CERTIFICATION TEST REPORT

Report Number. : 12756699-E1V2

Applicant	:	Samsung Electronics Co., Ltd. 129 Samsung-Ro, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 16677, Korea
Model	:	SM-A305N and SM-A305YN
FCC ID	:	A3LSMA305N
EUT Description	:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac and NFC
Test Standard(s)	:	FCC CFR47 PART 15 SUBPART B FCC CFR47 PART 22 SUBPART H FCC CFR47 PART 24 SUBPART E FCC CFR47 PART 27 SUBPART F, H, and M

Date Of Issue:
MARCH 26, 2019

Prepared by:
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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	3/21/2019	Initial Review	--
V2	3/26/2019	Updated Section 1, 5.2, 6, 7.1.1, 7.2.1 & Added Section 10.2	K.Kedida

TABLE OF CONTENTS

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-A305N AND SM-A305YN
FCC ID	A3LSMA305N
EUT Description	GSM/WCDMA/LTE PHONE WITH BT, DTS/UNII A/B/G/N/AC AND NFC
Serial Number	52004bc4470db595 (CONDUCTED), 52004bc446b7b567 (RADIATED)
Date Tested	MARCH 07, 2019 to MARCH 18, 2019
Applicable Standards	FCC CFR 47 PART 15B, 22H, 24E, 27 F, H, 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.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

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

2. 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, FCC KDB 971168 D01 v3r1.

3. 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

4. CALIBRATION AND UNCERTAINTY

4.1. 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.

4.2. 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

4.3. 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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE phone with BT, DTS/UNII a/b/g/n/ac and NFC. The model SM-A305N was used for final testing and is representative of the test results in this report.

5.2. MAXIMUM OUTPUT POWER

ERP/EIRP LIMIT

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

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015 Sub-Clause 5.2.7/ TIA-603-E Clause 2.2.17
KDB 971168 D01Section 5.8
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:

GSM MODES

Part 22 850MHz					
Frequency range (MHz)	Modulation	Radiated ERP		99% BW (kHz)	Emission Designator
		Average(dBm)	Average(W)		
824.2-848.8	GPRS	29.92	0.982	236.36	236KGXW
	EGPRS	25.15	0.327	226.51	227KG7W
Part 24 1900MHz					
Frequency range (MHz)	Modulation	EIRP		99% BW (kHz)	Emission Designator
		Average(dBm)	Average(W)		
1850.2-1909.8	GPRS	30.74	1.186	239.35	239KGXW
	EGPRS	30.71	1.178	241.88	242KG7W

WCDMA MODE

Part 22 Band 5					
Frequency range (MHz)	Modulation	Radiated ERP		99% BW (kHz)	Emission Designator
		Average(dBm)	Average (W)		
826.4-846.6	REL 99	21.28	0.134	4130	4M13F9W
	HSDPA	19.99	0.100	4160	4M16F9W
Part 24 Band 2					
Frequency range (MHz)	Modulation	Radiated ERP		99% BW (kHz)	Emission Designator
		Average(dBm)	Average (W)		
1852.4-1907.6	REL 99	24.94	0.312	4160	4M16F9W
	HSDPA	24.88	0.308	4150	4M15F9W

LTE BAND 5

Part 22H							
ERP Limit (W)		7.00					
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
1.4	QPSK	824.7	848.3	21.28	0.134	1090	1M09G7W
	16QAM			20.18	0.104	1100	1M10D7W
3.0	QPSK	825.5	847.5	21.67	0.147	2710	2M71G7W
	16QAM			20.86	0.122	2700	2M70D7W
5.0	QPSK	826.5	846.5	20.64	0.116	4500	4M50G7W
	16QAM			19.43	0.088	4500	4M50D7W
10.0	QPSK	829.0	844.0	21.66	0.147	8990	8M99G7W
	16QAM			20.51	0.112	8980	8M98D7W

LTE BAND 17

Part 27							
ERP Limit (W)		3.00					
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
5.0	QPSK	706.5	713.5	19.27	0.085	4510	4M51G7W
	16QAM			17.94	0.062	4500	4M50D7W
10.0	QPSK	709.0	711.0	19.23	0.084	9010	9M01G7W
	16QAM			17.98	0.063	8970	8M97D7W

LTE BAND 41

Part 27							
EIRP Limit (W)		2.00					
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
5.0	QPSK	2498.5	2687.5	16.82	0.048	4510	4M51G7W
	16QAM			15.44	0.035	4500	4M50D7W
10.0	QPSK	2501.0	2685.0	16.99	0.050	8970	8M97G7W
	16QAM			16.05	0.040	8970	8M97D7W
15.0	QPSK	2503.5	2682.5	17.02	0.050	13460	13M5G7W
	16QAM			16.08	0.041	13480	13M5D7W
20.0	QPSK	2506.0	2680.0	17.22	0.053	17900	17M9G7W
	16QAM			15.91	0.039	17950	17M9G7W

5.3. SOFTWARE AND FIRMWARE

The test utility software used during testing was A305N.001

5.4. MAXIMUM ANTENNA GAIN

Please see table below:

LTE Bands	Antenna Gain (dBi)
GSM850, 824 - 849MHz	-13.22
GSM1900, 1850 - 1910MHz	.09
WCDMA Band 2, 1850 - 1910 MHz	.09
WCDMA Band 5, 824 - 849 MHz	-13.22
LTE BAND 5, 824 - 849 MHz	-13.22
LTE BAND 17, 704 - 716 MHz	-8.28
LTE BAND 41, 2496 - 2690 MHz	-0.6

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports LTE Bands of:
Band 5, Band 17, and Band 41

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 and 16QAM 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 700/850/1900/2500MHz was worst-case orientation.

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):

GSM850 (Frequency range: 869-894 MHz) cover WCDMA B5 and LTE Band 5 due to overlapping frequency range. The low, middle, and high channel were set to test and spurious emissions was investigated in three orthogonal orientations X, Y and Z it was determined that X orientation was worst-case orientation.

5.6. 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

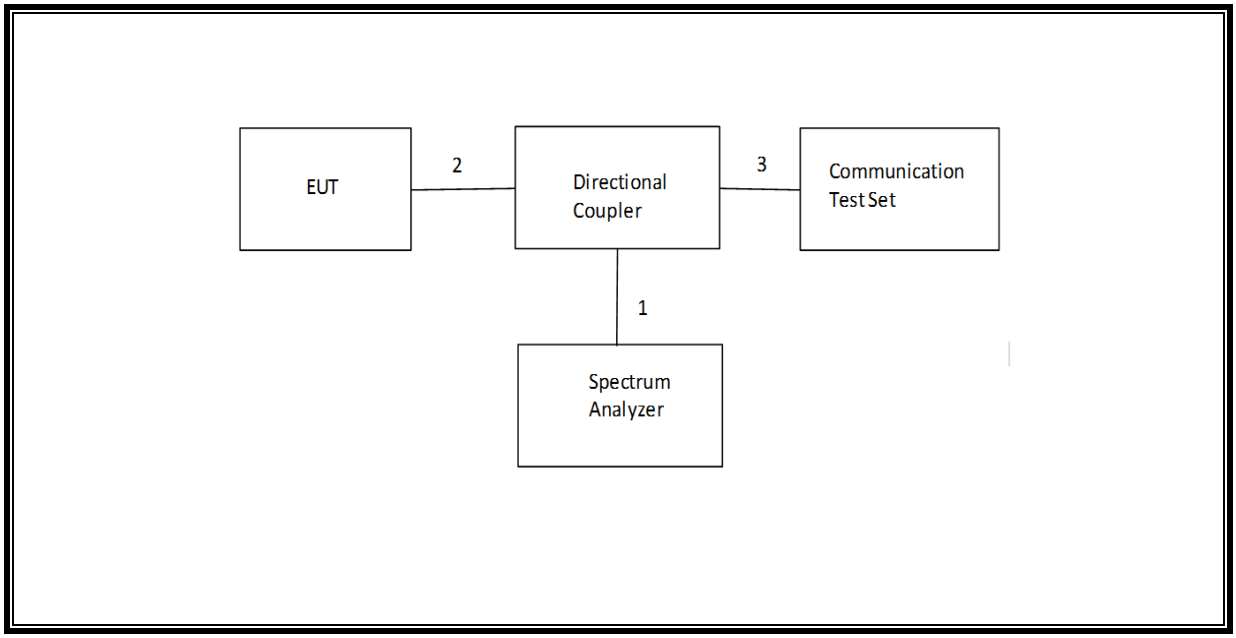
I/O CABLES (RF Radiated Test)

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

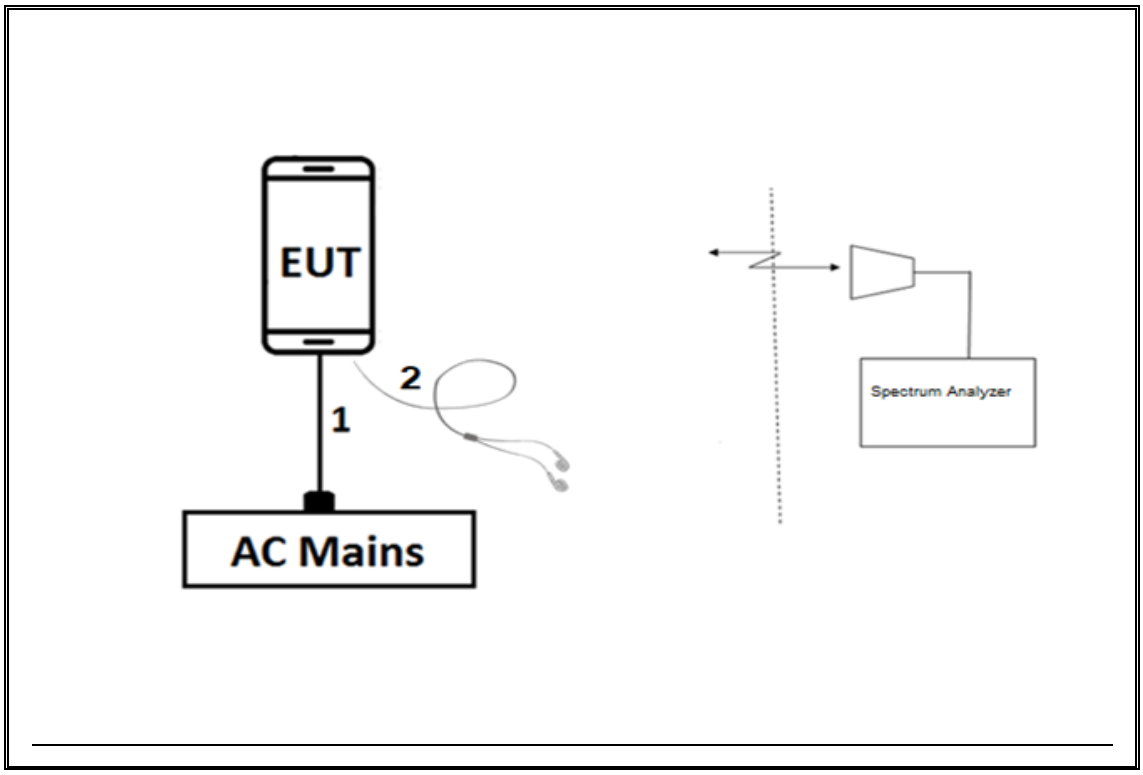
TEST SETUP

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

CONDUCTED TEST SETUP DIAGRAM



RADIATED TEST SETUP DIAGRAM



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**	**Last Cal**
Highpass Filter, 2.7 GHz	Micro-Circuits	H2G518G6	T772	07/05/19	07/05/18
Highpass Filter, 1.2 GHz	Micro-Tronics	HPM50108	T1737	04/17/19	04/17/18
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM50114	T1852	07/16/19	07/16/18
Highpass Filter, 4GHz	Micro-Tronics	HPM13351	T1241	07/19/19	07/19/18
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344	04/30/19	04/30/18
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T862	05/24/19	05/24/18
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	06/21/19	06/21/18
Antenna, Horn 0.7-18GHz	AR	AMPL-ATH1G18	PRE0189055	04/20/20	04/20/18
Antenna, Horn 18-26.5 GHz	ARA	MWH-1826/B	T477	06/16/2019	06/16/2018
Hybrid Antenna	SunAR rf motion	JB3	PRE0184971	11/13/19	11/13/18
Hybrid Antenna	SunAR rf motion	JB3	PRE0181575	08/01/19	08/01/18
RF Amplifier	AMPLICAL	AMP1G18-35	T1571	07/30/19	07/30/18
RF Amplifier	AMPLICAL	AMP1G18-35	T1569	06/03/19	06/03/18
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	171460	08/01/19	08/01/18
RF Amplifier	SONOMA INST.	310	PRE0180175	07/09/19	07/09/18
RF Amplifier	SONOMA INST.	310	PRE0180174	05/31/19	05/31/18
Directional Coupler	Mini-Circuits	ZUDC10-183+	T1136	06/18/19	06/18/18
Wideband Communication Test Set, Call Box	R&S	CMW500	T703	02/20/20	02/20/19
Wideband Communication Test Set, Call Box	R&S	CMW500	T953	02/18/20	02/18/19
Wideband Communication Test Set, Call Box	R&S	CMW500	T1872	02/15/20	02/15/19
Wideband Communication Test Set, Call Box	R&S	CMW500	T948	02/18/20	02/18/19
Chamber, Environmental	Thermotron	SE-600-10-10	T80	05/01/19	11/01/18
Spectrum Analyzer	Agilent (Keysight) Technologies	E4440A	T200	01/28/20	01/28/19
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179375	05/08/19	05/08/18
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179372	05/04/19	05/04/18
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179367	04/25/19	04/25/18
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1454	01/25/20	01/25/19
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1466	04/16/19	04/16/18
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T917	01/24/20	01/24/19
DC power supply, 8 V @ 3 A or 15 V @ 2 A	Agilent / HP	E3610A	None	CNR	CNR
DC power supply 15V	Sprensen	XT15-4	T463	CNR	CNR
Power Meter	Keysight	N1911A	T1268	06/25/2019	06/25/2018
Power Meter	Keysight	N1911A	T1265	01/29/20	01/29/19
Power Sensor	Keysight	N1921A	T1228	07/10/2019	07/10/2018
Power Sensor	Keysight	N1921A	T1227	02/05/20	02/05/19

UL AUTOMATION SOFTWARE			
CLT Software	UL	UL RF	Ver 7.6, November 11, 2017
Power Measurement Software	UL	UL RF	Ver 2.2, June 2017

NOTES:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.