

## **PCTEST**

7185 Oakland Mills Road, Columbia, MD 21046 USA Tel. 410.290.6652 / Fax 410.290.6654 http://www.pctest.com



# MEASUREMENT REPORT

FCC Part 22 & 90

#### **Applicant Name:**

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

#### Date of Testing:

4/21 - 6/21/2021 **Test Site/Location:** PCTEST Lab. Columbia, MD, USA **Test Report Serial No.:** 1M2104130035-06.A3L

## FCC ID:

## A3LSMF711B

## APPLICANT:

## Samsung Electronics Co., Ltd.

Application Type: Model: EUT Type: FCC Classification: FCC Rule Part: Test Procedure(s): Certification SM-F711B Portable Handset PCS Licensed Transmitter Held to Ear (PCE) §2.1049, §22(H), §90(S) ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01, KDB 648474 D03 v01r04

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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## MEASUREMENT REPORT FCC Part 22 & 90



Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Measurement	Max. Power [W]	Max. Power [dBm]	Emission Designator
	15 MHz	QPSK	821.5	ERP	0.073	18.62	13M5G7D
	13 10112	16QAM	821.5	ERP	0.063	17.97	13M5W7D
	15 MHz	QPSK	821.5	Conducted	0.308	24.88	13M5G7D
		16QAM	821.5	Conducted	0.258	24.11	13M5W7D
	10 MHz	QPSK	819.0	Conducted	0.316	24.99	9M01G7D
LTE Band 26	10 10112	16QAM	819.0	Conducted	0.267	24.26	8M97W7D
LTE Danu 20	5 MHz	QPSK	816.5 - 821.5	Conducted	0.311	24.93	4M51G7D
	5 1011 12	16QAM	816.5 - 821.5	Conducted	0.255	24.07	4M51W7D
3 M	3 MHz	QPSK	815.5 - 822.5	Conducted	0.313	24.96	2M71G7D
		16QAM	815.5 - 822.5	Conducted	0.257	24.10	2M72W7D
	1.4 MHz	QPSK	814.7 - 823.3	Conducted	0.327	25.15	1M10G7D
		16QAM	814.7 - 823.3	Conducted	0.253	24.03	1M10W7D

**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 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 17025-2017 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: A3LSMF711B**. 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 Parts 22 and 90.

The Equipment Under Test (EUT) can operate in one of three physical configurations – "Open", "Half open" and "Closed". All emissions are investigated in three modes for compliance.

Test Device Serial No.: 0044M, 0050M, 0065M, 0069M, 0086M, 0089M, 0100M

## 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (n5, n66), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer

## 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.

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 an authorized wireless charging pad WCP Model: EP-N5100 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 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

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].

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  $U_{CISPR}$  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
-	AP2	EMC Cable and Switch System	9/9/2020	Annual	9/9/2021	AP2
-	AP1	EMC Cable and Switch System	9/10/2020	Annual	9/10/2021	AP1
-	LTx1	Licensed Transmitter Cable Set	5/1/2020	Annual	5/1/2021	LTx1
-	LTx2	Licensed Transmitter Cable Set	9/16/2020	Annual	9/16/2021	LTx2
-	LTx3	LIcensed Transmitter Cable Set	8/28/2020	Annual	8/28/2021	LTx3
Keysight Technologies	N9020A	MXA Signal Analyzer	8/14/2020	Annual	8/14/2021	US46470561
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	8/17/2020	Annual	8/17/2021	MY52350166
Anritsu	MT8821C	Radio Communication Analyzer		N/A		6200901190
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2019	Biennial	10/10/2021	121034
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Espec	ESX-2CA	Environmental Chamber	8/27/2020	Annual	8/27/2022	17620
Keysight Technologies	N9030B	PXA Signal Analyzer, Multi-touch	9/17/2020	Annual	9/17/2021	MY57141001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator		N/A		11208010032
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator		N/A		11403100002
Rohde & Schwarz	CMU200	Base Station Simulator		N/A		836536/0005
Rohde & Schwarz	CMW500	Radio Communication Tester		N/A		100976
Rohde & Schwarz	CMW500	Radio Communication Tester		N/A		112347
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	7/15/2020	Annual	7/15/2021	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/9/2020	Annual	9/9/2021	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/10/2020	Annual	8/10/2021	103200
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	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**

#### **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:	A3LSMF711B
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	<u>LTE</u>

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
	Occupied Bandwidth	2.1049	N/A	PASS	Section 7.2
CONDUCTED	Conducted Band Edge / Spurious Emissions (LTE Band 26)	2.1051, 90.691(a)	<ul> <li>&gt; 43 + 10 log10 (P[Watts]) for all out-of-band emissions beyond 37.5 kHz from the Block Edge</li> <li>&gt; 50 + 10 log10 (P[Watts]) at Band Edge and for all out- of-band emissions within 37.5 kHz of Block Edge</li> </ul>	PASS	Sections 7.3, 7.4
CON	Frequency Stability	2.1055, 90.213	< 2.5 ppm	PASS	Section 7.8
	Conducted Power	2.1046, 90.635	< 100 Watts	PASS	Section 7.5
ED	Effective Radiated Power (LTE Band 26)	22.913(a)(2)	< 7 Watts max. ERP	PASS	Section 7.6
RADIATED	(LTE Band 26) 2.1053, 90.691(a)		<ul> <li>&gt; 43 + 10 log10 (P[Watts]) for all out-of-band emissions beyond 37.5 kHz from the Block Edge</li> <li>&gt; 50 + 10 log10 (P[Watts]) at Band Edge and for all out- of-band emissions within 37.5 kHz of Block Edge</li> </ul>	PASS	Section 7.7

Table 7-1. Summary of Test Results

#### Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 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.
- 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 EMC Software Tool Beta 8.
- 5) For LTE 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 "LTE Automation," Version.5.3.

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## 7.2 Occupied Bandwidth

#### **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  $\ge$  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

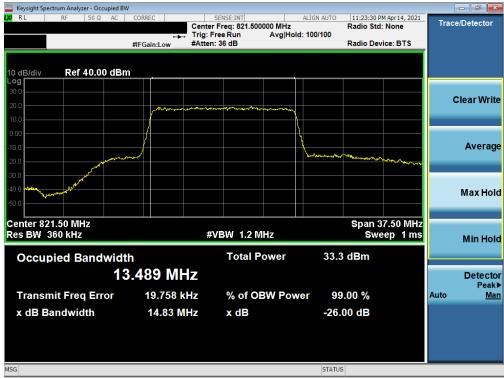
#### Test Notes

None.

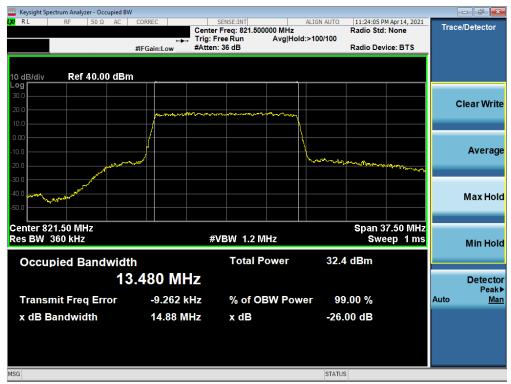
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## LTE Band 26



Plot 7-1. Occupied Bandwidth Plot (LTE Band 26 - 15MHz QPSK - Full RB Configuration)



Plot 7-2. Occupied Bandwidth Plot (LTE Band 26 - 15MHz 16-QAM - Full RB Configuration)

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🔤 Keysight Spectrum Analyze														- 0 ×
LXI RL RF	50 Ω A	AC CO	RREC		Con		SE:INT	00000 MI		ALIGN AUTO	11:52:44 Radio Sto	M Apr 14, 2021	Trac	e/Detector
				+	. Trig	: Free	Run			100/100				
		#IF	Gain:l	Low	#Att	ten: 36	dB				Radio De	vice: BTS		
	40.00 c	dBm												
Log 30.0														
20.0														Clear Write
10.0				~~~~	~~~~~	~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	-net-com	h					
0.00										1				Average
-10.0		-								home	have			Average
-20.0														
-30.0														
-40.0														Max Hold
-50.0														
Center 819.00 MH	7										Span 2	25.00 MHz		
Res BW 240 kHz						#VB	W 750	kHz				eep 1 ms		Min Hold
							_	_						minitiona
Occupied Ba							Total	Power	ſ	33.2	2 dBm			
		9.01	09	) MH	ΗZ									Detector
	_		-								00.00		Auto	Peak▶
Transmit Freq	Error		513	3.68 k	(HZ		% of C	DBW F	owe	er 99	.00 %		Auto	<u>Man</u>
x dB Bandwid	th		9.8	891 M	Hz		x dB			-26.	00 dB			
MSG										STATUS	5			
				-	_									

Plot 7-3. Occupied Bandwidth Plot (LTE Band 26 - 10MHz QPSK - Full RB Configuration)



Plot 7-4. Occupied Bandwidth Plot (LTE Band 26 - 10MHz 16-QAM - Full RB Configuration)

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CORREC	CENCETINE		10:00:00 AM April 0	
Cente	er Freq: 816.500000 MHz			Trace/Detector
		>100/100		
#IFGain:Low #Atte	n: 36 dB		Radio Device: BTS	
				Clear Wri
/				
				Avera
w		mon		Avera
			a state of the second	
				Max Ho
			Span 12 50 M	U7
#	#VBW 390 kHz			200
				Min Ho
)	Total Power	32.6	dBm	
5145 MHz				Detect
				Pea
3.233 kHz	% of OBW Powe	er 99.	00 %	Auto <u>M</u>
5.023 MHz	x dB	-26.0	0 dB	
	Trig: ##FGain:Low #Atte	Center Freq: 816.500000 MHz Trig: Free Run Avg Hold: #Atten: 36 dB #VBW 390 kHz Total Power 5145 MHz 3.233 kHz % of OBW Power	Center Freq: 816.500000 MHz Trig: Free Run Avg Hold:>100/100 #Atten: 36 dB #FGain:Low #Atten: 36 dB #VBW 390 kHz #VBW 390 kHz Total Power 32.6 5145 MHz 3.233 kHz % of OBW Power 99.	Center Freq: 816.500000 MHz       Radio Std: None         #IFGein:Low       #Atten: 36 dB       Avg Hold:>100/100       Radio Device: BTS         Addio Device: BTS       Avg/Hold:>100/100       Radio Device: BTS         Addio Device: BTS       Stg: Avg/Hold:>100/100       Stg: Avg/Hold:>100/100         Addio Device: BTS       Stg: Avg/Hold:>100/100       Stg

Plot 7-5. Occupied Bandwidth Plot (LTE Band 26 - 5MHz QPSK - Full RB Configuration)



Plot 7-6. Occupied Bandwidth Plot (LTE Band 26 - 5MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMF711B	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Keysight Spectrum Analyzer - Occupie RL RF 50 Ω A		SENSE:INT	ALIGN AUTO	12:07:58 At	1 Apr 15, 2021		
	Ce	enter Freq: 815.500000 MI	lz	Radio Std:		Trace	/Detector
		ig:FreeRun Avg Atten:36 dB	Hold: 100/100	Radio Dev	ce: BTS		
	#IT Gallit.Low						
	_						
0 dB/div Ref 40.00 d	Bm						
30.0							
20.0						С	lear Writ
10.0		mangen and a start and a start and a start and a start a	$\gamma$				
3.00	/		N				
			X				A
10.0			har	- Dar D			Averag
20.0 mailes and a second secon					man from		
80.0							
40.0							Max Hol
50.0							
Center 815.500 MHz Res BW 75 kHz		#VBW 240 kHz			500 MHz		
Res DW /J KHZ				Sweep	12.53 ms		Min Ho
Occupied Bandwi	dth	Total Power	32.4	4 dBm			
	2.7063 MHz						Detecto
Transmit Freq Error	-172 Hz	% of OBW P	ower 99	9.00 %		Auto	Ма
							_
x dB Bandwidth	3.015 MHz	x dB	-20.	.00 dB			
G			STATU	S			

Plot 7-7. Occupied Bandwidth Plot (LTE Band 26 - 3MHz QPSK - Full RB Configuration)



Plot 7-8. Occupied Bandwidth Plot (LTE Band 26 - 3MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMF711B	PCTEST <sup>®</sup> Proud to be part of <b>@</b> element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Keysight Spectrum Analyzer - Occupi					
<mark>0</mark> RL RF 50Ω	AC CORREC	SENSE:INT Center Freq: 814.700000 MHz	ALIGN AUTO 12:18:15 / Radio Sto	AM Apr 15, 2021 : None	Trace/Detector
		Trig: Free Run Avg Hold #Atten: 36 dB			
	#IFGain:Low	#Atten: 36 dB	Radio De	VICE: BIS	
10 dB/div Ref 40.00 d	dBm				
30.0					
20.0					Clear Wri
10.0		man man man			
0.00					
10.0					Avera
	man	λ.	man managene		
30.0				and a second way and	
40.0					
					Max Ho
-50.0					
Center 814.700 MHz			Span 3	3.500 MHz	
Res BW 33 kHz		#VBW 110 kHz	Sweep	5.867 ms	Min Ho
	141-	Total Power	31.9 dBm		
Occupied Bandw			51.9 UBIII		
	1.0959 MH	Z			Detect
Transmit Freq Erro	r -183 I	Hz % of OBW Pow	er 99.00 %		Peal Auto Ma
					<u></u>
x dB Bandwidth	1.235 MI	Hz x dB	-26.00 dB		
SG			STATUS		

Plot 7-9. Occupied Bandwidth Plot (LTE Band 26 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-10. Occupied Bandwidth Plot (LTE Band 26 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMF711B	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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## 7.3 Spurious and Harmonic Emissions at Antenna Terminal

#### **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 ≥ 100kHz
- 3. VBW  $\geq$  3 x RBW
- 4. Detector = RMS
- 5. Trace mode = Trace averaging (RMS) over 100 sweeps
- 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

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## LTE Band 26

	ectrum Analy												- 6 ×
XU RL	RF	50 Ω	AC	CORREC	ast⊶→	Trig: Fre		#Avg Typ	ALIGN AUTO	TRAC	Apr 14, 2021 E 1 2 3 4 5 6 E A WWWW T A N N N N N	Fr	equency
PASS	Ref 20	).00 di	Bm	IFGain:	ow	Atten: 3	0 dB		Mkr1	813.84	3 2 MHz 47 dBm		Auto Tun
10.0	e 1 Pass												enter Fre
10.00												30	Start Fre .000000 MH
20.0 30.0												814	Stop Fre .000000 M⊦
i0.0											1	78 <u>Auto</u>	CF Ste 400000 MI Ma
60.0	constitution and a star	ر میں میں اور	un and							g-species of the spinot of the spin		ľ	Freq Offs 0 H
70.0	the stand strends w		an de minie an										Scale Typ
Start 30.0 Res BW		2		:	#VBW	300 kHz	:	s	weep 37	Stop 8 .33 ms (2	14.0 MHz 0001 pts)	Log	Li
ISG									STATUS				

Plot 7-11. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)



Plot 7-12. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)

FCC ID: A3LSMF711B	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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	pectrum Analyz												- 0 ×
X/RL	RF	50 Ω	AC	CORREC		SEI	ISE:INT	#Avg Ty	ALIGN AUT		PM Apr 14, 2021	Fre	quency
PASS				PNO: Fa IFGain:L	ist ↔ ow	Trig: Free Atten: 40				1			
10 dB/div Log	Ref 30	.00 d	Bm						Ν	/lkr1 9.9 -37	59 5 GHz 7.90 dBm	, í	Auto Tune
Tra	ce 1 Pass					,						C	enter Freq
20.0												5.500	000000 GHz
10.0													Start Freq
0.00												1.000	000000 GHz
-10.0													Stop Freq
-20.0													000000 GHz
													CF Step
-30.0											1	900. <u>Auto</u>	000000 MHz Man
-40.0				~~~~									
-50.0												F	req Offset 0 Hz
-60.0													
													cale Type
Start 1.0	00 GHz / 1.0 MHz	,		-		3.0 MHz			woon		10.000 GHz (18001 pts)	Log	Lin
FRES DW				#		3.0 19182		,		TUS	(Topor pis)		

Plot 7-13. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)

FCC ID: A3LSMF711B	PCTEST* Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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## 7.4 Band Edge Emissions at Antenna Terminal

#### **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.

#### 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 averaging (RMS) over 100 sweeps
- 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

#### Test Notes

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 emissions are attenuated at least 26 dB below the transmitter power.

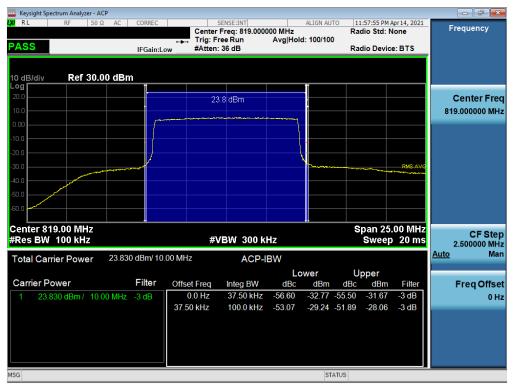
FCC ID: A3LSMF711B	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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## LTE Band 26

Keysight Spectrum Analyzer - ACP							
🗶 RL RF 50Ω AC COR		SENSE:INT Frea: 821.5000		ALIGN AUTO	11:56:39 PM Radio Std:	Apr 14, 2021	Frequency
PASS	Trig: F	ree Run	Avg Hold:	100/100			
IFG.	ain:Low #Atten:	36 dB			Radio Devi	ce: BTS	
10 dB/div Ref 30.00 dBm							
20.0		.8 dBm					Center Freq
10.0		.o ubm					821.500000 MHz
0.00							021.000000 1112
-10.0							
-20.0							
-30.0						RMS AVG	
-40.0							
-50.0							
-60.0							
Center 821.50 MHz					Enan 2	7.50 MHz	
#Res BW 100 kHz	#\	/BW 300 ki	Hz			p 20 ms	CF Step 3.750000 MHz
Total Carrier Power 23.821 dBn	1/ 15.00 MHz	ACP-I	BW				<u>Auto</u> Man
			Lov	ver	Upper		
Carrier Power Filt	onserried	Integ BW	dBc	dBm	dBc dBm		Freq Offse
1 23.821 dBm / 15.00 MHz -3 dl		37.50 kHz		-33.84 -5			0 Ha
	37.50 kHz	100.0 kHz	-54.11	-30.29 -5	3.08 -29.26	-3 dB	
MSG				STAT	10		

Plot 7-14. Channel Edge Plot (LTE Band 26 - 15MHz QPSK - Mid Channel)



#### Plot 7-15. Channel Edge Plot (LTE Band 26 - 10MHz QPSK - Mid Channel)

FCC ID: A3LSMF711B	PCTEST * Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Keysight Spectrum Anal	lyzer - ACP												X
XIRL RF	<u>50 Ω</u>	AC	CORREC			NSE:INT reg: 816.5000		ALIGN AU		:59:22 PM dio Std: I	Apr 14, 2021	Frequency	<b>/</b>
PASS			IFGain:L	↔ w	Trig: Fre #Atten: 3	e Run		d:>100/10	00	dio Devic			
			II Guillie										
	f 30.00	dBm											
- <b>og</b> 20.0								-11				Contor	Ero
10.0					23.8	3 dBm		į.				Center 816.500000	
0.00			· /~									816.500000	IVIH:
10.0								1					
20.0			J/					V	_		RMS AVG		
30.0													
40.0													
50.0													
60.0													
Center 816.500	MHz		11					11		nan 12	.50 MHz		
Res BW 100 kl					#VE	300 k	Hz				o 20 ms	CF \$ 1.250000	
Total Carrier Pov	ver 2	23.811	dBm/ 5.0	0 MHz		ACP-I	BW					<u>Auto</u>	Ма
								ower		pper			
Carrier Power			Filter	Offset		Integ BW	dBc	dBm	dBc	dBm	Filter	Freq O	
1 23.811 dBm	/ 5.000	MHz	-3 dB		0 Hz	37.50 kHz	-52.56	-28.75		-27.87	-3 dB		0 H:
				37.50	KHZ	100.0 kHz	-50.07	-20.20	-49.03	-25.22	-3 dB		
								07	ATUO				
SG								SI	ATUS				

Plot 7-16. Channel Edge Plot (LTE Band 26 - 5MHz QPSK - Low Channel)



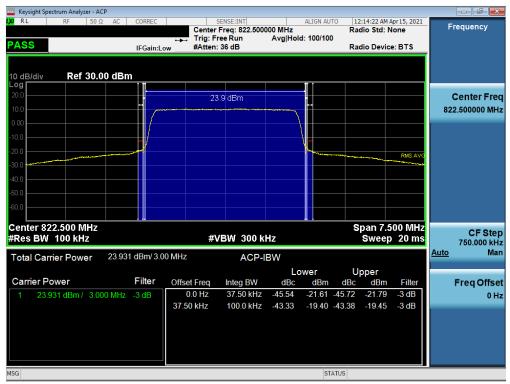
Plot 7-17. Channel Edge Plot (LTE Band 26 - 5MHz QPSK - High Channel)

FCC ID: A3LSMF711B	PCTEST* Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SUNG	Approved by: Technical Manager
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	ım Analyzer - ACI									
X/RL	RF 50 Ω	AC	CORREC	Cor	SENSE:INT nter Freg: 815.500		LIGN AUTO	12:15:00 A Radio Std	M Apr 15, 2021	Frequency
					g: Free Run	Avg Hold: '	100/100	Radio Stu	None	
PASS			IFGain:L	ow #At	ten: 36 dB			Radio Dev	ice: BTS	
10 dB/div	Ref 30.0	0 dBm								
Log			i 11				İ			
20.0					23.8 dBm	i.				Center Fr
10.0						·····				815.500000 M
0.00										
-10.0			/			│	_			
-20.0										
-30.0									RMS AVG	
40.0										
-50.0										
-60.0										
Center 815.	500 MHz						•	Span 7	.500 MHz	0.5.01
#Res BW 10					#VBW 300 k	Hz			ep 20 ms	CF St 750.000 k
	_	22.000	dBm/ 3.		100					Auto M
Total Carrier	r Power	23.809	dBm/ 3.	JU MHZ	ACP-	IBW				
Total Carrier		23.809		JU MHZ	ACP-	IBW Low	er	Upper		
Total Carrier Carrier Pow		23.809	Filter	Offset Fre				Upper dBc dBn	n Filter	Freq Offs
Carrier Pow			Filter	Offset Fre	q Integ BW z 37.50 kHz	Low dBc -47.54 -	dBm 23.73 -4	dBc dBn 6.62 -22.82	2 -3 dB	Freq Offs 0
Carrier Pow	er		Filter	Offset Fre	q Integ BW z 37.50 kHz	Low dBc -47.54 -	dBm	dBc dBn 6.62 -22.82	2 -3 dB	
Carrier Pow	er		Filter	Offset Fre	q Integ BW z 37.50 kHz	Low dBc -47.54 -	dBm 23.73 -4	dBc dBn 6.62 -22.82	2 -3 dB	
Carrier Pow	er		Filter	Offset Fre	q Integ BW z 37.50 kHz	Low dBc -47.54 -	dBm 23.73 -4	dBc dBn 6.62 -22.82	2 -3 dB	
Carrier Pow	er		Filter	Offset Fre	q Integ BW z 37.50 kHz	Low dBc -47.54 -	dBm 23.73 -4	dBc dBn 6.62 -22.82	2 -3 dB	
Carrier Pow	er		Filter	Offset Fre	q Integ BW z 37.50 kHz	Low dBc -47.54 -	dBm 23.73 -4	dBc dBn 6.62 -22.82	2 -3 dB	

Plot 7-18. Channel Edge Plot (LTE Band 26 - 3MHz QPSK - Low Channel)



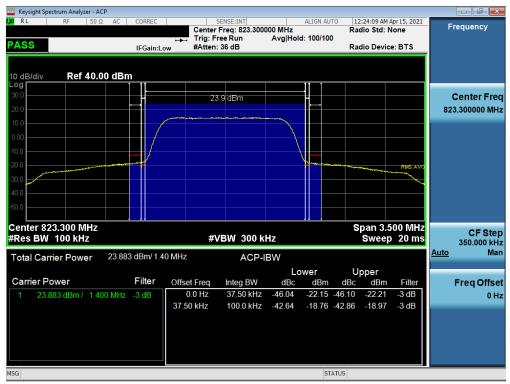
Plot 7-19. Channel Edge Plot (LTE Band 26 - 3MHz QPSK - High Channel)

FCC ID: A3LSMF711B	PCTEST* Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	A M S U N G	Approved by: Technical Manager
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Keysight Spectrum Analyzer	- ACP									_	
RL RF !	50Ω AC	CORREC		SENSE:INT Frea: 814.7000		ALIGN AUTO		23:10 AM / o Std: N	Apr 15, 2021	F	requency
PASS		IFGain:L	Trig: Fi	ree Run	Avg Hold	: 100/100		o Devic			
	0.00 dE	3m									
- <b>og</b> 30.0 20.0			23	5.7 dBm							Center Free 4.700000 MH
10.0											
20.0											
80.0									RMS AVG		
50.0											
Center 814.700 MH ¢Res BW 100 kHz	z	• ••	#\	/BW 300 ki	Hz	•••••			00 MHz 20 ms		CF Stej 350.000 kH
Total Carrier Power	23.7	'20 dBm/ 1.4	0 MHz	ACP-I	BW					<u>Auto</u>	Ма
					Lo	wer	Up	per			
Carrier Power		Filter	Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter		Freq Offse
1 23.720 dBm / 1	1.400 MH	z -3 dB	0.0 Hz	37.50 kHz	-48.63	-24.91 -4		-24.59	-3 dB		0 H
			37.50 kHz	100.0 kHz	-45.45	-21.73 -4	4 90	-21.18	-3 dB		
			57.30 KHZ	100.0 KHZ	-10.40	21.10	1.00				

Plot 7-20. Channel Edge Plot (LTE Band 26 - 1.4MHz QPSK - Low Channel)



Plot 7-21. Channel Edge Plot (LTE Band 26 - 1.4MHz QPSK - High Channel)

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# 7.5 Conducted Power Output Data §2.1046 §2.1046 §90.635

#### NOTES:

- 1. 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.
- 2. The unit was tested with its standard battery.

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]	Conducted Power [Watts]	Conducted Power Limit [dBm]	Margin (dB)
	QPSK	26765	821.5	1 / 74	24.88	0.308	50.00	-25.12
15 MHz	16-QAM	26765	821.5	1 / 74	24.11	0.258	50.00	-25.89
10 10112	64-QAM	26765	821.5	1 / 74	22.72	0.187	50.00	-27.28
	256-QAM	26765	821.5	1 / 74	20.07	0.102	50.00	-29.93
	QPSK	26740	819.0	1 / 25	24.99	0.316	50.00	-25.01
10 MHz	16-QAM	26740	819.0	1 / 25	24.26	0.267	50.00	-25.74
	64-QAM	26740	819.0	1 / 25	22.85	0.193	50.00	-27.15
	256-QAM	26740	819.0	1 / 25	20.51	0.112	50.00	-29.49
	QPSK	26715	816.5	1 / 12	24.91	0.310	50.00	-25.09
	QFOR	26765	821.5	1 / 12	24.93	0.311	50.00	-25.07
	16-QAM	26715	816.5	1 / 12	24.07	0.255	50.00	-25.93
5 MHz		26765	821.5	1 / 12	24.02	0.253	50.00	-25.98
5 MILLS	64-QAM	26715	816.5	1 / 12	22.90	0.195	50.00	-27.10
		26765	821.5	1 / 12	23.04	0.201	50.00	-26.96
	256-QAM	26715	816.5	1 / 12	20.40	0.110	50.00	-29.60
		26765	821.5	1 / 12	20.35	0.108	50.00	-29.65
	QPSK	26705	815.5	1/7	24.76	0.299	50.00	-25.24
	QF 5K	26775	822.5	1/7	24.96	0.313	50.00	-25.04
	16-QAM	26705	815.5	1/7	23.85	0.243	50.00	-26.15
3 MHz	10-QAIVI	26775	822.5	1/7	24.10	0.257	50.00	-25.90
JIVITIZ	64-QAM	26705	815.5	1/7	22.77	0.189	50.00	-27.23
	04-QAIVI	26775	822.5	1/7	22.96	0.198	50.00	-27.04
	256-QAM	26705	815.5	1/7	20.07	0.102	50.00	-29.93
	250-QAIVI	26775	822.5	1/7	20.38	0.109	50.00	-29.62
	QPSK	26697	814.7	1/3	24.81	0.303	50.00	-25.19
	QF3N	26783	823.3	1/3	25.15	0.327	50.00	-24.85
	16-QAM	26697	814.7	1/3	23.92	0.246	50.00	-26.08
1.4 MHz	10-QAIVI	26783	823.3	1/3	24.03	0.253	50.00	-25.97
	64-QAM	26697	814.7	1/3	22.95	0.197	50.00	-27.05
	04-QAIVI	26783	823.3	1/3	23.16	0.207	50.00	-26.84
	256-QAM	26697	814.7	1/3	20.15	0.103	50.00	-29.85
	200-QAIVI	26783	823.3	1/3	20.28	0.107	50.00	-29.72

Table 7-2. Conducted Power Output Data (LTE Band 26)

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## 7.6 Radiated Power (ERP)

#### **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

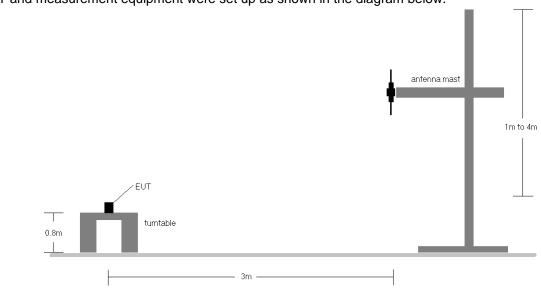
#### Test Settings

- 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  $\geq 2 \times \text{span} / \text{RBW}$
- 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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#### Test Setup



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



#### 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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Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
	QPSK	821.5	Н	210	291	6.72	1/0	14.05	18.62	0.073	38.45	-19.83
	16-QAM	821.5	Н	210	291	6.72	1/0	13.40	17.97	0.063	38.45	-20.48
15 MHz	QPSK	821.5	V	166	242	6.72	1/0	12.41	16.98	0.050	38.45	-21.47
	QPSK (WCP)	821.5	Н	282	269	6.72	1/0	11.52	16.09	0.041	38.45	-22.36
	QPSK (Closed)	821.5	Н	281	10	6.72	1 / 37	8.43	13.00	0.020	38.45	-25.45

Table 7-3. ERP Data (LTE Band 26)

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## 7.7 Radiated Spurious Emissions Measurements

#### **Test Overview**

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using 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

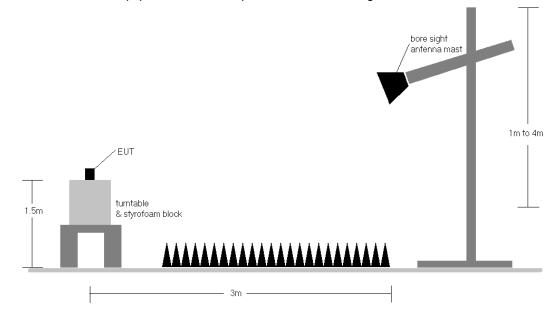
- 1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
- 2. VBW  $\ge$  3 x RBW
- 3. Span = 1.5 times the OBW
- 4. No. of sweep points  $\geq 2 \times \text{span} / \text{RBW}$
- 5. Detector = RMS
- 6. Trace mode = Average (Max Hold for pulsed emissions)
- 7. The trace was allowed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

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#### Test Setup



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

Figure 7-5. Test Instrument & Measurement Setup

#### Test Notes

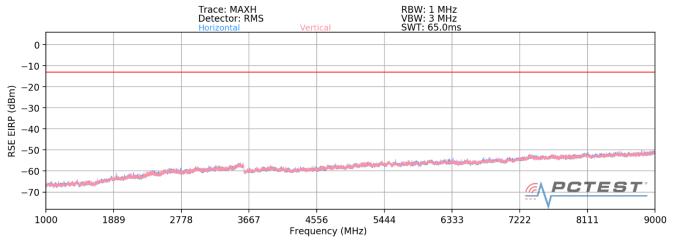
- 1. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
- 2. This unit was tested with its standard battery.
- 3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.
- 4. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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## LTE Band 26



Bandwidth (MHz):	15
Frequency (MHz):	821.5
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 37

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1643.0	Н	152	5	-75.59	-5.79	25.62	-69.64	-13.00	-56.64
2464.5	Н	113	137	-66.41	-2.25	38.34	-56.92	-13.00	-43.92
3286.0	Н	-	-	-77.65	0.67	30.02	-65.24	-13.00	-52.24
4107.5	Н	266	299	-77.40	2.29	31.89	-63.37	-13.00	-50.37
4929.0	Н	-	-	-78.92	3.58	31.66	-63.60	-13.00	-50.60
5750.5	Н	-	-	-79.01	5.64	33.63	-61.63	-13.00	-48.63
6572.0	Н		-	-79.07	5.81	33.74	-61.52	-13.00	-48.52

Table 7-4. Radiated Spurious Data (LTE Band 26)

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## 7.8 Frequency Stability / Temperature Variation

#### **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

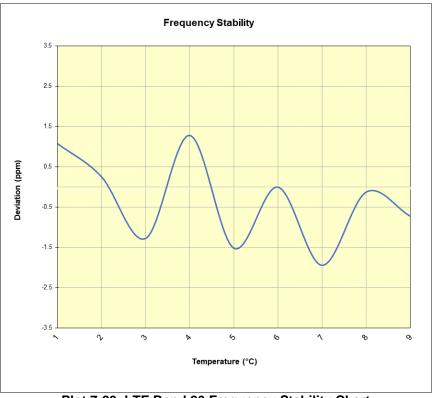
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## Frequency Stability / Temperature Variation

LTE Band 26					
	Operating	Frequency (Hz):	819,000,000		
	Ref	. Voltage (VDC):	4.32		
		Deviation Limit:	± 0.00025% or 2.5 ppm		
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
		- 30	819,008,485	889	0.0001085
		- 20	819,007,809	213	0.0000260
		- 10	819,006,550	-1,047	-0.0001278
		0	819,008,649	1,052	0.0001285
100 %	4.32	+ 10	819,006,356	-1,241	-0.0001516
		+ 20 (Ref)	819,007,597	0	0.0000000
		+ 30	819,006,005	-1,592	-0.0001943
		+ 40	819,007,494	-103	-0.0000126
		+ 50	819,007,005	-591	-0.0000722
Battery Endpoint	3.51	+ 20	819,006,968	-629	-0.0000768

Table 7-5. LTE Band 26 Frequency Stability Data



Plot 7-23. LTE Band 26 Frequency Stability Chart

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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: A3LSMF711B** complies with all the requirements of Parts 22(H) and 90 of the FCC rules.

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