.8	20.00	0.100	1080	1M08D7W
3.0	QPSK	1711.5	1778.5	23.9	21.10	0.129	2690	2M69G7W
	16QAM			22.7	19.90	0.098	2690	2M69D7W
5.0	QPSK	1712.5	1777.5	23.7	20.90	0.123	4500	4M50G7W
	16QAM			22.7	19.90	0.098	4510	4M51D7W
10.0	QPSK	1715.0	1775.0	23.7	20.90	0.123	8970	8M97G7W
	16QAM			22.5	19.70	0.093	8960	8M96D7W
15.0	QPSK	1717.5	1772.5	23.7	20.90	0.123	13460	13M5G7W
	16QAM			22.8	20.00	0.100	13440	13M4D7W
20.0	QPSK	1720.0	1770.0	23.7	20.90	0.123	17910	17M9G7W
	16QAM			22.7	19.90	0.098	17840	17M8D7W

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6.3. SOFTWARE AND FIRMWARE

The test utility software used during testing was A305F.001

6.4. MAXIMUM ANTENNA GAIN

LTE Bands	Antenna Gain (dBi)
GSM850, 824-849MHz	-2.20
GSM1900, 1850-1910MHz	1.30
WCDMA Band 2, 1850-1910 MHz	1.30
WCDMA Band 4, 1710-1755 MHz	-2.80
WCDMA Band 5, 824-849 MHz	-2.20
LTE BAND 2, 1850 - 1910 MHz	1.30
LTE BAND 4, 1710 - 1755 MHz	-2.80
LTE BAND 5, 824 - 849 MHz	-2.20
LTE BAND 12, 699 - 716 MHz	-5.0
LTE BAND 13, 777 - 787 MHz	-5.3
LTE BAND 17, 704 - 716 MHz	-5.0
LTE BAND 41 2496 - 2690 MHz	-1.40
LTE BAND 66, 1710 - 1780 MHz	-2.80

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6.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports LTE Bands of:
Band 2, Band 4, Band 5, Band 12, Band 13, Band 17, Band 41 and Band 66.

LTE Band 4 (1710 - 1755MHz,1.4/3/5/10/15/20MHz bandwidth) is covered by LTE Band 66 because it is a subset of LTE band 66 and they have same output power and channel bandwidth.

LTE Band 17 (704 - 716 MHz, 5/10 MHz bandwidth) is covered by LTE Band 12 because it is a subset of LTE band 12 and they have same output power and channel bandwidth.

The worst-case scenario for all measurements is based on the average conducted output power measurement investigation results. Output power measurements were measured on QPSK, 16QAM, and 64QAM modulations. All testing was performed using QPSK, and 16QAM modulations to represent the worst case.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, & Z, and it was determined that X position for 850/1900MHz was worst-case orientation. And Y position for 2500MHz.

All radios that can be transmitted simultaneously have been evaluated for radiated for all possible combinations of transmission and found to be in compliance.

For check the Part15B receiver mode (Appendix A):

For GSM850 / WCDMA B5 / LTE Band 5, 12 & 13 the spurious emissions was investigated in three orthogonal orientations X, Y and Z. It was determined that X orientation was worst-case orientation.

In addition, LTE Band 17 (Frequency range: 734-746 MHz) is covered by LTE Band 12 (Frequency range: 729-746 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	EP-TA50EWE	DW3J719AS/A-E	N/A
Earphone	Samsung	N/A	N/A	N/A

I/O CABLES (RF Conducted Test)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	RF Out	1	Spectrum Analyzer	Shielded	None	NA
2	Antenna Port	1	EUT	Shielded	0.1m	NA
3	RF In/Out	1	Communication Test Set	Shielded	1m	NA

I/O CABLES (RF Radiated Test)

I/O Cable List						
Cable No	Port	# of identic	Connector Type	Cable Type	Cable Length	Remarks
1	USB	1	AC Adapter	Un-shielded	1.2m	No
2	Earphone	1	USB	Un-shielded	1m	No
3	RF In/out	1	Communication Test Set	Un-shielded	2m	No

TEST SETUP

The EUT is continuously communicated to the call box during the tests

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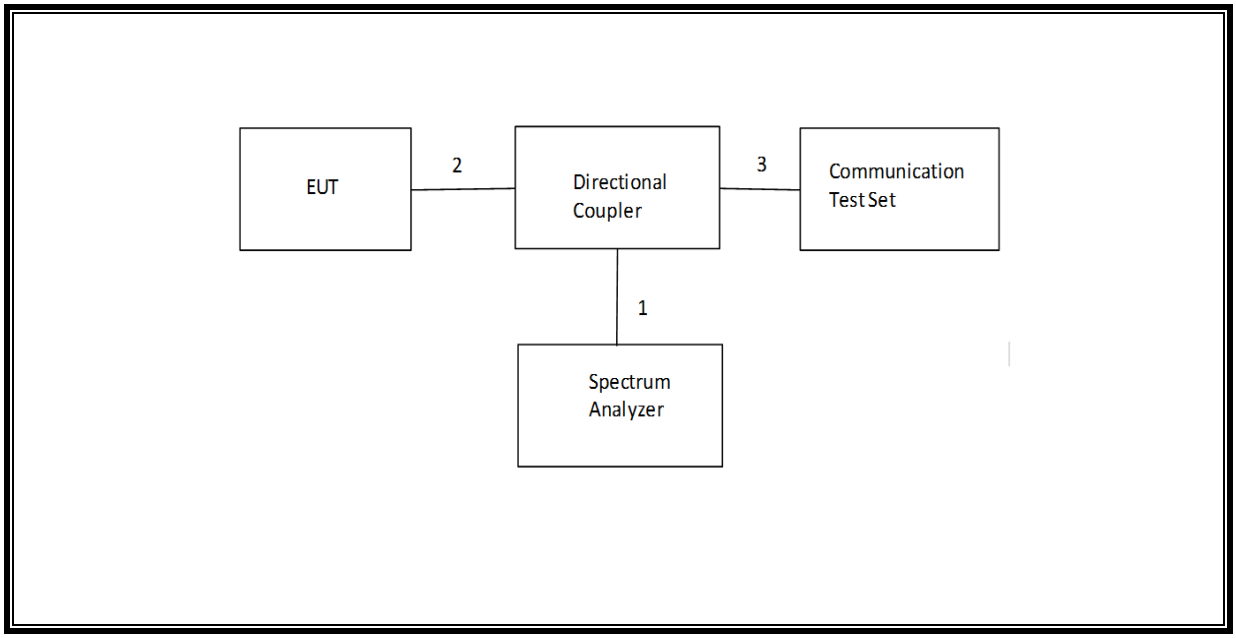
CONDUCTED TEST SETUP DIAGRAM



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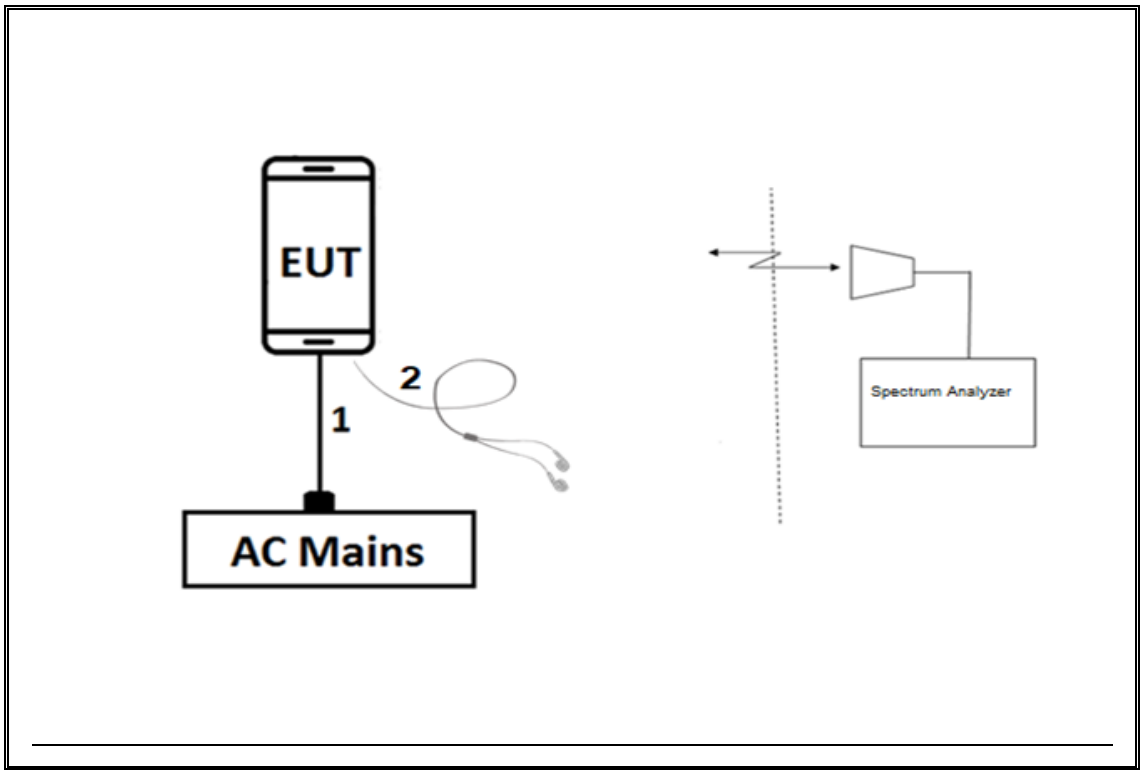
RADIATED TEST SETUP DIAGRAM



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