

# PCTEST

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



# PART 27 MEASUREMENT REPORT

#### **Applicant Name:**

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

# Date of Testing:

12/09/2021 - 12/31/2021 **Test Report Issue Date:** 01/07/2022 **Test Site/Location:** PCTEST Lab. Columbia, MD, USA **Test Report Serial No.:** 1M2112090153-05.A3L

# FCC ID:

# A3LSMS901JPN

Applicant Name:

# Samsung Electronics Co., Ltd.

Application Type: Model: Additional Model(s): EUT Type: FCC Classification: FCC Rule Part: Test Procedure(s): Certification SC-51C SCG13 Portable Handset PCS Licensed Transmitter Held to Ear (PCE) 27 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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			EIRP				
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Max. Power [W]	Max. Power [dBm]	Emission Designator	
	20 MHz	QPSK	2506.0 - 2680.0	0.255	24.07	18M1G7D	
		16QAM	2506.0 - 2680.0	0.229	23.59	18M1W7D	
	15 MHz	QPSK	2503.5 - 2682.5	0.246	23.90	13M5G7D	
LTE Band 41(BC3)		16QAM	2503.5 - 2682.5	0.222	23.46	13M6W7D	
LTE Band 41(PC3)	10 MHz	QPSK	2501.0 - 2685.0	0.255	24.07	9M09G7D	
		16QAM	2501.0 - 2685.0	0.220	23.43	9M03W7D	
	5 MHz	QPSK	2498.5 - 2687.5	0.254	24.05	4M52G7D	
	5 IVIHZ	16QAM	2498.5 - 2687.5	0.212	23.27	4M54W7D	

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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 17025-2017 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: A3LSMS901JPN**. 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 27.

Test Device Serial No.: 0018M, 0012M, 0004M

# 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850 WCDMA/HSPA, Multi-band LTE, 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 3.4 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 "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Measurement Guidance for Certification of Licensed Digital Transmitters" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

Deviation from Measurement Procedure.....None

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# 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 turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

For radiated power measurements, substitution method is used per the guidance of ANSI/TIA-603-E-2016. A halfwave dipole is 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 radiated spurious emissions measurements and calculations, conversion method is used per the formulas in KDB 971168 Section 5.8.4. Field Strength (EIRP) is calculated using the following formulas:

 $E_{[dB\mu V/m]} =$  Measured amplitude level<sub>[dBm]</sub> + 107 + Cable Loss<sub>[dB]</sub> + Antenna Factor<sub>[dB/m]</sub> And EIRP<sub>[dBm]</sub> =  $E_{[dB\mu V/m]}$  + 20logD - 104.8; where D is the measurement distance in meters.

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 414788 D01 v01r01.

Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI/TIA-603-E-2016.

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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
-	AP1	EMC Cable and Switch System	3/9/2021	Annual	3/9/2022	AP1
-	ETS	EMC Cable and Switch System	3/4/2021	Annual	3/4/2022	ETS
-	LTx1	Licensed Transmitter Cable Set	3/12/2021	Annual	3/12/2022	LTx1
-	LTx2	Licensed Transmitter Cable Set	3/12/2021	Annual	3/12/2022	LTx2
-	LTx5	LIcensed Transmitter Cable Set	3/3/2021	Annual	3/3/2022	LTx5
Anritsu	MT8821C	Radio Communication Analyzer		N/A		6201525694
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2020	Biennial	3/12/2022	128337
ETS Lindgren	3816/2NM	LISN	7/9/2020	Biennial	7/9/2022	00114451
Keysight Technologies	N9030A	PXA Signal Analyzer	9/2/2020	Annual	12/20/2021	MY55410501
Keysight Technologies	N9038A	MXE EMI Receiver	8/11/2020	Annual	2/1/2022	MY51210133
Rohde & Schwarz	CMW500	Radio Communication Tester		N/A		112347
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	1/21/2021	Annual	1/21/2022	101716
Rohde & Schwarz	FSW26	2Hz-26.5GHz Signal and Spectrum Analyzer	2/10/2021	Annual	2/10/2022	103187

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

# **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**

#### Example: Spurious emission at 3700.40 MHz

The receive 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 3700.40 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.50 dBm so this harmonic was 25.50 dBm -(-24.80) = 50.3 dBc.

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# 7.0 TEST RESULTS

# 7.1 Summary

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

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
	Transmitter Conducted Output Power	2.1046(a), 2.1046(c)	N/A	PASS	See RF Exposure Report
CONDUCTED	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 7.2
CONDI	Conducted Band Edge / Spurious Emissions (LTE Band 41)	2.1051, 27.53(m)	Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Sections 7.3, 7.4
	Frequency Stability	2.1055, 27.54	Fundamental emissions stay within authorized frequency block	PASS	Section 7.7
1 111	Equivalent Isotropic Radiated Power (LTE Band 41)	27.50(h)(2)	≤ 2 Watts max. EIRP	PASS	Section 7.5
RADI	Radiated Spurious Emissions (LTE Band 41)	2.1053, 27.53(m)	Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Section 7.6

Table 7-1. Summary of Test Results (FCC)

#### 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 were all 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) All conducted emissions measurements are performed with automated test software to capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST EMC Software Tool v1.0.

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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  $\geq$  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

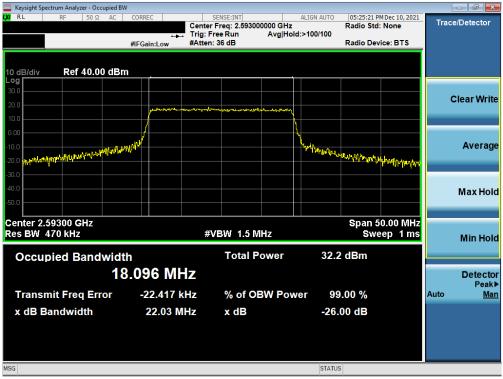
#### None.

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Keysight Spectrum Analyzer - Occupied						_	- 0
XI RL RF 50Ω AC	CORREC	SENSE:INT enter Freq: 2.593000000 GI	ALIGN AUTO	05:21:06 PM D Radio Std: N		Trace/	Detector
			⊓∠ Hold: 100/100	Radio Stu. N	one		
	#IFGain:Low ##	Atten: 36 dB		Radio Devic	e: BTS		
10 dB/div Ref 40.00 dE	m						
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30.0						~	lear Write
20.0	ىلىدەرىي بىردار مەركى <u>ئ</u> ىلىرىدىن	Manna				C	learwrite
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0.00	/		\				
-10.0	h /		H. I.				Average
-20.0 Luch dirth and which man and the plant	AYAYIY		MINN NUMBER	MIN & And	to the second		/ li ol ug
Arrest find share a state of the				un William Anthenry	a han a h		
-30.0							
-40.0							Max Hole
-50.0							
Center 2.59300 GHz				Span 50.			
Res BW 470 kHz		#VBW 1.5 MHz			p 1 ms		
		**BW 1.9 MI12		01100	<b>F</b> 1113		Min Hold
Occupied Bandwic	lth	Total Power	32.7	/dBm			
							-
	8.115 MHz						Detecto Peak
Transmit Freq Error	-7.890 kHz	% of OBW P	ower 99	0.00 %		Auto	Mai
•							
x dB Bandwidth	22.83 MHz	x dB	-26.	00 dB			
MSG			STATU	s			

Plot 7-1. Occupied Bandwidth Plot (LTE Band 41(PC3) - 20MHz QPSK - Full RB)

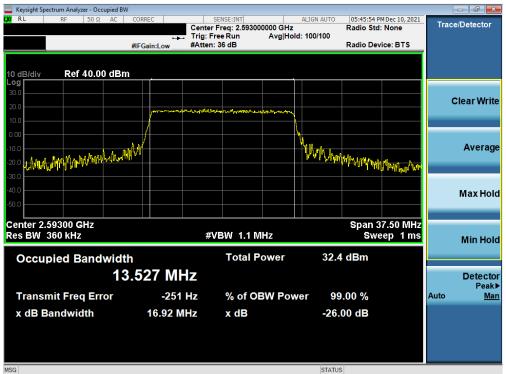


Plot 7-2. Occupied Bandwidth Plot (LTE Band 41(PC3) - 20MHz 16-QAM - Full RB)

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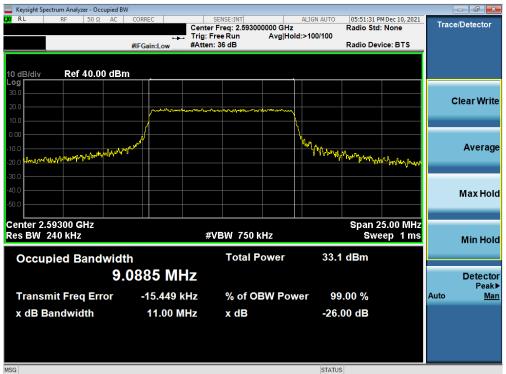
Plot 7-3. Occupied Bandwidth Plot (LTE Band 41(PC3) - 15MHz QPSK - Full RB)



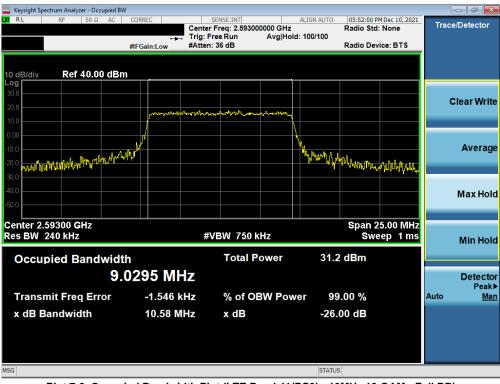
Plot 7-4. Occupied Bandwidth Plot (LTE Band 41(PC3) - 15MHz 16-QAM - Full RB)

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Plot 7-5. Occupied Bandwidth Plot (LTE Band 41(PC3) - 10MHz QPSK - Full RB)



Plot 7-6. Occupied Bandwidth Plot (LTE Band 41(PC3) - 10MHz 16-QAM - Full RB)

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Plot 7-7. Occupied Bandwidth Plot (LTE Band 41(PC3) - 5MHz QPSK - Full RB)



Plot 7-8. Occupied Bandwidth Plot (LTE Band 41(PC3) - 5MHz 16-QAM - Full RB)

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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. Detector = RMS
- 3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
- 4. Sweep time = auto couple
- 5. The trace was allowed to stabilize
- 6. Please see test notes below for RBW and VBW settings

#### 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

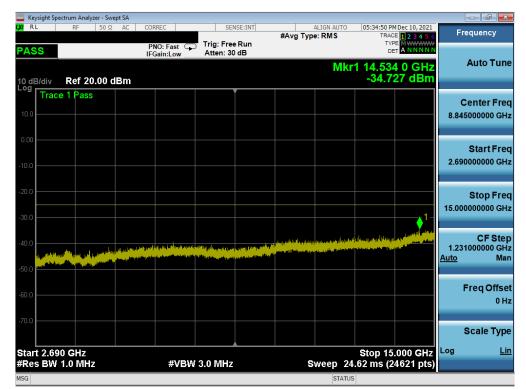
 Per Part 27, RSS-195 and RSS-199, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution 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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	/sight Spec		alyzer - Sv	vept SA										
RI		RF	50 \$	2 AC	CORF	EC	5	ENSE:INT	#A	ALIGN AUTO		PM Dec 10, 2021	F	requency
PAS	S					0:Fast ← ain:Low	Trig: Fr Atten:		#Avg Ty	pe: RMS	T	CE 1 2 3 4 5 6 (PE M WWWWW DET A NNNNN		
0 dE	3/div	Ref	20.00	dBm						N		3 0 GHz 329 dBm		Auto Tur
<b>.og</b> 10.0	Trace	1 Pa	SS											Center Fre
0.00 10.0													3	Start Fr 0.000000 M
20.0 30.0													2.47	Stop Fr 5000000 G
10.0					. di sastilita		alalian a di da ang si salim	ultysia dolain	bentes <mark>ht Aktorese</mark>	da da Marsianda da Marsia	an të një për së të		24 <u>Auto</u>	CF St 4.500000 M M
0.0			and a sub-		a fin an faile i	in a first for the state of								Freq Off
0.0														0
far	t 0.030	GHZ									Ston	2.475 GHz	Log	Scale Ty
	5 BW 1					#VB	W 3.0 MH	7		Sween	3 260 ms	(4891 pts)		
			112					£		Uncep	0.200 1113	(1031 pt3)		

Plot 7-9. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



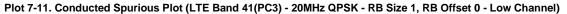
Plot 7-10. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

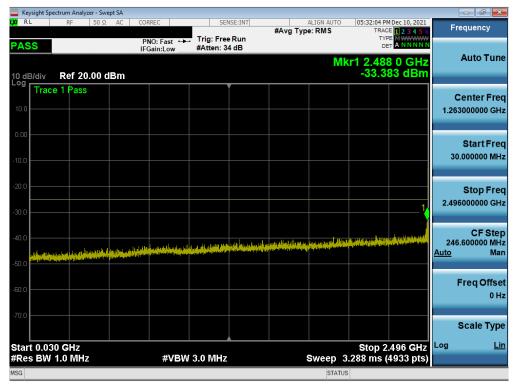
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🚾 Keysight Sp											
XIRL	RF	50 Ω	AC	CORREC		NSE:INT	#Avg Ty	ALIGN AU pe: RMS		10 PM Dec 10, 2021 TRACE 1 2 3 4 5 6	Frequency
PASS				PNO: Fast IFGain:Low	Trig: Fre Atten: 1					DET A N N N N	
								N	lkr1 25.	749 0 GHz	Auto Tune
10 dB/div Log	Ref 0.	00 dB	m						-44	4.741 dBm	
Trac	e 1 Pass	6				Ĭ					Center Fred
-10.0											21.00000000 GHz
-20.0											Start Fred
-30.0											15.00000000 GHz
-40.0										<b>1</b>	Stop Free
								والمريسين الم	والمرية المعادية المق	and and an a start of the start	27.00000000 GHz
-50.0		huber	heyberde	a Harrison and the	and the second s	n an		A Martin	مقطع الألبيرياني فتسديلني	Constraint Property and the second	
-60.0 <b>-60.0</b>			and an and the little is	A CHI THE ALL DURING THE	to our incention of the second						CF Step 1.20000000 GHz
											Auto Man
-70.0											
-80.0											Freq Offset
-00.0											0 Hz
-90.0											
											Scale Type
Start 15.0									Stop	27.000 GHz	Log <u>Lin</u>
#Res BW	1.0 MH	z		#VE	SW 3.0 MHz			Sweep	30.40 m	s (24001 pts)	
MSG								ST	ATUS		





Plot 7-12. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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Keysight Spect	rum Analyze		t SA											
X/RL	RF	50 Ω	AC	CORREC		SEI	ISE:INT	#Avg Ty	ALIGN AU De: RMS	то		M Dec 10, 2021	F	requency
PASS				PNO: F IFGain:I	ast 🖵	Trig: Free Atten: 30		• •			TY			
				ii ouiiii					N	lkr'	1 14.98	9 5 GHz		Auto Tune
Log	Ref 20.	00 dE	3m								-34.9	51 dBm		
Trace	1 Pass													Center Fred
10.0													8.84	5000000 GHz
0.00														Start Freq
-10.0													2.69	00000000 GHz
-20.0														Stop Free
~~~													15.00	0000000 GHz
-30.0												L K		
-40.0					the lost sector				and the second	e je stra	Apple and a process		1.03	CF Step 1000000 GHz
D. COMPTER	A Martin Providence	Propt A Like	alaya da san	nan papagan na m	alle Balles and	anger and an approved	(Weight He I have	a and the second state of the second s	a bi serinder		difficie, le direct bibliche		Auto	Man
-50.0	ارى يونى كان مۇلگا													
-60.0														Freq Offset
-80.0														0 Hz
-70.0														
														Scale Type
Start 2.690	GHz										Stop 15	.000 GHz	Log	<u>Lin</u>
#Res BW 1	.0 MHz				#VBW	3.0 MHz		ę	Sweep	24.	.62 ms (2	4621 pts)		
MSG									ST	ATUS				

Plot 7-13. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



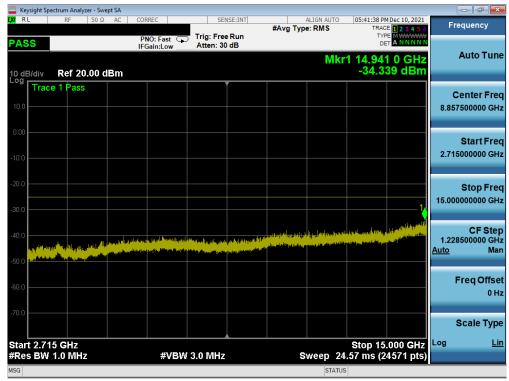
Plot 7-14. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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	ectrum Analyz		ot SA										
KI RL	RF	50 Ω	AC	CORREC		SEN	ISE:INT	#Ava	ALIGN AU Type: RMS		M Dec 10, 2021	Frequ	iency
PASS				PNO: Fa		Trig: Free Atten: 30			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	T			
I0 dB/div	Ref 20	.00 d	Bm							Mkr1 2.37 -41.9	'3 5 GHz 64 dBm	Αι	ito Tune
-og Trace	e 1 Pass											Cer	nter Fred
10.0												1.26300	0000 GH
0.00												S	tart Free
10.0												30.00	0000 MH:
20.0												S	top Fre
30.0													0000 GH
											▲1		CF Ster
40.0						المرابي .	tanantar ka 11	e, a se di distant	Laudio con a bilati da		n Linder and the		0000 MH: Mar
0.0 Tanta and			landra an di di Grandri Dan Ma	a la tra serie (in 1919 : La constante	alpiai appl Statistics			the state state	and a constant of the	ann, fear Aire ann an Anna Anna Anna Anna Anna Anna An			
50.0												Fre	eq Offse 0 Hi
70.0													
												Sc	ale Type
itart 0.03 Res BW				#	VBW	3.0 MHz			Sweer	Stop 2 3.288 ms	2.496 GHz (4933 pts)	Log	Lir
SG					- 44					ATUS	(Hore proy		

Plot 7-15. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-16. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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	Spectrum Analyzer - Swe	ept SA									- # ×
LXI RL	RF 50 Ω	AC COR	REC	SEN	ISE:INT	#Avg Typ	ALIGN AUTO e: RMS		MDec 10, 2021	Fr	equency
PASS		PN IFG	NO: Fast 📮 Gain:Low	Trig: Free Atten: 10				TYP			
10 dB/div Log	Ref 0.00 dE	3m					Mł	(r1 25.73) -45.3	9 5 GHz 75 dBm		Auto Tune
-10.0	ice 1 Pass										Center Freq 0000000 GHz
-20.0										15.00	Start Freq 0000000 GHz
-40.0				Lau					1	27.00	Stop Freq 0000000 GHz
-60.0		Anna an a fear an Anna Anna Anna Anna Anna Anna Anna A			an a		and the second second			1.20 Auto	CF Step 0000000 GHz Man
-70.0											Freq Offset
-80.0											0 Hz
-90.0											Scale Type
	.000 GHz V 1.0 MHz		#\/D\M	3.0 MHz			woon	Stop 27 30.40 ms (2	.000 GHz	Log	Lin
			#VDVV	3.0 19182		3			400 T pts)		
MSG							STAT	05			

Plot 7-17. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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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.

# The minimum permissible attenuation level for Band 41 is as noted in the Test Notes on the following page.

#### Test Procedure Used

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#### Test Settings

- 1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
- 2. Span was set large enough so as to capture all out of band emissions near the band edge
- 3. RBW  $\geq$  1% of the emission bandwidth
- 4. VBW > 3 x RBW
- 5. Detector = RMS
- 6. Number of sweep points  $\geq 2 \times \text{Span/RBW}$
- 7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
- 8. Sweep time = auto couple
- 9. 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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- 1. Per 27.53(a)(5) in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 1 MHz). 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.
- 2. Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.

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			us Emissions						
KI RL	R	RF 50 Ω	AC CORREC	Cente	SENSE:INT r Freq: 2.506000	ALIGN AUT	0 05:36:09 Radio St	PM Dec 10, 2021	Frequency
	Gat	te: LO		Trig:	Free Run				
PASS			IFGain:Lo	ow #Atte	n: 26 dB		Radio De	vice: BTS	
10 dB/	div	Ref 40.00	dBm						
Log									
30.0									Center Fre
20.0									2.506000000 GH
10.0									
0.00					manana	Alanda and the state of the sta	anter a constraint of the second of the seco		
-10.0									
-20.0									
-30.0									
-40.0		Jundantagen	┉╗┧╗┥╡╏╏┟┙╱╍┵╍┶╇┝┝	A PROPERTY OF				Mur Miller Miller	
FO 0		Mary and Mary and a second						1 4 1 1	
-50.0	ر المالية الم	No day							
							Stop		
	2.471 C						Stop	2.521 GHz	
Start	2.471 G	GHz	Stop Erog			Amplitudo		2.521 GHz	517.200000 MH
	2.471 G	GHz	Stop Freq	RBW	Frequency	Amplitude	∆ Limit	2.521 GHz	517.200000 MH
Start Spur 1	2.471 C	GHZ Start Freq 2.4710 GHz	2.4905 GHz	1.000 MHz	Frequency 2.487867500 G	Hz -33.45 dBm	∆ Limit -8.448 d	2.521 GHz B	
Start Spur 1 2	2.471 G	<b>Start Freq</b> 2.4710 GHz 2.4905 GHz	2.4905 GHz 2.4950 GHz	1.000 MHz 1.000 MHz	Frequency 2.487867500 G 2.494640000 G	Hz -33.45 dBm Hz -31.10 dBm	∆ Limit -8.448 d -18.10 d	<b>2.521 GHz</b> B B	517.200000 MH <u>Auto</u> Mar
Start	2.471 G	<b>Start Freq</b> 2.4710 GHz 2.4905 GHz 2.4950 GHz	2.4905 GHz 2.4950 GHz 2.4960 GHz	1.000 MHz 1.000 MHz 430.0 kHz	Frequency 2.487867500 G 2.494640000 G 2.495993333 G	Hz         -33.45 dBm           Hz         -31.10 dBm           Hz         -31.66 dBm	∆ Limit -8.448 d -18.10 d -18.66 d	<b>2.521 GHz</b> B B B	517.200000 MH
Start Spur 1 2 3	2.471 G	<b>Start Freq</b> 2.4710 GHz 2.4905 GHz	2.4905 GHz 2.4950 GHz	1.000 MHz 1.000 MHz 430.0 kHz	Frequency 2.487867500 G 2.494640000 G	Hz         -33.45 dBm           Hz         -31.10 dBm           Hz         -31.66 dBm	∆ Limit -8.448 d -18.10 d	<b>2.521 GHz</b> B B B	517.200000 MH <u>Auto</u> Ma Freq Offse
Start Spur 1 2 3	2.471 G	<b>Start Freq</b> 2.4710 GHz 2.4905 GHz 2.4950 GHz	2.4905 GHz 2.4950 GHz 2.4960 GHz	1.000 MHz 1.000 MHz 430.0 kHz	Frequency 2.487867500 G 2.494640000 G 2.495993333 G	Hz         -33.45 dBm           Hz         -31.10 dBm           Hz         -31.66 dBm	∆ Limit -8.448 d -18.10 d -18.66 d	<b>2.521 GHz</b> B B B	517.200000 MH <u>Auto</u> Ma Freq Offse
Start Spur 1 2 3	2.471 G	<b>Start Freq</b> 2.4710 GHz 2.4905 GHz 2.4950 GHz	2.4905 GHz 2.4950 GHz 2.4960 GHz	1.000 MHz 1.000 MHz 430.0 kHz	Frequency 2.487867500 G 2.494640000 G 2.495993333 G	Hz         -33.45 dBm           Hz         -31.10 dBm           Hz         -31.66 dBm	∆ Limit -8.448 d -18.10 d -18.66 d	<b>2.521 GHz</b> B B B	517.200000 MH <u>Auto</u> Ma Freq Offse
Start Spur 1 2 3	2.471 G	<b>Start Freq</b> 2.4710 GHz 2.4905 GHz 2.4950 GHz	2.4905 GHz 2.4950 GHz 2.4960 GHz	1.000 MHz 1.000 MHz 430.0 kHz	Frequency 2.487867500 G 2.494640000 G 2.495993333 G	Hz         -33.45 dBm           Hz         -31.10 dBm           Hz         -31.66 dBm	∆ Limit -8.448 d -18.10 d -18.66 d	<b>2.521 GHz</b> B B B	517.200000 MH <u>Auto</u> Ma Freq Offse
Start Spur 1 2 3	2.471 G	<b>Start Freq</b> 2.4710 GHz 2.4905 GHz 2.4950 GHz	2.4905 GHz 2.4950 GHz 2.4960 GHz	1.000 MHz 1.000 MHz 430.0 kHz	Frequency 2.487867500 G 2.494640000 G 2.495993333 G	Hz         -33.45 dBm           Hz         -31.10 dBm           Hz         -31.66 dBm	∆ Limit -8.448 d -18.10 d -18.66 d	<b>2.521 GHz</b> B B B	517.200000 MH <u>Auto</u> Ma Freq Offse
Start Spur 1 2 3	2.471 G	<b>Start Freq</b> 2.4710 GHz 2.4905 GHz 2.4950 GHz	2.4905 GHz 2.4950 GHz 2.4960 GHz	1.000 MHz 1.000 MHz 430.0 kHz	Frequency 2.487867500 G 2.494640000 G 2.495993333 G	Hz         -33.45 dBm           Hz         -31.10 dBm           Hz         -31.66 dBm	∆ Limit -8.448 d -18.10 d -18.66 d -18.83 d	<b>2.521 GHz</b> B B B	517.200000 MH <u>Auto</u> Ma Freq Offse

Plot 7-18. Lower ACP Plot (LTE Band 41(PC3) - 20MHz QPSK - Full RB)



Plot 7-19. Upper ACP Plot (LTE Band 41(PC3) - 20MHz QPSK - Full RB)

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	pectrum Analyzer - S		sions											
L <mark>XI</mark> RL	RF 50	Ω AC	CORREC			SENSE:INT r Freq: 2.50350 Free Run	00000		ALIGN AUT			PM Dec 10, 20 d: None	21	Frequency
PASS	Gate: LO		IFGain:L	ow		n: 26 dB				R	adio De	evice: BTS		
10 dB/div	Ref 40.	00 dBm	1											
Log 30.0														
														Center Freq
20.0														2.503500000 GHz
10.0						Par-geneitriätiluksik	-	Sec. 1	Mart 1 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	****	والمعالم			
0.00														
-10.0														
-20.0														
-30.0			1.1	ad and and firm	a intrastante	2						u .		
-40.0		<b>UPA-SULAN</b>	United and a second	N.									de l	
-50.0	and the state of the second													
Start 2.4	77 GHz										Stop	2.515 GH	z	CF Step
														20.000000 MHz
Spur Ra	ange   Start Fr		op Freq	RB		Frequency		Ampli			∆ Limit			<u>Auto</u> Man
1 1	2.4773 0		905 GHz			2.487364167					7.482 d			
2 2														Freq Offset
3 3														0 Hz
4 4	2.4960 0	GHz 2.5	148 GHz	300	0 kHz	2.509812500	GHz	6.054	dBm	-	18.95 d	В		0112
	2.4905 G 2.4950 G 2.4960 G	GHz 2.4	950 GHz 960 GHz 148 GHz	300.	0 kHz	2.494685000 2.495771667 2.509812500	GHz	-32.75	dBm	-	18.95 d 19.75 d 18.95 d	B		Freq Offset 0 Hz
MSG									STA	TUS				





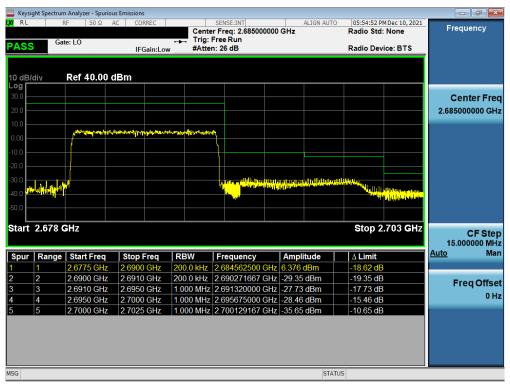
Plot 7-21. Upper ACP Plot (LTE Band 41(PC3) - 15MHz QPSK – Full RB)

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						ssions	ous Emis	n Analyzer - Spuriou	ight Spectrum	
Frequency	PM Dec 10, 2021 <b>1: None</b>	05:54:04 P Radio Std	ALIGN AUTO GHz	SENSE:INT r Freq: 2.501000000 Free Run		CORREC	AC	KF 50 Ω /		RL
-	vice: BTS	Radio Dev		n: 26 dB		IFGain:Low		le. LO	S	ASS
						1	dBm	Ref 40.00 (	/div	0 d <u>B/</u>
Center Fre										. <b>og</b> 30.0
2.501000000 GI										20.0
		where we are the second se	******	put the second processor						10.0 - 3.00 -
										10.0
										20.0
	With almost and	<u> </u>			NALLALANA	Y en fermanisti		المراجلين .		30.0
	* "MANAMANA								+hwith)	40.0 40.0
	2.509 GHz	Stop 2						2117	2.484 0	
15.000000 MI	2.003 0112	01002						2112	2.404 0	Juanu
Auto Ma		∆ Limit	Amplitude	Frequency	RBW	op Freq	St	Start Freq	Range	Spur
	В	-4.774 dE	-29.77 dBm	2.490278333 GHz	1.000 MHz	1905 GHz	2.4	2.4835 GHz	1	
	B	-13.80 dE	-26.80 dBm	2.494730000 GHz	1.000 MHz	1950 GHz	2.4	2.4905 GHz	2	-
Fred Offs				2.495685000 GHz	200 0 1/11-	960 GHz	24	2.4950 GHz	3	;
Freq Offs	В	-16.12 dE	-29.12 dBm	2.495685000 GHZ	200.0 KHZ	1900 GHZ	Z.4	2.4000012	3	)

Plot 7-22. Lower ACP Plot (LTE Band 41(PC3) - 10MHz QPSK - Full RB)



Plot 7-23. Upper ACP Plot (LTE Band 41(PC3) - 10MHz QPSK – Full RB)

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	ht Spectrum	n Analyzer - Spu	rious Emissi	ons											
U RL	F	RF 50 Ω	AC (	CORREC			er Fre	ISE:INT eq: 2.49850	00000		ALIGN AUTO		05:58:37 P adio Std	M Dec 10, 2021 : None	Frequency
PASS	Gat	te: LO		IFGain:L	⊷ ow	, Trig: #Atte						R	adio Dev	/ice: BTS	
l0 dB/di ₋og Γ	liv	Ref 40.00	) dBm												*
30.0							_								Center Fre
20.0							_								2.498500000 GH
10.0								Margan	3#1.~~~~~	·/mains	٦.				
0.00								l							
10.0															
						A LAND COMPANY	- M				<b>N</b> .				
30.0			العريب	بهم المحمد المعالم المعالم المعالم الم	in a state		٢N				Mar Marina	hi kan	Manadown		
40.0							-							here and the second	
	_	- Barry Walkson - Contraction												"""IT TO A CONTRACT OF	
50.0	an an an an An Pur	and a start a st												han an a	
	2.485 0	GHz												2.508 GHz	10.000000 MH
Start 2		GHZ	Sto	p Freq	R	BW	Fre	equency		Ampli				1.416.416.494	10.000000 MH
Start 2 Spur	Range 1	Start Freq 2.4845 GH	z 2.49	05 GHz	1.	000 MHz	2.4	90380000		-38.32	tude dBm		Stop 2 Limit	2.508 GHz	10.000000 MH
<b>Spur</b> 1 2 2	<b>Range</b> 1 2	<b>Start Freq</b> 2.4845 GH 2.4905 GH	z 2.49 z 2.49	05 GHz 50 GHz	1.	000 MHz 000 MHz	2.4 2.4	90380000 94107500	GHz	- <u>38.32</u> -26.74	itude dBm dBm	4	Stop 2 <u>Limit</u> 13.32 de 13.74 de	2.508 GHz	
Start 2 Spur   1 2 3 3	Range 1 2 3	Start Freq 2.4845 GH	z 2.49 z 2.49	05 GHz	1.	000 MHz 000 MHz	2.4 2.4	90380000	GHz	- <u>38.32</u> -26.74	itude dBm dBm	4	Stop 2 Limit	2.508 GHz	10.000000 MH <u>Auto</u> Ma Freq Offse
start 2	<b>Range</b> 1 2	<b>Start Freq</b> 2.4845 GH 2.4905 GH	z 2.49 z 2.49 z 2.49	05 GHz 50 GHz	1. 1. 1.	000 MHz 000 MHz 0.0 kHz	2.4 2.4 2.4	90380000 94107500	GHz GHz	- <mark>38.32</mark> -26.74 -22.05	tude dBm dBm dBm		Stop 2 <u>Limit</u> 13.32 de 13.74 de	2.508 GHz	10.000000 MH <u>Auto</u> Ma
Start 2	Range 1 2 3	<b>Start Freq</b> 2.4845 GH; 2.4905 GH; 2.4950 GH;	z 2.49 z 2.49 z 2.49	<mark>05 GHz</mark> 50 GHz 60 GHz	1. 1. 1.	000 MHz 000 MHz 0.0 kHz	2.4 2.4 2.4	90380000 94107500 95918333	GHz GHz	- <mark>38.32</mark> -26.74 -22.05	tude dBm dBm dBm		Stop 2 Limit 13.32 dE 13.74 dE 9.053 dE	2.508 GHz	10.000000 MH <u>Auto</u> Ma Freq Offse

Plot 7-24. Lower ACP Plot (LTE Band 41(PC3) - 5MHz QPSK - Full RB)



Plot 7-25. Upper ACP Plot (LTE Band 41(PC3) - 5MHz QPSK - Full RB)

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# 7.5 Uplink Carrier Aggregation §27.53(m)

#### Test Overview

The EUT is set up to transmit two contiguous LTE channels. The power level of both carriers 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 its maximum duty cycle, 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 Band 41, the minimum permissible attenuation level of any spurious emission is $55 + 10 \log_{10}(P_{[Watts]})$ .

#### 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 at least 10 \* the fundamental frequency (separated into at least two plots per channel)
- 2. Detector = RMS
- 3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
- 4. Sweep time = auto couple
- 5. The trace was allowed to stabilize
- 6. Please see test notes below for RBW and VBW settings

#### Test Setup

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



Figure 7-4. Test Instrument & Measurement Setup

#### Test Notes

- Conducted power and spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device. The worst case (highest) powers were found while operating with QPSK modulation with both carriers set to transmit using 1RB.
- 2. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. 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.

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# **Uplink CA Configuration 41C**

		Bandwidth			PCC				scc				ULCA TX.	
Power State	Band	(PCC + SCC)	Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	Power [dBm]	
				39750	2506.0	1	99		39948	2525.8	1	0	24.45	
			QPSK	40620	2593.0	1	99	QPSK	40818	2612.8	1	0	24.37	
Max		41 (PC3) 20MHz + 20MHz	20MHz + 20MHz QPS		41490	2680.0	1	0	]	41292	2660.2	1	99	24.93
IVICIA	LTE D41 (FC3)			QPSK	41490	2680	100	0	QPSK	41292	2660.2	100	0	22.98
			16-QAM	41490	2680	100	0	16-QAM	41292	2660.2	100	0	22.31	
			64-QAM	41490	2680	100	0	64-QAM	41292	2660.2	100	0	21.90	

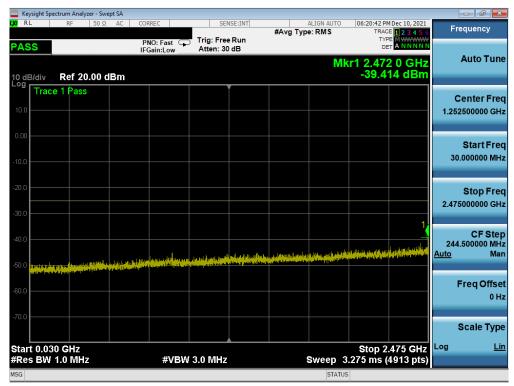
Table 7-26. Conducted Power Data (ULCA LTE B41(PC3))

FCC ID: A3LSMS901JPN	PCTEST Proud to be per of @ element	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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	trum Analyzer -									
XI RL	RF 50	ΩAC	CORREC		Run	#Avg Ty	ALIGN AUTO pe: RMS	TRAC	4Dec 10, 2021 E 1 2 3 4 5 6 E M WWWWW	Frequency
10 dB/div	Ref 39.97	′ dBm	IFGain:Low	Atten: 50	) dB		Mk	r1 2.516	00 GHz 26 dBm	Auto Tun
30.0	10-1									Center Fre 2.593000000 GH
20.0 9.97										Start Fre 2.496000000 G⊦
0.03										Stop Fre 2.69000000 GH
20.0				L. South Strategy and Strategy	bata shi nan a	in the state of the second		ter file for a still link.	Verten en Minterier Verten en Minterier	CF Ste 19.400000 Mi <u>Auto</u> Mi
40.0										Freq Offs 0 I
.50.0										Scale Typ
Start 2.496 #Res BW 1			#VB	V 3.0 MHz			Sweep	Stop 2.69 1.315 ms (	0000 GHz 4933 pts)	Log <u>L</u>
ISG							STAT			

Plot 7-27. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



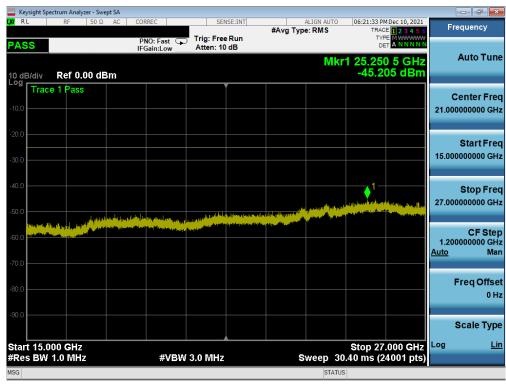
Plot 7-28. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: A3LSMS901JPN		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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	ectrum Analy:		t SA										-	- @ <b>X</b>
X/RL	RF	50 Ω	AC	CORREC			ISE:INT	#Avg Ty	ALIGN AU pe: RMS	TO 06:21	TRACE	3456	Fred	luency
PASS				PNO: F IFGain:	ast 🖵 Low	Trig: Free Atten: 30								
10 dB/div	Ref 20	.00 dE	3m						N	lkr1 14. -3	.838 9 5.109	GHz dBm	A	uto Tune
Log Trac	e 1 Pass					`								nter Fred 00000 GHz
-10.0														Start Fred
-20.0												1		Stop Fred 00000 GH
-40.0			ar tagarat Antification	Tipore videos contra success	arenange (te	an tha an	gyrnyd yraitad yn	upin saarii a faran in a saarii a faran in a saarii a sa	ya Tana (Magarak La nagaraka (Ma				1.2310 <u>Auto</u>	CFStep 00000GH Mar
-50.0													Fr	eq Offse 0 H
-70.0														cale Type
Start 2.69 #Res BW		,			#VBW	3.0 MHz			Sween	Stop 24.84 m	5 15.000 (2484	) GHz 1 pts)	Log	Lin
MSG										ATUS		. 17.07		

Plot 7-29. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



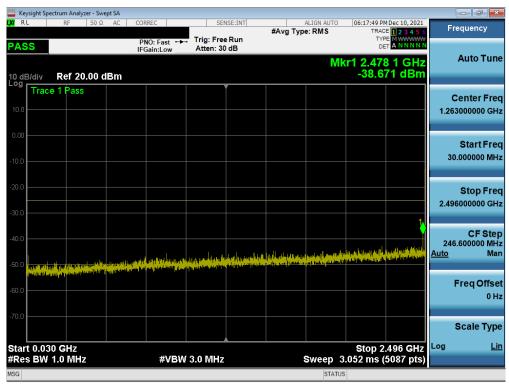
Plot 7-30. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

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	ectrum Analyzer - S									
X/RL	RF 50 9		ORREC		NSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	Dec 10, 2021 E 1 2 3 4 5 6 E M WWWW	Frequency
10 dB/div	Ref 39.97	I	PNO: Fast 🕞 FGain:Low	Atten: 50			Mk	DE		Auto Tu
30.0					₩1					Center Fr 2.593000000 G
9.97										Start Fr 2.496000000 G
10.03				المرا						Stop Fr 2.690000000 G
20.0 <mark>Jarija</mark> a 30.0	n da i anga bita di majika s	dates al terres de cel						and the second secon	ante e la contrata la	CF St 19.400000 M <u>Auto</u> M
40.0										Freq Offs 0
50.0	600 GHz							Stop 2 60	9000 GHz	Scale Ty
#Res BW			#VBW	/ 3.0 MHz			Sweep	1.315 ms (	4933 pts)	
ISG							STATU	JS		

Plot 7-31. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-32. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMS901JPN	PCTEST Proud to be part of @wikement	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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🔤 Keysight Spe	ctrum Analyz	er - Swep	ot SA											- d ×
LXU RL	RF	50 Ω	AC	CORREC		SEN	ISE:INT	#Avg Tvp	ALIGN AUT	го <mark>06</mark>		4 Dec 10, 2021 E 1 2 3 4 5 6	F	requency
PASS				PNO: I IFGain:	Fast 🖵 :Low	Trig: Free Atten: 30					TYP			
10 dB/div Log	Ref 20.	00 d	Bm						Μ	kr1 1	4.73 34.5	7 5 GHz 89 dBm		Auto Tune
10.0 <b>Trace</b>	e 1 Pass													Center Freq 15000000 GHz
-10.0													2.69	Start Freq 90000000 GHz
-20.0												1	15.00	Stop Freq
-40.0			Interport of the second se	an a		and the second second	and a second by	n parata pina pina pina di sa	harrog bild fir r fach a factor	ulihan gutreu gentennek keze	Alayan a Shaddaa	aber de la factor de la contra a na parte de la contra a	1.23 <u>Auto</u>	CF Step 31000000 GHz Man
-60.0														Freq Offset 0 Hz
-70.0														Scale Type
Start 2.69 #Res BW					#VBW	3.0 MHz		s	weep	St 24.62	op 15 ms (2	.000 GHz 4621 pts)	Log	<u>Lin</u>
MSG									_	ATUS				

Plot 7-33. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



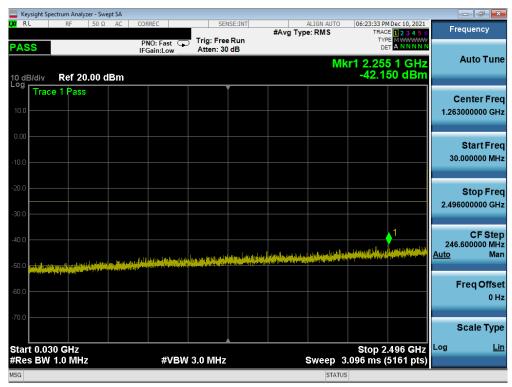
Plot 7-34. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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	ctrum Analyzer - Sv	vept SA								
LXI RL	RF 50 S	2 AC C	ORREC	SEN	ISE:INT	#Avg Typ	ALIGN AUTO		MDec 10, 2021	Frequency
10 dB/div	Ref 39.97	1	PNO: Fast 🕞 FGain:Low	Trig: Free Atten: 50				TYF DE 1 2.670		Auto Tune
30.0	Kei 39.97								/1	Center Fred 2.593000000 GHz
20.0 9.97										Start Free 2.496000000 GH
-0.03										Stop Fred 2.690000000 GH;
-20.0	o la divina di bila di bisa di Manazione di bisa di bis Manazione di bisa di bis			integra anti i transferi tegis 1 i terra de la constante de la const 1 i terra de la constante de la constante de la constante de la constante						CF Step 19.400000 MH: <u>Auto</u> Mar
-40.0										Freq Offse 0 Ha
-50.0 Start 2.49	600 GHz							Stop 2.6	9000 GHz	Scale Type
#Res BW			#VBW	3.0 MHz			Sweep 1	.315 ms (	4933 pts)	
MSG							STATUS	5		

Plot 7-35. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-36. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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	ectrum Analy	zer - Swej	pt SA											
X/RL	RF	50 Ω	AC	CORREC			NSE:INT	#Avg	ALIGN A Type: RMS		TRAC	M Dec 10, 2021		equency
PASS				PNO: F IFGain:	ast ⊊ Low	Trig: Free #Atten: 3					TYI Di			
10 dB/div	Ref 20	.00 d	Bm							Mkr1	14.78 -30.4	3 5 GHz 02 dBm		Auto Tune
Log Trace	e 1 Pass													enter Fred 500000 GH
													0.007	500000 GH
0.00													2 715	Start Free
-10.0													2.715	000000 GH
-20.0													15.000	Stop Fre
-30.0										of la sele	ut.l. water		15.000	000000 GH.
-40.0 <mark>1979'9'9'9</mark>	य कि जेही जा	A ROAD PARTY	ang ya kupa Ana anina an	Ha <mark>laranan</mark> Samutati	nganar jayan Ang sajadi dan		a ann a dhadalan Ann an a	and an	ور مورور و مراور و م مراور موروز و مراور و م	aliyada di	india dan persona kana kana kana kana kana kana kana k	and the second	1.228	CF Stej 500000 GH
-50.0													<u>Auto</u>	Ма
-60.0													F	req Offse
-70.0														0 H
70.0													5	Scale Typ
Start 2.71 #Res BW		,			#VBW	3.0 MHz			Sween	24	Stop 15	.000 GHz 4571 pts)	Log	<u>Li</u>
ISG	110 1011					010 11112				TATUS	51-1113 (2	iter i ptoj		

Plot 7-37. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



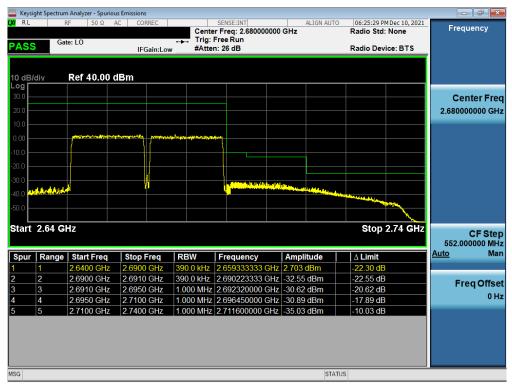
Plot 7-38. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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	oectrum Analyzer - Spuri								
	RF 50 Ω	AC CORREC	Trig: I	SENSE:INT r Freq: 2.506000 Free Run		ALIGN AUTC	Radio Std		Frequency
PASS	Guile. EO	IFGain:Lo	w #Atter	n: 26 dB			Radio Dev	rice: BTS	
10 dB/div	Ref 30.00	dBm							
Log 20.0									O a máx m E ma m
									Center Freq
10.0									2.506000000 GHz
0.00				Law Age 2 Activity and		Laborator proposition	and a state of the second s		
-10.0									
-20.0									
-30.0									
-40.0		الملديه ويعد	الكندمارا أيضاريك.		· ·			and the state of the	
-50.0		Market Road							
-60.0									
-00.0									
Start 2.4	46 GHz						Stop 2	.546 GHz	CF Step
									552.000000 MHz
Spur   Ra	nge   Start Freq	Stop Freq	RBW	Frequency	Ampli	tude	∆ Limit		<u>Auto</u> Man
1 1	2.4460 GHz	2.4905 GHz	1.000 MHz	2.484418333 0	GHz -32.58	dBm	-7.583 dE	}	
2 2	2.4905 GHz	2.4950 GHz		2.491797500			-18.61 dE	3	Freq Offset
3 3	2.4950 GHz			2.495371667 0			-20.02 dE		0 Hz
4 4	2.4960 GHz	2.5460 GHz	390.0 kHz	2.506416667	GHz 2.151	dBm	-22.85 dE	3	0 H2
MSG						STAT	US		

Plot 7-39. Lower ACP Plot (ULCA LTE B41(PC3) - 20MHz QPSK - Full RB)



Plot 7-40. Upper ACP Plot (ULCA LTE B41(PC3) - 20MHz QPSK – Full RB)

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# 7.6 Radiated Power (EIRP)

## Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed as RMS average measurements while the EUT is operating 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

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

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

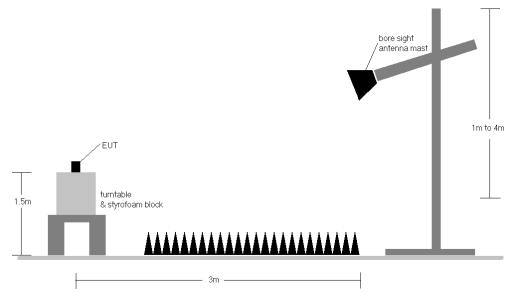


Figure 7-5. Radiated Test Setup >1GHz

## 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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Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
N	QPSK	2506.0	Н	121	212	9.50	1/0	14.57	24.07	0.255	33.01	-8.94
MHz	QPSK	2593.0	н	143	218	9.49	1/0	14.31	23.80	0.240	33.01	-9.21
20 N	QPSK	2680.0	н	134	238	9.87	1 / 99	13.35	23.22	0.210	33.01	-9.79
5	16-QAM	2593.0	Н	143	218	9.49	1/0	14.10	23.59	0.229	33.01	-9.42
N	QPSK	2503.5	Н	121	212	9.50	1 / 37	14.40	23.90	0.246	33.01	-9.11
MHz	QPSK	2593.0	Н	143	218	9.49	1/0	14.18	23.67	0.233	33.01	-9.34
15 1	QPSK	2682.5	Н	134	238	9.87	1/0	13.14	23.00	0.200	33.01	-10.01
-	16-QAM	2593.0	Н	143	218	9.49	1/0	13.97	23.46	0.222	33.01	-9.55
N	QPSK	2501.0	Н	121	212	9.49	1/0	14.58	24.07	0.255	33.01	-8.94
MHz	QPSK	2593.0	Н	143	218	9.49	1/0	14.12	23.61	0.230	33.01	-9.40
10 1	QPSK	2685.0	Н	134	238	9.86	1/0	12.89	22.75	0.188	33.01	-10.26
	16-QAM	2593.0	Н	143	218	9.49	1/0	13.94	23.43	0.220	33.01	-9.58
N	QPSK	2498.5	Н	121	212	9.49	1/0	14.56	24.05	0.254	33.01	-8.96
MHz	QPSK	2593.0	Н	143	218	9.49	1/0	13.92	23.41	0.219	33.01	-9.60
2 2	QPSK	2687.5	Н	134	238	9.86	1 / 24	12.65	22.50	0.178	33.01	-10.51
	16-QAM	2593.0	Н	143	218	9.49	1/0	13.78	23.27	0.212	33.01	-9.74
20 MHz	Opposite Pol.	2506.0	V	117	266	9.54	1/0	7.23	16.77	0.048	33.01	-16.24
20 10112	WCP	2506.0	Н	103	197	9.50	1 / 12	12.02	21.52	0.142	33.01	-11.49

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

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# 7.7 Radiated Spurious Emissions Measurements

## **Test Overview**

Radiated spurious emissions measurements are performed using the field strength conversion method described in KDB 971168 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 RMS measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

### **Test Procedures Used**

KDB 971168 D01 v03r01 - Section 5.8

### **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 > 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.

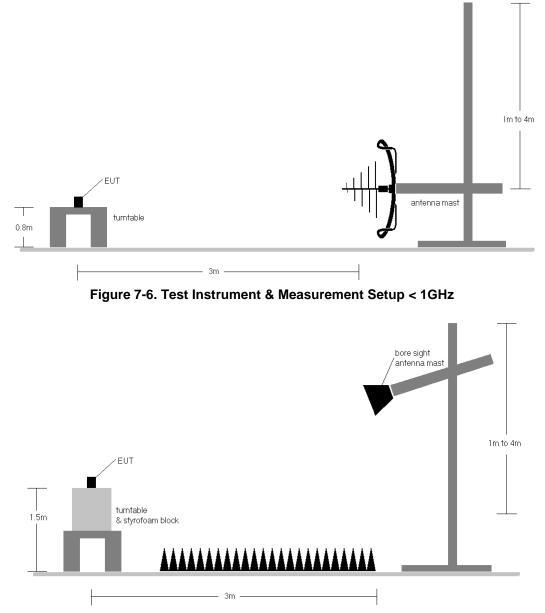


Figure 7-7. Test Instrument & Measurement Setup >1 GHz

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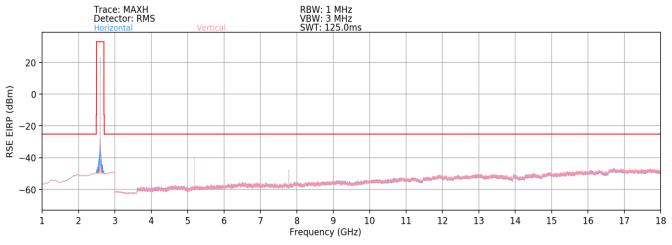


- Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
   a) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   b) EIRP (dBm) = E(dBµV/m) + 20logD 104.8; where D is the measurement distance in meters.
- 2) The 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.
- 3) This unit was tested with its standard battery.
- 4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 5) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 6) The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- 7) ULCA spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.

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# LTE Band 41(PC3)



Plot 7-41. Radiated Spurious Plot (LTE Band 41 (PC3))

Bandwidth (MHz):	20
Frequency (MHz):	2506.0
RB / Offset:	1 / 50

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]
5012.00	V	114	41	-48.79	7.63	65.84	-29.42	-25.00	-4.42
7518.00	V	121	8	-64.05	13.15	56.10	-39.15	-25.00	-14.15
10024.00	V	273	25	-70.94	15.43	51.49	-43.76	-25.00	-18.76
12530.00	V	-	-	-71.98	19.15	54.17	-41.09	-25.00	-16.09
15036.00	V	-	-	-72.89	22.51	56.62	-38.63	-25.00	-13.63
17542.00	V	-	-	-74.54	26.01	58.47	-36.79	-25.00	-11.79
20048.00	V	-	-	-62.58	-7.29	37.13	-67.67	-25.00	-42.67
22554.00	V	-	-	-63.48	-6.53	36.99	-67.81	-25.00	-42.81

Table 7-3. Radiated Spurious Data (LTE Band 41 (PC3) – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	2593.0
RB / Offset:	1 / 50

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]
5186.00	V	115	56	-51.38	7.75	63.37	-31.89	-25.00	-6.89
7779.00	V	320	321	-69.16	13.16	51.00	-44.26	-25.00	-19.26
10372.00	V	103	313	-70.58	16.36	52.78	-42.48	-25.00	-17.48
12965.00	V	397	8	-73.36	19.61	53.25	-42.01	-25.00	-17.01
15558.00	V	-	-	-73.28	23.42	57.14	-38.12	-25.00	-13.12
18151.00	V	-	-	-63.03	-8.36	35.61	-69.19	-25.00	-44.19
20744.00	V	-	-	-63.69	-6.81	36.50	-68.30	-25.00	-43.30
23337.00	V	-	-	-63.32	-6.66	37.03	-67.77	-25.00	-42.77

Table 7-4. Radiated Spurious Data (LTE Band 41 (PC3) – Mid Channel)

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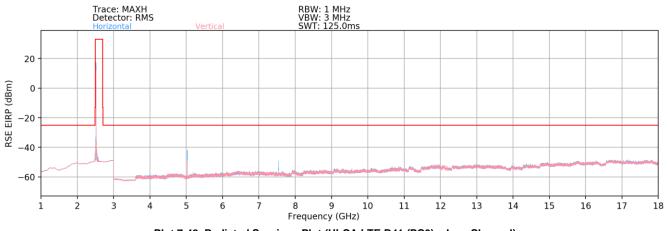
Bandwidth (MHz):	20
Frequency (MHz):	2680.0
RB / Offset:	1 / 50

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]
5360.00	V	106	346	-67.35	8.60	48.25	-47.01	-25.00	-22.01
8040.00	V	106	85	-69.03	13.32	51.29	-43.97	-25.00	-18.97
10720.00	V	-	-	-73.50	17.01	50.51	-44.74	-25.00	-19.74
13400.00	V	-	-	-73.80	20.49	53.69	-41.57	-25.00	-16.57
16080.00	V	-	-	-73.99	24.45	57.46	-37.79	-25.00	-12.79
18760.00	V	-	-	-63.14	-8.23	35.63	-69.17	-25.00	-44.17
21440.00	V	-	-	-64.28	-6.59	36.13	-68.67	-25.00	-43.67
24120.00	V	-	-	-66.33	-6.16	34.51	-70.29	-25.00	-45.29

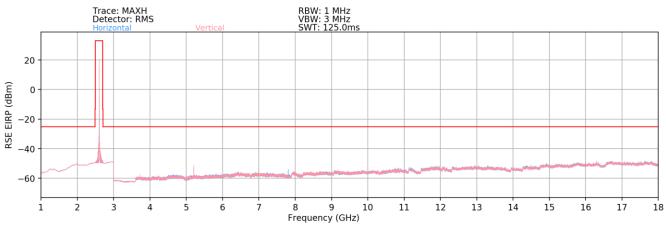
Table 7-5. Radiated Spurious Data (LTE Band 41 (PC3) – High Channel)

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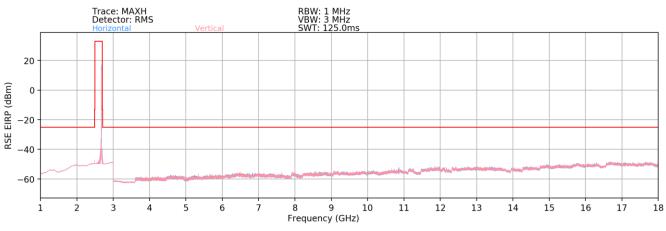












Plot 7-44. Radiated Spurious Plot (ULCA LTE B41 (PC3) – High Channel)

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20
2506.0
1 / 99
20
2525.8
1 / 0

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]
5031.80	Н	118	49	-50.92	4.44	60.52	-34.74	-25.00	-9.74
7547.70	Н	111	75	-65.47	7.75	49.28	-45.97	-25.00	-20.97
10079.60	Н	269	58	-74.93	10.66	42.73	-52.52	-25.00	-27.52
12597.50	Н	-	-	-79.72	14.35	41.63	-53.63	-25.00	-28.63
15117.00	Н	-	-	-79.77	15.77	43.00	-52.26	-25.00	-27.26
17611.30	Н	-	-	-80.13	17.70	44.57	-50.69	-25.00	-25.69

#### Table 7-6. Radiated Spurious Data (ULCA LTE B41 (PC3) – Low Channel)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2593.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2612.8
SCC RB / Offset:	1/0

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]
5205.80	Н	114	63	-61.37	5.01	50.64	-44.62	-25.00	-19.62
7808.70	Н	261	68	-67.71	7.66	46.95	-48.31	-25.00	-23.31
10411.60	Н	-	-	-79.31	11.33	39.02	-56.23	-25.00	-31.23
13014.50	Н	-	-	-79.10	14.48	42.38	-52.88	-25.00	-27.88
15617.40	Н	-	-	-79.51	16.16	43.65	-51.61	-25.00	-26.61

Table 7-7. Radiated Spurious Data (ULCA LTE B41 (PC3) - Mid Channel)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2680.0
PCC RB / Offset:	1/0
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2660.2
SCC RB / Offset:	1 / 99

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]
5340.20	Н	125	55	-69.44	4.75	42.31	-52.95	-25.00	-27.95
8010.30	Н	225	283	-74.99	7.91	39.92	-55.34	-25.00	-30.34
10680.40	Н	-	-	-80.06	12.09	39.03	-56.23	-25.00	-31.23
13350.50	Н	-	-	-79.60	14.04	41.44	-53.82	-25.00	-28.82
16020.60	Н	-	-	-79.64	16.78	44.14	-51.12	-25.00	-26.12

Table 7-8. Radiated Spurious Data (ULCA LTE B41 (PC3) – High Channel)

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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.

### 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

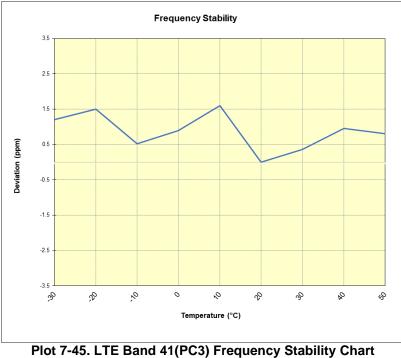
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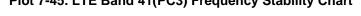
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LTE Band 41						
	Operating Frequency (Hz):		2,593,000,000		]	
	Ref. Voltage (VDC):		4.43		]	
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)	
		- 30	2,593,002,997	3,119	0.0001203	
		- 20	2,593,003,763	3,885	0.0001498	
		- 10	2,593,001,244	1,366	0.0000527	
		0	2,593,002,187	2,309	0.0000891	
100 %	4.43	+ 10	2,593,004,031	4,154	0.0001602	
		+ 20 (Ref)	2,592,999,877	0	0.0000000	
		+ 30	2,593,000,812	935	0.0000361	
		+ 40	2,593,002,360	2,482	0.0000957	
		+ 50	2,593,001,957	2,080	0.0000802	
Battery Endpoint	3.36	+ 20	2,593,001,072	1,195	0.0000461	

Table 7-9. LTE Band 41(PC3) Frequency Stability Data





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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: A3LSMS901JPN** complies with all the requirements of Part 27 of the FCC rules.

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