



# PCTEST ENGINEERING LABORATORY, INC.

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## MEASUREMENT REPORT FCC Part 22, 24, & 27 LTE

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

**Date of Testing:**  
3/13 - 3/24/2017  
**Test Site/Location:**  
PCTEST Lab., Columbia, MD, USA  
**Test Report Serial No.:**  
1M1703100103-03.A3L

<b>FCC ID :</b>	<b>A3LSMG950N</b>
<b>APPLICANT:</b>	<b>SAMSUNG ELECTRONICS CO., LTD.</b>



**Application Type:** Class II Permissive Change  
**FCC Classification:** PCS Licensed Transmitter Held to Ear (PCE)  
**FCC Rule Part(s):** §2; §22; §24; §27  
**Test Procedure(s):** ANSI/TIA-603-D-2010, KDB 971168 D01 v02r02, KDB 648474 D03 v01r04  
**EUT Type:** Portable Handset  
**Model:** SM-G950N  
**Test Device Serial No.:** *identical prototype* [S/N: E3D12, E3D02]  
**Class II Permissive Change:** Please see FCC change document  
**Original Grant Date:** 3/10/2017

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

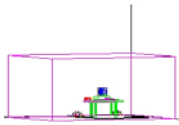


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## FCC Part 22, 24, & 27

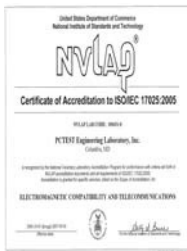
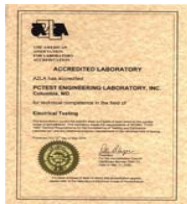


### §2.1033 General Information



**APPLICANT:** Samsung Electronics Co., Ltd.  
**APPLICANT ADDRESS:** 129, Samsung-ro,  
 Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea  
**TEST SITE:** PCTEST ENGINEERING LABORATORY, INC.  
**TEST SITE ADDRESS:** 7185 Oakland Mills Road, Columbia, MD 21045 USA  
**FCC RULE PART(S):** §2; §22; §24; §27  
**BASE MODEL:** SM-G950N  
**FCC ID:** A3LSMG950N  
**FCC CLASSIFICATION:** PCS Licensed Transmitter Held to Ear (PCE)  
**FREQUENCY TOLERANCE:** ±0.00025 % (2.5 ppm)  
**Test Device Serial No.:** E3D12, E3D02       Production     Pre-Production     Engineering  
**DATE(S) OF TEST:** 3/13 - 3/24/2017  
**TEST REPORT S/N:** 1M1703100103-03.A3L

### Test Facility / Accreditations

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



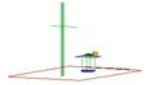
- PCTEST facility is an FCC registered (PCTEST Reg. No. 159966) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451B-1).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451B-1) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

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## MEASUREMENT REPORT

### FCC Part 22, 24, & 27



Mode	FCC Rule Part	Tx Frequency (MHz)	ERP/EIRP		Modulation
			Max. Power (W)	Max. Power (dBm)	
LTE Band 12/17	27	699.7 - 715.3	0.029	14.58	QPSK
LTE Band 12/17	27	699.7 - 715.3	0.022	13.46	16QAM
LTE Band 13	27	799.5 - 784.5	0.078	18.94	QPSK
LTE Band 13	27	799.5 - 784.5	0.061	17.87	16QAM
LTE Band 5/26	22H	824.7 - 848.3	0.094	19.75	QPSK
LTE Band 5/26	22H	824.7 - 848.3	0.074	18.71	16QAM
LTE Band 4	27	1710.7 - 1754.3	0.262	24.19	QPSK
LTE Band 4	27	1710.7 - 1754.3	0.205	23.11	16QAM
LTE Band 2/25	24E	1850.7 - 1909.3	0.146	21.65	QPSK
LTE Band 2/25	24E	1850.7 - 1909.3	0.113	20.54	16QAM
LTE Band 41	27	2498.5 - 2687.5	0.157	21.96	QPSK
LTE Band 41	27	2498.5 - 2687.5	0.123	20.89	16QAM

#### EUT Overview

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# 1.0 INTRODUCTION

## 1.1 Scope

Measurement and determination of electromagnetic emissions (EME) 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 Industry Canada Certification and Engineering Bureau.

## 1.2 Testing Facility

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Intern't'l (BWI) airport, the city of Baltimore and the Washington, DC area. (See Figure 1-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39° 10'23" N latitude and 76° 49'50" W longitude. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2014 on January 22, 2015.

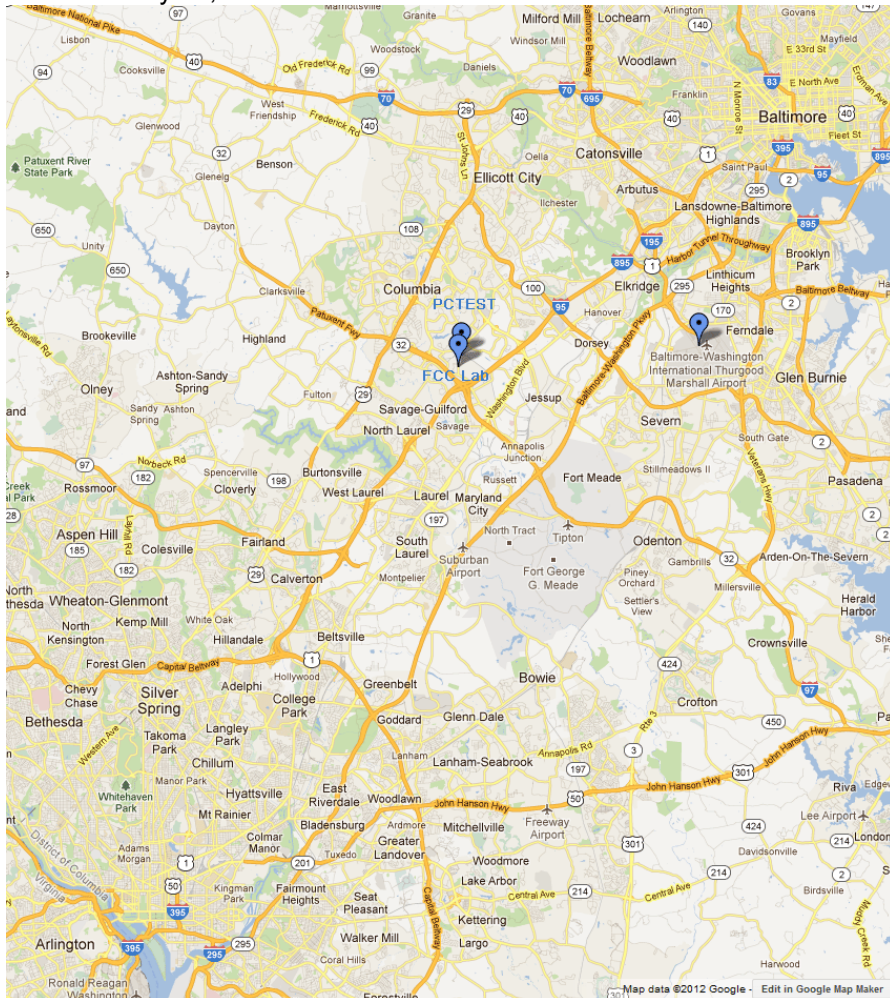


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMG950N**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

### 2.2 Device Capabilities

This device contains the following capabilities:

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

LTE Band 12 (698 - 716 MHz) overlaps the entire frequency range of LTE Band 17 (704 - 716 MHz). Therefore, test data provided in this report covers Band 17 as well as Band 12.

LTE Band 26 (814.7 – 849 MHz) overlaps the entire frequency range of LTE Band 5 (824 – 849 MHz). Therefore, test data provided in this report covers Band 5 and the portion of Band 26 subject to Part 22.

LTE Band 25 (1850 - 1915 MHz) overlaps the entire frequency range of LTE Band 2 (1850 - 1910 MHz). Therefore, test data provided in this report covers Band 2 as well as Band 25.



### 2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-D-2010 and KDB 971168 D01 v02r02. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on a certified wireless charging pad (WCP) while operating under normal conditions in a simulated call or data transmission configuration. 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-D-2010) and “Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems” (KDB 971168 D01 v02r02) were used in the measurement of the EUT.

### 3.1 Block C Frequency Range

#### §27.5(b)(3)

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.

### 3.2 Block A Frequency Range

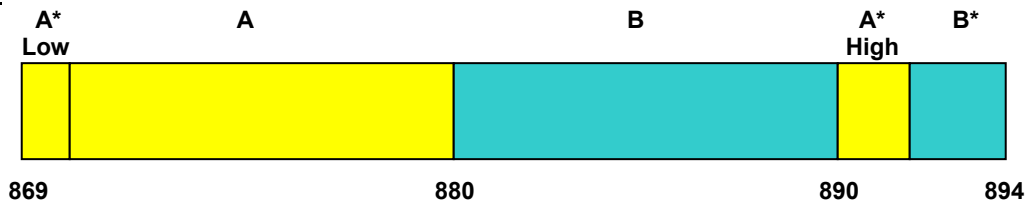
#### §27.5(c)

698-746 MHz band. The following frequencies are available for licensing pursuant to this part in the 698-746 MHz band: (1) Three paired channel blocks of 12 megahertz each are available for assignment as follows:

Block A: 698-704 MHz and 728-734 MHz;  
 Block B: 704-710 MHz and 734-740 MHz; and  
 Block C: 710-716 MHz and 740-746 MHz.



### 3.3 Cellular - Base Frequency Blocks

#### §22.905



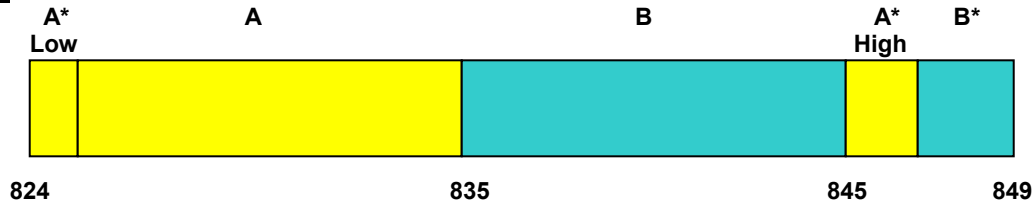
**BLOCK 1:** 869 – 880 MHz (A\* Low + A)  
**BLOCK 2:** 880 – 890 MHz (B)

**BLOCK 3:** 890 – 891.5 MHz (A\* High)  
**BLOCK 4:** 891.5 – 894 MHz (B\*)

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### 3.4 Cellular - Mobile Frequency Blocks

§22.905

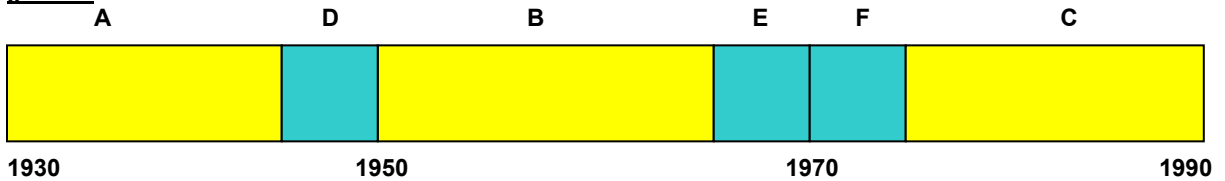


BLOCK 1: 824 – 835 MHz (A\* Low + A)  
 BLOCK 2: 835 – 845 MHz (B)

BLOCK 3: 845 – 846.5 MHz (A\* High)  
 BLOCK 4: 846.5 – 849 MHz (B\*)

### 3.5 PCS - Base Frequency Blocks

§24.229

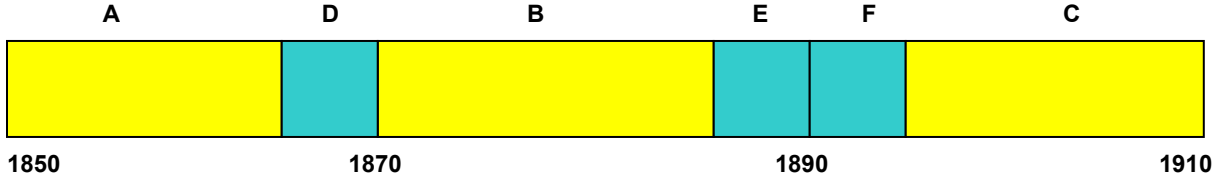


BLOCK 1: 1930 – 1945 MHz (A)  
 BLOCK 2: 1945 – 1950 MHz (D)  
 BLOCK 3: 1950 – 1965 MHz (B)

BLOCK 4: 1965 – 1970 MHz (E)  
 BLOCK 5: 1970 – 1975 MHz (F)  
 BLOCK 6: 1975 – 1990 MHz (C)

### 3.6 PCS - Mobile Frequency Blocks

§24.229

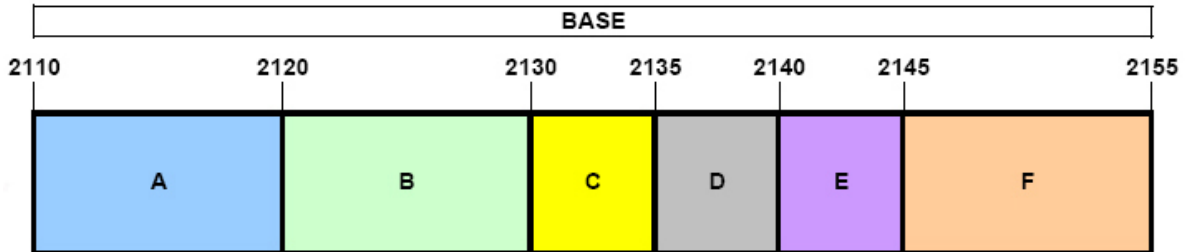


BLOCK 1: 1850 – 1865 MHz (A)  
 BLOCK 2: 1865 – 1870 MHz (D)  
 BLOCK 3: 1870 – 1885 MHz (B)

BLOCK 4: 1885 – 1890 MHz (E)  
 BLOCK 5: 1890 – 1895 MHz (F)  
 BLOCK 6: 1895 – 1910 MHz (C)

### 3.7 AWS - Base Frequency Blocks

§27.5(h)



BLOCK 1: 2110 – 2120 MHz (A)  
 BLOCK 2: 2120 – 2130 MHz (B)  
 BLOCK 3: 2130 – 2135 MHz (C)

BLOCK 4: 2135 – 2140 MHz (D)  
 BLOCK 5: 2140 – 2145 MHz (E)  
 BLOCK 6: 2145 – 2155 MHz (F)

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### 3.10 Radiated Power and Radiated Spurious Emissions

§2.1053 §22.913(a.2) §22.917(a) §24.232(c) §24.238(a) §27.50(b.10) §27.50(c.10) §27.50(d.4) §27.53(f) §27.53(g) §27.53(h) §27.53(m)

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. A 72.4cm high PVC support structure is placed on top of the turntable. A 3" (~7.6cm) sheet of high density polystyrene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm.



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 v02r02.

Per the guidance of ANSI/TIA-603-D-2010, 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:

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

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  $P_g \text{ [dBm]} - \text{cable loss [dB]}$ .



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  $43 + 10\log_{10}(\text{Power}_{\text{[Watts]}})$ . For Band 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  $55 + 10\log_{10}(\text{Power}_{\text{[Watts]}})$ .

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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 data shown herein meets or exceeds the  $U_{\text{CISPR}}$  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)
Conducted Bench Top Measurements	1.13
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 C63.5-2006.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	7/11/2016	Annual	7/11/2017	RE1
-	LTx3	Licensed Transmitter Cable Set	10/12/2016	Annual	10/12/2017	LTx3
Agilent	N9038A	MXE EMI Receiver	4/21/2016	Annual	4/21/2017	MY51210133
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	7/6/2016	Annual	7/6/2017	441119
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	7/11/2016	Annual	7/11/2017	441128
Emco	3115	Horn Antenna (1-18GHz)	3/10/2016	Biennial	3/10/2018	9704-5182
Emco	6502	Active Loop Antenna (10k - 30 MHz)	8/9/2016	Biennial	8/9/2018	2936
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/23/2016	Biennial	8/23/2018	135427
Espec	ESX-2CA	Environmental Chamber	4/4/2016	Annual	4/4/2017	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	4/26/2016	Biennial	4/26/2018	128337
K & L	13SH10-1000/U1000	N Type High Pass Filter	7/6/2016	Annual	7/6/2017	13SH10-1000/U1000-1
K & L	13SH10-1000/U1000	N Type High Pass Filter	7/11/2016	Annual	7/11/2017	13SH10-1000/U1000-2
K & L	11SH10-3075/U18000	High Pass Filter	7/11/2016	Annual	7/11/2017	11SH10-3075/U18000-2
K & L	11SH10-3075/U18000	High Pass Filter	7/6/2016	Annual	7/6/2017	11SH10-3075/U18000-1
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	4/4/2016	Annual	4/4/2017	11401010036
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Mini-Circuits	PWR-SENS-4RMS	USB Power Sensor	4/4/2016	Annual	4/4/2017	11210140001
Mini-Circuits	TVA-11-422	RF Power Amp	N/A			QA1303002
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11403100002
PCTEST	-	EMC Switch System	7/11/2016	Annual	7/11/2017	NM1
PCTEST	-	EMC Switch System	7/6/2016	Annual	7/6/2017	NM2
Rhode & Schwarz	TS-PR18	Pre-Amplifier	7/6/2016	Annual	7/6/2017	101622
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			100976
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	7/11/2016	Annual	7/11/2017	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	4/7/2016	Annual	4/7/2017	100040
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/16/2016	Annual	5/16/2017	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/15/2016	Annual	7/15/2017	100348
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	3/30/2016	Biennial	3/30/2018	9105-2404
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/2/2016	Biennial	3/2/2018	N/A
Sunol	DRH-118	Horn Antenna (1-18GHz)	7/30/2015	Biennial	7/30/2017	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	3/14/2016	Biennial	3/14/2018	A051107

**Table 5-1. Test Equipment**

**Notes:**

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
2. 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

### Spurious Radiated Emission – LTE Band

#### **Example: Middle Channel LTE Mode 2<sup>nd</sup> 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: A3LSMG950N  
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)  
 Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Result	Reference
22.913(a.2)	Effective Radiated Power (Band 5, 26)	< 7 Watts max. ERP	RADIATED	PASS	Section 7.2
27.50(b.10) 27.50(c.10)	Effective Radiated Power (Band 12, 13, 17)	< 3 Watts max. ERP		PASS	Section 7.2
24.232(c) 27.50(h.2)	Equivalent Isotropic Radiated Power (Band 2, 25, 41)	< 2 Watts max. EIRP		PASS	Section 7.2
27.50(d.4)	Equivalent Isotropic Radiated Power (Band 4)	< 1 Watts max. EIRP		PASS	Section 7.2
2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	Undesirable Emissions	> 43 + 10log <sub>10</sub> (P[Watts]) for all out-of-band emissions		PASS	Section 7.3
27.53(f)	Undesirable Emissions (Band 13)	< -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions less than 700Hz BW) For all emissions in the band 1559 – 1610 MHz		PASS	Section 7.3
27.53(m)	Undesirable Emissions	> 43 + 10log <sub>10</sub> (P[Watts]) at channel edges > 55 + 10log <sub>10</sub> (P[Watts]) at 5.5MHz away and beyond channel edges		PASS	Section 7.3

**Table 7-1. Summary of Test Results**

**Note:**

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)

§22.913(a.2) §24.232(c.2) §27.50(h.2) §27.50(b.10) §27.50(c.10) §27.50(d.4)

### Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) 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 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 v02r02 – Section 5.2.1

ANSI/TIA-603-D-2010 – Section 2.2.17

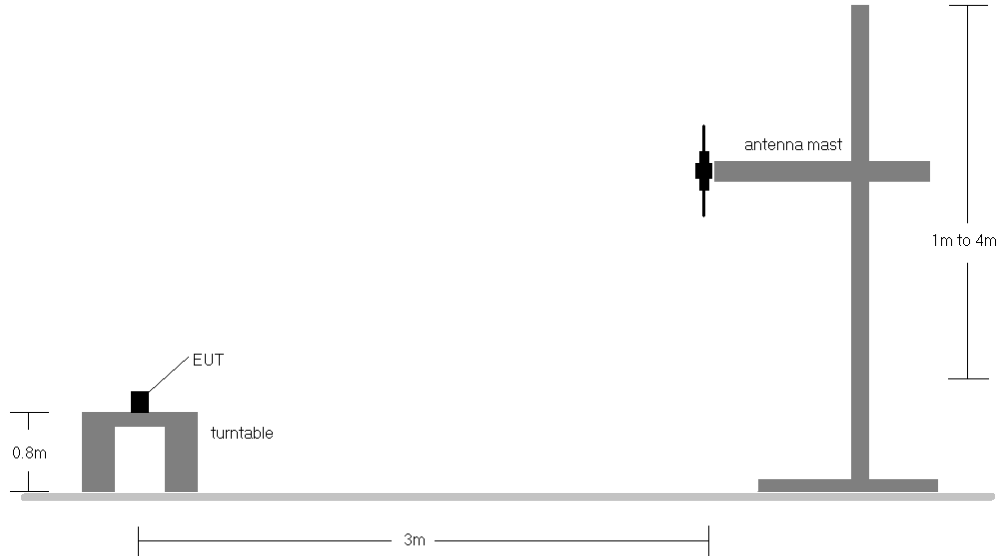
### Test Settings

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

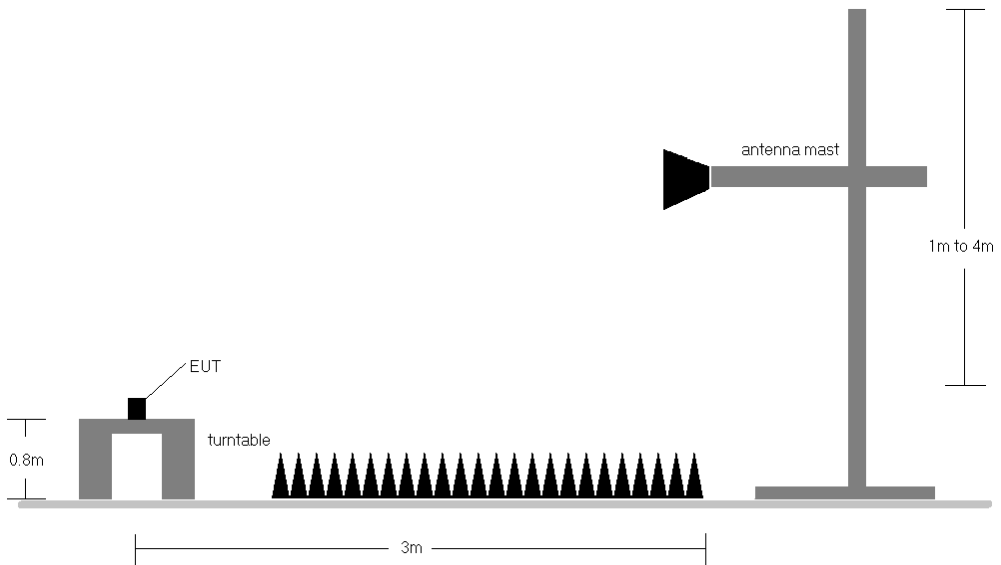
FCC ID: A3LSMG950N		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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### Test Setup

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**

### 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.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
701.50	5	QPSK	H	240	207	1 / 24	12.09	2.49	14.58	34.77	-20.19
707.50	5	QPSK	H	242	197	1 / 24	11.80	2.56	14.36	34.77	-20.41
713.50	5	QPSK	H	204	221	1 / 0	11.06	2.60	13.66	34.77	-21.11
701.50	5	16-QAM	H	240	207	1 / 24	10.97	2.49	13.46	34.77	-21.31
701.50	5	QPSK	V	184	122	1 / 24	10.11	2.49	12.60	34.77	-22.17
701.50	5 (WCP)	QPSK	H	207	205	1 / 24	11.88	2.49	14.37	34.77	-20.40



**Table 7-2. ERP Data (Band 12/17)**

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
779.50	5	QPSK	H	100	269	1 / 12	16.33	2.47	18.80	34.77	-15.97
782.00	5	QPSK	H	100	271	1 / 0	16.40	2.54	18.94	34.77	-15.83
784.50	5	QPSK	H	239	283	1 / 12	16.13	2.63	18.76	34.77	-16.01
782.00	5	16-QAM	H	100	271	1 / 0	15.33	2.54	17.87	34.77	-16.90
782.00	5	QPSK	V	123	114	1 / 0	14.72	2.54	17.26	34.77	-17.51
782.00	5 (WCP)	QPSK	H	100	278	1 / 0	14.58	2.54	17.12	34.77	-17.65

**Table 7-3. ERP Data (Band 13)**

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
826.50	5	QPSK	H	223	279	1 / 24	14.24	5.51	19.75	38.45	-18.70
836.50	5	QPSK	H	100	266	1 / 24	13.27	5.14	18.41	38.45	-20.04
846.50	5	QPSK	H	100	108	1 / 12	11.78	4.66	16.44	38.45	-22.01
826.50	5	16-QAM	H	223	279	1 / 24	13.20	5.51	18.71	38.45	-19.74
826.50	5	QPSK	V	167	102	1 / 74	12.99	5.51	18.50	38.45	-19.95
826.50	5 (WCP)	QPSK	H	202	64	1 / 0	11.62	5.51	17.13	38.45	-21.32

**Table 7-4. ERP Data (Band 5/26)**

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turtable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1712.50	5	QPSK	H	110	10	1 / 12	14.58	9.61	24.19	30.00	-5.81
1732.50	5	QPSK	H	108	6	1 / 0	14.25	9.50	23.75	30.00	-6.25
1752.50	5	QPSK	H	100	12	1 / 24	13.39	9.39	22.78	30.00	-7.22
1712.50	5	16-QAM	H	110	10	1 / 12	13.50	9.61	23.11	30.00	-6.89
1712.50	5	QPSK	V	207	143	1 / 12	12.30	9.50	21.80	30.00	-8.20
1712.50	5 (WCP)	QPSK	H	100	10	1 / 12	13.30	9.50	22.80	30.00	-7.20



**Table 7-5. EIRP Data (Band 4)**

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turtable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1851.50	3	QPSK	H	100	0	1 / 0	12.45	9.12	21.57	33.01	-11.44
1880.00	3	QPSK	H	100	0	1 / 0	12.55	9.10	21.65	33.01	-11.36
1908.50	3	QPSK	H	100	23	1 / 0	12.40	9.15	21.55	33.01	-11.46
1880.00	3	16-QAM	H	100	0	1 / 0	11.44	9.10	20.54	33.01	-12.47
1880.00	3	QPSK	V	126	51	1 / 0	12.27	9.10	21.37	33.01	-11.64
1880.00	3 (WCP)	QPSK	H	100	24	1 / 0	12.00	9.10	21.10	33.01	-11.91

**Table 7-6. EIRP Data (Band 2/25)**

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turtable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
2498.50	5	QPSK	H	100	209	1 / 0	13.54	8.42	21.96	33.01	-11.05
2593.00	5	QPSK	H	100	212	1 / 0	12.35	8.65	21.00	33.01	-12.01
2687.50	5	QPSK	H	100	212	1 / 0	13.35	8.44	21.79	33.01	-11.22
2498.50	5	16-QAM	H	100	209	1 / 0	12.47	8.42	20.89	33.01	-12.12
2498.50	5	QPSK	V	130	44	1 / 0	11.32	8.42	19.74	33.01	-13.27
2498.50	5 (WCP)	QPSK	H	100	212	1 / 0	10.75	8.42	19.17	33.01	-13.84

**Table 7-7. EIRP Data (Band 41)**

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## 7.3 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(c) §27.53(f) §27.53(g) §27.53(h) §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

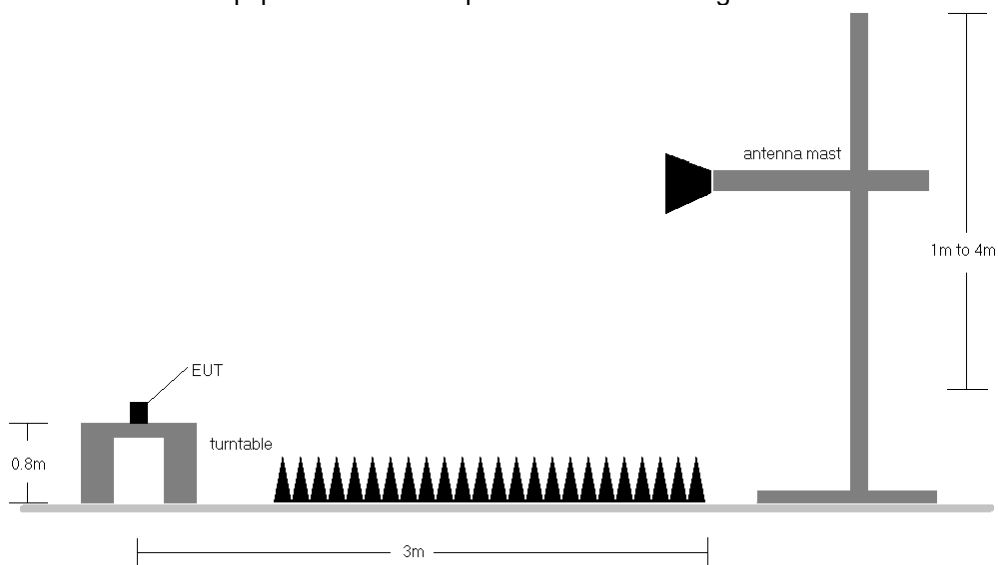
### Test Settings

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

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OPERATING FREQUENCY: 701.50 MHz  
 CHANNEL: 23035  
 MEASURED OUTPUT POWER: 14.58 dBm = 0.029 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  27.58 dBc



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1403.00	H	-	-	-68.03	5.92	-62.11	76.7
2104.50	H	-	-	-67.63	6.80	-60.83	75.4
2806.00	H	-	-	-64.21	8.12	-56.09	70.7

**Table 7-8. Radiated Spurious Data (Band 12/17 – Low Channel)**

OPERATING FREQUENCY: 701.50 MHz  
 CHANNEL: 23035  
 MEASURED OUTPUT POWER: 14.37 dBm = 0.027 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  27.37 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1403.00	H	-	-	-70.58	5.92	-64.66	79.0
2104.50	H	-	-	-69.00	6.80	-62.20	76.6
2806.00	H	-	-	-66.92	8.12	-58.80	73.2

**Table 7-9. Radiated Spurious Data with WCP (Band 12/17 – Low Channel)**

FCC ID: A3LSMG950N		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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OPERATING FREQUENCY: 782.00 MHz  
 CHANNEL: 23230  
 MEASURED OUTPUT POWER: 18.94 dBm = 0.078 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  31.94 dBc



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
2346.00	H	100	162	-63.37	7.00	-56.37	75.3
3128.00	H	-	-	-62.02	7.21	-54.81	73.7
3910.00	H	-	-	-64.55	7.15	-57.40	76.3

**Table 7-10. Radiated Spurious Data (Band 13 – Mid Channel)**

MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.00 MHz  
 DISTANCE: 3 meters  
 NARROWBAND EMISSION LIMIT: -50 dBm  
 WIDEBAND EMISSION LIMIT: -40 dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	H	-	-	-68.50	6.41	-62.09	-22.1

**Table 7-11. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)**

FCC ID: A3LSMG950N		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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OPERATING FREQUENCY: 782.00 MHz  
 CHANNEL: 23230  
 MEASURED OUTPUT POWER: 17.12 dBm = 0.052 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  30.12 dBc



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
2346.00	H	267	162	-62.49	7.00	-55.49	72.6
3128.00	H	-	-	-62.75	7.21	-55.54	72.7
3910.00	H	-	-	-65.23	7.15	-58.08	75.2

**Table 7-12. Radiated Spurious Data with WCP (Band 13 – Mid Channel)**

MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.00 MHz  
 DISTANCE: 3 meters  
 NARROWBAND EMISSION LIMIT: -50 dBm  
 WIDEBAND EMISSION LIMIT: -40 dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	H	-	-	-69.59	6.41	-63.18	-23.2

**Table 7-13. Radiated Spurious Data with WCP (Band 13 – 1559-1610MHz Band)**

FCC ID: A3LSMG950N		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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OPERATING FREQUENCY: 1712.50 MHz  
 CHANNEL: 19975  
 MEASURED OUTPUT POWER: 24.19 dBm = 0.262 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  37.19 dBc



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]	[dBc]
3425.00	H	-	-	-62.76	9.65	-53.11	77.3
5137.50	H	-	-	-64.51	10.91	-53.60	77.8
6850.00	H	-	-	-58.11	10.78	-47.33	71.5

**Table 7-14. Radiated Spurious Data (Band 4 – Low Channel)**

OPERATING FREQUENCY: 1712.50 MHz  
 CHANNEL: 19975  
 MEASURED OUTPUT POWER: 22.80 dBm = 0.191 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  35.80 dBc

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]	[dBc]
3425.00	H	-	-	-61.98	9.65	-52.33	75.1
5137.50	H	-	-	-64.60	10.91	-53.69	76.5
6850.00	H	-	-	-58.82	10.78	-48.04	70.8

**Table 7-15. Radiated Spurious Data with WCP (Band 4 – Low Channel)**

FCC ID: A3LSMG950N		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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OPERATING FREQUENCY: 1880.00 MHz  
 CHANNEL: 18900  
 MEASURED OUTPUT POWER: 21.65 dBm = 0.146 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 3.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  34.65 dBc



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]	[dBc]
3760.00	H	-	-	-66.87	9.79	-57.08	78.7
5640.00	H	-	-	-65.29	11.35	-53.94	75.6
7520.00	H	-	-	-59.27	11.22	-48.05	69.7

**Table 7-16. Radiated Spurious Data (Band 2/25 – Mid Channel)**

OPERATING FREQUENCY: 1880.00 MHz  
 CHANNEL: 18900  
 MEASURED OUTPUT POWER: 21.10 dBm = 0.129 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 3.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  34.10 dBc

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]	[dBc]
3760.00	H	-	-	-66.43	9.79	-56.64	77.7
5640.00	H	-	-	-64.73	11.35	-53.38	74.5
7520.00	H	-	-	-59.21	11.22	-47.99	69.1

**Table 7-17. Radiated Spurious Data with WCP (Band 2/25 – Mid Channel)**

FCC ID: A3LSMG950N		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1703100103-03.A3L	Test Dates: 3/13 - 3/24/2017	EUT Type: Portable Handset	Page 25 of 27	

OPERATING FREQUENCY: 2498.50 MHz  
 CHANNEL: 39675  
 MEASURED OUTPUT POWER: 21.96 dBm = 0.157 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $55 + 10 \log_{10}(W)$  46.96 dBc



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]	[dBc]
4997.00	H	100	212	-63.35	11.19	-52.15	74.1
7495.50	H	-	-	-59.12	11.14	-47.98	69.9
9994.00	H	100	117	-56.99	12.55	-44.44	66.4

**Table 7-18. Radiated Spurious Data (Band 41 – Low Channel)**

OPERATING FREQUENCY: 2498.50 MHz  
 CHANNEL: 39675  
 MEASURED OUTPUT POWER: 19.17 dBm = 0.083 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 5.0 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $55 + 10 \log_{10}(W)$  44.17 dBc



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]	[dBc]
4997.00	H	100	134	-64.41	11.19	-53.21	72.4
7495.50	H	-	-	-58.77	11.14	-47.63	66.8
9994.00	H	100	104	-53.79	12.55	-41.24	60.4

**Table 7-19. Radiated Spurious Data with WCP (Band 41 – Low Channel)**

FCC ID: A3LSMG950N		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1703100103-03.A3L	Test Dates: 3/13 - 3/24/2017	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: A3LSMG950N** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

FCC ID: A3LSMG950N	 <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>			<b>Approved by:</b> Quality Manager
<b>Test Report S/N:</b> 1M1703100103-03.A3L	<b>Test Dates:</b> 3/13 - 3/24/2017	<b>EUT Type:</b> Portable Handset	Page 27 of 27	