

PCTEST ENGINEERING LABORATORY, INC.

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MEASUREMENT REPORT

Part 96 LTE

Applicant Name:

Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea Date of Testing: 01/22 - 05/08/2019 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1903060032-04.A3L

FCC ID:	A3LSMG977T
APPLICANT:	Samsung Electronics Co., Ltd.
Application Type	Contification
Application Type:	Certification
Model:	SM-G977T
Additional Model(s):	SM-G977P
EUT Type:	Portable Handset
FCC Classification:	Citizens Band End User Devices (CBE)
FCC Rule Part(s):	96
Test Procedure(s):	ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01,

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Randy Ortanez President



KDB 648474 D03 v01r04, KDB 940660 D01 v01, WINNF-TS-0122 V1.0.0



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MEASUREMENT REPORT FCC Part 96



Mode	FCC Rule	Tx Frequency (MHz)	El Max. Power	RP Max. Power	Emission	Modulation
	Part		(VV)	(dBm)	Designator	
LTE Band 48	27	3552.5 - 3697.5	0.079	18.97	4M53G7D	QPSK
LTE Band 48	27	3552.5 - 3697.5	0.062	17.95	4M52W7D	16QAM
LTE Band 48	27	3552.5 - 3697.5	0.046	16.59	4M53W7D	64QAM
LTE Band 48	27	3552.5 - 3697.5	0.026	14.17	4M51W7D	256QAM
LTE Band 48	27	3555 - 3695	0.081	19.11	9M05G7D	QPSK
LTE Band 48	27	3555 - 3695	0.063	18.00	9M03W7D	16QAM
LTE Band 48	27	3555 - 3695	0.046	16.66	9M04W7D	64QAM
LTE Band 48	27	3555 - 3695	0.027	14.27	9M03W7D	256QAM
LTE Band 48	27	3557.5 - 3692.5	0.080	19.05	13M5G7D	QPSK
LTE Band 48	27	3557.5 - 3692.5	0.063	18.01	13M5W7D	16QAM
LTE Band 48	27	3557.5 - 3692.5	0.046	16.67	13M5W7D	64QAM
LTE Band 48	27	3557.5 - 3692.5	0.027	14.36	13M5W7D	256QAM
LTE Band 48	27	3560 - 3690	0.088	19.46	18M1G7D	QPSK
LTE Band 48	27	3560 - 3690	0.067	18.25	18M0W7D	16QAM
LTE Band 48	27	3560 - 3690	0.050	16.98	18M0W7D	64QAM
LTE Band 48	27	3560 - 3690	0.031	14.94	18M0W7D	256QAM

EUT Overview (LTE B48)

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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.

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 a CBRS Alliance (OnGo) Approved Test Lab
- PCTEST is a WInnForum Approved Test Lab
- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for CBRS Alliance Certification Test Plan and WInnForum Conformance and Performance Test Technical Standard.
- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMG977T**. The test data contained in this report pertains only to the emissions due to the EUT's LTE Band 48 operation in the CBRS band.

Test Device Serial No.: 9878B, 2581B, 2573B, 0263M, 0244M.

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA/EvDO Rev0/A, 1x Advanced (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (n41, n260, n261, EN-DC), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE), NFC, Wireless Phone 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 placed 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 Measurement Procedure

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

3.2 Radiated Power and Radiated Spurious Emissions

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

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

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

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

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

The calculated P_d levels are then compared to the absolute spurious emission limit of -40dBm which is equivalent to the required minimum attenuation of 16 + 10log₁₀(Power [Watts]).

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

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4.0 MEASUREMENT UNCERTAINTY

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

Contribution	Expanded Uncertainty (±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
-	LTx3	LIcensed Transmitter Cable Set	8/23/2018	Annual	8/23/2019	LTx3
Agilent	N9030A	PXA Signal Analyzer (44GHz)	5/25/2018	Annual	5/25/2019	MY52350166
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	9/17/2018	Annual	9/17/2019	441119
Espec	ESX-2CA	Environmental Chamber	4/25/2019	Annual	4/25/2020	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/28/2018	Biennial	3/28/2020	128337
Mini Circuits	TVA-11-422	RF Power Amp		N/A		QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Mini-Circuits	PWR-SEN-4RMS	USB Power Sensor	4/19/2019	4/19/2019 Annual 4/19		11401010036
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator		N/A		
Rohde & Schwarz	CMW500	Radio Communication Tester	6/8/2018	Annual	6/8/2019	112347
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	9/19/2018	Annual	9/19/2019	100040
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/21/2018	Annual	5/21/2019	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/9/2018	Annual	8/9/2019	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/18/2018	Annual	6/18/2019	102134
Ruckus Wireless	Q710	SmartCell Q710 Access Point		N/A		511729000096
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	4/30/2018	Biennial	4/30/2020	9105-2404
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Tx	4/30/2018	Biennial	4/30/2020	9105-2403
Seekonk	NC-100	Torque Wrench (8" lb)	5/10/2018	Biennial	5/10/2020	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107
Sunol	DRH-118	Horn Antenna (1-18 GHz)	8/11/2017	Biennial	8/11/2019	A042511

Table 5-1. Test Equipment

Notes:

- 1. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.
- 2. 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.

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6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

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

Spurious Radiated Emission – LTE Band

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

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

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7.0 TEST RESULTS

7.1 Summary

Company Name:	Samsung Electronics Co., Ltd.
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FCC Classification:	Citizens Band End User Devices (CBE)
Mode(s):	LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A		PASS	Section 7.2
2.1046	Transmitter Conducted Output Power	N/A		PASS	See RF Exposure Report
2.1051 96.41(e)	Out of Band Emissions	-13 dBm/Mhz at frequencies within 0-10MHz of channel edge -25 dBm/MHz at frequencies greater than 10MHz above and below channel edge -40 dBm/MHz at frequencies below 3530 MHz and above 3720 MHz		PASS	Section 7.3, 7.4
2.1055	Frequency Stability	Fundamental emissions stay within authorized frequency block	CONDUCTED	PASS	Section 7.7
96.47	End User Device Additional Requirements (CBSD Protocol)	End User Devices may operate only if they can positively receive and decode an authorization signal transmitted by a CBSD, including the frequencies and power limits for their operation. An End User Device must discontinue operations, change frequencies, or change its operational power level within 10 seconds of receiving instructions from its associated CBSD.		PASS	Section 7.8

Table 7-1. Summary of Conducted Test Results

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
96.41(b)	Equivalent Isotropic Radiated Power (EIRP)	23 dBm/10MHz	RADIATED	PASS	Section 7.5
2.1053 96.41(e)	Undesirable Emissions	-40 dBm/MHz		PASS	Section 7.6

Table 7-2. Summary of Radiated Test Results

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Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots 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) 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 "LTE Automation," Version 5.1.

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7.2 Occupied Bandwidth §2.1049

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 - Section 4.2

Test Settings

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

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

Test Setup

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



Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None.

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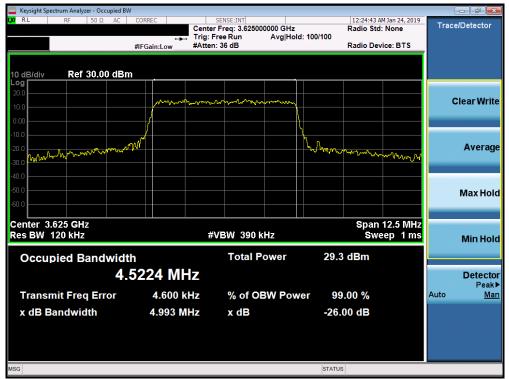
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including physical in



Band 48

Keysight Spectrum Analyzer - Occupied BW					
XIRL RF 50Ω AC	Center		Radio : d: 100/100	17 AM Jan 24, 2019 Std: None Device: BTS	Trace/Detector
10 dB/div Ref 30.00 dBm					
10.0 0.00 10.0					Clear Writ
20.0 www.www.www.www. 30.0 40.0			martalunitati	Marana	Averag
					Max Hol
Center 3.625 GHz Res BW 120 kHz		/BW 390 kHz Total Power		an 12.5 MHz weep 1 ms	Min Hol
Occupied Bandwidth 4.5	251 MHz	Total Fower	29.9 UBIII	1	Detecto Peak
Transmit Freq Error x dB Bandwidth	3.508 kHz 4.999 MHz	% of OBW Pov x dB	ver 99.00 % -26.00 dB		Auto <u>Ma</u>
SG			STATUS		

Plot 7-1. Occupied Bandwidth Plot (Band 48 – 5.0MHz QPSK - Full RB Configuration)



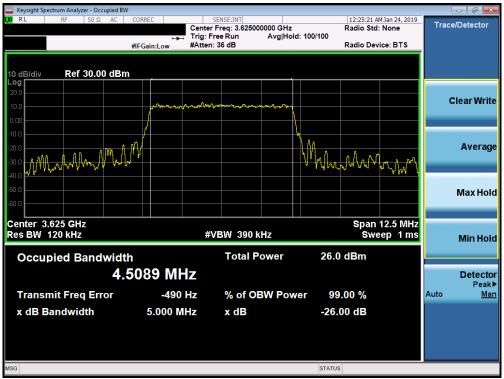
Plot 7-2. Occupied Bandwidth Plot (Band 48 – 5.0MHz 16-QAM - Full RB Configuration)

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Plot 7-3. Occupied Bandwidth Plot (Band 48 – 5.0MHz 64-QAM - Full RB Configuration)



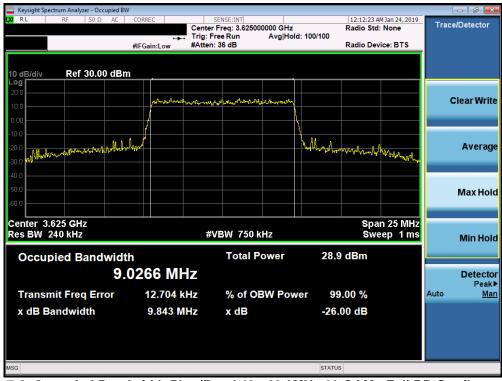
Plot 7-4. Occupied Bandwidth Plot (Band 48 – 5.0MHz 256-QAM - Full RB Configuration)

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Keysight Spectrum Analyzer - Occupied B\	V				
ΙΧΊ RL RF 50Ω AC	Center	SENSE:INT Freq: 3.625000000 GHz Free Run Avg Ho		04 AM Jan 24, 2019 Std: None	Trace/Detector
	#IFGain:Low #Atten	: 36 dB	Radio	Device: BTS	
10 dB/div Ref 30.00 dBr	n				
20.0	unan Marianan	and and the state of the second			Clear Write
-10.0			Virminan		Average
-20.0				wood water water of the second states of the second	Average
-50.0					Max Hold
Center 3.625 GHz Res BW 240 kHz	#1	VBW 750 kHz		pan 25 MHz weep 1 ms	Min Hold
Occupied Bandwidt	h	Total Power	30.3 dBm		
9.	9.0461 MHz				
Transmit Freq Error	9.154 kHz	% of OBW Pov	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	10.29 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-5. Occupied Bandwidth Plot (Band 48 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-6. Occupied Bandwidth Plot (Band 48 - 10.0MHz 16-QAM - Full RB Configuration)

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🔤 Keysight Spectrum Analyzer - Occupied BW						x
LXU RE 50Ω AC	Center	SENSE:INT Freq: 3.625000000 GHz ree Run Avg Hold	Radio Std	M Jan 24, 2019 I: None	Trace/Detector	
	#IFGain:Low #Atten:		Radio De	vice: BTS		
10 dB/div Ref 30.00 dBm						
20.0		manumanum			Clear Wri	ite
-10.0	M				A	
-20.0 -30.0 Hudymun Mr. Mr. Mr. M.	W ^{rel}		have have been hered	2 ^{DA} ward Martin	Avera	ge
-50.0					Max Ho	bld
Center 3.625 GHz Res BW 240 kHz	#\	/BW 750 kHz		n 25 MHz eep 1 ms	Min Ho	old
Occupied Bandwidt	n	Total Power	27.8 dBm			
)353 MHz				Detect Pea	
Transmit Freq Error	5.362 kHz	% of OBW Pow	er 99.00 %		Auto <u>M</u>	lan
x dB Bandwidth	10.05 MHz	x dB	-26.00 dB			
MSG			STATUS			

Plot 7-7. Occupied Bandwidth Plot (Band 48 - 10.0MHz 64-QAM - Full RB Configuration)



Plot 7-8. Occupied Bandwidth Plot (Band 48 - 10.0MHz 256-QAM - Full RB Configuration)

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Keysight Spectrum Analyzer - Occupied B	W				
ιχύ R.L RF 50 Ω AC		SENSE:INT er Freq: 3.625000000 GHz Free Run Avg Ho		M Jan 23, 2019 I: None	Trace/Detector
		en: 36 dB	Radio De	vice: BTS	
10 dB/div Ref 30.00 dBr	n				
20.0		men manakan			Clear Write
-10.0					
-20.0			Ummun	May Radin Martin Ann	Average
-40.0					Max Hold
-60.0					Max Hold
Center 3.625 GHz Res BW 360 kHz	ŧ	¥VBW 1.1 MHz		37.5 MHz eep 1 ms	Min Hold
Occupied Bandwid		Total Power	30.8 dBm		
	3.520 MHz				Detector Peak▶
Transmit Freq Error	13.667 kHz	% of OBW Pov	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	15.09 MHz	x dB	-26.00 dB		
MSG			STATUS		

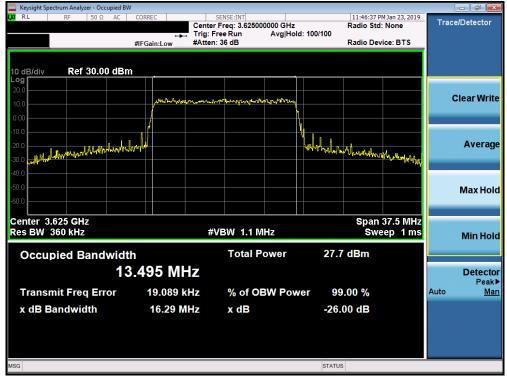
Plot 7-9. Occupied Bandwidth Plot (Band 48 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-10. Occupied Bandwidth Plot (Band 48 - 15.0MHz 16-QAM - Full RB Configuration)

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Plot 7-11. Occupied Bandwidth Plot (Band 48 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-12. Occupied Bandwidth Plot (Band 48 - 15.0MHz 256-QAM - Full RB Configuration)

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Keysight Spectrum Analyzer - Occupied BW					- ē -
LXX RL RF 50Ω AC		SENSE:INT enter Freq: 3.625000000 GI ig: Free Run Avg		2 PM Jan 23, 2019 td: None	Trace/Detector
	#IFGain:Low #A	tten: 36 dB	Radio D	evice: BTS	
10 dB/div Ref 30.00 dBm					
Log 20.0 10.0	and the former	๛๚๛๚๚๚๛๛๛๛๛๛๚๚๚๚๚๚๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛	~		Clear Write
0.00					
-20.0 manhamman	How.		Cal Andrewski and and a start of the	when the the	Average
-40.0					
-60.0					Max Hold
Center 3.625 GHz Res BW 470 kHz		#VBW 1.5 MHz		an 50 MHz veep 1 ms	Min Hold
Occupied Bandwidt		Total Power	31.2 dBm		
	.053 MHz				Detector Peak▶
Transmit Freq Error	35.519 kHz	% of OBW P	ower 99.00 %		Auto <u>Man</u>
x dB Bandwidth	20.02 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-13. Occupied Bandwidth Plot (Band 48 - 20.0MHz QPSK - Full RB Configuration)



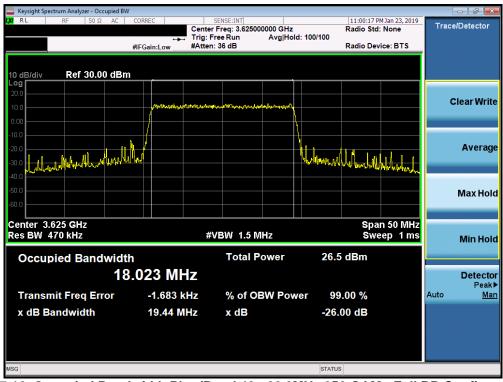
Plot 7-14. Occupied Bandwidth Plot (Band 48 - 20.0MHz 16-QAM - Full RB Configuration)

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🔤 Keysight Spectrum Analyzer - Occupied BW					
XX RL RF 50Ω AC	Center	SENSE:INT Freq: 3.625000000 GHz ree Run Avg Hold: - 36 dB	10:59:59 PMJa Radio Std: No 100/100 Radio Device:	one	Trace/Detector
	#IFGain:Low #Atten	. 30 00	Radio Device.	. 013	
10 dB/div Ref 30.00 dBm					
20.0	mun ment to print the state of the street	Low to see Villey Warden			Clear Write
0.00					
-10.0 -20.0 -30.0 -14401000100	dire		annother and monthly play	hankland	Average
-40.0					Max Hold
Center 3.625 GHz Res BW 470 kHz	#\	/BW 1.5 MHz	Span 5 Sweep	50 MHz 5 1 ms	Min Hold
Occupied Bandwidt	ı	Total Power	28.8 dBm		
	.017 MHz				Detector Peak▶
Transmit Freq Error	12.218 kHz	% of OBW Powe	er 99.00 %	A	Auto <u>Man</u>
x dB Bandwidth	19.63 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-15. Occupied Bandwidth Plot (Band 48 - 20.0MHz 64-QAM - Full RB Configuration)



Plot 7-16. Occupied Bandwidth Plot (Band 48 - 20.0MHz 256-QAM - Full RB Configuration)

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7.3 Spurious and Harmonic Emissions at Antenna Terminal §2.1051 §96.41(e)

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 10th 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.

The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/Mhz.

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
- 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

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. 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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Band 48

	ectrum Analyz											-	- 6 🖻
RL	RF	50 Ω I	DC	CORREC		SE	NSE:INT	#Avg Typ	ALIGN AUTO		4 Jan 24, 2019 E 1 2 3 4 5 6	Fred	quency
				PNO: Fa	ast ↔ .ow	Trig: Per #Atten: 2				TYP			
0 dB/div	Ref 20	.00 dB	m						Mk	r1 3.41 [°] -44.8	1 1 GHz 91 dBm	4	Auto Tur
°g												Ce	enter Fre
10.0													00000 GH
D.00												:	Start Fre
10.0												30.0	00000 MI
20.0													Stop Fre
30.0												3.5100	00000 GI
													OF Oto
10.0											DL1 -40.00 d 1		CF Ste
50.0										and the second secon		<u>Auto</u>	M
					******							E.	
50.0												FI	r eq Offs 0 I
70.0													
0.0												S	cale Typ
tart 30 N	1117									Stop 3	.510 GHz	Log	L
	1.0 MHz			#	¢VBW	3.0 MHz			Sweep 4	.692 ms (7039 pts)	_	
SG									STATUS				

Plot 7-17. Conducted Spurious Plot (Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-18. Conducted Spurious Plot (Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

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	ectrum Analy	zer - Swep	ot SA									-	
XI RL	RF	50 Ω	DC	CORREC		SE	INSE:INT	#4.40	ALIGN AUTO Type: RMS		M Jan 24, 2019 CE 1 2 3 4 5 6	Fred	quency
				PNO: F IFGain:	ast ⊶⊶ Low	Trig: Pe #Atten:		#Avg	Type. Kills	TY D			
10 dB/div Log	Ref 0.	00 dB	m						Mkr	1 26.23 -53.	8 5 GHz 20 dBm	Δ	luto Tun
10.0													enter Fre 1000000 GH
30.0													Start Fre
40.0 50.0											DL1 -40.00 dBm		Stop Fre 000000 GH
50.0 (19) (19)												1.2000 <u>Auto</u>	CF Ste 000000 GH Ma
80.0												Fr	r eq Offs e 0 ⊢
.90.0													cale Typ
Start 15.0 Res BW					#VBW	3.0 MH:	z		Sweep 20	Stop 27 80 ms (2	2.000 GHz 24001 pts)	Log	Li
ISG									STATUS	3			

Plot 7-19. Conducted Spurious Plot (Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-20. Conducted Spurious Plot (Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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		m Analyzer ·													
LXI RL		RF 5	0Ω	DC	CORREC			SENSE:INT	#Av	g Type:	IGN AUTO		3 PM Jan 24, 2019 RACE 1 2 3 4 5 6	Fre	quency
		-5.44.0	7 40		PNO: I IFGain	Fast ↔ Low	Trig: Po #Atten:					kr1 3.6	Bee 5 GHz 4.07 dBm		Auto Tune
10 dB/div	R	ef 14.0	7 aB	m								_	4.07 0.011		
4.07													_		enter Freq 500000 GHz
-5.93															
														3.675	Start Freq 000000 GHz
-15.9															
-25.9														15 000	Stop Freq
-35.9													DL1 -40.00 dBm	13.000	000000 GHZ
-45.9								Ale alice and a second	,	~~~			/	1.132	CF Step 500000 GHz
-55.9	~~~		\sim										_	<u>Auto</u>	Man
-65.9														F	req Offset
75.0															0 Hz
-75.9														\$	Scale Type
Start 3.6 #Res Bi						#\/R\A	/ / 3.0 MH			Sw	een 1	Stop	15.000 GHz (22601 pts)	Log	<u>Lin</u>
MSG	- 1.0	-141112				<i></i>	- 3 1 1				STATU		(22001 pt3)		

Plot 7-21. Conducted Spurious Plot (Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-22. Conducted Spurious Plot (Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMG977T		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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	ectrum Analyzer - Swept SA					
LXI RL	RF 50 Ω D(C CORREC	SENSE:INT	ALIGN A #Avg Type: RMS		Peak Search
10 dB/div	Ref 20.00 dBn	PNO: Fast IFGain:Low	Trig: Periodic #Atten: 26 dB		Mkr1 3.628 7 GHz -43.63 dBm	Next Peak
10.0						Next Pk Right
-10.0						Next Pk Left
-20.0						Marker Delta
-40.0					DL1 -40.00 d 1	Mkr→CF
			finance financia dana ang pangana ang p			Mkr→RefLvl
-70.0 Start 30 M #Res BW		#VBW	3.0 MHz	Swee	Stop 3.640 GHz p 6.101 ms (7041 pts	More 1 of 2
MSG					TATUS	

Plot 7-23. Conducted Spurious Plot (Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-24. Conducted Spurious Plot (Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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	pectrum Analy:										(.
L <mark>XI</mark> RL	RF	50 Ω D	DC CO	RREC	SEN	ISE:INT	#Avg Typ	ALIGN AUTO		1 Jan 24, 2019 E 1 2 3 4 5 6	Frequen	су
	-		P IF	NO: Fast 🖵 Gain:Low	Trig: Peri #Atten: 1				TYP			-
10 dB/div Log	Ref 0.(00 dBm	•					Mkr	1 26.129 -48.3	9 0 GHz 32 dBm	Auto	Tune
-10.0											Center 21.00000000	
-20.0											Star 15.00000000	t Freq 00 GHz
-40.0					n - , milling biograms (see , see) state		in the second second second			DL1 -40.00 dBm	Stop 27.00000000) Freq 00 GHz
-60.0	n Janei y Kilon distriction (district ayan ya Kina ayan ya Kina ayan di ya mula				nag si da sere producer na si da se la sere producer						CF 1.20000000 <u>Auto</u>	Step 00 GHz Man
-70.0											Freq	Offset 0 Hz
-90.0											Scale	
Start 15. #Res BW	000 GHz / 1.0 MHz	2		#VBW	3.0 MHz		s	weep 20	Stop 27. .80 ms <u>(2</u>	.000 GHz 4001 pts)	Log	Lin
MSG								STATUS				

Plot 7-25. Conducted Spurious Plot (Band 48 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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7.4 Band Edge Emissions at Antenna Terminal §2.1051 §96.41(e)

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 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.

The conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed -25 dBm/MHz.

The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/Mhz.

Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

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 > 1% of the emission bandwidth
- 4. VBW \geq 3 x RBW
- 5. Detector = RMS
- 6. Number of sweep points $\geq 2 \times \text{Span/RBW}$
- 7. Trace mode = trace average
- 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.



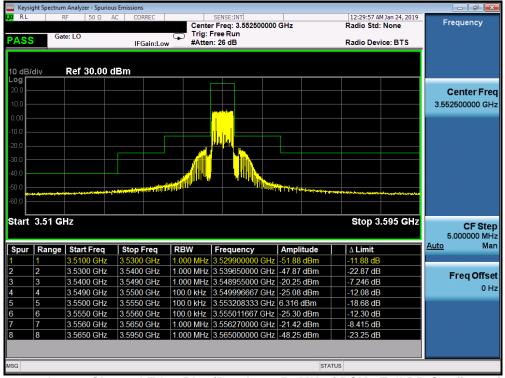
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

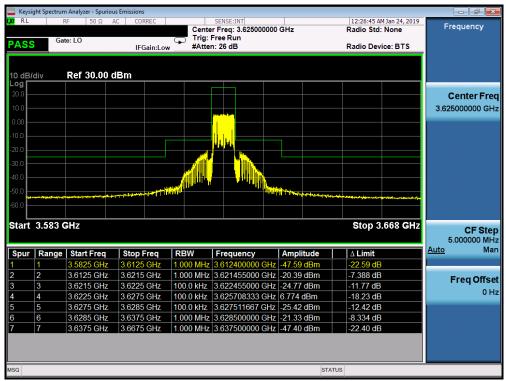
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Band 48



Plot 7-26. Lower Channel Edge Plot (Band 48 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-27. Mid Channel Edge Plot (Band 48 - 5.0MHz QPSK - Full RB Configuration)

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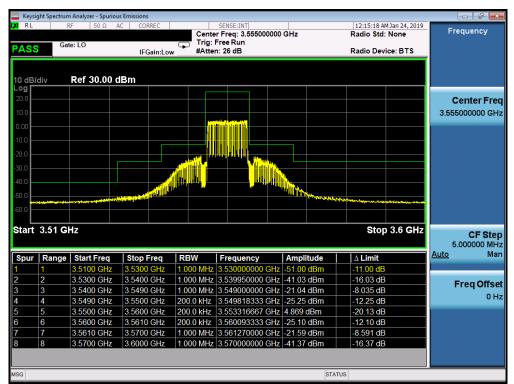
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ASS	6-1	ke:LO	AC CORREC	Trig:	SENSE:INT r Freq: 3.697500000 Free Run n: 26 dB	GHz	12:30:37 AM Jan 24, 2019 Radio Std: None Radio Device: BTS	Frequency
0 dB/	/div	Ref 30.00 d	dBm					
- og 20.0								Center Fre 3.697500000 GH
0.00 - 10.0 - 20.0 -								
30.0 - 40.0 -								
50.0 60.0	guipantos guarante	amen ya nye	and and the state of the state	, A.,				
60.0	3.655 C	GHz					Stop 3.74 GHz	5.000000 MH
60.0			Stop Freq	RBW	Frequency	Amplitude	Stop 3.74 GHz	Cr Sie
io.o				RBW		Amplitude		5.000000 MH
itart	Range	Start Freq	Stop Freq	RBW 1.000 MHz	Frequency	Amplitude	∆ Limit	5.000000 MH <u>Auto</u> Ma
Start	Range	Start Freq 3.6550 GHz	Stop Freq 3.6850 GHz	RBW 1.000 MHz 1.000 MHz	Frequency 3.684850000 GHz	Amplitude -47.59 dBm -21.86 dBm	∆ Limit -22.59 dB	5.000000 Mi Auto Ma
start	Range	Start Freq 3.6550 GHz 3.6850 GHz	Stop Freq 3.6850 GHz 3.6940 GHz	RBW 1.000 MHz 1.000 MHz 100.0 kHz	Frequency 3.684850000 GHz 3.693955000 GHz	Amplitude -47.59 dBm -21.86 dBm -25.47 dBm	∆ Limit -22.59 dB -8.862 dB	Auto Ma
Start	Range 1 2 3	Start Freq 3.6550 GHz 3.6850 GHz 3.6940 GHz	Stop Freq 3.6850 GHz 3.6940 GHz 3.6950 GHz	RBW 1.000 MHz 1.000 MHz 100.0 KHz 100.0 KHz	Frequency 3.684850000 GHz 3.693955000 GHz 3.694996667 GHz	Amplitude 47.59 dBm -21.86 dBm -25.47 dBm 6.612 dBm	Δ Limit -22.59 dB -8.862 dB -12.47 dB	5.00000 Mi <u>Auto</u> Ma
50.0	Range 1 2 3 4	Start Freq 3.6550 GHz 3.6850 GHz 3.6940 GHz 3.6950 GHz	Stop Freq 3.6850 GHz 3.6940 GHz 3.6950 GHz 3.6950 GHz 3.7000 GHz	RBW 1.000 MHz 1.000 MHz 100.0 kHz 100.0 kHz	Frequency 3.684850000 GHz 3.693955000 GHz 3.694996667 GHz 3.698208333 GHz	Amplitude 47.59 dBm -21.86 dBm -25.47 dBm 6.612 dBm -26.24 dBm	△ Limit -22.59 dB -8.862 dB -12.47 dB -18.39 dB	Auto Ma
50.0 Start	Range 1 2 3 4 5 6 7	Start Freq 3.6550 GHz 3.6850 GHz 3.6940 GHz 3.6950 GHz 3.7000 GHz	Stop Freq 3.6850 GHz 3.6950 GHz 3.6950 GHz 3.6950 GHz 3.6900 GHz 3.7000 GHz 3.7010 GHz	RBW 1.000 MHz 1.000 MHz 1000 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz	Frequency 3 684850000 GHz 3 693955000 GHz 3 694996667 GHz 3 698208333 GHz 3.700011667 GHz	Amplitude 47.59 dBm -21.86 dBm -25.47 dBm 6.612 dBm -26.24 dBm -23.05 dBm	Δ Limit -22.59 dB -8.862 dB -12.47 dB -18.39 dB -13.24 dB	Auto Ma
Start	Range 1 2 3 4 5 6	Start Freq 3.6550 GHz 3.6850 GHz 3.6940 GHz 3.6950 GHz 3.7000 GHz 3.7010 GHz	Stop Freq 3.6850 GHz 3.6950 GHz 3.7000 GHz 3.7010 GHz 3.7100 GHz	RBW 1.000 MHz 1.000 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz	Frequency 3.684850000 GHz 3.693955000 GHz 3.694996667 GHz 3.698208333 GHz 3.70001667 GHz 3.701015000 GHz	Amplitude 47.59 dBm -21.86 dBm -25.47 dBm 6.612 dBm -26.24 dBm -23.05 dBm -47.44 dBm	Δ Limit -22.59 dB -8.862 dB -12.47 dB -18.39 dB -13.24 dB -10.05 dB	Auto Ma
Spur	Range 1 2 3 4 5 6 7	Start Freq 3.6550 GHz 3.6850 GHz 3.6940 GHz 3.6950 GHz 3.7000 GHz 3.7010 GHz 3.7100 GHz	Stop Freq 3.6850 GHz 3.6940 GHz 3.6950 GHz 3.7000 GHz 3.7010 GHz 3.7020 GHz	RBW 1.000 MHz 1.000 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz	Frequency 3.634850000 GHz 3.693955000 GHz 3.694996667 GHz 3.700011667 GHz 3.701015000 GHz 3.71015803333 GHz	Amplitude 47.59 dBm -21.86 dBm -25.47 dBm 6.612 dBm -26.24 dBm -23.05 dBm -47.44 dBm	Δ Limit -22.59 dB -8.862 dB -12.47 dB -18.39 dB -13.24 dB -10.05 dB -22.44 dB	Auto Mi

Plot 7-28. Upper Channel Edge Plot (Band 48 - 5.0MHz QPSK - Full RB Configuration)



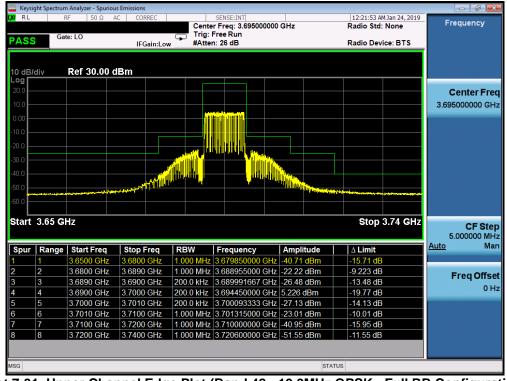
Plot 7-29. Lower Channel Edge Plot (Band 48 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMG977T		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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PAS	6-1	RF 50Ω A te:LO	AC CORREC	Trig:	SENSE:INT r Freq: 3.625000000 Free Run n: 26 dB) GHz	12:14:37 AM Jan 24, 201 Radio Std: None Radio Device: BTS	9 Frequency
10 dB	/div	Ref 30.00 c	dBm					_
Log 20.0 - 10.0 -								Center Free 3.625000000 GH
0.00 -								
-20.0 -30.0						<u> </u>		
-40.0 -			WHAT WAT THE PARTY OF			Minth		
- 17								** <mark>*</mark>
	3.58 GI						Stop 3.67 GH	Z
		Hz					Stop 3.67 GH	5.000000 MH
	Range	Hz Start Freq	Stop Freq	RBW	Frequency	Amplitude	∆ Limit	CF SIE
Start Spur	Range	Hz Start Freq 3.5800 GHz	Stop Freq 3.6100 GHz	1.000 MHz	3.609850000 GHz	-40.10 dBm	Δ Limit -15.10 dB	5.000000 MH
Start Spur 1 2	Range	Hz 3.5800 GHz 3.6100 GHz	Stop Freq 3.6100 GHz 3.6190 GHz	1.000 MHz 1.000 MHz	3.609850000 GHz 3.618955000 GHz	-40.10 dBm -20.12 dBm	Δ Limit -15.10 dB -7.123 dB	5.000000 MH <u>Auto</u> Ma
Start Spur 1 2 3	Range Range 2 3	Hz 3.5800 GHz 3.6100 GHz 3.6190 GHz	Stop Freq 3.6100 GHz 3.6190 GHz 3.6200 GHz	1.000 MHz 1.000 MHz 200.0 kHz	3.609850000 GHz 3.618955000 GHz 3.619963333 GHz	-40.10 dBm -20.12 dBm -24.64 dBm	Δ Limit -15.10 dB -7.123 dB -11.64 dB	5.00000 MH Auto Ma
Start Spur	Range 1 2 3 4	Hz 3.5800 GHz 3.6100 GHz 3.6190 GHz 3.6200 GHz	Stop Freq 3.6100 GHz 3.6190 GHz 3.6200 GHz 3.6300 GHz	1.000 MHz 1.000 MHz 200.0 kHz 200.0 kHz	3.609850000 GHz 3.618955000 GHz 3.619963333 GHz 3.623616667 GHz	-40.10 dBm -20.12 dBm -24.64 dBm 5.494 dBm	∆ Limit -15.10 dB -7.123 dB -11.64 dB -19.51 dB	Auto Ma
Start	Range 1 2 3 4 5	Hz 3.5800 GHz 3.6100 GHz 3.6100 GHz 3.6200 GHz 3.6300 GHz	Stop Freq 3.6100 GHz 3.6190 GHz 3.6200 GHz 3.6300 GHz 3.6310 GHz	1.000 MHz 1.000 MHz 200.0 kHz 200.0 kHz 200.0 kHz	3.609850000 GHz 3.618955000 GHz 3.619963333 GHz 3.623616667 GHz 3.630121667 GHz	-40.10 dBm -20.12 dBm -24.64 dBm 5.494 dBm -24.61 dBm	Δ Limit -15.10 dB -7.123 dB -11.64 dB -19.51 dB -11.61 dB	Auto Ma
Start Spur 1 2	Range 1 2 3 4 5 6	Hz Start Freq 3.5800 GHz 3.6100 GHz 3.6190 GHz 3.6200 GHz 3.6300 GHz 3.6310 GHz	Stop Freq 3.6100 GHz 3.6200 GHz 3.6300 GHz 3.6300 GHz 3.6300 GHz 3.6300 GHz	1.000 MHz 1.000 MHz 200.0 KHz 200.0 kHz 200.0 kHz 1.000 MHz	3.609850000 GHz 3.618955000 GHz 3.619963333 GHz 3.623616667 GHz 3.630121667 GHz 3.631270000 GHz	-40.10 dBm -20.12 dBm -24.64 dBm 5.494 dBm -24.61 dBm -21.30 dBm	Δ Limit -15.10 dB -7.123 dB -11.64 dB -19.51 dB -11.61 dB -8.301 dB	5.000000 MH <u>Auto</u> Ma
Start	Range 1 2 3 4 5	Hz 3.5800 GHz 3.6100 GHz 3.6100 GHz 3.6200 GHz 3.6300 GHz	Stop Freq 3.6100 GHz 3.6190 GHz 3.6200 GHz 3.6300 GHz 3.6310 GHz	1.000 MHz 1.000 MHz 200.0 KHz 200.0 kHz 200.0 kHz 1.000 MHz	3.609850000 GHz 3.618955000 GHz 3.619963333 GHz 3.623616667 GHz 3.630121667 GHz	-40.10 dBm -20.12 dBm -24.64 dBm 5.494 dBm -24.61 dBm -21.30 dBm	Δ Limit -15.10 dB -7.123 dB -11.64 dB -19.51 dB -11.61 dB	5.00000 MH Auto Ma

Plot 7-30. Mid Channel Edge Plot (Band 48 - 10.0MHz QPSK - Full RB Configuration)



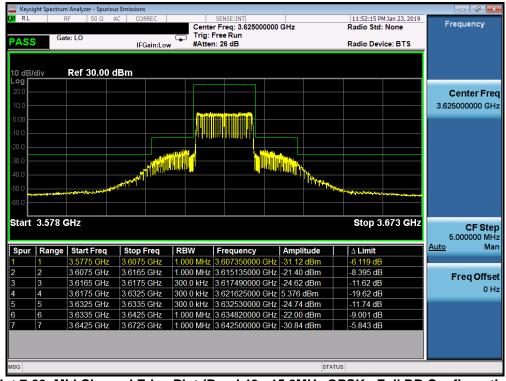
Plot 7-31. Upper Channel Edge Plot (Band 48 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMG977T		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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PASS	RF 5	0 Ω AC	CORREC	Trig:	SENSE:INT Freq: 3.55750000 Free Run n: 26 dB	0 GHz	11:53:31 PM Radio Std: Radio Devi		Frequency
10 dB/di Log 20.0	V Ref 30	0.00 dBm							Center Fre
10.0 0.00 10.0									3.557500000 GH
20.0				and the second second					
40.0			1			Thomas and the second s			
60.0								****	
	51 GHz					A		605 GHz	CF Ste 5.000000 MH Auto Ma
Spur F	Range Start F		op Freq	RBW	Frequency	Amplitude	∆ Limit	605 GHz	5.000000 MH
Spur F	Range Start F	GHz 3.5	300 GHz	1.000 MHz	3.529933333 GH	z -50.25 dBm	Δ Limit	605 GHz	5.000000 Mł <u>Auto</u> Ma
Spur F	Range Start F 3.5100 3.5300	GHz 3.5 GHz 3.5	300 GHz 400 GHz	1.000 MHz 1.000 MHz	3.529933333 GH 3.539950000 GH	z -50.25 dBm z -32.62 dBm	Δ Limit -10.25 dB -7.617 dB	605 GHz	5.000000 Mł <u>Auto</u> Ma Freq Offs
Spur F	Range Start F 3.5100 3.5300 3.5300 3.5400	GHz 3.5 GHz 3.5 GHz 3.5 GHz 3.5	300 GHz 400 GHz 490 GHz	1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz	3.529933333 GH 3.539950000 GH 3.547635000 GH	z -50.25 dBm z -32.62 dBm z -23.01 dBm	Δ Limit -10.25 dB -7.617 dB -10.01 dB	605 GHz	5.000000 Mł <u>Auto</u> Ma Freq Offs
Spur F 1 2 2 3 3 4 4	Range Start F 3.5100 3.5300 3.5300 3.5400 3.5400 3.5490	GHz 3.5	300 GHz 400 GHz	1.000 MHz 1.000 MHz 1.000 MHz 300.0 MHz	3.529933333 GH 3.539950000 GH	z -50.25 dBm z -32.62 dBm z -23.01 dBm z -26.00 dBm	Δ Limit -10.25 dB -7.617 dB	605 GHz	5.000000 Mł <u>Auto</u> Ma Freq Offs
Spur I 1 1 2 2 3 3 4 4	Range Start F 3.5100 3.5300 3.5300 3.5400 3.5400 3.5490 3.5500 3.5500	GHz 3.5	300 GHz 400 GHz 490 GHz 500 GHz	1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 300.0 KHz 300.0 KHz	3.529933333 GH; 3.539950000 GH; 3.547635000 GH; 3.549960000 GH;	z -50.25 dBm z -32.62 dBm z -23.01 dBm z -26.00 dBm z 4.887 dBm	Δ Limit -10.25 dB -7.617 dB -10.01 dB -13.00 dB	605 GHz	5.000000 MH
Spur I 1 1 2 2 3 3 4 4 5 5	Range Start F 3.5100 3.5100 3.5300 3.5400 3.5400 3.5400 3.5400 3.5400 3.5500 3.5500 3.5500 3.5650	GHz 3.5 GHz 3.5	300 GHz 400 GHz 490 GHz 500 GHz 650 GHz	1.000 MHz 1.000 MHz 1.000 MHz 300.0 KHz 300.0 KHz 300.0 KHz	3.529933333 GH; 3.539950000 GH; 3.547635000 GH; 3.549960000 GH; 3.561250000 GH;	z -50.25 dBm z -32.62 dBm z -23.01 dBm z -26.00 dBm z 4.887 dBm z -25.71 dBm	Δ Limit -10.25 dB -7.617 dB -10.01 dB -13.00 dB -20.11 dB	605 GHz	5.000000 MH <u>Auto</u> Ma Freq Offs

Plot 7-32. Lower Channel Edge Plot (Band 48 - 15.0MHz QPSK - Full RB Configuration)



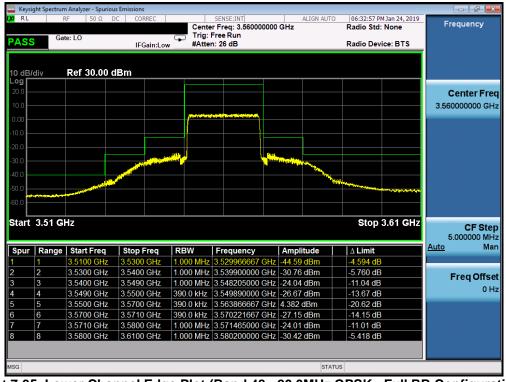
Plot 7-33. Mid Channel Edge Plot (Band 48 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMG977T		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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PASS	Gat	F 50 Ω e: LO	AC CORREC	Trig:	sense:INT r Freq: 3.692500000 Free Run n: 26 dB	GHz	12:11:03 AM Radio Std: Radio Devi		Frequency
10 dB/di Log	liv	Ref 30.00	dBm						
20.0 — 10.0 —				dimental di					Center Fre 3.692500000 GH
0.00									
20.0									
30.0									
40.0				1900 P <mark>.</mark> —					
50.0	a, ing for the left of		APPANANT MILLING				New Street Stree	4pt-alin-turnistanys	
50.0	3.645 G	high a second					Stop 3	3.74 GHz	5.000000 MH
50.0 60.0 Start 3	Range	GHZ Start Freq	Stop Freq	RBW	Frequency	Amplitude	∆ Limit	3.74 GHz	CF Ste 5.00000 MH <u>Auto</u> Ma
50.0 60.0 Start 3 Spur 1	Range 1	GHZ Start Freq 3.6450 GHz	Stop Freq 3.6750 GHz	RBW 1.000 MHz	Frequency 3.674850000 GHz	Amplitude	∆ Limit -7.256 dB	3.74 GHz	5.000000 MH
50.0 60.0 Start 3 Spur 1 2 2	Range 1 2	GHZ Start Freq 3.6450 GHz 3.6750 GHz	Stop Freq 3.6750 GHz 3.6840 GHz	RBW 1.000 MHz 1.000 MHz	Frequency 3.674850000 GHz 3.682635000 GHz	Amplitude -32.26 dBm -22.72 dBm	Δ Limit -7.256 dB -9.723 dB	3.74 GHz	5.000000 MH
50.0 60.0 Start 3 Spur 1 1 2 3 3	Range 1 2 3	SHz Start Freq 3.6450 GHz 3.6750 GHz 3.6840 GHz	Stop Freq 3.6750 GHz 3.6840 GHz 3.6850 GHz	RBW 1.000 MHz 1.000 MHz 300.0 kHz	Frequency 3.674850000 GHz 3.682635000 GHz 3.684990000 GHz	Amplitude -32.26 dBm -22.72 dBm -25.51 dBm	Δ Limit -7.256 dB -9.723 dB -12.51 dB	3.74 GHz	5.000000 MH <u>Auto</u> Ma
50.0 60.0 Start 3 Spur 1 2 3 3 4	Range 1 2 3 4	SHz Start Freq 3.6450 GHz 3.6750 GHz 3.6840 GHz 3.6850 GHz	Stop Freq 3.6750 GHz 3.6840 GHz 3.6850 GHz 3.7000 GHz	RBW 1.000 MHz 1.000 MHz 300.0 kHz 300.0 kHz	Frequency 3.674850000 GHz 3.682635000 GHz 3.684990000 GHz 3.698350000 GHz	Amplitude -32.26 dBm -22.72 dBm -25.51 dBm 5.705 dBm	Δ Limit -7.256 dB -9.723 dB -12.51 dB -19.30 dB	3.74 GHz	5.000000 MH <u>Auto</u> Ma Freq Offs
50.0 60.0 Start 3 Spur 1 2 3 3 3 4 4 4 5 5	Range 1 2 3 4 5	Start Freq 3.6450 GHz 3.6750 GHz 3.6840 GHz 3.6840 GHz 3.6850 GHz 3.7000 GHz	Stop Freq 36750 GHz 36850 GHz 37000 GHz 37000 GHz 37000 GHz	RBW 1.000 MHz 1.000 MHz 300.0 kHz 300.0 kHz 300.0 kHz	Frequency 3.674850000 GHz 3.682635000 GHz 3.684990000 GHz 3.698350000 GHz 3.700000000 GHz	Amplitude -32.26 dBm -22.72 dBm -25.51 dBm -26.24 dBm	Δ Limit -7.256 dB -9.723 dB -12.51 dB -19.30 dB -13.24 dB	3.74 GHz	5.000000 MH <u>Auto</u> Ma Freq Offs
50.0 60.0 Start 3 Spur 1 2 2 3 3 4 4 4 6 6 (Range 1 2 3 4 5 6	SHZ Start Freq 3.6450 GHz 3.6750 GHz 3.6840 GHz 3.6850 GHz 3.6850 GHz 3.7000 GHz 3.7000 GHz	Stop Freq 36750 GHz 36840 GHz 36850 GHz 37000 GHz 37010 GHz 3,7010 GHz 3,7010 GHz	RBW 1.000 MHz 1.000 MHz 300.0 kHz 300.0 kHz 300.0 kHz 300.0 kHz 1.000 MHz	Frequency 3.674850000 GHz 3.682635000 GHz 3.684990000 GHz 3.70000000 GHz 3.702845000 GHz	Amplitude -32.26 dBm -22.72 dBm -25.51 dBm -26.24 dBm -26.24 dBm -23.87 dBm	Δ Limit -7.256 dB -9.723 dB -12.51 dB -19.30 dB -13.24 dB -10.87 dB	3.74 GHz	5.000000 MH <u>Auto</u> Ma Freq Offs
50.0 60.0 Start 3 Spur 1 2 2 3 3 3 5 4 4 4 5 6 6 6 7	Range 1 2 3 4 5 6 7	Start Freq 3.6450 GHz 3.6750 GHz 3.6840 GHz 3.6840 GHz 3.6850 GHz 3.7000 GHz	Stop Freq 36750 GHz 36850 GHz 37000 GHz 37000 GHz 37000 GHz	RBW 1.000 MHz 1.000 MHz 300.0 kHz 300.0 kHz 300.0 kHz 1.000 MHz 1.000 MHz	Frequency 3.674850000 GHz 3.682635000 GHz 3.684990000 GHz 3.698350000 GHz 3.700000000 GHz	Amplitude 32.26 dBm -22.72 dBm -25.51 dBm 5.705 dBm -26.24 dBm -23.87 dBm -33.99 dBm	Δ Limit -7.256 dB -9.723 dB -12.51 dB -19.30 dB -13.24 dB	3.74 GHz	5.000000 MH <u>Auto</u> Ma Freq Offs

Plot 7-34. Upper Channel Edge Plot (Band 48 - 15.0MHz QPSK - Full RB Configuration)



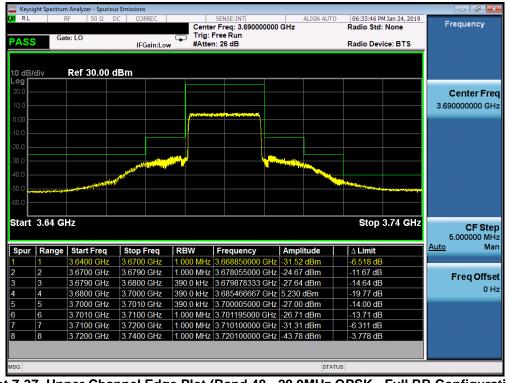
Plot 7-35. Lower Channel Edge Plot (Band 48 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMG977T		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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		RF 50Ω	DC COR	REC	Trig: I	SENSE:INT r Freq: 3.62500 Free Run	0000 GHz	ALIGN AUT	Rad	io Std:		Frequ	ency
PAS	s		IFG	ain:Low	#Atter	n: 26 dB			Rad	io Devi	ice: BTS		
10 dB		Dof 20.00	dBas										
-og [Jaiv	Ref 30.00	UBIII										
20.0												Cent	ter Fre
10.0													
					Start Automation	-						3.625000	000 GF
0.00													
10.0													
20.0													
					urda 🚽		(U) to the state						
30.0			and the second s	De la com			and the second	and the second second					
40.0			A REAL PROPERTY.					" North State					
50.0 .		and the second s							and the second s	-			
-60 0													
-0.0 T													
L	3 575 (247								on 3	675 CHz		
L	3.575 0	GHz							SI	top 3.	.675 GHz		
L											.675 GHz	5.000	000 MH
Start		GHz Start Freq	Stop F	req	RBW	Frequency		plitude		imit	.675 GHz		000 MH
Start	Range	Start Freq 3.5750 GHz	3.6050	GHz	1.000 MHz	3.604550000	GHz -29.	60 dBm	ΔL	imit 97 dB	.675 GHz	5.000	000 MH
Start Spur 1 2	Range	Start Freq 3.5750 GHz 3.6050 GHz	3.6050 3.6140	GHz GHz	1.000 MHz 1.000 MHz	3.604550000 3.613250000	GHz -29. GHz -24.	60 dBm 41 dBm	ΔL -4.5 -11.	imit 97 dB 41 dB	.675 GHz	5.000 <u>Auto</u>	000 MH Ma
Start Spur 1 2	Range	Start Freq 3.5750 GHz	3.6050	GHz GHz	1.000 MHz 1.000 MHz	3.604550000	GHz -29. GHz -24.	60 dBm 41 dBm	ΔL -4.5 -11.	imit 97 dB	.675 GHz	5.000 <u>Auto</u>	000 M⊦ Ma
Start	Range 1 2 3 4	Start Freq 3.5750 GHz 3.6050 GHz 3.6140 GHz 3.6150 GHz	3.6050 3.6140 3.6150 3.6350	GHz GHz GHz GHz GHz	1.000 MHz 1.000 MHz 390.0 kHz 390.0 kHz	3.604550000 3.613250000 3.614905000 3.628866667	GHz -29. GHz -24. GHz -26. GHz 5.15	50 dBm 41 dBm 54 dBm 5 dBm	ΔL -4.5 -11. -13. -19.	imit 97 dB 41 dB 54 dB 85 dB	675 GHz	5.000 <u>Auto</u>	000 M⊦ Ma
	Range 1 2 3 4 5	Start Freq 3.5750 GHz 3.6050 GHz 3.6140 GHz	3.6050 3.6140 3.6150 3.6350 3.6360	GHz GHz GHz GHz GHz GHz	1.000 MHz 1.000 MHz 390.0 kHz 390.0 kHz 390.0 kHz	3.604550000 3.613250000 3.614905000 3.628866667 3.635341667	GHz -29. GHz -24. GHz -26. GHz 5.15 GHz -26.	60 dBm 41 dBm 54 dBm 5 dBm 45 dBm	ΔL -4.5 -11. -13. -19. -13.	imit 97 dB 41 dB 54 dB 85 dB 45 dB	.675 GHz	5.000 <u>Auto</u>	000 M⊢ Ma
Start	Range 1 2 3 4	Start Freq 3.5750 GHz 3.6050 GHz 3.6140 GHz 3.6150 GHz	3.6050 3.6140 3.6150 3.6350	GHz GHz GHz GHz GHz GHz	1.000 MHz 1.000 MHz 390.0 kHz 390.0 kHz 390.0 kHz	3.604550000 3.613250000 3.614905000 3.628866667	GHz -29. GHz -24. GHz -26. GHz 5.15 GHz -26.	60 dBm 41 dBm 54 dBm 5 dBm 45 dBm	ΔL -4.5 -11. -13. -19. -13.	imit 97 dB 41 dB 54 dB 85 dB	.675 GHz	5.000 <u>Auto</u>	CFSte 000 MH Ma qOffse 0 H
Start	Range 1 2 3 4 5	Start Freq 3.5750 GHz 3.6050 GHz 3.6140 GHz 3.6150 GHz 3.6350 GHz	3.6050 3.6140 3.6150 3.6350 3.6360	GHz GHz GHz GHz GHz GHz GHz	1.000 MHz 1.000 MHz 390.0 kHz 390.0 kHz 390.0 kHz 1.000 MHz	3.604550000 3.613250000 3.614905000 3.628866667 3.635341667	GHz -29. GHz -24. GHz -26. GHz 5.15 GHz -26. GHz -26. GHz -26. GHz -26.	60 dBm 41 dBm 54 dBm 5 dBm 45 dBm 10 dBm	ΔL -4.5 -11. -13. -19. -13. -11.	imit 97 dB 41 dB 54 dB 85 dB 45 dB		5.000 <u>Auto</u>	000 M⊢ Ma
Start	Range 1 2 3 4 5 6	Start Freq 3.5750 GHz 3.6050 GHz 3.6140 GHz 3.6150 GHz 3.6350 GHz 3.6360 GHz	3.6050 3.6140 3.6150 3.6350 3.6360 3.6360 3.6450	GHz GHz GHz GHz GHz GHz GHz	1.000 MHz 1.000 MHz 390.0 kHz 390.0 kHz 390.0 kHz 1.000 MHz	3.604550000 3.613250000 3.614905000 3.628866667 3.635341667 3.636195000	GHz -29. GHz -24. GHz -26. GHz 5.15 GHz -26. GHz -26. GHz -26. GHz -26.	60 dBm 41 dBm 54 dBm 5 dBm 45 dBm 10 dBm	ΔL -4.5 -11. -13. -19. -13. -11.	imit 97 dB 41 dB 54 dB 85 dB 45 dB 10 dB		5.000 <u>Auto</u>	000 M⊦ Ma
Start	Range 1 2 3 4 5 6	Start Freq 3.5750 GHz 3.6050 GHz 3.6140 GHz 3.6150 GHz 3.6350 GHz 3.6360 GHz	3.6050 3.6140 3.6150 3.6350 3.6360 3.6360 3.6450	GHz GHz GHz GHz GHz GHz GHz	1.000 MHz 1.000 MHz 390.0 kHz 390.0 kHz 390.0 kHz 1.000 MHz	3.604550000 3.613250000 3.614905000 3.628866667 3.635341667 3.636195000	GHz -29. GHz -24. GHz -26. GHz 5.15 GHz -26. GHz -26. GHz -26. GHz -26.	60 dBm 41 dBm 54 dBm 5 dBm 45 dBm 10 dBm	ΔL -4.5 -11. -13. -19. -13. -11.	imit 97 dB 41 dB 54 dB 85 dB 45 dB 10 dB		5.000 <u>Auto</u>	000 MH Ma

Plot 7-36. Mid Channel Edge Plot (Band 48 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-37. Upper Channel Edge Plot (Band 48 - 20.0MHz QPSK - Full RB Configuration)

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7.5 Radiated Power (EIRP) §96.41(b)

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 above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.2.1

ANSI/TIA-603-E-2016 - Section 2.2.17

Test Settings

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

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

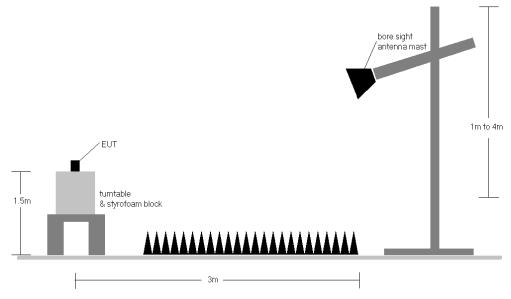


Figure 7-4. Radiated Test Setup >1GHz

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) The worst case EIRP shown in this section is found with LTE operating only using 1RB. As such, the EIRP/10MHz and full channel EIRP values will be identical since 1RB is fully contained within all available channel bandwidths for LTE Band 48 (i.e. 5, 10, 15, 20MHz).

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	Channel		Ant.	Antenna	Turntable		Substitute	Ant.				
Frequency [MHz]	Bandwidth [MHz]	Mod.	Pol. [H/V]	Height [cm]	Azimuth [degree]	RB Size/Offset	Level [dBm]	Gain [dBi]	EIRP [dBm/10MHz]	EIRP [Watts]	EIRP Limit [dBm/10MHz]	Margin [dB]
3552.50	5	QPSK	н	168	271	1 / 0	10.22	8.71	18.93	0.078	23.00	-4.07
3625.00	5	QPSK	Н	183	253	1 / 24	10.71	8.26	18.97	0.079	23.00	-4.03
3697.50	5	QPSK	Н	165	294	1 / 24	10.02	8.68	18.70	0.074	23.00	-4.30
3625.00	5	16-QAM	Н	183	253	1 / 24	9.69	8.26	17.95	0.062	23.00	-5.05
3625.00	5	64-QAM	Н	183	253	1 / 24	8.33	8.26	16.59	0.046	23.00	-6.41
3625.00	5	256-QAM	н	183	253	1 / 24	5.91	8.26	14.17	0.026	23.00	-8.83
3555.00	10	QPSK	Н	170	305	1 / 0	10.35	8.69	19.04	0.080	23.00	-3.96
3625.00	10	QPSK	Н	174	241	1 / 0	10.72	8.26	18.98	0.079	23.00	-4.02
3695.00	10	QPSK	н	156	284	1 / 0	10.45	8.66	19.11	0.081	23.00	-3.89
3695.00	10	16-QAM	Н	156	284	1 / 0	9.34	8.66	18.00	0.063	23.00	-5.00
3695.00	10	64-QAM	Н	156	284	1 / 0	8.00	8.66	16.66	0.046	23.00	-6.34
3695.00	10	256-QAM	Н	156	284	1 / 0	5.61	8.66	14.27	0.027	23.00	-8.73
3557.50	15	QPSK	Н	155	321	1 / 74	10.38	8.67	19.05	0.080	23.00	-3.95
3625.00	15	QPSK	Н	161	304	1 / 0	10.72	8.26	18.98	0.079	23.00	-4.02
3692.50	15	QPSK	Н	152	280	1 / 0	9.85	8.64	18.49	0.071	23.00	-4.51
3557.50	15	16-QAM	Н	155	321	1 / 74	9.34	8.67	18.01	0.063	23.00	-4.99
3557.50	15	64-QAM	Н	155	321	1 / 74	8.00	8.67	16.67	0.046	23.00	-6.33
3557.50	15	256-QAM	н	155	321	1 / 74	5.69	8.67	14.36	0.027	23.00	-8.64
3560.00	20	QPSK	н	128	317	1 / 0	10.37	8.65	19.02	0.080	23.00	-3.98
3625.00	20	QPSK	Н	138	315	1 / 0	11.07	8.26	19.33	0.086	23.00	-3.67
3690.00	20	QPSK	Н	144	260	1/0	10.85	8.61	19.46	0.088	23.00	-3.54
3690.00	20	16-QAM	Н	144	260	1/0	9.64	8.61	18.25	0.067	23.00	-4.75
3690.00	20	64-QAM	Н	144	260	1/0	8.37	8.61	16.98	0.050	23.00	-6.02
3690.00	20	256-QAM	Н	144	260	1/0	6.33	8.61	14.94	0.031	23.00	-8.06
3690.00	QPSK	н	V	144	44	10.85	7.43	8.61	16.04	0.040	23.00	-6.96
3690.00	QPSK (WCP)	н	н	238	304	10.85	7.29	8.61	15.90	0.039	23.00	-7.10

Table 7-3. EIRP Data (Band 48)

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7.6 Radiated Spurious Emissions Measurements §2.1053 §96.41(e)

Test Overview

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

Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.8

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

Test Settings

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

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EUT turntable 8. styrofoam block

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

Figure 7-5. Test Instrument & Measurement Setup

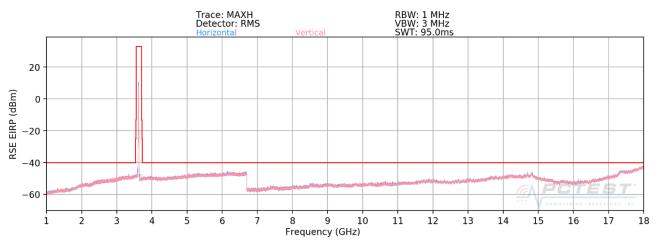
Test Notes

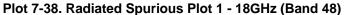
- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with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

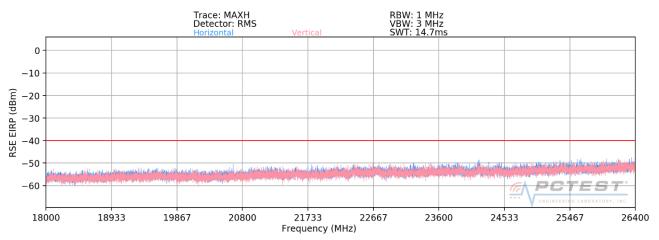
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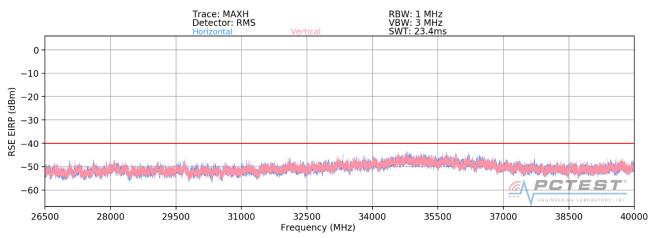








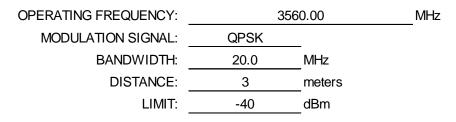




Plot 7-40. Radiated Spurious Plot 26.5 - 40GHz (Band 48)

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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
7120.00	V	372	320	-67.25	11.71	-55.54	-15.5
10680.00	V	-	-	-70.25	12.55	-57.70	-17.7
14240.00	V	-	-	-64.05	11.35	-52.70	-12.7
17800.00	V	-	-	-59.75	10.01	-49.73	-9.7

Table 7-4. Radiated Spurious Data (Band 48 – Low Channel)

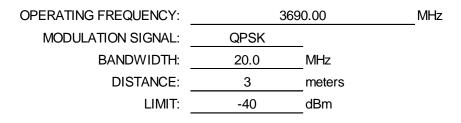
OPERATING FREQUENCY:	3625.00		
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	20.0	MHz	
DISTANCE:	3	meters	
LIMIT:	-40	dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
7250.00	V	349	196	-65.83	11.32	-54.51	-14.5
10875.00	V	-	-	-70.56	12.71	-57.85	-17.9
14500.00	V	-	-	-64.63	11.61	-53.01	-13.0

Table 7-5. Radiated Spurious Data (Band 48 – Mid Channel)

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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
7380.00	V	116	169	-64.26	10.96	-53.30	-13.3
11070.00	V	116	182	-68.56	12.72	-55.84	-15.8
14760.00	V	-	-	-65.43	12.02	-53.40	-13.4

Table 7-6. Radiated Spurious Data (Band 48 – High Channel)

OPERATING FREQUENCY:	369	0.00	MHz
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	20.0	MHz	
DISTANCE:	3	meters	
LIMIT:	-40	dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
7380.00	V	153	201	-67.26	10.96	-56.30	-16.3
11070.00	V	-	-	-69.75	12.72	-57.03	-17.0
14760.00	V	-	-	-65.62	12.02	-53.59	-13.6

Table 7-7. Radiated Spurious Data with WCP (Band 48 – High Channel)

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7.7 Frequency Stability / Temperature Variation §2.1055

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.

For Part 96, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

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).
- 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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Band 48 Frequency Stability Measurements

OPERATING FREQUENCY:	3,625,000,000	Hz
CHANNEL:	55990	_
REFERENCE VOLTAGE:	4.31	VDC

VOLTAGE (%)	POWER (VDC)	ТЕМР (°С)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.31	- 30	3,625,000,135	135	#########
100 %		- 20	3,625,000,213	213	#########
100 %		- 10	3,624,999,992	-8	#########
100 %		0	3,624,999,773	-227	#########
100 %		+ 10	3,625,000,066	66	#########
100 %		+ 20	3,624,999,985	-15	#########
100 %		+ 30	3,625,000,125	125	#########
100 %		+ 40	3,625,000,005	5	#########
100 %		+ 50	3,625,000,066	66	#########
BATT. ENDPOINT	3.44	+ 20	3,625,000,318	318	#########

Table 7-8. Frequency Stability Data (Band 48)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Band 48 Frequency Stability Measurements

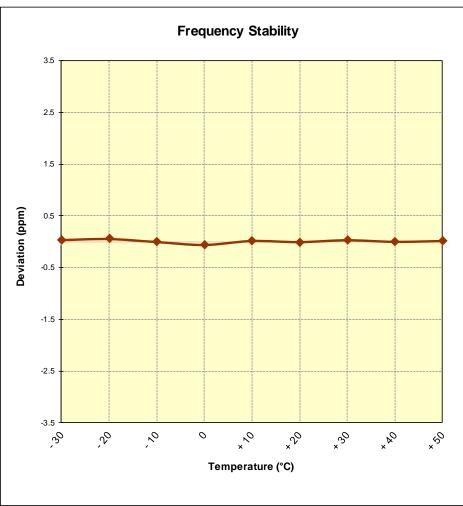


Figure 7-6. Frequency Stability Graph (Band 48)

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7.8 End User Device Additional Requirement (CBSD Protocol) §96.47

Test Overview and Limit

End user device additional requirements (CBSD Protocol) are tested per the test procedures listed below. During testing, the EUT is connected to a certified CBSD (Ruckus FCC ID: S9GQ910US00) as a companion device to show compliance with Part 96.47.

End User Devices may operate only if they can positively receive and decode an authorization signal transmitted by a CBSD, including the frequencies and power limits for their operation.

An End User Device must discontinue operations, change frequencies, or change its operational power level within 10 seconds of receiving instructions from its associated CBSD.

Test Procedure Used

KDB 940660 D01 v01, WINNF-TS-0122 V1.0.0.

Test Setup/Method

The EUT was connected via an RF cable to a certified CBSD and spectrum analyzer. The following procedure is performed by applying WINNF-TS-0122 CBRS CBSD Test Specification.

- 1. Run#1:
 - a. Setup WINNF.PT.C.HBT.1 with 3615MHz 3635MHz and power level at 13 dBm/MHz.
 - b. Enable AP service from Ruckus Cloud management.
 - c. Check EUT Tx frequency and power.
 - d. Disable AP service from Ruckus Cloud management and check EUT stop transmission within 10s.
- 2. Run#2:
 - a. Setup WINNF.PT.C.HBT.1 with 3660MHz 3680MHz and power level at 8 dBm/MHz.
 - b. Enable AP service from Ruckus Cloud management.
 - c. Check EUT Tx frequency and power.
 - d. Disable AP service from Ruckus Cloud management and check EUT stop transmission within 10s.

Test Notes

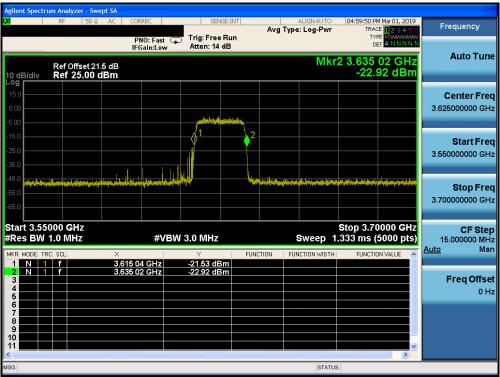
The EUT is an End User Device.

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Run#1:

- Tx frequency set: 3615 3635MHz.
- MaxEIRP set: 13dBm/MHz



Plot 7-41. Run#1 End User Device Frequency of Operations

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Agilent Spectrum Analyzer - Swept SA						
ΙΧΙ RF 50Ω AC		SENSE:IN		ALIGN AUTO	05:03:35 PM Mar 01, 20: TRACE 1234	
	PNO: Fast ↔ IFGain:Low	Trig: Free Run Atten: 30 dB			TYPE WAAAAAAA DET P S N N N	N N
10 dB/div Ref 20.00 dBm					∆Mkr3 10.01 -33.31 d	S Auto Tune B
		20				Center Freq 3.625000000 GHz
-20.0 -30.0 -40.0			in the second	in the particular state of the	<u>3∆1</u>	Start Freq 3.625000000 GHz
-50.0						Stop Freq 3.625000000 GHz
Center 3.625000000 GHz Res BW 3.0 MHz	#VBV	V 50 MHz		Sweep	Span 0 H 13.00 s (5000 pts	IZ CF Step s) 3.000000 MHz Auto Man
MKR MODE TRC SCL X	1.174 s	۲ -12.03 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	5.241 s (Δ) 10.01 s (Δ)	1.39 dB -33.31 dB				Freq Offset 0 Hz
6 7 8 9 10						
		100			>	
MSG				STATU	s	

Plot 7-42. Run#1 End User Device Discontinues Operations within 10s

Note:

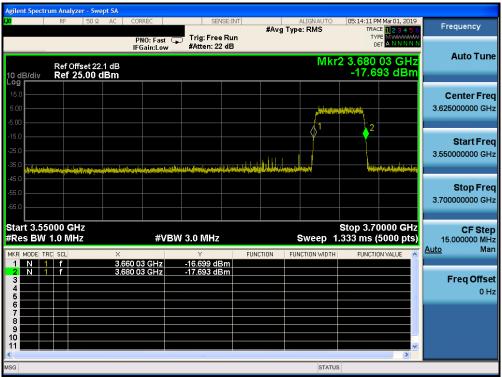
- Marker 1: CBSD sends instructions to discontinue LTE operations.
- Marker 2: EUT discontinues operation.
- Marker 3: 10 seconds elapsed time from CBSD sending instructions to EUT.

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Run#2:

- Tx frequency set: 3660–3680MHz.
- MaxEIRP set: 8dBm/MHz



Plot 7-43. Run#2 End User Device Frequency of Operations

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Agilent Spectrum Analyzer - Swept SA							
ΙΧ΄ RF 50 Ω AC		SENSE:IN		ALIGNAUTO		Mar 01, 2019	Frequency
	PNO: Fast 🔸	. Trig: Free Rui Atten: 30 dB			TYP	EWWWWWWW TPSNNNN	Auto Tune
10 dB/div Ref 20.00 dBm					∆Mkr3 -32	10.00 s 2.29 dB	AutoTune
Log 10.0 0.00 -10.0 Δ1 -10.0 Δ2Δ1							Center Freq 3.670000000 GHz
-20.0		antige die state en state für ginge fan skiede	lander og strev av brevkjøtstil stil og		<u>Δ1</u>	let prove op- and public	Start Freq 3.670000000 GHz
-50.0 -60.0 -70.0							Stop Freq 3.670000000 GHz
Center 3.670000000 GHz Res BW 3.0 MHz	#VBW	50 MHz	FUNCTION F	Sweep	S 13.00 s (\$ FUNCTIO	<u> </u>	CF Step 3.000000 MHz <u>Auto</u> Man
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	94.31 ms 1.514 s (Δ) 10.00 s (Δ)	-12.94 dBm -2.34 dB -32.29 dB					Freq Offset 0 Hz
MSG				STATU	5		

Plot 7-44. Run#2 End User Device Discontinues Operations within 10s

Note:

- Marker 1: CBSD sends instructions to discontinue LTE operations.
- Marker 2: EUT discontinues operation.
- Marker 3: 10 seconds elapsed time from CBSD sending instructions to EUT.

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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: A3LSMG977T** complies with all of the End User Device requirements of Part 96 of the FCC Rules for LTE operation only.

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