

MEASUREMENT REPORT
LTE

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


Date of Testing:
 6/14 - 6/29/2019
Test Site/Location:
 PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
 1M1907090118-03.A3L

FCC ID:	A3LSMF900F
APPLICANT:	Samsung Electronics Co., Ltd.



Application Type: Class II Permissive Change
Model: SM-F900F
EUT Type: Portable Handset
FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s): 27
Test Procedure(s): ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01,
Class II Permissive Change: Please see FCC change document
Original Grant Date: 4/11/2019

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 §2.947. 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



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T A B L E O F C O N T E N T S

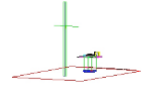
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FCC Part 27



Mode	FCC Rule Part	Tx Frequency (MHz)	EIRP		Modulation
			Max. Power (W)	Max. Power (dBm)	
LTE Band 38	27	2572.5 - 2617.5	0.239	23.79	QPSK
LTE Band 38	27	2572.5 - 2617.5	0.199	22.98	16QAM
LTE Band 38	27	2572.5 - 2617.5	0.162	22.10	64QAM
LTE Band 38	27	2575 - 2615	0.232	23.66	QPSK
LTE Band 38	27	2575 - 2615	0.178	22.51	16QAM
LTE Band 38	27	2575 - 2615	0.126	21.02	64QAM
LTE Band 38	27	2577.5 - 2612.5	0.222	23.47	QPSK
LTE Band 38	27	2577.5 - 2612.5	0.192	22.83	16QAM
LTE Band 38	27	2577.5 - 2612.5	0.146	21.65	64QAM
LTE Band 38	27	2580 - 2610	0.270	24.31	QPSK
LTE Band 38	27	2580 - 2610	0.206	23.13	16QAM
LTE Band 38	27	2580 - 2610	0.163	22.11	64QAM
LTE Band 41 (PC3)	27	2498.5 - 2687.5	0.246	23.91	QPSK
LTE Band 41 (PC3)	27	2498.5 - 2687.5	0.214	23.29	16QAM
LTE Band 41 (PC3)	27	2498.5 - 2687.5	0.159	22.00	64QAM
LTE Band 41 (PC3)	27	2501 - 2685	0.245	23.89	QPSK
LTE Band 41 (PC3)	27	2501 - 2685	0.213	23.27	16QAM
LTE Band 41 (PC3)	27	2501 - 2685	0.158	21.98	64QAM
LTE Band 41 (PC3)	27	2503.5 - 2682.5	0.248	23.94	QPSK
LTE Band 41 (PC3)	27	2503.5 - 2682.5	0.215	23.32	16QAM
LTE Band 41 (PC3)	27	2503.5 - 2682.5	0.160	22.03	64QAM
LTE Band 41 (PC3)	27	2506 - 2680	0.246	23.90	QPSK
LTE Band 41 (PC3)	27	2506 - 2680	0.196	22.91	16QAM
LTE Band 41 (PC3)	27	2506 - 2680	0.149	21.73	64QAM

EUT Overview (High Bands)

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.



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. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

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

- 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.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMF900F**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: 1424S, 1414S, 1417S

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE), NFC, ANT+, Wireless Power Transfer

LTE Band 41 (2496 - 2690 MHz) overlaps the entire frequency range of LTE Band 38 (2570 - 2620 MHz). Therefore, test data provided in this report covers Band 38 as well as Band 41.

This device uses a tuner circuit that dynamically updates the antenna impedance parameters to optimize antenna performance for certain bands and modes of operation. The tuner for this device was set to simulate a "free space" condition where the transmit antenna is matched to the medium into which it is transmitting and, thus, the power is at its maximum level.



2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

The EUT is capable of operating in folded closed and unfolded open configurations. The worst-case configuration for radiated emissions was determined from open and closed configurations in X, Y, and Z orientations for horizontal and vertical antenna polarizations. The worst case radiated emissions data is shown in this report.

2.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

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3.0 DESCRIPTION OF TESTS

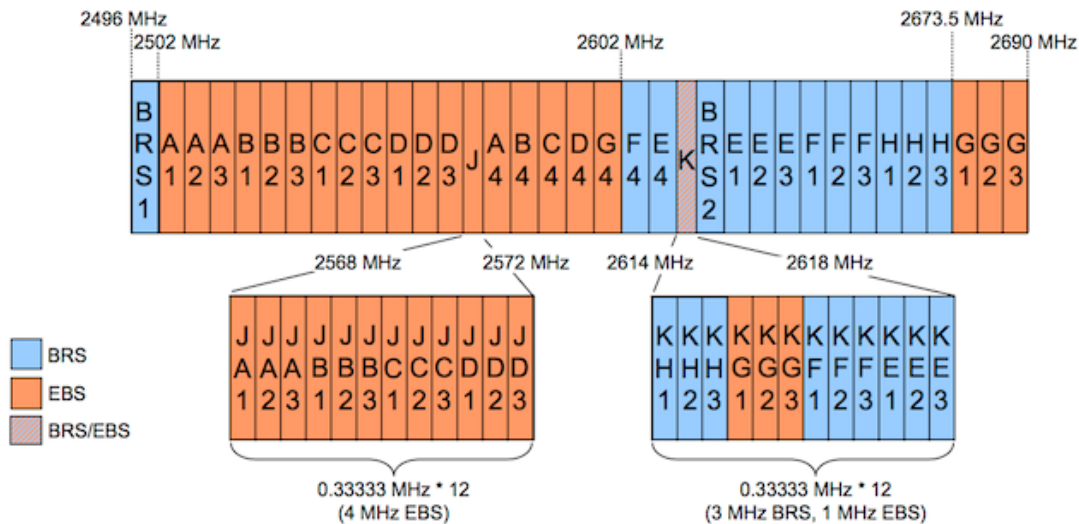
3.1 Measurement Procedure

The measurement procedures described in the document titled “Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards” (ANSI/TIA-603-E-2016) and “Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems” (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

3.2 Block C Frequency Range

Two paired channels of 11 megahertz each are available for assignment in Block C in the 746-757 MHz and 776-787 MHz bands. In the event that no licenses for two channels in this Block C are assigned based on the results of the first auction in which such licenses were offered because the auction results do not satisfy the applicable reserve price, the spectrum in the 746-757 MHz and 776-787 MHz bands will instead be made available for assignment at a subsequent auction as follows: (i) Two paired channels of 6 megahertz each available for assignment in Block C1 in the 746-752 MHz and 776-782 MHz bands. (ii) Two paired channels of 5 megahertz each available for assignment in Block C2 in the 752-757 MHz and 782-787 MHz bands.

3.3 BRS/EBS Frequency Block



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3.4 Radiated Power and Radiated Spurious Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer “Channel Power” function with the integration band set to the emissions’ occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.



Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_d [dBm] = P_g [dBm] - \text{cable loss [dB]} + \text{antenna gain [dBd/dBi]}$$

Where, P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_g [dBm] - \text{cable loss [dB]}$.

The calculated P_d levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of $43 + 10\log_{10}(\text{Power [Watts]})$. For Band 7 and 41, the calculated P_d levels are compared to the absolute spurious emission limit of -25dBm which is equivalent to the required minimum attenuation of $55 + 10\log_{10}(\text{Power [Watts]})$. For Band 30, the calculated P_d levels are compared to the absolute spurious emission limit of -40dBm which is equivalent to the required minimum attenuation of $70 + 10\log_{10}(\text{Power [Watts]})$.



All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 474788 D01.

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4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (\pm dB)
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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5.0 TEST EQUIPMENT CALIBRATION DATA



Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	LTx1	Licensed Transmitter Cable Set	6/4/2019	Annual	6/4/2020	LTx1
-	LTx2	Licensed Transmitter Cable Set	8/23/2018	Annual	8/23/2019	LTx2
Agilent	N9020A	MXA Signal Analyzer	4/20/2019	Annual	4/20/2020	US46470561
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	8/8/2018	Annual	8/8/2019	441128
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/9/2018	Biennial	8/9/2020	135427
ETS-Lindgren	3115	Double Ridged Guide Horn 750MHz - 18GHz	3/28/2018	Biennial	3/28/2020	150693
Keysight Technologie	N9020A	MXA Signal Analyzer	4/29/2019	Annual	4/29/2020	MY54500644
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			107826
Rohde & Schwarz	CMW500	Radio Communication Tester	11/14/2018	Annual	11/14/2019	100976
Rohde & Schwarz	CMW500	Radio Communication Tester	6/26/2019	Annual	6/26/2020	112347
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	6/5/2019	Annual	6/5/2020	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/9/2018	Annual	8/9/2019	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/18/2018	Annual	7/18/2019	102134
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107
Sunol	DRH-118	Horn Antenna (1-18 GHz)	8/11/2017	Biennial	8/11/2019	A042511

Table 5-1. Test Equipment

Notes:

1. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

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6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz
 G = Phase Modulation
 7 = Quantized/Digital Info
 D = Data transmission, telemetry, telecommand

QAM Modulation



Emission Designator = 8M45W7D

LTE BW = 8.45 MHz
 W = Amplitude/Angle Modulated
 7 = Quantized/Digital Info
 D = Data transmission, telemetry, telecommand

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm - (-24.80).

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7.0 TEST RESULTS

7.1 Summary



Company Name: Samsung Electronics Co., Ltd.
 FCC ID: A3LSMF900F
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
24.232(c) 27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 41/38)	< 2 Watts max. EIRP	Radiated	Pass	Section 7.2
27.53(m)	Undesirable Emissions (Band 41/38)	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.3
27.53(m)	Uplink Carrier Aggregation	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.4

Table 7-1. Summary of Radiated Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.

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7.2 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.



Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer’s “channel power” measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer’s “time domain power” measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW $\geq 3 \times$ RBW
4. Span = 1.5 times the OBW
5. No. of sweep points $\geq 2 \times$ span / RBW
6. Detector = RMS
7. Trigger is set to “free run” for signals with continuous operation with the sweep times set to “auto”. Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the “gating” function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

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Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

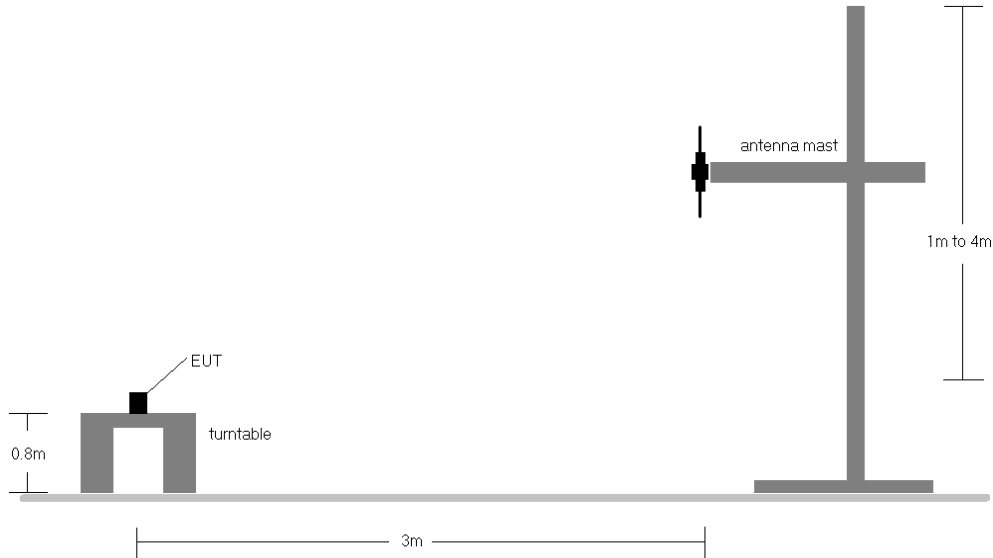


Figure 7-1. Radiated Test Setup <1GHz

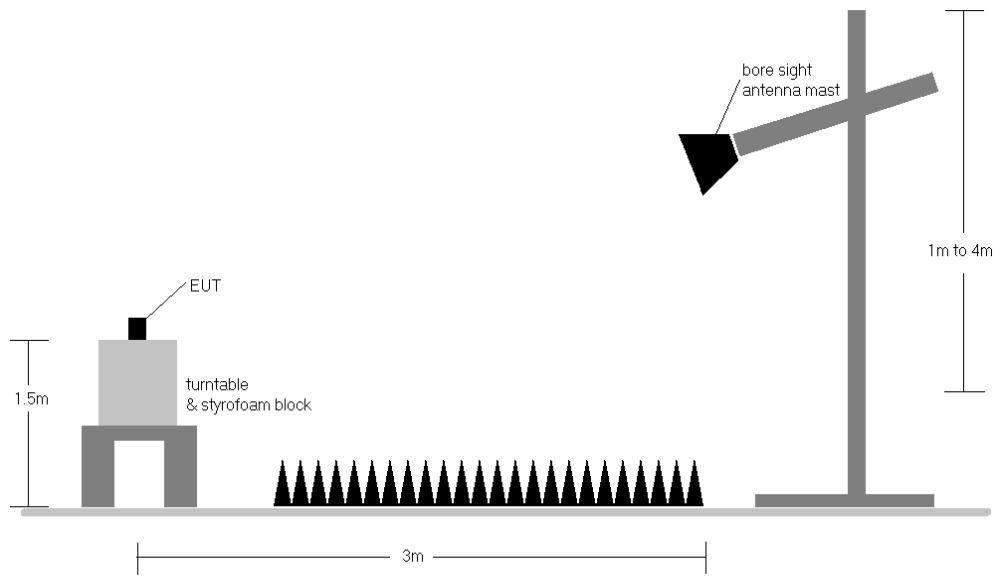






Figure 7-2. Radiated Test Setup >1GHz

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Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) The Class II Permissive Change test results reported herein are within the expected measurement tolerances of the original certification test results. It has been determined that the radiated powers did not change.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	EUT Configuration	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2498.50	5	QPSK	Open	H	100	353	1 / 24	14.48	9.43	23.91	0.246	33.01	-9.10
2502.50	5	QPSK	Open	H	102	193	1 / 24	11.87	9.43	21.30	0.135	33.01	-11.71
2593.00	5	QPSK	Open	H	105	143	1 / 0	13.88	9.55	23.43	0.220	33.01	-9.58
2687.50	5	QPSK	Open	H	100	333	1 / 24	9.52	9.82	19.33	0.086	33.01	-13.68
2498.50	5	16-QAM	Open	H	100	353	1 / 24	13.86	9.43	23.29	0.214	33.01	-9.72
2498.50	5	64-QAM	Open	H	100	353	1 / 24	12.57	9.43	22.00	0.159	33.01	-11.01
2501.00	10	QPSK	Open	H	100	353	1 / 49	14.46	9.43	23.89	0.245	33.01	-9.12
2505.00	10	QPSK	Open	H	102	193	1 / 49	11.82	9.43	21.25	0.133	33.01	-11.76
2593.00	10	QPSK	Open	H	105	143	1 / 0	13.88	9.55	23.43	0.220	33.01	-9.58
2685.00	10	QPSK	Open	H	100	333	1 / 49	9.33	9.82	19.15	0.082	33.01	-13.86
2501.00	10	16-QAM	Open	H	100	353	1 / 49	13.84	9.43	23.27	0.213	33.01	-9.74
2501.00	10	64-QAM	Open	H	100	353	1 / 49	12.55	9.43	21.98	0.158	33.01	-11.03
2503.50	15	QPSK	Open	H	100	353	1 / 74	14.52	9.43	23.94	0.248	33.01	-9.07
2507.50	15	QPSK	Open	H	102	193	1 / 74	11.88	9.42	21.30	0.135	33.01	-11.71
2593.00	15	QPSK	Open	H	105	143	1 / 0	13.81	9.55	23.36	0.217	33.01	-9.65
2682.50	15	QPSK	Open	H	100	333	1 / 74	9.28	9.83	19.10	0.081	33.01	-13.91
2503.50	15	16-QAM	Open	H	100	353	1 / 74	13.90	9.43	23.32	0.215	33.01	-9.69
2503.50	15	64-QAM	Open	H	100	353	1 / 74	12.61	9.43	22.03	0.160	33.01	-10.98
2506.00	20	QPSK	Open	H	100	353	1 / 99	14.48	9.42	23.90	0.246	33.01	-9.11
2510.00	20	QPSK	Open	H	102	193	1 / 99	11.84	9.42	21.26	0.134	33.01	-11.75
2593.00	20	QPSK	Open	H	105	143	1 / 0	13.73	9.55	23.28	0.213	33.01	-9.73
2680.00	20	QPSK	Open	H	100	333	1 / 99	9.28	9.83	19.11	0.082	33.01	-13.90
2506.00	20	16-QAM	Open	H	100	353	1 / 99	13.49	9.42	22.91	0.196	33.01	-10.10
2506.00	20	64-QAM	Open	H	100	353	1 / 99	12.31	9.42	21.73	0.149	33.01	-11.28
2503.50	15	QPSK	Open	V	121	388	1 / 49	12.24	9.42	21.66	0.147	33.01	-11.35
2503.50	5	QPSK	Closed	H	100	256	1 / 49	11.79	9.42	21.21	0.132	33.01	-11.80

Table 7-2. EIRP Data (Band 41 PC3)

FCC ID: A3LSMF900F		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1907090118-03.A3L	Test Dates: 6/14 - 6/29/2019	EUT Type: Portable Handset	Page 15 of 27	

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	EUT Configuration	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2572.50	5	QPSK	Open	H	100	161	1 / 0	14.36	9.43	23.79	0.239	33.01	-9.22
2595.00	5	QPSK	Open	H	111	148	1 / 24	13.38	9.55	22.93	0.196	33.01	-10.08
2617.50	5	QPSK	Open	H	109	164	1 / 24	13.50	9.82	23.32	0.215	33.01	-9.69
2572.50	5	16-QAM	Open	H	100	161	1 / 0	13.55	9.43	22.98	0.199	33.01	-10.03
2572.50	5	64-QAM	Open	H	100	161	1 / 0	12.67	9.43	22.10	0.162	33.01	-10.91
2575.00	10	QPSK	Open	H	100	165	1 / 49	14.23	9.43	23.66	0.232	33.01	-9.35
2595.00	10	QPSK	Open	H	101	258	1 / 49	13.18	9.55	22.73	0.188	33.01	-10.28
2615.00	10	QPSK	Open	H	100	155	1 / 49	13.41	9.82	23.23	0.210	33.01	-9.78
2575.00	10	16-QAM	Open	H	100	165	1 / 49	13.08	9.43	22.51	0.178	33.01	-10.50
2575.00	10	64-QAM	Open	H	100	165	1 / 49	11.59	9.43	21.02	0.126	33.01	-11.99
2577.50	15	QPSK	Open	H	100	167	1 / 74	14.05	9.42	23.47	0.222	33.01	-9.54
2595.00	15	QPSK	Open	H	103	154	1 / 74	13.29	9.55	22.84	0.192	33.01	-10.17
2612.50	15	QPSK	Open	H	111	153	1 / 74	13.37	9.83	23.20	0.209	33.01	-9.81
2577.50	15	16-QAM	Open	H	100	167	1 / 74	13.41	9.42	22.83	0.192	33.01	-10.18
2577.50	15	64-QAM	Open	H	100	167	1 / 74	12.23	9.42	21.65	0.146	33.01	-11.36
2580.00	20	QPSK	Open	H	100	140	1 / 0	14.81	9.50	24.31	0.270	33.01	-8.70
2595.00	20	QPSK	Open	H	101	195	1 / 99	13.68	9.56	23.24	0.211	33.01	-9.77
2610.00	20	QPSK	Open	H	104	158	1 / 99	13.34	9.65	22.99	0.199	33.01	-10.02
2580.00	20	16-QAM	Open	H	100	140	1 / 0	13.63	9.50	23.13	0.206	33.01	-9.88
2580.00	20	64-QAM	Open	H	100	140	1 / 0	12.61	9.50	22.11	0.163	33.01	-10.90
2580.00	20	QPSK	Open	V	286	284	1 / 0	14.46	9.50	23.96	0.249	33.01	-9.05
2580.00	20	QPSK	Open	H	111	156	1 / 0	12.08	9.50	21.58	0.144	33.01	-11.43

Table 7-3. EIRP Data (Band 38)

FCC ID: A3LSMF900F		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1907090118-03.A3L	Test Dates: 6/14 - 6/29/2019	EUT Type: Portable Handset	Page 16 of 27	

7.3 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.



Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $\geq 2 \times$ span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

FCC ID: A3LSMF900F		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1907090118-03.A3L	Test Dates: 6/14 - 6/29/2019	EUT Type: Portable Handset	Page 17 of 27	

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

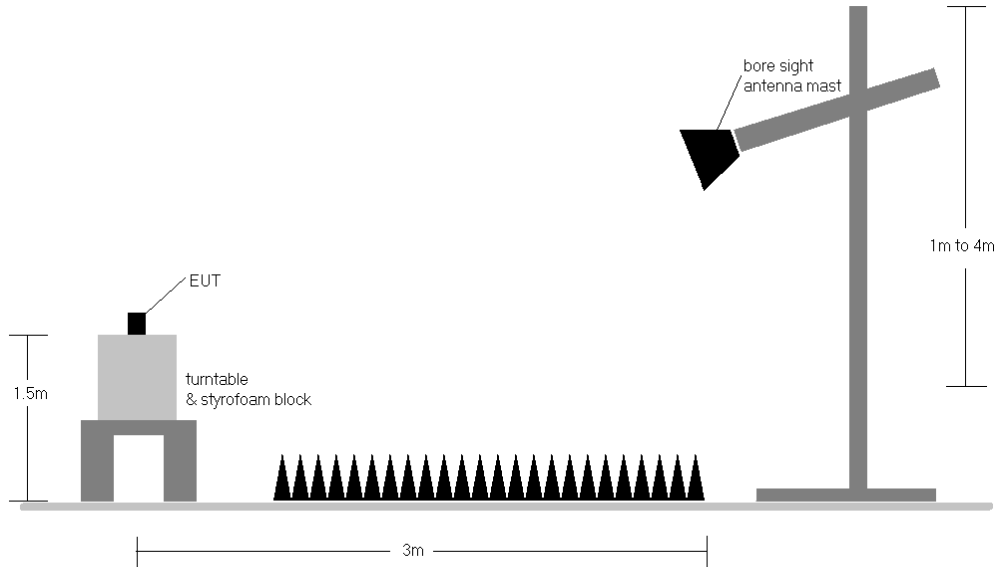




Figure 7-3. Test Instrument & Measurement Setup

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 4) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

FCC ID: A3LSMF900F		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1907090118-03.A3L	Test Dates: 6/14 - 6/29/2019	EUT Type: Portable Handset	Page 18 of 27	

Band 41PC3

OPERATING FREQUENCY: 2510.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5020.00	H	-	-	-70.95	10.88	-60.06	-35.1
7595.00	H	-	-	-67.29	11.23	-56.06	-31.1
10170.00	H	-	-	-66.37	12.09	-54.28	-29.3
12745.00	H	-	-	-65.75	13.63	-52.11	-27.1

Table 7-4. Radiated Spurious Data (Band 41 – Low Channel – OPEN)

OPERATING FREQUENCY: 2593.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.00	H	-	-	-70.41	10.74	-59.67	-34.7
7781.00	H	118	183	-62.91	11.44	-51.47	-26.5
10376.00	H	-	-	-67.48	12.42	-55.06	-30.1
12971.00	H	-	-	-65.99	13.29	-52.70	-27.7



Table 7-5. Radiated Spurious Data (Band 41 – Mid Channel – OPEN)

FCC ID: A3LSMF900F		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1907090118-03.A3L	Test Dates: 6/14 - 6/29/2019	EUT Type: Portable Handset		Page 19 of 27	

OPERATING FREQUENCY: 2680.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5360.00	H	-	-	-69.53	10.70	-58.83	-33.8
7975.00	H	117	222	-55.73	11.20	-44.52	-19.5
10590.00	H	-	-	-66.89	12.58	-54.31	-29.3
13205.00	H	-	-	-65.09	13.03	-52.06	-27.1

Table 7-6. Radiated Spurious Data (Band 41 – High Channel – OPEN)

FCC ID: A3LSMF900F		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1907090118-03.A3L	Test Dates: 6/14 - 6/29/2019	EUT Type: Portable Handset	Page 20 of 27	

Band 38

OPERATING FREQUENCY: 2580.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5160.00	H	157	33	-62.08	10.70	-51.38	-26.4
7740.00	H	195	24	-52.62	11.43	-41.19	-16.2
10320.00	H	-	-	-56.62	12.36	-44.26	-19.3

Table 7-7. Radiated Spurious Data (Band 38 – Low Channel – OPEN)

OPERATING FREQUENCY: 2595.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5190.00	H	120	330	-64.64	10.75	-53.89	-28.9
7785.00	H	252	287	-58.26	11.44	-46.82	-21.8
10380.00	H	-	-	-63.85	12.43	-51.42	-26.4



Table 7-8. Radiated Spurious Data (Band 38 – Mid Channel – OPEN)

FCC ID: A3LSMF900F		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1907090118-03.A3L	Test Dates: 6/14 - 6/29/2019	EUT Type: Portable Handset		Page 21 of 27	

OPERATING FREQUENCY: 2610.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5220.00	H	129	256	-61.84	10.74	-51.10	-26.1
7830.00	H	204	30	-48.09	11.35	-36.74	-11.7
10440.00	H	-	-	-56.85	12.57	-44.28	-19.3

Table 7-9. Radiated Spurious Data (Band 38 – High Channel – OPEN)

FCC ID: A3LSMF900F		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1907090118-03.A3L	Test Dates: 6/14 - 6/29/2019	EUT Type: Portable Handset	Page 22 of 27	

7.4 Uplink Carrier Aggregation Radiated Measurements

\$2.1053, \$27.53(m)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.



Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.8

ANSI/TIA-603-D-2010 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW \geq 3 x RBW
3. No. of sweep points \geq 2 x span / RBW
4. Detector = RMS
5. Trace mode = trace average for continuous emissions, max hold for pulse emissions
6. The trace was allowed to stabilize

FCC ID: A3LSMF900F		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1907090118-03.A3L	Test Dates: 6/14 - 6/29/2019	EUT Type: Portable Handset	Page 23 of 27	

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

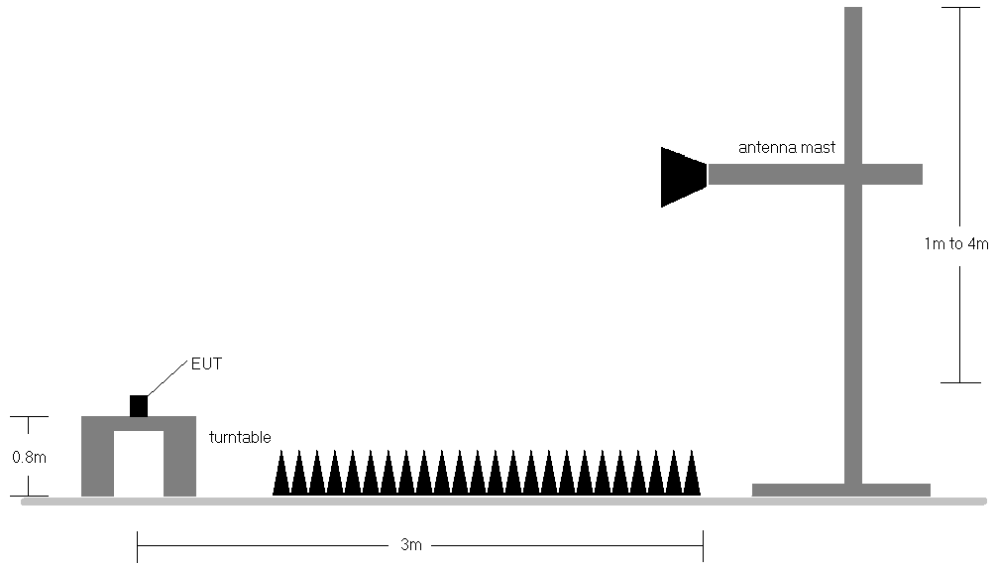




Figure 7-4. Test Instrument & Measurement Setup

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) Radiated spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. The worst case (highest) emissions were found while operating with QPSK modulation with both carriers set to transmit using 1RB.
- 4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 5) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 6) No significant emissions were found as a result of two uplink carriers operating contiguously.

FCC ID: A3LSMF900F		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1907090118-03.A3L	Test Dates: 6/14 - 6/29/2019	EUT Type: Portable Handset		Page 24 of 27

OPERATING FREQUENCY (PCC): 2577.50 MHz
 OPERATING FREQUENCY (SCC): 2592.50 MHz
 CHANNEL (PCC): 3800
 CHANNEL (SCC): 38150
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5155.00	H	-	-	-62.47	8.56	-53.91	-53.9
7732.50	H	-	-	-58.38	8.49	-49.89	-49.9
10310.00	H	-	-	-57.78	9.85	-47.93	-47.9

Table 7-7-10. Radiated Spurious Data (ULCA 38C PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Low Channel – Open)

OPERATING FREQUENCY (PCC): 2595.00 MHz
 OPERATING FREQUENCY (SCC): 2580.00 MHz
 CHANNEL (PCC): 38000
 CHANNEL (SCC): 37850
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5190.00	H	-	-	-64.44	8.70	-55.74	-55.7
7785.00	H	-	-	-59.91	8.69	-51.22	-51.2
10380.00	H	-	-	-57.17	9.62	-47.55	-47.6



Table 7-7-11. Radiated Spurious Data (ULCA 38C PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Mid Channel – Open)

FCC ID: A3LSMF900F		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1907090118-03.A3L	Test Dates: 6/14 - 6/29/2019	EUT Type: Portable Handset		Page 25 of 27	

OPERATING FREQUENCY (PCC): 2612.50 MHz
 OPERATING FREQUENCY (SCC): 2597.50 MHz
 CHANNEL (PCC): 38175
 CHANNEL (SCC): 38025
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5225.00	H	-	-	-62.87	8.70	-54.18	-54.2
7837.50	H	-	-	-60.03	8.95	-51.08	-51.1
10450.00	H	-	-	-55.41	9.32	-46.09	-46.1

Table 7-7-12. Radiated Spurious Data (ULCA 38C PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – High Channel – Open)

FCC ID: A3LSMF900F		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1907090118-03.A3L	Test Dates: 6/14 - 6/29/2019	EUT Type: Portable Handset	Page 26 of 27	

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMF900F** complies with all the requirements of Part 22, 24, & 27.27 of the FCC Rules for LTE operation only.

FCC ID: A3LSMF900F		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1907090118-03.A3L	Test Dates: 6/14 - 6/29/2019	EUT Type: Portable Handset		Page 27 of 27