

PCTEST ENGINEERING LABORATORY, INC.

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**MEASUREMENT REPORT** 

FCC Part 22 & 90

### Applicant Name:

FCC ID:

APPLICANT:

Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea Date of Testing: 04/04/2019 - 05/15/2019 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1904030051-04.A3L

# A3LSMA102U

Samsung Electronics Co., Ltd.

Application Type:	Certification
Model:	SM-A102U
EUT Type:	Portable Handset
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part:	§2.1049, §22(H), §90(S), §90(R)
Test Procedure(s):	ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01

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.





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# MEASUREMENT REPORT FCC Part 22(H) & 90

Mode	Tx Frequency (MHz)	Measurement	Max. Power (W)	Max. Power (dBm)	Emission Designator	Modulation
LTE Band 14	790.5 - 795.5	ERP	0.105	20.22	4M56G7D	QPSK
LTE Band 14	790.5 - 795.5	ERP	0.084	19.23	4M57W7D	16-QAM
LTE Band 14	790.5 - 795.5	ERP	0.065	18.10	4M55W7D	64-QAM
LTE Band 14	793	ERP	0.100	19.99	9M06G7D	QPSK
LTE Band 14	793	ERP	0.078	18.93	9M04W7D	16-QAM
LTE Band 14	793	ERP	0.063	17.96	9M05W7D	64-QAM
CDMA800 (BC10)	817.9 - 823.1	Conducted	0.262	24.19	1M28F9W	CDMA
LTE Band 26	814.7 - 823.3	Conducted	0.296	24.72	1M08G7D	QPSK
LTE Band 26	814.7 - 823.3	Conducted	0.240	23.80	1M09W7D	16-QAM
LTE Band 26	814.7 - 823.3	Conducted	0.186	22.69	1M08W7D	64-QAM
LTE Band 26	815.5 - 822.5	Conducted	0.295	24.70	2M70G7D	QPSK
LTE Band 26	815.5 - 822.5	Conducted	0.233	23.68	2M71W7D	16-QAM
LTE Band 26	815.5 - 822.5	Conducted	0.189	22.77	2M70W7D	64-QAM
LTE Band 26	816.5 - 821.5	Conducted	0.295	24.70	4M52G7D	QPSK
LTE Band 26	816.5 - 821.5	Conducted	0.234	23.70	4M52W7D	16-QAM
LTE Band 26	816.5 - 821.5	Conducted	0.183	22.62	4M52W7D	64-QAM
LTE Band 26	819	Conducted	0.299	24.75	9M03G7D	QPSK
LTE Band 26	819	Conducted	0.233	23.67	9M01W7D	16-QAM
LTE Band 26	819	Conducted	0.185	22.66	9M02W7D	64-QAM
LTE Band 26	821.5	Conducted	0.287	24.58	13M5G7D	QPSK
LTE Band 26	821.5	Conducted	0.232	23.66	13M4W7D	16-QAM
LTE Band 26	821.5	Conducted	0.183	22.63	13M4W7D	64-QAM
LTE Band 26	821.5	ERP	0.052	17.12	13M5G7D	QPSK
LTE Band 26	821.5	ERP	0.041	16.10	13M4W7D	16-QAM
LTE Band 26	821.5	ERP	0.033	15.14	13M4W7D	64-QAM

**EUT Overview** 

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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: A3LSMA102U**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 90(R), 22(H) and 90(S).

Test Device Serial No.: 10272, 12411, 12106, 10223

### 2.2 Device Capabilities

This device contains the following capabilities:

800/850/1900 CDMA/EvDO Rev0/A, 1x Advanced (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE)

## 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.

## 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 Evaluation 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 Radiated Power and Radiated Spurious Emissions

### §2.1053, §90.635, §90(S), §90(R)

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 wooden turntable 80cm above the ground plane and 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:

 $P_{d [dBm]} = P_{g [dBm]} - cable loss [dB] + antenna gain [dBd/dBi]$ 

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  $P_{g [dBm]}$  – 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<sub>10</sub>(Power [Watts]) specified in 90(S).

For fundamental radiated power measurements, the guidance of KDB 971168 D01 v03r01 is used to record the EUT power level that is subsequently matched via the aforementioned substitution method given in ANSI/TIA-603-E-2016.

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  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±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 C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	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
Agilent	N9030A	PXA Signal Analyzer (44GHz)	5/25/2018	Annual	5/25/2019	MY52350166
Anritsu	MT8821C	Radio Communication Analyzer	7/24/2018	Annual	7/24/2019	6201664756
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	9/17/2018	Annual	9/17/2019	441119
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
Espec	ESX-2CA	Environmental Chamber	4/28/2018	Annual	4/28/2019	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/28/2018	Biennial	3/28/2020	128337
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	4/19/2019	Annual	4/19/2020	11401010036
Mini Circuits	TVA-11-422	RF Power Amp		N/A		QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator		N/A		11208010032
Rohde & Schwarz	CMW500	Radio Communication Tester	9/25/2018	Annual	9/25/2019	102060
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/21/2018	Annual	5/21/2019	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/9/2018	Annual	8/9/2019	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/18/2018	Annual	6/18/2019	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/25/2018	Annual	6/25/2019	102133
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	7/16/2018	Biennial	7/16/2020	101073
Seekonk	NC-100	Torque Wrench	5/9/2018	Biennial	5/9/2020	22217
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	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

## Emission Designator

### Emission Designator = 1M25F9W

CDMA BW = 1.25 MHz F = Frequency Modulation 9 = Composite Digital Info W = Combination (Audio/Data) (Measured at the 99.75% power bandwidth)

### Spurious Radiated Emission – BC10

### Example: Channel 476 CDMA BC10 Mode 3rd Harmonic (2453.70MHz)

The average spectrum analzyer 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 analzyer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 2453.70 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) = 50.3 dBc.

### **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 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:	A3LSMA102U
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	<u>CDMA / EvDO / LTE</u>
Band:	Band Class 10 / Band 26 / Band 14

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A		PASS	Section 7.2
2.1051 90.691 90.543	Conducted Band Edge / Spurious Emissions	On all frequencies between 769- 775 MHz and 799-805 MHz, attenuation by a factor not less than 65 + 10 log(P) dB in a 6.25 kHz band segment, for mobile and portable stations. (LTE B14) On any frequency between 775- 788 MHz, above 805 MHz, and below 758 MHz, attenuation by at least 43 + 10 log(P) dB. (LTE B14) > 43 + 10 log <sub>10</sub> (P[Watts]) for all out-of-band emissions except > 50 + 10 log <sub>10</sub> (P[Watts]) at Band Edge and for all out-of- band emissions within 37.5kHz of Block Edge. (CDMA BC10 and LTE B26)	CONDUCTED	PASS	Sections 7.3, 7.4
2.1055 90.213	Frequency Stability	< 2.5 ppm		PASS	Section 7.8
2.1046 90.635	Conducted Power	< 100 Watts		PASS	Section 7.5
22.913(a.2)	Effective Radiated Power (Band 26)	< 7 Watts max. ERP		PASS	Section 7.6
90.542(a)(7)	Effective Radiated Power (Band 14)	< 3 Watts max. ERP	RADIATED	PASS	Section 7.6
2.1053 90.691 90.543	Radiated Spurious Emissions	> 43 + 10 log <sub>10</sub> (P[Watts]) for all out-of-band emissions except     adiated Spurious     > 50 + 10 log <sub>10</sub> (P[Watts]) at		PASS	Section 7.7

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

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#### Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in Section 7.0 were taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "2G/3G Automation," Version 3.9.

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# 7.2 Occupied Bandwidth §2.1049

### **Test Overview**

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

### **Test Procedure Used**

KDB 971168 D01 v03r01 - Section 4.2

### **Test Settings**

- 1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 1 5% of the expected OBW
- 3. VBW  $\geq$  3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize
- 8. If necessary, steps 2 7 were repeated after changing the RBW such that it would be within

1-5% of the 99% occupied bandwidth observed in Step 7

### Test Setup

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



Figure 7-1. Test Instrument & Measurement Setup

### Test Notes

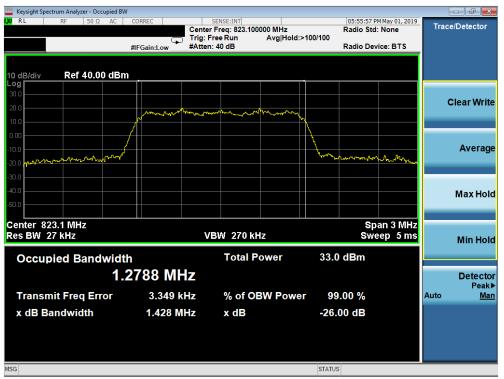
### None.

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www.www.com analyzer - Occupied BW						ð X
XX RL RF 50Ω AC	Center Trig: F	SENSE:INT Freq: 817.900000 MHz free Run Avg Hold: : 40 dB	Radio Std:		Trace/Det	ector
10 dB/div Ref 40.00 dBm						
30.0 20.0 10.0	man was seen as the second	mmmmmmm			Clea	r Write
-10.0 -20.0			han hanna	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	A	/erage
-30.0					Ma	x Hold
Center 817.9 MHz Res BW 27 kHz	v	BW 270 kHz		an 3 MHz ep 5 ms	Mi	n Holo
Occupied Bandwidt	h	Total Power	32.8 dBm			
	2727 MHz				De	etectoi Peak≱
Transmit Freq Error	-360 Hz	% of OBW Powe	r 99.00 %		Auto	Mar
x dB Bandwidth	1.428 MHz	x dB	-26.00 dB			
MSG			STATUS			





### Plot 7-2. Occupied Bandwidth Plot (Ch. 684)

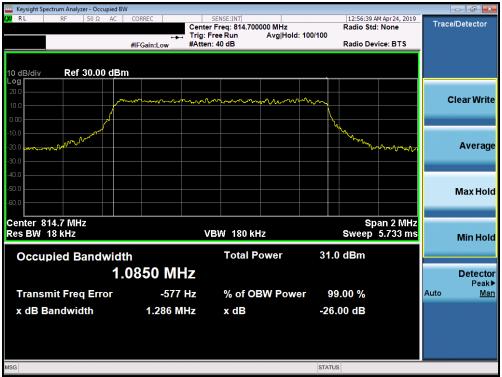
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# LTE Band 26



Plot 7-3. Occupied Bandwidth Plot (LTE Band 26, 1.4MHz QPSK – RB Size 6– Low Channel)



Plot 7-4. Occupied Bandwidth Plot (LTE Band 26, 1.4MHz 16-QAM - RB Size 6- Low Channel)

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Plot 7-5. Occupied Bandwidth Plot (LTE Band 26, 1.4MHz 64-QAM – RB Size 6– Low Channel)



Plot 7-6. Occupied Bandwidth Plot (LTE Band 26, 3MHz QPSK – RB Size 15– Low Channel)

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RL     RF     50 Ω     AC	CORREC Ce		Radio Sto d: 100/100	1: None	☐ ि <mark>—</mark> —
	#IFGain:Low #A	Atten: 40 dB	Radio De	vice: BTS	
0 dB/div Ref 30.00 dE	m				
.og					
10.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Amman Marine	m		Clear Writ
0.00					
1. A A A A A A A A A A A A A A A A A A A			N.		
10.0			Mr.		Averag
20.0 Horrand			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1 March	Averag
30.0					
40.0					
50.0					Max Hol
60.0					
Center 815.5 MHz			er	an 5 MHz	
Res BW 47 kHz		VBW 470 kHz		2.133 ms	Min Hol
					MITHO
Occupied Bandwid	lth	Total Power	31.5 dBm		
2	.7079 MHz				Detecto
				_	Peak
Transmit Freq Error	-1.479 kHz	% of OBW Pow	ver 99.00 %	Au	ito <u>Ma</u>
x dB Bandwidth	3.076 MHz	x dB	-26.00 dB		

Plot 7-7. Occupied Bandwidth Plot (LTE Band 26, 3MHz 16-QAM - RB Size 15- Low Channel)



Plot 7-8. Occupied Bandwidth Plot (LTE Band 26, 3MHz 64-QAM – RB Size 15– Low Channel)

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Plot 7-9. Occupied Bandwidth Plot (LTE Band 26, 5MHz QPSK - RB Size 25- Low Channel)



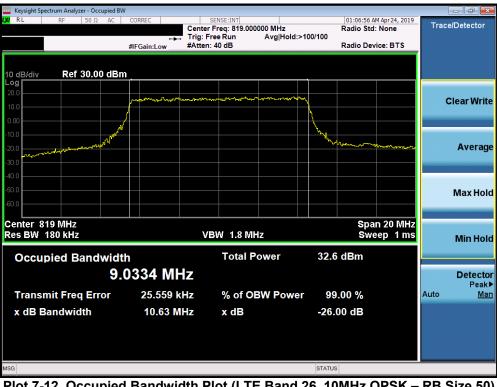
Plot 7-10. Occupied Bandwidth Plot (LTE Band 26, 5MHz 16-QAM – RB Size 25– Low Channel)

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Plot 7-11. Occupied Bandwidth Plot (LTE Band 26, 5MHz 64-QAM - RB Size 25- Low Channel)



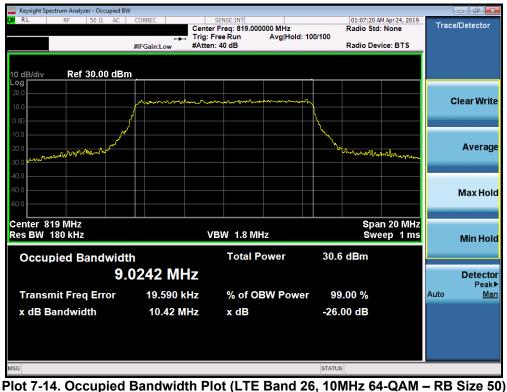
Plot 7-12. Occupied Bandwidth Plot (LTE Band 26, 10MHz QPSK – RB Size 50)

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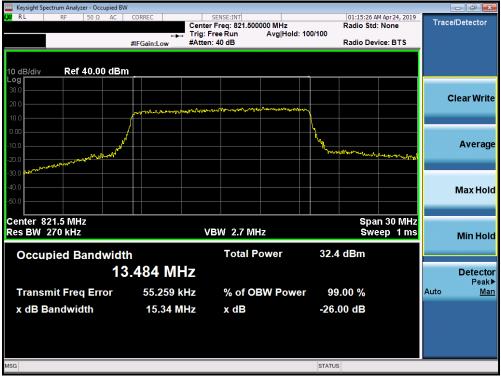


Plot 7-13. Occupied Bandwidth Plot (LTE Band 26, 10MHz 16-QAM – RB Size 50)

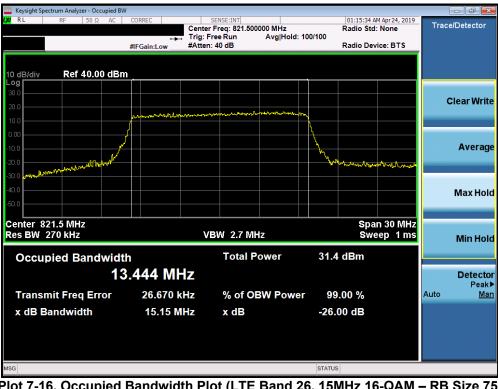


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Plot 7-15. Occupied Bandwidth Plot (LTE Band 26, 15MHz QPSK - RB Size 75)



Plot 7-16. Occupied Bandwidth Plot (LTE Band 26, 15MHz 16-QAM – RB Size 75)

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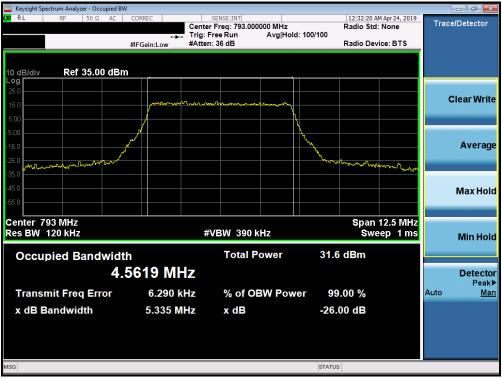
Keysight Spectrum Analyzer - Occupie	ed BW				
<b>LX/</b> RL RF 50Ω A		SENSE:INT ter Freg: 821.500000 MHz	01:15:42 AM Radio Std:		race/Detector
	+++ Trig	: Free Run Avg Hold: '	100/100		
	#IFGain:Low #Att	ten: 40 dB	Radio Devi	e: BTS	
10 dB/div Ref 40.00 d	Bm		-,,		
30.0					
20.0					Clear Write
10.0	and the second s	en and the second se	~ <u>_</u>		
0.00					
-10.0	¥		<u>\</u>		Average
-20.0	/T		NAL .		Ū
-30.0			Monar Manar Marine	hopping the second s	
-40.0					Maxilald
-50.0					Max Hold
Center 821.5 MHz				30 MHz	
Res BW 270 kHz		VBW 2.7 MHz	SWe	ep 1 ms	Min Hold
Occupied Bandwi	dth	Total Power	30.5 dBm		
	13.442 MHz				Detector
	13.442 IVINZ				Detector Peak►
Transmit Freq Error	53.161 kHz	% of OBW Power	r 99.00 %	Aut	o <u>Man</u>
x dB Bandwidth	15.32 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-17. Occupied Bandwidth Plot (LTE Band 26, 15MHz 64-QAM – RB Size 75)

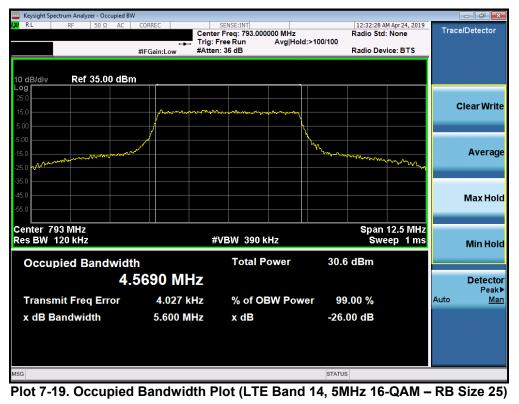
FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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# LTE Band 14



Plot 7-18. Occupied Bandwidth Plot (LTE Band 14, 5MHz QPSK – RB Size 25)



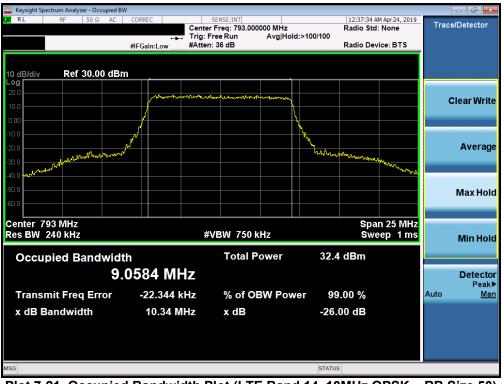
FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	MSUNG	Approved by: Quality Manager
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Plot 7-20. Occupied Bandwidth Plot (LTE Band 14, 5MHz 64-QAM – RB Size 25)



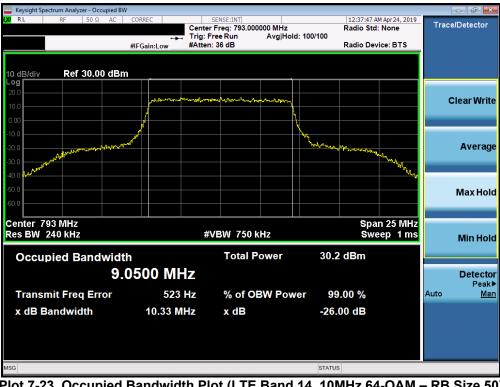
Plot 7-21. Occupied Bandwidth Plot (LTE Band 14, 10MHz QPSK – RB Size 50)

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Plot 7-22. Occupied Bandwidth Plot (LTE Band 14, 10MHz 16-QAM - RB Size 50)



Plot 7-23. Occupied Bandwidth Plot (LTE Band 14, 10MHz 64-QAM – RB Size 50)

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# 7.3 Spurious and Harmonic Emissions at Antenna Terminal §2.1051 §90.691 §90.543

### Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10<sup>th</sup> harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

# The minimum permissible attenuation level of any spurious emission is $43 + 10 \log_{10}(P_{[Watts]})$ , where P is the transmitter power in Watts.

### Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

### **Test Settings**

- 1. Start frequency was set to 30MHz and stop frequency was set to 10GHz (separated into at least two plots per channel)
- 2. RBW ≥ 1MHz
- 3. VBW  $\geq$  3 x RBW
- 4. Detector = RMS
- 5. Trace mode = max hold
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

### Test Setup

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



Figure 7-2. Test Instrument & Measurement Setup

### Test Notes

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for Part 22. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

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Res Bl	N 100	kHz				#VBW	300 kHz		s	sweep	37.33 1	ns (20	001 pts)		
tart 30	.0 MH	z									St	top 81	4.0 MHz	Log	L
															Scale Typ
i0.0	( walnessen		The date is	into although at											
i0.0			and on the local data												. 01
													Ť		Freq Offs
0.0													1		
0.0														7 <u>Auto</u>	8.400000 M M
															CF St
0.0														01	4.000000 14
												D	L1 -13.00 dBm	81	Stop Fr 4.000000 M
0.0															
).00														3	0.000000 M
															Start Fr
0.0															
0.0														42	2.000000 M
															Center Fr
) dB/div og r	Re	ef 30.	00 d	Bm								-44.1	2 dBm		
										Mk	r1 813	8.529	6 MHz		Auto Tu
					PNO: F IFGain:	ast ⊶⊷ Low	Trig: Fre Atten: 4					TYPE DET	A WWWWW A N N N N N		
RL	R	F	50 Ω	AC	CORREC		SE	NSE:INT	#Avg Typ	e: RMS	05:	TRACE	May 01, 2019	F	requency
		-												_	

Plot 7-24. Conducted Spurious Plot (CDMA BC10 Ch. 476)



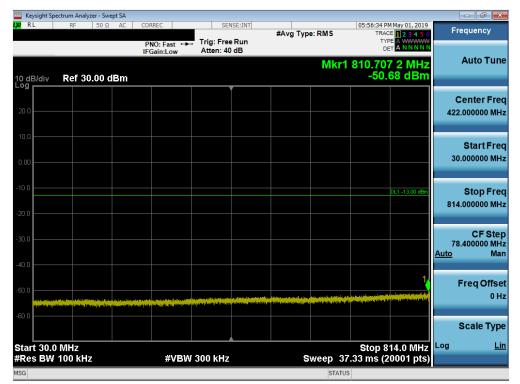
#### Plot 7-25. Conducted Spurious Plot (CDMA BC10 Ch. 476)

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	Spectrum Analy												- 6 💌
RL	RF	50 Ω	AC		ast 🛏	Trig: Free		#Avg Ty	pe: RMS		15 PM May 01, 2019 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Free	quency
) dB/div	Ref 0.	00 dB	m	IFGain:	Low	#Atten: 36	6 dB		Mk	kr1 10.0 -	00 00 GHz 37.40 dBm	4	uto Tun
											DL1 -13.00 dBm		enter Fre
0.0											1,		Start Fr 100000 G
0.0													Stop Fr 100000 G
0.0												900.0 <u>Auto</u>	CF St 000000 M M
D.O												Fi	req Offs 0
0.0	000 GHz									Stor	) 10.000 GHz		cale Ty
	V 1.0 MH	z			#VBW	3.0 MHz			Sweep	16.00 m	s (20001 pts)		
G									ST	ATUS			





### Plot 7-27. Conducted Spurious Plot (CDMA BC10 Ch. 684)

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager			
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		alyzer - Swej	pt SA										- 6
RL	RF	50 Ω	AC	PNO:	Fast 🗔			#Avg Ty	pe: RMS	TRA	MMay 01, 2019 CE 1 2 3 4 5 6 PE A WWWWW ET A NNNNN	Fre	equency
0 dB/div og	Ref	0.00 dB	m						Μ	kr1 824.1 -18	132 MHz 95 dBm		Auto Tur
10.0											DL1 -13.00 dBm		enter Fre 000000 Mi
0.0 <b></b>												824.	Start Fr 000000 M
												1.000	<b>Stop Fr</b> 000000 G
	N. Hannanne	han the state of the	al-Inditives of	u det fogter forge	teefterforestation open of	haayalahiingkantiaykayttayktaytt	Arythayh,place,ann	46,5%4,1%2,24%	n abili ann an an airte	Maadhayal	aarahaan didaangaari na fisar	17. <u>Auto</u>	CF St 600000 M N
).0 ).0												F	req Offs 0
	2400 0									Stop 1.0			Scale Ty
tart 0.8 Res BW					#VBW	300 kHz			Sweep	8.533 ms	0000 GHz (4001 pts)		
G									STA		· · · · ·		

Plot 7-28. Conducted Spurious Plot (CDMA BC10 Ch. 684)



### Plot 7-29. Conducted Spurious Plot (CDMA BC10 Ch. 684)

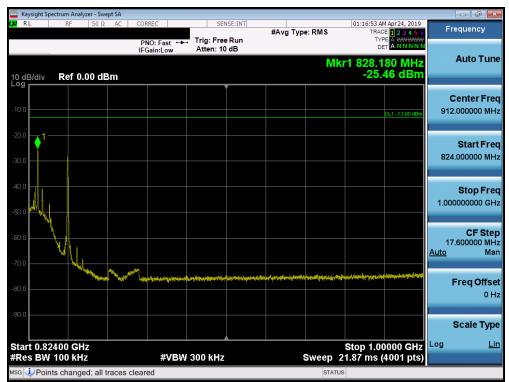
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# LTE Band 26

PNO: Fast     Trig: Free Run Atten: 40 dB     TRACE Def Def Def Def Def Def Def Def Def Def		ectrum Analyz		t SA										- f 💌
NRK + S 14,000 0 MHZ     -28.26 dBm       2     -28.26 dBm       30.00000 M     -28.26 dBm       30.00000 M     -28.26 dBm       2     -28.26 dBm       2     -28.26 dBm       30.00000 M     -28.26 dBm       2     -28.26 dBm       2     -28.26 dBm       <	RL	RF	50 Ω		PNO: Fa	ist ↔→ ow	Trig: Fre	e Run	#Avg Typ	e: RMS	TRA T	CE 1 2 3 4 5 6		
Center Fr     Center Fr     C22.00000 M     C00	0 dB/div	Ref 30	.00 dE	3m						Mkr	1 814.00 -28	0 0 MHz .26 dBm		Auto Tun
000   001   0	20.0							Ĭ						
0.0 1<	10.0 D.00													Start Fre 000000 M⊦
000   10000   1000   1000	20.0											DL1 -13.00 dBm		<b>Stop Fre</b> 000000 м⊦
0.0   Image: State of the	30.0 <b></b>													CF Ste 400000 MH Ma
tart 30.0 MHz Stop 814.0 MHz	50.0 <b>menodos</b> t			al tractal contra	i (and the frame) (the maging state		Gungan an Albaird a bran a Gungan ya Ku Kung anyang Ka		sport for a first product on the state of th	artila dina anti teriba te anta ferina di jerana di	a Vala galan alah beratentah 1904 - Santa Santa gala belapi sari		F	reqOffso 0⊦
Res BW 100 kHz #VBW 300 kHz Sweep 97.33 ms (20001 pts)	io.0	MHz									Stop	314.0 M <u>Hz</u>		cale Typ
SG	Res BW				#	VBW	300 kHz		s		07.33 ms (	20001 pts)		

Plot 7-30. Conducted Spurious Plot (LTE Band 26, 15.0MHz QPSK – RB Size 1, RB Offset 0)



Plot 7-31. Conducted Spurious Plot (LTE Band 26, 15.0MHz QPSK - RB Size 1, RB Offset 0)

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🔤 Keysight S	pectrum Analy	zer - Swep	ot SA										
XI RL	RF	50 Ω	AC	CORREC	ast 🔸	Trig: Free		#Avg Typ	e: RMS	TRA	AM Apr 24, 2019 CE 1 2 3 4 5 6 (PE A WWWWW ET A NNNNN	Frec	luency
10 dB/div Log	Ref 0.	00 dB	m	IFGain:L		#Atten: 32	2 dB		Mkr	1 8.090	20 GHz 30 dBm	A	uto Tune
-10.0											DL1 -13.00 dBm		nter Fred 00000 GHz
-20.0													Start Fred 00000 GHz
-40.0			<b>un <sup>i</sup> da</b>					ha na kaya ng panahari kiti Na lagua ng panahari kiti					Stop Fred 00000 GH:
60.0												900.0 <u>Auto</u>	CF Step 00000 MH Mar
80.0												Fr	e <b>q Offse</b> 0 H
-90.0												So	c <b>ale Type</b> Lir
Start 1.0 #Res BW	00 GHz / 1.0 MH:	z		;	#VBW	3.0 MHz		s	weep 16	Stop 10 6.00 ms (2	).000 GHz 20001 pts)	_	
ISG									STATU	5			

Plot 7-32. Conducted Spurious Plot (LTE Band 26, 15.0MHz QPSK – RB Size 1, RB Offset 0)

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# LTE Band 14

	ectrum Analyzer -									
<mark>0</mark> RL	RF 50	Ω ΑC	CORREC PNO: Fast IFGain:Low		#Avg Type	RMS	TRAC	M Apr 24, 2019 E <b>1 2 3 4 5</b> 6 E A WWWWW A N N N N N	Fr	equency
0 dB/div	Ref 20.00	) dBm				M	kr1 787. -33.	80 MHz 14 dBm		Auto Tun
10.0										Center Fre .000000 MH
10.0								DL1 -13.00 dBm	30	<b>Start Fre</b> .000000 MH
20.0								1	788	Stop Fre .000000 M⊦
io.o									75 <u>Auto</u>	CF Ste .800000 MH Ma
60.0 <mark>ml and a</mark>			Andres Viewennen der die Stephender der Felste Bange all ster des Stephens processie	an a fall as fall an fall an fall fang ffean de fall a fall an fall an fa			a ann an tha ann a' bhlia ann a bh		ľ	Freq Offs 0 ⊦
							041 - 7			Scale Typ L
tart 30.0 Res BW	100 kHz		#VBW	300 kHz	S	weep 93	stop / .99 ms (1	88.0 MHz 5161 pts)		-
SG						STATUS				

Plot 7-33. Conducted Spurious Plot (LTE Band 14, 10.0MHz QPSK – RB Size 1, RB Offset 0)

0 dB/div Ref 20.00 dBm -46.11 dBm Center Free		ectrum Analyzer - Swept SA						
Auto Tun Mkr1 800.75 MHz 46.11 dBm Center Fre 899.00000 MH Start Fre 798.00000 MH Center Fre 899.00000 MH Start Fre 798.00000 MH Center Fre 899.00000 MH Center Fre 899.0000 MH Center Fre 899.00000 MH Center Fre 899.0000 MH Center Fre 899.00000 MH Center Fre 899.00000 MH Center Fre 899.0000 MH Center Fre 899.00000 MH Center Fre 899.0000	X/RL	RF 50 Ω AC	PNO: Fast	Trig: Free R	#Avg Ty un	pe: RMS	TRACE 1 2 3 4 5 6 TYPE A WWWW	
100   Image: Center Free     100   Image: Center Free <td< th=""><th>10 dB/div</th><th>Ref 20.00 dBm</th><th></th><th>Atten: 30 dt</th><th>5</th><th>М</th><th>kr1 800.75 MHz</th><th></th></td<>	10 dB/div	Ref 20.00 dBm		Atten: 30 dt	5	М	kr1 800.75 MHz	
10.0   DL1-13.00.0EH   Start Free     20.0   DL1-13.00.0EH   Stop Free     30.0   DL1-13.00.0EH   Stop Free <td>10.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Center Fre 899.000000 MH</td>	10.0							Center Fre 899.000000 MH
Stop Fre 1.00000000 GH CF Ste 20.200000 MH Auto Ma Freq Offse 0 H Scale Typ Start 0.7980 GHz Stop 1.0000 GHz							DL1 -13.00 dBm	
1   20.200000 MH     50.0   1     1   1 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
tart 0.7980 GHz Stop 1.0000 GHz	_ <b> </b> ♦'							20.200000 MH
tart 0.7980 GHz Stop 1.0000 GHz	50.0 <b>11</b>	naðalafar hönni stjótning þór skipasnapa fanskyför sjótning	na ang may na sang dan sa	anti Mirusti Mura di Miri	มูรี รายชื่อสมาร์รางสรารุสตรีละ) และสารางสาร	an ann an start an s	ntolakhte Majortan natifikkan nanor-natifikkana kipo	
		80 GHz					Stop 1 0000 CHz	
			#VBW	300 kHz		Sweep 2	25.05 ms (4041 pts)	

Plot 7-34. Conducted Spurious Plot (LTE Band 14, 10.0MHz QPSK – RB Size 1, RB Offset 0)

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🔤 Keysight Sp	ectrum Analyz	er - Swep	ot SA										
XI RL	RF	50 Ω	AC	CORREC PNO: Fa	list 😱	Trig: Free		#Avg Typ	e: RMS	TRAC	M Apr 24, 2019 DE <b>1 2 3 4 5</b> 6 DE A WWWWW T A N N N N N	Freq	uency
10 dB/div Log	Ref 0.0	0 dB	m	IFGain:L	ow	#Atten: 3	2 dB		Mk	r1 7.22	4 5 GHz 35 dBm	A	uto Tune
10.0											DL1 -13.00 dBm		nter Fred
30.0									1				tart Free
40.0									ang delation provide the second s		el sener d'Alth Dentines y Jos Sener d'Alth Dentines y Jos Sener d'Alth Antonio y Sener des		top Free
70.0												900.00 <u>Auto</u>	CF Ste 00000 MH Ma
30.0												Fre	e <b>q Offse</b> 0 H
90.0												Sc	ale Typ
Start 1.00 ≇Res BW	00 GHz 1.0 MHz			#	VBW	3.0 MHz		s	weep 15	Stop 10 .60 ms (1	.000 GHz 8001 pts)	-	
ISG									STATUS				

Plot 7-35. Conducted Spurious Plot (LTE Band 14, 10.0MHz QPSK – RB Size 1, RB Offset 0)

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# 7.4 Band Edge Emissions at Antenna Terminal §2.1051 §90.691 §90.543

### Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

For LTE B26 operation under Part 90.691, the minimum permissible attenuation level of any spurious emission removed from the EA licensee's frequency block by greater than 37.5 kHz is  $43 + 10\log_{10}(P_{[Watts]})$ , where P is the transmitter power in Watts. The minimum permissible attenuation level of any spurious emission removed from the EA licensee's frequency block by up to and including 37.5 kHz is  $50 + 10\log_{10}(P_{[Watts]})$ , where P is the transmitter power in Watts.

For LTE Band 14 operation under Part 90.543, the power of any emission must be reduced below the mean output power (P) by at least 43 + 10log (P) dB measured in a 100 kHz bandwidth for frequencies less than 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz.

Additionally, for LTE Band 14 operation, on all frequencies between 769-775 MHz and 799-805 MHz, the power of any emission shall be attenuated by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

### Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

### **Test Settings**

- 1. Span was set large enough so as to capture all out of band emissions near the band edge
- 2. RBW = 100 kHz
- 3. VBW = 300 kHz
- 4. Detector = RMS
- 5. Trace mode = trace average
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

### Test Setup

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



Figure 7-3. Test Instrument & Measurement Setup

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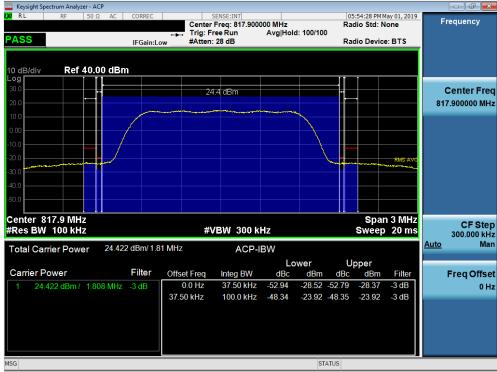
For channel edge emission, the signal analyzer's "ACP" measurement capability is used.

Per 22.917(b) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

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## CDMA BC10



Plot 7-36. Channel Edge Plot (CDMA BC10 - Ch. 476)



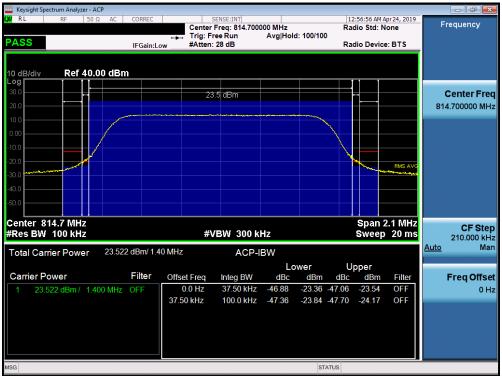
### Plot 7-37. Channel Edge Plot (CDMA BC10 - Ch. 684)

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 64
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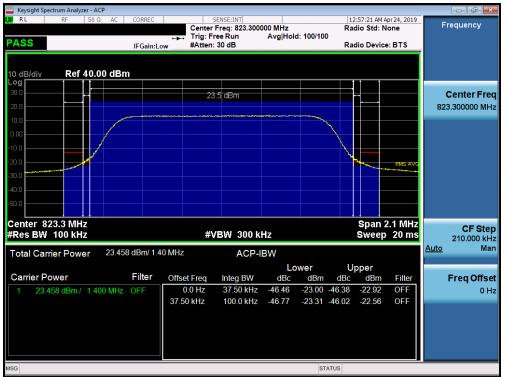
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# LTE Band 26



Plot 7-38. Channel Edge Plot (LTE Band 26, 1.4MHz QPSK – RB Size 6– Low Channel)



Plot 7-39. Channel Edge Plot (LTE Band 26, 1.4MHz QPSK - RB Size 6 - High Channel)

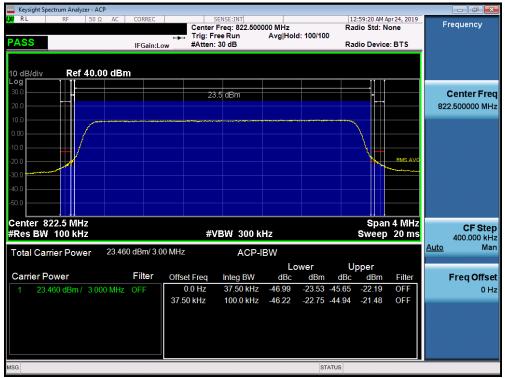
FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Keysight Spectrum Analyzer - ACP       RL     RF     50 Ω     AC     CORR       ASS     IFGa			000 MHz Avg Hold:>	-100/100	12:58:31 AM adio Std: N adio Devic	None	Freque	ency
0 dB/div Ref 30.00 dBm								
	23.5	5 dBm					Cent 815.500	ter Free 000 MH
						RMS AVG		
50.0 50.0								
Center 815.5 MHz Res BW 100 kHz	#VI	BW 300 k	Hz			n 4 MHz 9 20 ms	400	CF Ste
Total Carrier Power 23.527 dBm	3.00 MHz	ACP-I					<u>Auto</u>	Ma
Carrier Power Filte	r Offset Freq	Integ BW	Low dBc	er dBm dBo	Upper : dBm	Filter	Ero	q Offs
1 23.527 dBm / 3.000 MHz OFF	0.0 Hz	37.50 kHz	-46.32 -	22.80 -46.80	-23.27	OFF	FIE	0 H
	37.50 kHz	100.0 kHz	-45.99 -	22.46 -46.21	-22.68	OFF		
G				STATUS				

Plot 7-40. Channel Edge Plot (LTE Band 26, 3MHz QPSK - RB Size 15- Low Channel)



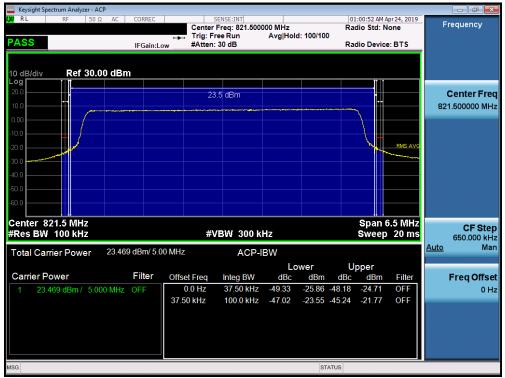
Plot 7-41. Channel Edge Plot (LTE Band 26, 3MHz QPSK - RB Size 15 - High Channel)

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - ACP RL RF 50 Ω AC	CORREC	Center Trig: F	SENSE:INT Freq: 816.5000 ree Run : 28 dB	000 MHz Avg Hold:	100/100	Radi	00:25 AM A o Std: N o Device		Fr	requency
0 dB/div Ref 30.00 dE	3m	23	s.5 dBm							Center Fred
								RMS AVG		
enter 816.5 MHz Res BW 100 kHz			/BW 300 ki					6.5 MHz 20 ms	Auto	CF Stej 650.000 kH Mai
Total Carrier Power 23.5	502 dBm/ 5.0	00 MHz	ACP-I							
Carrier Power	Filter	Offset Freq	Integ BW	Lov dBc	ver dBm	dBc	per dBm	Filter		Freq Offse
1 23.502 dBm / 5.000 MH	Iz OFF	0.0 Hz 37.50 kHz	37.50 kHz 100.0 kHz		-25.49 -22.60		-25.52 -22.98	OFF OFF		0  -
									-	

Plot 7-42. Channel Edge Plot (LTE Band 26, 5MHz QPSK – RB Size 25– Low Channel)



Plot 7-43. Channel Edge Plot (LTE Band 26, 5MHz QPSK - RB Size 25 - High Channel)

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - ACP RL RF 50 Ω AC CORREC		ENSE:INT	000 MHz		01:07:28 AM A		Freque	
PASS IFGain:L	🛶 Trig: Fr	ee Run	Avg Hold:	100/100	Radio Device			
10 dB/div Ref 30.00 dBm								
20.0	23.	5 dBm					Cente 819.0000	e <b>r Frec</b> 100 MH:
0.00								
-20.0					- h	RMS AVG		
-50.0								
Center 819 MHz #Res BW 100 kHz	#V	BW 300 ki	Hz			12 MHz 20 ms	1.2000	F Step
Total Carrier Power 23.473 dBm/ 10	.00 MHz	ACP-I	BW				<u>Auto</u>	Mar
Carrier Power Filter	Offset Freq	Integ DW/	Low dBc	ver dBm dE	Upper Bc dBm	Filter	Erog	Offse
1 23.473 dBm / 10.00 MHz OFF	0.0 Hz	Integ BW 37.50 kHz	-54.41	-30.94 -53.0	4 -29.57	OFF	Freq	0 Ha
	37.50 kHz	100.0 kHz	-50.59	-27.12 -49.5	8 -26.10	OFF		
ISG				STATUS				

Plot 7-44. Channel Edge Plot (LTE Band 26, 10MHz QPSK – RB Size 50)



Plot 7-45. Channel Edge Plot (LTE Band 26, 15MHz QPSK – RB Size 75)

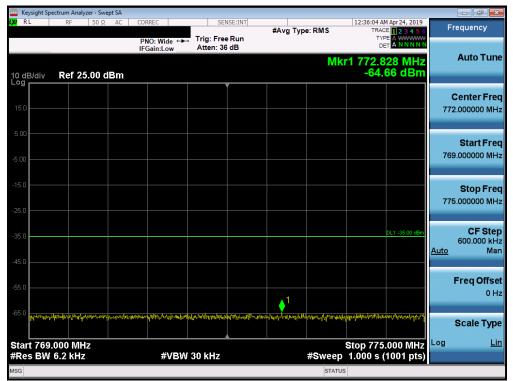
FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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### LTE Band 14

Keysight Spectrun											
XV RL F	RF 50 Ω		ORREC		Run	#Avg Type	RMS	TRAC	Apr 24, 2019 <b>1 2 3 4 5 6</b> <b>A WWWWWW</b> <b>A NNNNN</b>	F	requency
	ef 25.00 di		IFGain:Low	Atten: 36	dB		Mkr	1 787.9	84 MHz 75 dBm		Auto Tun
- <b>og</b> 15.0									~~~~~		Center Fre 8.000000 MH
5.00									DL1 -13.00 dBm	78	<b>Start Fre</b> 6.000000 MH
25.0				T. J.	1					79	<b>Stop Fre</b> 0.000000 МН
35.0 <del>~~~~~</del> 45.0		<u>_m</u>	~~~~~~							<u>Auto</u>	<b>CF Ste</b> 400.000 k⊢ Ma
55.0											Freq Offs 0 H
65.0											Scale Typ
enter 788.0 Res BW 100			#VBV	/ 300 kHz		5	weep 1.	Span 4. 000 ms ('	000 MHz 1001 pts)	Log	Li
SG							STATUS				





Plot 7-47. Lower Emission Mask Plot (LTE Band 14, 5MHz QPSK – RB Size 25)

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - Swept S					
X/ RL RF 50Ω /	AC CORREC	SENSE:INT	#Avg Type: RMS	12:36:20 AM Apr 24, 2019 TRACE 1 2 3 4 5 6	Frequency
	PNO: Wide 😱 IFGain:Low	Trig: Free Run Atten: 36 dB			Auto Tune
10 dB/div Ref 25.00 dB	m		IVIK	r1 798.020 MHz -21.96 dBm	
		Ĭ			Center Free
15.0					798.000000 MH:
5.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~			Start Free
-5.00					796.000000 MH:
-15.0				DL1 -13.00 dBm	Stop Free
					800.000000 MH:
-25.0		WWW M	1		CF Ster
-35.0				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	400.000 kH Auto Mar
-45.0					<u>rato</u> ma
-55.0					Freq Offse
-65.0					
					Scale Type
Center 798.000 MHz #Res BW 100 kHz	#VBW	300 kHz	Sweep	Span 4.000 MHz I.000 ms (1001 pts)	Log <u>Lir</u>
ISG			STATU		

Plot 7-48. Upper Band Edge Plot (LTE Band 14, 5MHz QPSK – RB Size 25)



Plot 7-49. Upper Emission Mask Plot (LTE Band 14, 5MHz QPSK – RB Size 25)

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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	ectrum Analyze		t SA										
LXI RL	RF	50 Ω	AC	CORREC	ide 🕢	SE Trig: Fre	e Run	#Avg Typ	e: RMS	TRAC	M Apr 24, 2019 CE 1 2 3 4 5 6 PE A WWWWW A N N N N N	F	requency
10 dB/div	Ref 25.	.00 dB	3m	IFGain:L	.ow	Atten: 30	6 dB		MI	kr1 787.9			Auto Tune
Log													<b>Center Freq</b> 8.000000 MHz
-5.00											DL1 -13.00 dBm	78	Start Freq 4.000000 MHz
-15.0						•	1				DE1 - 13.00 dBm	79	Stop Freq 2.000000 MHz
-35.0	,	~~~~	~~~~	~~~~	~~~~	~~~~^~^^						<u>Auto</u>	CF Step 800.000 kHz Mar
-55.0													Freq Offset 0 Hz
-65.0													Scale Type
Center 78 #Res BW				7.	¢VBW	360 kHz			Sweep	Span 8 1.000 ms (	2000 1911 12	Log	<u>Lin</u>
MSG									STAT	JS			

Plot 7-50. Lower Band Edge Plot (LTE Band 14, 10MHz QPSK - RB Size 50)



Plot 7-51. Lower Emission Mask Plot (LTE Band 14, 10MHz QPSK – RB Size 50)

FCC ID: A3LSMA102U	CALEST.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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	ectrum Analyzer - S										
LXU RL	RF 50	Ω AC	CORREC	Trig: Free		#Avg Typ	e: RMS	TRAC	Apr 24, 2019 <b>1 2 3 4 5 6</b> E A WWWWW T A N N N N N	F	requency
10 dB/div Log	Ref 25.00	dBm	IFGain:Low	Atten: 36	dB		Mk	r1 798.0			Auto Tune
15.0											Center Freq 3.000000 MHz
-5.00			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						DL1 -13.00 dBm	794	Start Fred 4.000000 MHz
-15.0				- VA	<b>↓</b> <sup>1</sup> —					803	Stop Fred 2.000000 MH;
-35.0					M. A.A.	- marken for	~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<u>Auto</u>	<b>CF Step</b> 800.000 kH: Mar
-55.0											Freq Offse 0 H
-65.0											Scale Type
Center 79 #Res BW	8.000 MHz 120 kHz		#VBW	360 kHz			Sweep 1	Span 8 1.000 ms (	000 1911 12	Log	Lin
MSG							STATU	s			

Plot 7-52. Upper Band Edge Plot (LTE Band 14, 10MHz QPSK - RB Size 50)



FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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### 7.5 Conducted Power Output Data §2.1046 §90.635

Frequency [MHz]	BC10 [Channel]	Battery Type	Cond. PWR [dBm]	Cond. PWR [Watts]	Cond. PWR Limit [dBm]	Margin [dB]
817.90	476	Standard	24.19	0.262	50.00	-25.81
823.10	684	Standard	24.14	0.259	50.00	-25.86
	T-1-1- 7.0.0	DNAA DOAA	O a se al se a tra al D			

Table 7-2. CDMA BC10 Conducted Power Output Data

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Cond. PWR [dBm]	Cond. PWR [Watts]	Cond. PWR Limit [dBm]	Margin [dB]
814.70	1.4	QPSK	24.72	0.296	50.00	-25.28
823.30	1.4	QPSK	24.62	0.290	50.00	-25.38
814.70	1.4	16-QAM	23.80	0.240	50.00	-26.20
823.30	1.4	16-QAM	23.75	0.237	50.00	-26.25
814.70	1.4	64-QAM	22.67	0.185	50.00	-27.33
823.30	1.4	64-QAM	22.69	0.186	50.00	-27.31
815.50	3	QPSK	24.70	0.295	50.00	-25.30
822.50	3	QPSK	24.61	0.289	50.00	-25.39
815.50	3	16-QAM	23.68	0.233	50.00	-26.32
822.50	3	16-QAM	23.56	0.227	50.00	-26.44
815.50	3	64-QAM	22.70	0.186	50.00	-27.30
822.50	3	64-QAM	22.77	0.189	50.00	-27.23
816.50	5	QPSK	24.70	0.295	50.00	-25.30
821.50	5	QPSK	24.61	0.289	50.00	-25.39
816.50	5	16-QAM	23.70	0.234	50.00	-26.30
821.50	5	16-QAM	23.69	0.234	50.00	-26.31
816.50	5	64-QAM	22.62	0.183	50.00	-27.38
821.50	5	64-QAM	22.51	0.178	50.00	-27.49
819.00	10	QPSK	24.75	0.299	50.00	-25.25
819.00	10	16-QAM	23.67	0.233	50.00	-26.33
819.00	10	64-QAM	22.66	0.185	50.00	-27.34
821.50	15	QPSK	24.58	0.287	50.00	-25.42
821.50	15	16-QAM	23.66	0.232	50.00	-26.34
821.50	15	64-QAM	22.63	0.183	50.00	-27.37

Table 7-3. LTE Band 26 Conducted Power Output Data

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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- 1. For CDMA mode, this device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits.
- 2. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
- 3. This unit was tested with its standard battery.

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#### 7.6 Radiated Power (ERP) §22.913(a.2) §90.542(a)(7)

#### **Test Overview**

Effective Radiated Power (ERP) 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. 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.
- 2. RBW = 1 5% of the expected OBW, not to exceed 1MHz
- 3. VBW  $\geq$  3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points  $\geq$  2 x span / RBW
- 6. Detector = RMS
- 7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
- 8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
- 9. Trace mode = trace averaging (RMS) over 100 sweeps
- 10. The trace was allowed to stabilize

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

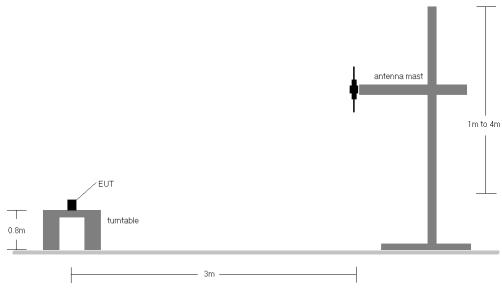


Figure 7-4. Radiated Test Setup <1GHz

#### 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 [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
821.50	15	QPSK	Н	130	293	1 / 74	12.44	6.83	17.12	0.052	38.45	-21.33
821.50	15	16-QAM	Н	130	293	1 / 74	11.42	6.83	16.10	0.041	38.45	-22.35
821.50	15	64-QAM	Н	130	293	1 / 74	10.46	6.83	15.14	0.033	38.45	-23.31

Table 7-54. ERP Data (Band 26)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
790.50	5	QPSK	Н	230	191	1 / 24	15.63	6.29	19.77	0.095	34.77	-15.00
793.00	5	QPSK	н	237	181	1 / 24	15.84	6.34	20.03	0.101	34.77	-14.74
795.50	5	QPSK	Н	233	177	1 / 24	15.98	6.39	20.22	0.105	34.77	-14.56
795.50	5	16-QAM	Н	233	177	1 / 24	14.99	6.39	19.23	0.084	34.77	-15.55
795.50	5	64-QAM	Н	233	177	1 / 24	13.86	6.39	18.10	0.065	34.77	-16.68
793.00	10	QPSK	Н	231	191	1 / 49	15.80	6.34	19.99	0.100	34.77	-14.78
793.00	10	16-QAM	Н	231	191	1 / 49	14.74	6.34	18.93	0.078	34.77	-15.84
793.00	10	64-QAM	Н	231	191	1 / 49	13.77	6.34	17.96	0.063	34.77	-16.81
795.50	5	QPSK	V	173	182	1 / 24	13.58	6.39	17.82	0.060	34.77	-16.96

Table 7-55. ERP Data (Band 14)

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#### 7.7 Radiated Spurious Emissions Measurements §2.1053 §90(S) §90(R)

#### **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 horizontally and vertically 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 maximum power, and at the appropriate frequencies.

#### Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.8

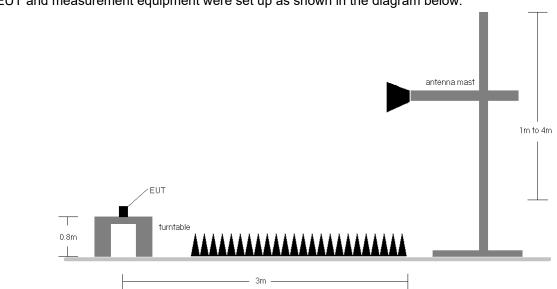
ANSI/TIA-603-E-2016 - Section 2.2.12

#### **Test Settings**

- 1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
- 2. VBW  $\geq$  3 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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The EUT and measurement equipment were set up as shown in the diagram below.

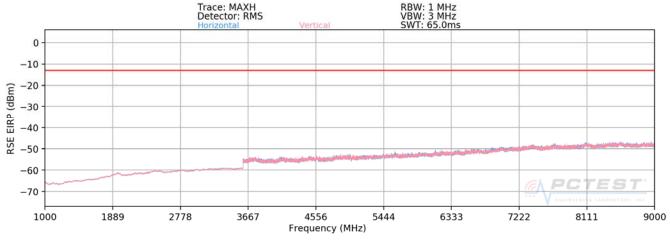
Figure 7-5. Test Instrument & Measurement Setup

#### Test Notes

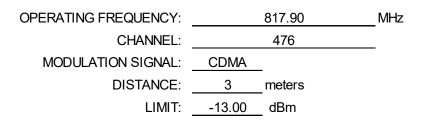
- 1. For CDMA mode, this device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits.
- 2. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
- 3. This unit was tested with its standard battery.
- 4. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.
- 5. The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- 6. Per 90(R)(f), emissions in the 1559 1610MHz band are subject to a limit of -40dBm/MHz for wideband signals. These emission measurements are shown in this section below.

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Plot 7-56. Radiated Spurious Plot above 1GHz (CDMA BC10 Mode)



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]
1635.80	Н	-	-	-69.28	3.59	-65.69	-52.7
2453.70	Н	101	8	-56.47	4.17	-52.30	-39.3
3271.60	Н	-	-	-67.15	5.69	-61.45	-48.5
4089.50	Н	-	-	-68.25	7.52	-60.73	-47.7

Table 7-4. CDMA BC10 Radiated Spurious Data (Ch. 476)

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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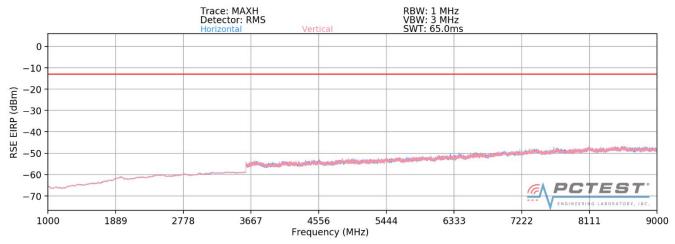
### OPERATING FREQUENCY: 823.10 MHz CHANNEL: 684 MODULATION SIGNAL: CDMA DISTANCE: 3 meters LIMIT: -13.00 dBm

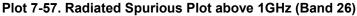
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1646.20	н	-	-	-69.18	3.60	-65.58	-52.6
2469.30	Н	102	22	-57.98	4.21	-53.77	-40.8
3292.40	Н	-	-	-67.27	5.76	-61.51	-48.5
4115.50	Н	-	-	-68.08	7.58	-60.50	-47.5

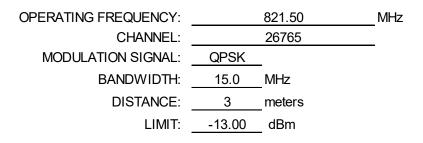
Table 7-5. CDMA BC10 Radiated Spurious Data (Ch. 684)

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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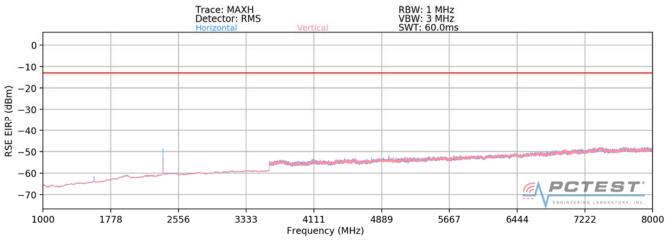
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1643.00	Н	117	204	-67.32	3.60	-63.72	-50.7
2464.50	Н	110	14	-39.28	4.19	-35.09	-22.1
3286.00	Н	-	-	-67.28	5.74	-61.54	-48.5
4107.50	H	162	42	-66.65	7.56	-59.09	-46.1
4929.00	Н	-	-	-68.94	8.56	-60.37	-47.4
5750.50	Н	-	-	-67.61	8.77	-58.84	-45.8

Table 7-6. Radiated Spurious Data (LTE Band 26 – Mid Channel)

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#### Plot 7-58. Radiated Spurious Plot above 1GHz (Band 14)

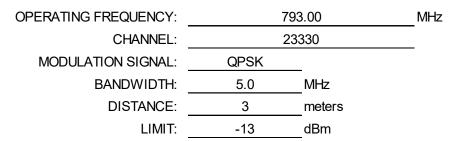
OPERATING FREQUENCY:	79	0.50	MHz
CHANNEL:	23	305	
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	5.0	MHz	
DISTANCE:	3	meters	
LIMIT:	-13	_dBm	

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]
2371.50	Н	102	328	-51.56	4.07	-47.49	-34.5
3162.00	Н	-	-	-66.77	5.42	-61.35	-48.3
3952.50	Н	-	-	-68.39	7.24	-61.16	-48.2

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

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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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]
2379.00	Н	100	322	-51.71	4.09	-47.62	-34.6
3172.00	Н	-	-	-66.75	5.43	-61.32	-48.3
3965.00	Н	-	-	-68.53	7.25	-61.28	-48.3

Table 7-8. Radiated Spurious Data (LTE Band 14 – Mid Channel)

OPERATING FREQUENCY:	79	5.50 MHz
CHANNEL:	23	355
MODULATION SIGNAL:	QPSK	_
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	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]
2386.50	Н	100	323	-52.15	4.11	-48.04	-35.0
3182.00	Н	-	-	-66.79	5.44	-61.35	-48.3
3977.50	Н	-	-	-68.34	7.27	-61.07	-48.1

Table 7-9. Radiated Spurious Data (LTE Band 14 – High Channel)

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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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 [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1581.00	Н	163	16	-66.38	3.54	-62.83	-22.8
1586.00	Н	185	159	-68.25	3.55	-64.70	-24.7
1591.00	Н	177	33	-67.33	3.55	-63.78	-23.8

Table 7-10. Radiated Spurious Data (LTE Band 14 – Part 90.543(f))

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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#### Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

### The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ( $\pm 2.5$ ppm) of the center frequency.

#### Test Procedure Used

ANSI/TIA-603-E-2016

#### Test Settings

- 1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
- 2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
- 3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

#### Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

#### Test Notes

None

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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OPERATING FREQUENCY:	817,900,000	Hz
CHANNEL:	476	_
REFERENCE VOLTAGE:	4.31	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %		- 30	817,900,067	67	0.0000082
100 %		- 20	817,899,967	-33	-0.0000040
100 %		- 10	817,900,167	167	0.0000204
100 %		0	817,899,814	-186	-0.0000227
100 %		+ 10	817,900,153	153	0.0000187
100 %		+ 20	817,900,130	130	0.0000159
100 %		+ 30	817,900,069	69	0.0000084
100 %		+ 40	817,899,924	-76	-0.0000093
100 %		+ 50	817,900,314	314	0.0000384
BATT. ENDPOINT	3.71	+ 20	817,899,935	-65	-0.0000079

Table 7-11. CDMA BC10 Frequency Stability Data

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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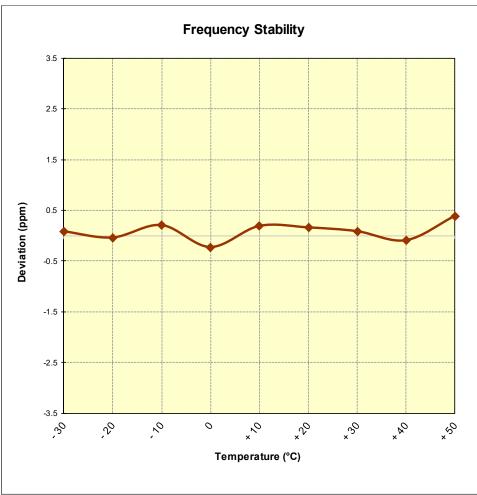


Figure 7-6. CDMA BC10 Frequency Stability Graph

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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OPERATING FREQUENCY:	819,000,000	Hz
CHANNEL:	26740	_
REFERENCE VOLTAGE:	4.31	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %		- 30	819,000,307	307	0.0000375
100 %		- 20	818,999,696	-304	-0.0000371
100 %		- 10	818,999,982	-18	-0.0000022
100 %		0	818,999,764	-236	-0.0000288
100 %		+ 10	818,999,808	-192	-0.0000234
100 %		+ 20	819,000,072	72	0.000088
100 %		+ 30	818,999,574	-426	-0.0000520
100 %		+ 40	818,999,797	-203	-0.0000248
100 %		+ 50	819,000,083	83	0.0000101
BATT. ENDPOINT	3.71	+ 20	818,999,943	-57	-0.0000070

Table 7-12. LTE Band 26 Frequency Stability Data

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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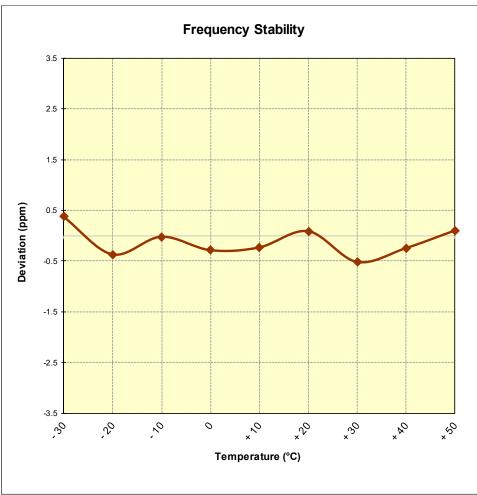


Table 7-13. LTE Band 26 Frequency Stability Data

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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OPERATING FREQUENCY:	793,000,000	Hz
CHANNEL:	23330	
REFERENCE VOLTAGE:	4.31	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.31	- 30	793,000,026	26	0.0000033
100 %		- 20	792,999,779	-221	-0.0000279
100 %		- 10	793,000,222	222	0.0000280
100 %		0	792,999,965	-35	-0.0000044
100 %		+ 10	793,000,242	242	0.0000305
100 %		+ 20	793,000,056	56	0.0000071
100 %		+ 30	792,999,994	-6	-0.0000008
100 %		+ 40	793,000,346	346	0.0000436
100 %		+ 50	792,999,948	-52	-0.0000066
BATT. ENDPOINT	3.71	+ 20	792,999,897	-103	-0.0000130

Table 7-14. LTE Band 14 Frequency Stability Data

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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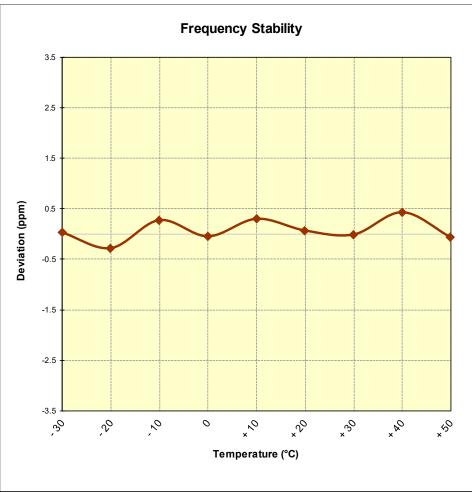


Table 7-15. LTE Band 14 Frequency Stability Data

FCC ID: A3LSMA102U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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### 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMA102U** complies with all the requirements of Parts 22(H) and 90 of the FCC rules.

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Test Report S/N:	Test Dates:	EUT Type:		Dage 64 of 64
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