

**ELEMENT WASHINGTON DC LLC** 

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# Part 96 MEASUREMENT REPORT

#### **Applicant Name:**

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

#### Date of Testing:

6/7/2023 - 7/25/2023 **Test Report Issue Date:** 8/2/2023 **Test Site/Location:** Element lab., Columbia, MD, USA **Test Report Serial No.:** 1M2304260060-11.A3L

## FCC ID: APPLICANT:

## A3LSMS711U

Samsung Electronics Co., Ltd.

Application Type:	Certification
Model:	SM-S711U
Additional Models:	SM-S711U1
EUT Type:	Portable Handset
FCC Classification:	Citizens Band End User Devices (CBE)
FCC Rule Part(s):	96
Test Procedure(s):	ANSI C63.26-2015, KDB 940660 D01 v03, WINNF-TS-0122
	v1.0.2, 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.

RJ Ortanez Executive Vice President



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# MEASUREMENT REPORT FCC Part 96

				El	RP	Emission	
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Max. Power	Max. Power	Emission Designator	
				[W]	[dBm]	-	
	20+20 MHz	QPSK	3570.0 - 3680.0	0.101	20.06	37M6G7D	
	2012010112	16QAM	3570.0 - 3680.0	0.080	19.02	37M7W7D	
	20+15 MHz	QPSK	3567.5 - 3682.5	0.094	19.71	32M8G7D	
	20110 10112	16QAM	3567.5 - 3682.5	0.065	18.16	32M9W7D	
	20+10 MHz	QPSK	3565.0 - 3685.0	0.093	19.67	27M9G7D	
	20+10 10112	16QAM	3565.0 - 3685.0	0.065	18.13	27M9W7D	
	20+5 MHz	QPSK	3562.5 - 3687.5	0.097	19.88	23M0G7D	
LTE Dand 49		16QAM	3562.5 - 3687.5	0.076	18.78	23M0W7D	
LTE Band 48	20 MHz	QPSK	3560.0 - 3690.0	0.120	20.79	18M1G7D	
		16QAM	3560.0 - 3690.0	0.096	19.83	18M0W7D	
	15 MHz	QPSK	3557.5 - 3692.5	0.123	20.90	13M5G7D	
		16QAM	3557.5 - 3692.5	0.100	20.00	13M5W7D	
	10 MHz 5 MHz	QPSK	3555.0 - 3695.0	0.110	20.43	9M05G7D	
		16QAM	3555.0 - 3695.0	0.089	19.48	9M04W7D	
		QPSK	3552.5 - 3697.5	0.117	20.67	4M54G7D	
		16QAM	3552.5 - 3697.5	0.090	19.56	4M54W7D	
		π/2 BPSK	3570.0 - 3680.0	0.125	20.96	35M9G7D	
	40 MHz	QPSK	3570.0 - 3680.0	0.124	20.94	38M0G7D	
		16QAM	3570.0 - 3680.0	0.107	20.31	37M9W7D	
	30 MHz	π/2 BPSK	3565.0 - 3685.0	0.124	20.94	27M0G7D	
		QPSK	3565.0 - 3685.0	0.123	20.89	28M0G7D	
ND Dand n 49		16QAM	3565.0 - 3685.0	0.106	20.24	28M0W7D	
NR Band n48		π/2 BPSK	3560.0 - 3690.0	0.119	20.76	18M0G7D	
	20 MHz	QPSK	3560.0 - 3690.0	0.118	20.70	18M2G7D	
		16QAM	3560.0 - 3690.0	0.102	20.07	18M3W7D	
		π/2 BPSK	3555.0 - 3695.0	0.112	20.48	8M61G7D	
	10 MHz	QPSK	3555.0 - 3695.0	0.112	20.49	8M66G7D	
		16QAM	3555.0 - 3695.0	0.095	19.76	8M64W7D	
EUT Overview							

**EUT Overview** 

**Note:** EIRP levels shown in the table above are measured over the full channel bandwidth. These values will appear on the Grant of Authorization.

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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 Element Test Location**

These measurement tests were conducted at the Element laboratory 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 Element lab located in Columbia, MD 21046, U.S.A.

- Element Washington DC LLC is a OnGo Alliance Approved Test Lab (ATL)
- Element Washington DC LLC is a WInnForum Approved Test Lab
- Element Washington DC LLC 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.
- Element Washington DC LLC 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).
- Element Washington DC LLC facility is a registered (2451B) test laboratory with the site description on file with ISED.
- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreement.

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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS711U**. 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. Per FCC Part 96, this device is evaluated as a Citizens Band End User Devices (CBE).

Test Device Serial No.: 0325M, 0602M, 0640M, 0754M, 0726M, 1200M, 0660M, 0656M, 0590M

## 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1 and FR2), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power

This device uses a tuner circuit that dynamically updates the antenna impedance parameters to optimize antenna performance for certain bands and modes of operation. The tuner for this device was set to simulate a "free space" condition where the transmit antenna is matched to the medium into which it is transmitting and, thus, the power is at its maximum level.

## 2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) Model: EP-N5100 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

### 2.4 Software and Firmware

Testing was performed on device(s) using software/firmware version S711USQU0AWG7 installed on the EUT.

## 2.5 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 "American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services" (ANSI C63.26-2015) were used in the measurement of the EUT.

Deviation from Measurement Procedure......None

## 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 C63.26-2015. For emissions below 1GHz, a half-wave 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, the field strength conversion method is used per the formulas in Section 5.2.7 of ANSI C63.26-2015. Field Strength (EIRP) is calculated using the following formulas:

$$\begin{split} E_{[dB\mu V/m]} &= Measured \ amplitude \ level_{[dBm]} + 107 + Cable \ Loss_{[dB]} + Antenna \ Factor_{[dB/m]} \\ And \\ EIRP_{[dBm]} &= E_{[dB\mu V/m]} + 20logD - 104.8; \ where \ D \ is the measurement \ distance \ in \ meters. \end{split}$$

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 C63.26-2015.

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## 4.0 MEASUREMENT UNCERTAINTY

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

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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## 5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	AP2-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-001
-	AP2-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-002
-	ETS-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-001
-	ETS-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-002
-	LTX1	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX1
-	LTX2	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX2
-	LTX3	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX3
-	LTX4	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX4
-	LTX5	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX5
Anritsu	MT8821C	Radio Communication Analyzer		N/A		620152694
EMCO	3115	Horn Antenna (1-18GHz)	8/8/2022	8/8/2022 Biennial 8/8/2024		9704-5182
EMCO	3116	Horn Antenna (18-40GHz)	7/20/2021	Biennial	8/30/2023	9203-2178
Keysight Technologies	N9030A	PXA Signal Analyzer (3Hz-26.5GHz)	9/6/2022	9/6/2022 Annual 9/6/2023		MY54490576
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	3/15/2023	Annual	3/15/2024	MY52350166
Rohde & Schwarz	CMW500	Radio Communication Tester		N/A		112347
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	9/28/2022	Biennial	9/28/2024	101058
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	8/29/2022	Annual	8/29/2023	100342
Rohde & Schwarz	ESW44	EMI Test Receiver (2Hz-44GHz)	3/1/2023	Annual	3/1/2024	101716
Rohde & Schwarz	VULB9162	Bi-Log Antenna	2/21/2023	Biennial	2/21/2025	00301
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	8/30/2022	Biennial	8/30/2024	A051107

#### Table 5-1. Test Equipment

#### Notes:

- 1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
- 2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

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# 6.0 SAMPLE CALCULATIONS

### **Emission Designator**

#### **QPSK Modulation**

#### Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

#### **QAM Modulation**

#### Emission Designator = 8M45W7D

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

## Spurious Radiated Emission – LTE Band

#### Example: Middle Channel LTE Mode 2<sup>nd</sup> Harmonic (7250 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) = 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:	Citizens Band End User Devices (CBE)
Mode(s):	LTE/NR

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
	Conducted Power	2.1046(a), 2.1046(c)	N/A	PASS	Section 7.2
	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 7.3
	Conducted Band Edge / Spurious Emissions (EUD)	2.1051, 96.41(e)(ii)	-13 dBm/MHz at frequencies within 0-B MHz of channel edge (where B is the bandwidth of the assigned channel) -25 dBm/MHz at frequencies greater than B MHz above and below channel edge -40 dBm/MHz at frequencies below 3530 MHz and above 3720 MHz	PASS	Sections 7.4, 7.5
CONDUCTED	Conducted Band Edge / Spurious Emissions (CBSD)	2.1051, 96.41(e)(i)	-13 dBm/MHz at frequencies within 0-10 MHz of above the upper SAS-assigned channel edge and within 0- 10MHz below the lower SAS-assigned channel edge -25 dBm/MHz at frequencies greater than 10 MHz above and below channel edge -emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz	PASS	Sections 7.4, 7.5
-	Additional Maximum Power Reduction (A-MPR)	2.1046	N/A	PASS	Section 7.6
	Frequency Stability	2.1055	Fundamental emissions stay within authorized frequency block	PASS	Section 7.10
	End User Device Additional Requirements (CBSD Protocol)	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.	PASS	Section 7.11
	Uplink Carrier Aggregation	96.41(e)	> 43 + 10log(P[Watts]) at Band Edge and for all out-of- band emissions	PASS	Section 7.7
	Equivalent Isotropic Radiated Power (EIRP) (EUD)	96.41(b)	23 dBm/10MHz	PASS	Section 7.8
RADIATED	Equivalent Isotropic Radiated Power (EIRP) (Catogory A CBSD)	96.41(b)	30 dBm/10MHz	PASS	Section 7.8
RADI	Equivalent Isotropic Radiated Power (EIRP) (Catogory B CBSD)	96.41(b)	47 dBm/10MHz	PASS	Section 7.8
	Radiated Spurious Emissions	2.1053, 96.41(e)	-40 dBm/MHz	PASS	Section 7.9

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

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#### Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots 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.
- 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 EMC Software Tool v1.1.

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## 7.2 Conducted Output Power Data

#### **Test Overview**

The EUT is set up to transmit at maximum power for LTE. All power levels 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.

A-MPR is implemented in this device per the A-MPR specification in 3GPP TS 36.101. The conducted powers are shown herein to cover the different A-MPR levels specified in the standard. Measurement equipment was set up with triggering/gating on the spectrum analyzer such that powers were measured only during the on-time of the signal.

#### Test Procedure Used

ANSI C63.26-2015 – Section 5.2

#### **Test Settings**

- 1. Span =  $2 \times OBW$  to  $3 \times OBW$
- 2. RBW = 1% to 5% of the OBW
- 3. Number of measurement points in sweep  $\geq$  2 x span / RBW
- 4. Sweep = auto-couple (less than transmission burst duration)
- 5. Detector = RMS (power)
- 6. Trigger was set to enable power measurements only on full power bursts
- 7. Trace was allowed to stabilize
- 8. Spectrum analyzer's "Channel Power" function was used to compute the power by integrating the spectrum across the OBW of the signal

#### Test Setup

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



Figure 7-1. Test Instrument & Measurement Setup

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#### Test Notes

- 1. A-MPR was only applied for test purposes to the 2CC case since the 1CC case was compliant for all testing at max power.
- 2. A-MPR was verified to comply with the "CA\_NS\_10" specification in the 3GPP TS 36.101 standard by setting the MCC to a U.S. code and the MNC to a U.S. carrier supporting LTE B48 operation.
- 3. 256QAM operations does not employ A-MPR.
- 4. Conducted power measurements were evaluated 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.
- 5. All other conducted power measurements are contained in the RF exposure report for this filing.
- 6. Conducted power was found to reduce for the higher order QAM modulations when compared to 16QAM. Due to this trend, only the worst-case QAM (16QAM) powers are included in this section.

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Bandwidth	Modulation	PCC			SCC			Conducted
Bandwidth	Modulation	Bandwidth [MHz]	Frequency [MHz]	RB / Offset	Bandwidth [MHz]	Frequency [MHz]	RB / Offset	Power [dBm]
		20	3560.0	1 / 99	20	3579.8	1 / 0	22.55
z	QPSK	20	3625.0	1 / 99	20	3644.8	1 / 0	22.23
НИ		20	3690.0	1 / 0	20	3670.2	1 / 99	22.27
40 MHz	16-QAM	20	3560.0	1 / 99	20	3579.8	1 / 0	21.68
4	64-QAM	20	3625.0	1 / 99	20	3644.8	1 / 0	20.46
	256-QAM	20	3560.0	1 / 99	20	3579.8	1 / 0	17.56
		20	3560.0	1 /99	15	3577.1	1 / 0	22.19
Z	QPSK	20	3625.0	1 / 99	15	3642.1	1 / 0	22.17
НИ		20	3690.0	1 / 0	15	3672.9	1 / 74	22.21
35 MHz	16-QAM	20	3690.0	1 / 0	15	3672.9	1 / 74	21.53
3	64-QAM	20	3625.0	1 / 99	15	3642.1	1 / 0	20.31
	256-QAM	20	3690.0	1 / 0	15	3672.9	1 / 74	17.47
		20	3560.0	1 / 99	10	3574.4	1 / 0	22.15
Z	QPSK	20	3625.0	1 / 99	10	3639.4	1 / 0	21.92
НИ		20	3690.0	1 / 0	10	3675.6	1 / 49	22.21
30 MHz	16-QAM	20	3690.0	1 / 0	10	3675.6	1 / 49	21.50
3	64-QAM	20	3690.0	1 / 0	10	3675.6	1 / 49	20.48
	256-QAM	20	3690.0	1 / 0	10	3675.6	1 / 49	17.75
		20	3560.0	1 / 99	5	3571.7	1 / 0	22.37
z	QPSK	20	3625.0	1 / 99	5	3636.7	1 / 0	22.06
НИ		20	3690.0	1 / 0	5	3678.3	1 / 24	22.27
25 MHz	16-QAM	20	3560.0	1 / 99	5	3571.7	1 / 0	21.44
3	64-QAM	20	3560.0	1 / 99	5	3571.7	1 / 0	20.41
	256-QAM	20	3560.0	1 / 99	5	3571.7	1 / 0	17.40

Table 7-2. Conducted Power Output Data (LTE ULCA Band 48)

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Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
Z		55340	3560.0	1 / 99	22.84
20 MHz	QPSK	55990	3625.0	1 / 99	22.27
0		56640	3690.0	1 / 99	22.59
2	16-QAM	55340	3560.0	1 / 99	21.90
Z		55315	3557.5	1 / 74	22.95
15 MHz	QPSK	55990	3625.0	1 / 74	22.23
		56665	3692.5	1 / 74	22.34
Ļ	16-QAM	56665	3692.5	1 / 74	21.54
Z		55290	3555.0	1 / 49	22.48
НИ	QPSK	55990	3625.0	1 / 49	22.39
10 MHz		56690	3695.0	1 / 49	22.52
Ļ	16-QAM	56690	3695.0	1 / 49	21.61
N		55265	3552.5	1 / 12	22.72
E H	QPSK	55990	3625.0	1 / 24	22.03
5 MHz		56715	3697.5	1 / 24	22.85
	16-QAM	56715	3697.5	1 / 24	21.70

Table 7-3. Conducted Power Output Data (LTE Band 48)

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Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
		638000	3570.0	1 / 104	22.78
	π/2 BPSK	641666	3625.0	1 / 104	22.96
E F		645332	3680.0	1 / 1	22.82
40 MHz		638000	3570.0	1 / 104	22.76
40	QPSK	641666	3625.0	1 / 104	22.96
		645332	3680.0	1 / 1	22.80
	16-QAM	638000	3570.0	1 / 104	21.70
		637666	3565.0	1 / 76	22.76
	π/2 BPSK	641666	3625.0	1 / 39	22.91
HZ		645666	3685.0	1 / 1	22.88
30 MHz	QPSK	637666	3565.0	1 / 76	22.71
30		641666	3625.0	1 / 39	22.89
		645666	3685.0	1/1	22.89
	16-QAM	637666	3565.0	1 / 76	21.63
		637334	3560.0	1 / 49	22.58
	π/2 BPSK	641666	3625.0	1 / 49	22.82
HZ		646000	3690.0	1 / 49	22.70
20 MHz		637334	3560.0	1 / 49	22.52
20	QPSK	641666	3625.0	1 / 49	22.77
		646000	3690.0	1 / 49	22.68
	16-QAM	637334	3560.0	1 / 49	21.46
		637000	3555.0	1 / 12	22.30
	π/2 BPSK	641666	3625.0	1 / 22	22.68
HZ		646332	3695.0	1 / 1	22.61
10 MHz		637000	3555.0	1 / 12	22.31
10	QPSK	641666	3625.0	1 / 22	22.67
		646332	3695.0	1 / 1	22.60
	16-QAM	637000	3555.0 r Output Data (NR Bar	1 / 12	21.15

Table 7-4. Conducted Power Output Data (NR Band n48)

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## 7.3 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

ANSI C63.26-2015 - Section 5.4.4

#### 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 7-2. Test Instrument & Measurement Setup

#### Test Notes

None

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## LTE Band 48

Mode	Bandwidth	Modulation	OBW [MHz]
	20+20 MHz	QPSK	37.64
	20+20 MHZ	16QAM	37.65
	20+15 MHz	QPSK	32.80
		16QAM	32.87
	20+10 MHz	QPSK	27.89
		16QAM	27.89
	20+5 MHz	QPSK	23.00
LTE Dand 49		16QAM	22.98
LTE Band 48	20 MHz	QPSK	18.05
		16QAM	18.02
	15 MHz	QPSK	13.52
		16QAM	13.52
	10 MHz	QPSK	9.05
		16QAM	9.04
	5 MHz	QPSK	4.54
1		16QAM	4.54

Table 7-5. Occupied Bandwidth Test Result (LTE Band 48)



Plot 7-1. Occupied Bandwidth Plot (ULCA LB48 - 20+20MHz QPSK - Full RB Configuration - Ant1)

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🤤 Keysight Spectrum Analyzer - Occupie	ed BW					7 🗙
<b>LX/</b> RL RF 50Ω D		SENSE:INT er Freg: 3.635000000 GHz	ALIGN AUTO 02:11:35 P Radio Std	M Jun 30, 2023 : None	Trace/Dete	ctor
	+++ Trig:		1: 100/100 Radio Dev	vice: BTS		
	#IFGain:Low #Atte	in. 50 dB	Raulo Dev	ICE. B13		
10 dB/div Ref 40.00 d	iBm					
Log						
30.0					Clear	Write
20.0	ndersterentiter heding	he adamentited to be				
10.0						
-10.0					Ave	erage
					~~~	age
-20.0 Mushappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappenshippinghappens	see applied of		Knowlands mapphenon man	www.		
-40.0						
-50.0					Max	Hold
-30.0						
Center 3.63500 GHz				00.0 MHz		
Res BW 910 kHz	1	#VBW 1.5 MHz	Swe	eep 1 ms	Min	Hold
Occupied Bandwi	idth	Total Power	26.9 dBm			
	37.653 MHz				Det	ector
						Peak►
Transmit Freq Error	-136.78 kHz	% of OBW Pow	er 99.00 %		Auto	<u>Man</u>
x dB Bandwidth	40.02 MHz	x dB	-26.00 dB			
MSG			STATUS			

Plot 7-2. Occupied Bandwidth Plot (ULCA LB48 - 20+20MHz 16-QAM - Full RB Configuration - Ant1)



Plot 7-3. Occupied Bandwidth Plot (ULCA LB48 - 20+15MHz QPSK - Full RB Configuration - Ant1)

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Keysight Spectrum Analyzer - Occupied BV			· · · ·		
🗶 RL RF 50Ω DC		er Freq: 3.632500000 GHz	Radio Std	M Jun 30, 2023 : None	Trace/Detector
		Free Run Avg Hold: en: 26 dB	: 100/100 Radio Dev	rice: BTS	
	si Guileon				
10 dB/div Ref 30.00 dBr	n				
20.0					
10.0	والمراهورها بحرائكم والأربي والموالي	www.whileware	<u>M</u>		Clear Write
0.00		V			
-10.0					
-20.0					Average
-30.0 -40.0 ปีแกมส์เห็นไปไป แล้วได้ปีแป้นส์ได้ไป	want		Mary Mary model at at the		
			้ เหมาในไหล่ง เมือง เมโตรง เป็นเป็นเป็นเป็น	and the second	
-50.0					Max Hold
-60.0					
Center 3.63250 GHz				7.50 MHz	
Res BW 820 kHz	+	#VBW 2.7 MHz	SWE	ep 1 ms	Min Hold
Occupied Bandwidt	h	Total Power	27.0 dBm		
32	2.872 MHz				Detector
Transmit Freq Error	2.4604 MHz	% of OBW Powe	er 99.00 %		Peak► Auto Man
-					Auto <u>muri</u>
x dB Bandwidth	34.84 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-4. Occupied Bandwidth Plot (ULCA LB48 - 20+15MHz 16-QAM - Full RB Configuration - Ant1)



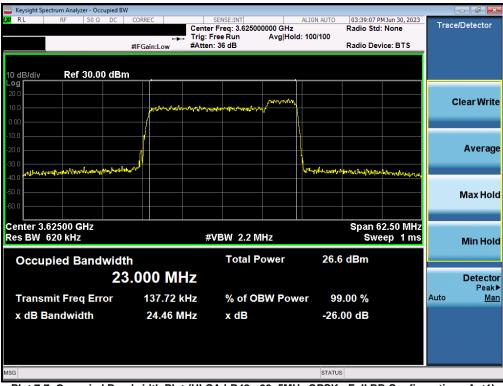
Plot 7-5. Occupied Bandwidth Plot (ULCA LB48 - 20+10MHz QPSK - Full RB Configuration - Ant1)

FCC ID: A3LSMS711U	PART 96 MEASUREMENT REPORT		Approved by: Technical Manager
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Keysight Spectrum Analyzer - Occupied BW					
ίχα RL RF 50Ω DC	Center Trig: F		ALIGN AUTO 03:23:47 I Radio Sto d: 100/100 Radio De		Trace/Detector
10 dB/div Ref 30.00 dBm			Radio De	vice. D 13	
20.0 10.0 0.00		man from the second			Clear Write
-10.0 -20.0 -30.0	add		Hand hand hand hand	Marthautor	Average
-40.0 -50.0 -60.0					Max Hold
Center 3.62500 GHz Res BW 680 kHz		VBW 2.4 MHz	Sw	75.00 MHz eep 1 ms	Min Hold
Occupied Bandwidt 27	<sup>h</sup> ′.893 MHz	Total Power	26.8 dBm		Detector Peak▶
Transmit Freq Error x dB Bandwidth	13.376 kHz 29.47 MHz	% of OBW Pow x dB	ver 99.00 % -26.00 dB		Auto <u>Man</u>
MSG			STATUS		

Plot 7-6. Occupied Bandwidth Plot (ULCA LB48 - 20+10MHz 16-QAM - Full RB Configuration - Ant1)



Plot 7-7. Occupied Bandwidth Plot (ULCA LB48 - 20+5MHz QPSK - Full RB Configuration - Ant1)

FCC ID: A3LSMS711U		PART 96 MEASUREMENT REPORT		
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Keysight Spectrum Analyzer - Occupied	BW							- 7 💌
LXIRL RF 50Ω DC	CORREC	SENSE:INT Center Freg: 3.625000		ALIGN AUTO	03:39:41 Pf Radio Std:	4 Jun 30, 2023	Trace	e/Detector
	· • • ·	Trig: Free Run	Avg Hold:	100/100	Raulo Stu.	None		
	#IFGain:Low	#Atten: 36 dB			Radio Dev	ice: BTS		
10 dB/div Ref 30.00 dE	Зm							
Log								
20.0			wound					Clear Write
10.0	phalamaria	ม <sup>ู่ใน</sup> สุขทางใจใจเกมต์สารได้เป็นสารญ						
0.00	/							
-10.0			I					
-20.0								Average
	N.							Ŭ
-30.0 wargelingentreach work work work	tor for the second s			Hundrentle	al and the provides	withurst		
-40.0								
-50.0								Max Hold
-60.0								
					0			
Center 3.62500 GHz Res BW 620 kHz		#VBW 2.2 M	u-,			2.50 MHz ep 1 ms		
Res BW 020 KHZ		#VBVV 2.2 WI	Π <u>Ζ</u>		SWC	eprins		Min Hold
Occupied Bandwig	dth	Total Po	ower	26.6	dBm			
2	2.982 MH	Z						Detector Peak▶
Transmit Freq Error	86.585 kl	Iz % of OE	W Powe	r 99.	.00 %		Auto	Peak⊯ <u>Man</u>
x dB Bandwidth	24.31 MI	lz xdB		-26 (	)0 dB			
	24.31 MI			-20.0	o ub			
MSG				STATUS				

Plot 7-8. Occupied Bandwidth Plot (ULCA LB48 - 20+5MHz 16-QAM - Full RB Configuration - Ant1)



Plot 7-9. Occupied Bandwidth Plot (LTE Band 48 - 20MHz QPSK - Full RB Configuration - Ant1)

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Keysight Spectrum Analyzer - Occupied I	BW					×
KL RF 50Ω DC	CORREC	SENSE:INT ter Freg: 3.625000000 GH:		AM Jun 07, 2023	Trace/Detec	ctor
			z Radio Si old: 100/100	a: None		
		en: 36 dB	Radio D	evice: BTS		
10 dB/div Ref 40.00 dB	m					
Log						
30.0					<b>0</b> 1	
20.0					Clear	write
10.0	malmound	- market the market and the				_
0.00						
-10.0					٨٧٥	erage
	N N N		Wann De ha er er			nuge
-20.0 -30.0 Winny May herefor many marked of the	elw hall		How have and the second of the	White also		
-30.0 VANTA 4				ALL AND A		
-40.0					Мах	Hold
-50.0						
Center 3.62500 GHz				50.00 MHz		
Res BW 470 kHz		#VBW 1.5 MHz	SV	veep 1 ms	Min	Hold
	141-	Total Power	27.0 dBm			
Occupied Bandwid		Total Fower	21.0 ubiii			
1	8.016 MHz					ector
						Peak►
Transmit Freq Error	279 Hz	% of OBW Po	wer 99.00 %		Auto	Man
x dB Bandwidth	19.36 MHz	x dB	-26.00 dB			
MSG			STATUS			

Plot 7-10. Occupied Bandwidth Plot (LTE Band 48 - 20MHz 16-QAM - Full RB Configuration - Ant1)

Keysight Spectrum Analyzer - Occupied	BW					
<b>LX RL</b> RF 50 Ω DC	Ce	SENSE:INT nter Freq: 3.625000000 GHz g: Free Run Avg Hold	Radio St	AM Jun 07, 2023 d: None	Trace/Detector	
		tten: 36 dB		evice: BTS		
10 dB/div Ref 40.00 dE	3m					
30.0						
20.0					Clear Write	
10.0	nothernanderthern	absoration monor where the				
0.00						
-10.0					Average	
-20.0	www		Hoge hand a strange of the second sec	Mark My Hill working		
-30.0 M <sup>2</sup>				(In Maria China		
-40.0					Max Hold	
-50.0						
Center 3.62500 GHz			Span	37.50 MHz		
Res BW 360 kHz		#VBW 1.1 MHz	Sw	veep 1ms	Min Hold	
Occupied Bandwig	ith	Total Power	27.7 dBm			
	3.524 MHz				Detector Peak►	
Transmit Freq Error	13.383 kHz	% of OBW Powe	er 99.00 %		Auto <u>Man</u>	
x dB Bandwidth	14.84 MHz	x dB	-26.00 dB			
MSG			STATUS			
Diet 7 11 Occupied B	Plot 7-11 Occupied Bandwidth Plot (  TE Band 48 - 15MHz OPSK - Full RB Configuration - Ant1)					

Plot 7-11. Occupied Bandwidth Plot (LTE Band 48 - 15MHz QPSK - Full RB Configuration - Ant1)

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Keysight Spectrum Analyzer - Occupied I	BW				
<b>LXI</b> RL RF 50 Ω DC	CORREC	SENSE:INT r Freq: 3.625000000 GHz	ALIGN AUTO 11:20:30 / Radio Sto	M Jun 07, 2023	Trace/Detector
			1: 100/100	: None	
		n: 36 dB	Radio De	vice: BTS	
10 dB/div Ref 40.00 dB	m				
Log					
30.0					Clear Write
20.0					Cical Will
10.0	where W We have man the way	Manggar Made Maker			
0.00					
-10.0					Average
-20.0	de al		Andreastra		-
-20.0 -30.0 Jun Martin My Martin Martin			Buddeland worked	APh Johnson	
				VI	
-40.0					Max Hold
-50.0					
Center 3.62500 GHz			Snan '	37.50 MHz	
Res BW 360 kHz	#	VBW 1.1 MHz		eep 1 ms	
	"			cep mo	Min Hold
Occupied Bandwid	lth	Total Power	26.8 dBm		
					Dete etc
	3.520 MHz				Detecto Peak
Transmit Freq Error	-17.686 kHz	% of OBW Pow	er 99.00 %		Auto <u>Mar</u>
x dB Bandwidth	14.64 MHz	x dB	-26.00 dB		
			20100 42		
MSG			STATUS		

Plot 7-12. Occupied Bandwidth Plot (LTE Band 48 - 15MHz 16-QAM - Full RB Configuration - Ant1)



Plot 7-13. Occupied Bandwidth Plot (LTE Band 48 - 10MHz QPSK - Full RB Configuration - Ant1)

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🔤 Keysight Spectrum Analyzer - Occupie	ed BW				
<b>(X)</b> RL RF 50Ω D	Cente 	er Freq: 3.625000000 GHz Free Run Avg Hold:	Radio Std: 100/100		Trace/Detector
	#IFGain:Low #Atte	n: 36 dB	Radio Dev	ice: BTS	
10 dB/div Ref 40.00 d	dBm				
30.0					
20.0					Clear Write
10.0	prohimmennen	wardwark and many			
0.00					
-10.0					Average
-20.0	Mulmvl		Apriles and mynor angly	6 h	
550.0 <b>1</b>				wollow	
-40.0					Max Hold
-50.0					
Center 3.62500 GHz			Span 2	5.00 MHz	
Res BW 240 kHz	#	≇VBW 750 kHz	Swe	ep 1 ms	Min Hold
Occupied Bandwi	idth	Total Power	26.5 dBm		
	9.0365 MHz				Detector
		% of OBW Powe	- 00 00 %		Peak► Auto Man
Transmit Freq Error					Auto <u>man</u>
x dB Bandwidth	10.05 MHz	x dB	-26.00 dB		
MSG			STATUS		
MSG			STATUS		

Plot 7-14. Occupied Bandwidth Plot (LTE Band 48 - 10MHz 16-QAM - Full RB Configuration - Ant1)



Plot 7-15. Occupied Bandwidth Plot (LTE Band 48 - 5MHz QPSK - Full RB Configuration - Ant1)

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Keysight Spectrum Analyzer - Occupied BW						
LX/ RL RF 50Ω DC	CORREC	SENSE:INT Center Freg: 3.62500	ALIGN AUTO	11:16:42 AM Jun Radio Std: Nor		Trace/Detector
	·••-	Trig: Free Run	Avg Hold: 100/100			
	#IFGain:Low	#Atten: 36 dB		Radio Device:	BTS	
10 dB/div Ref 40.00 dBm						
30.0						
20.0						Clear Write
10.0	monor	manun	nmm			
0.00						
-10.0			<u></u>			Average
-20.0			Jer hand			
-20.0				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	MAN	
-40.0						Max Hold
-50.0						IVIAX HOIU
Center 3.625000 GHz Res BW 120 kHz		VOW 4.9 MU	-	Span 12.5		
Res BW 120 KH2		VBW 1.2 MH	2	Sweep	1 ms	Min Hold
Occupied Bandwidth		Total P	ower 26.	.7 dBm		
	362 MH	7				Detector
4.5		Z				Peak►
Transmit Freq Error	-6.078 kl	Hz % of OE	3W Power 9	9.00 %	P	Auto <u>Man</u>
x dB Bandwidth	5.116 MI	Hz xdB	-26	6.00 dB		
MSG			STAT	us		

Plot 7-16. Occupied Bandwidth Plot (LTE Band 48 - 5MHz 16-QAM - Full RB Configuration - Ant1)

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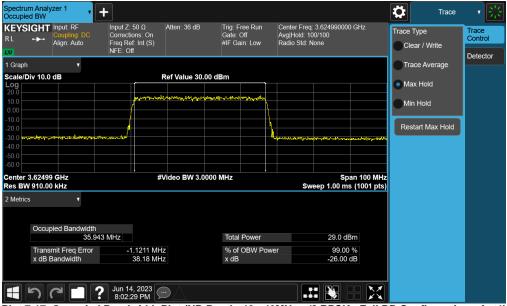
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## NR Band n48

Mode	Bandwidth	Modulation	OBW [MHz]
		π/2 BPSK	35.94
	40 MHz	QPSK	37.99
		16QAM	37.93
	30 MHz	π/2 BPSK	26.98
		QPSK	27.97
NR Band n48		16QAM	28.00
NK Dahu 1140		π/2 BPSK	18.03
	20 MHz	QPSK	18.19
		16QAM	18.30
		π/2 BPSK	8.61
	10 MHz	QPSK	8.66
		16QAM	8.64

Table 7-6. Occupied Bandwidth Test Result (NR Band n48)



Plot 7-17. Occupied Bandwidth Plot (NR Band n48 - 40MHz  $\pi/2$  BPSK - Full RB Configuration - Ant1)

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Spectru Occupie	im Analy ed BW	zer 1	• +	•								\$	Trace	- * 法
KEYS RL	GHT →	Input: RF Coupling: Align: Aut	DC o	Input Z: Correction Freq Ref	ons: On f: Int (S)	Atten: 36 dB	Gate	Free Run : Off Bain: Low	Center Fre Avg Hold: Radio Std:		) GHz	Trace	Type ear / Write	Trace Control
LXI				NFE: Off	f									Detector
1 Graph					_							Tr	ace Average	
Scale/I	Div 10.0	dB			R	ef Value 30.	00 dBm					• M	ax Hold	
20.0 10.0 0.00				;	nopelingue	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	topper-sylveps	fold of some two of the	\			См	in Hold	
-10.0	Yllubalu	white	ylawala fiyddaw	wana					Muserian	างจากรูโรรการการการการการการการการการการการการกา	al-frankanser	Re	start Max Hold	
-40.0														
-50.0 -60.0														
Center Res BV					#V	ideo BW 3.0	0000 MHz		s	Spa weep 1.00 ms	an 100 MHz s (1001 pts)			
2 Metric	:s	۲												
	Occup	oied Band												
	_		37.990 N					al Power		26.5 dE				
		mit Freq E 3andwidth			17.336 kHz 40.22 MHz		% c x di	of OBW Powe B	er	99.00 -26.00				
	5		]?	Jun 14 8:03:0	, 2023 2 PM									

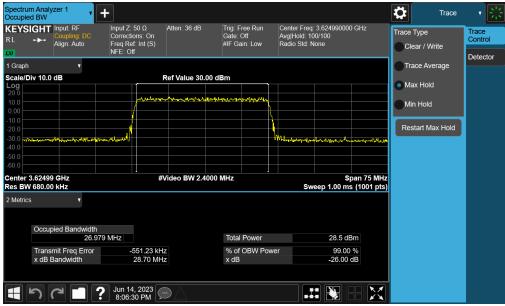
Plot 7-18. Occupied Bandwidth Plot (NR Band n48 - 40MHz QPSK - Full RB Configuration - Ant1)

Spectrur Occupied KEYSI R L	d BW	zer 1 Input: RF Coupling: Align: Aut	DC	Input Z: 5 Correctio Freq Ref NFE: Off	ons: On : Int (S)	Atten: 36 dB	Gat	: Free Run e: Off Gain: Low	Center Fred Avg Hold: 1 Radio Std: I		00 GHz	Trace Type Clear / V	Trace Vrite	Trace Control
1 Graph		۲										Trace A	/erage	Delector
Scale/D	iv 10.0	dB			R	ef Value 30.	00 dBm							
20.0												Max Hol	a	
10.0				/	nd for warmen have	******	halipperiorities	un all and a state of the	(			Min Hold	ł	
-10.0				{										
-20.0									<b>.</b>			Restart M	lax Hold	
-30.0 atta -40.0	astrones.te	ALCONTACT)	3.31× • • • •	44 (Margaratina and					Trainghound	Maralpatrati-Paper-	et fallen bergen ander som			
-50.0														
-60.0														
Center 3 Res BW					#V	ideo BW 3.0	0000 MHz		Sv		pan 100 MHz 1s (1001 pts)			
2 Metrics														
	Occurs	ied Band	uidth											
	Occup	i <del>cu</del> Dallu		7 MHz			Та	tal Power		26.5 c	IBm			
		nit Freq E		-2	4.392 kHz		%	of OBW Pow	er	99.0				
		andwidth		4	40.33 MHz		x	βB		-26.00	) dB			
	5)			Jun 14 8:03:3	, 2023 7 PM									

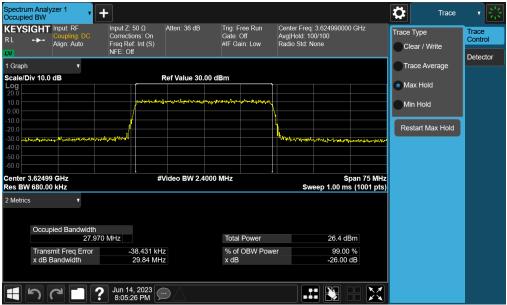
Plot 7-19. Occupied Bandwidth Plot (NR Band n48 - 40MHz 16-QAM - Full RB Configuration - Ant1)

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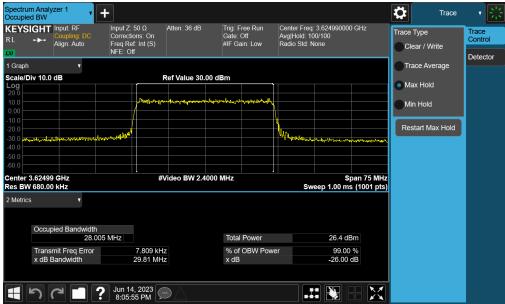
Plot 7-20. Occupied Bandwidth Plot (NR Band n48 - 30MHz  $\pi/2$  BPSK - Full RB Configuration - Ant1)



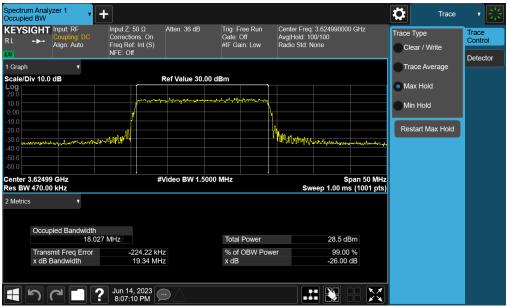
Plot 7-21. Occupied Bandwidth Plot (NR Band n48 - 30MHz QPSK - Full RB Configuration - Ant1)

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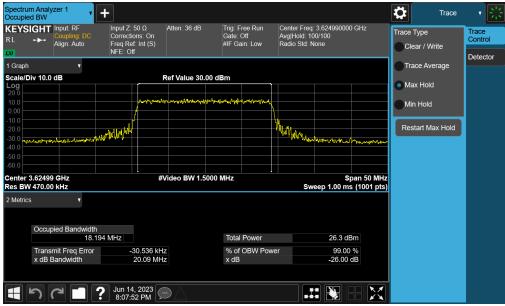
Plot 7-22. Occupied Bandwidth Plot (NR Band n48 - 30MHz 16-QAM - Full RB Configuration - Ant1)



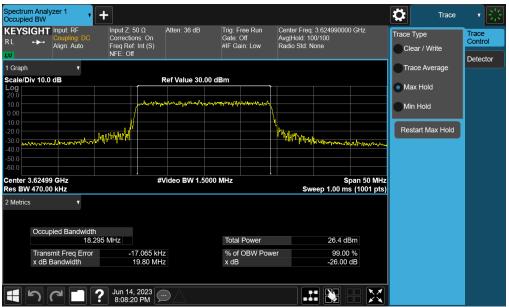
Plot 7-23. Occupied Bandwidth Plot (NR Band n48 - 20MHz π/2 BPSK - Full RB Configuration - Ant1)

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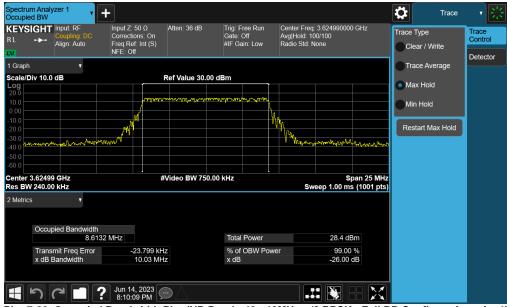
Plot 7-24. Occupied Bandwidth Plot (NR Band n48 - 20MHz QPSK - Full RB Configuration - Ant1)



Plot 7-25. Occupied Bandwidth Plot (NR Band n48 - 20MHz 16-QAM - Full RB Configuration - Ant1)

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Plot 7-26. Occupied Bandwidth Plot (NR Band n48 - 10MHz π/2 BPSK - Full RB Configuration - Ant1)



Plot 7-27. Occupied Bandwidth Plot (NR Band n48 - 10MHz QPSK - Full RB Configuration - Ant1)

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Spectrur Occupie		zer 1	+									$\mathbf{\dot{\mathbf{v}}}$	Trace			崇
KEYSI RL		Input: RF Coupling: DC Align: Auto	Freq R	tions: On ef: Int (S)	Atten: 36 dB	Gat	i: Free Run ie: Off Gain: Low		Center Freq Avg Hold: 10 Radio Std: N		GHz	Trace	Type lear / Write	Trac Cont		
LXI			NFE: C	Off										Dete	ecto	r
1 Graph Scale/D	iv 10 0 .	T AB			Ref Value 30.	00 dBm						TΓ	ace Average			
	10.01				Ker value 30.							O M	ax Hold			
10.0 0.00				James Las	°∽₽₽₽₩₩₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽	nuntifinner	and a contraction of the second s	2				СМ	in Hold			
-10.0 -20.0 -30.0			- mark	¥ —				ľ	Myghan -			Re	start Max Hold			
	man ~.	Mary May Mary	wavan .					-	Y I SAUG SU	<sup>พา</sup> พากใ <sub>การก</sub> ูโก	warn					
-50.0																
Center 3 Res BW				#	Video BW 75	50.00 kHz			Sw	Sp veep 1.00 ms	oan 25 MHz (1001 pts)					
2 Metrics	5	•														
	Occupi	ied Bandwid	lth 6442 MHz			То	tal Power			25.2 dB						
	Transn	nit Freg Erro		5.356 kH	7		of OBW P	owe	-	99.00						
		andwidth		9.800 MH		x		owe		-26.00 0						
	5)			4, 2023 03 PM	$\Box \triangle$											

Plot 7-28. Occupied Bandwidth Plot (NR Band n48 - 10MHz 16-QAM - Full RB Configuration - Ant1)

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## 7.4 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 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

ANSI C63.26-2015 – Section 5.7.4

#### 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 = Max Hold
- 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 7-3. Test Instrument & Measurement Setup

#### Test Notes

- 1. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz.
- 2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

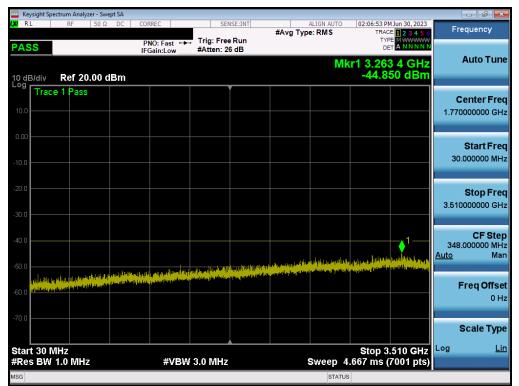
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## LTE Band 48 ULCA

Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
LTE Band 48	20+20MHz	Low	30.0 - 3,510.0	-44.85	-42	-2.40
ULCA		Low	3,510.0 - 3,630.0	-42.40	-38	-4.85
		Low	3,610.0 - 15,000.0	-45.72	-40	-5.72
		Low	15,000.0 - 27,000.0	-50.09	-40	-10.09
		Low	27,000.0 - 37,000.0	-46.84	-40	-6.84
		Mid	30.0 - 3,575.0	-38.04	-13	-25.04
		Mid	3,575.0 - 3,695.0	-44.01	-40	-4.01
		Mid	3,695.0 - 15,000.0	-42.64	-40	-2.64
		Mid	15,000.0 - 27,000.0	-51.17	-40	-11.17
		Mid	27,000.0 - 37,000.0	-47.45	-40	-7.45
		High	30.0 - 3,620.0	-42.61	-40	-2.61
		High	3,620.0 - 3,740.0	-46.57	-40	-6.57
		High	3,740.0 - 15,000.0	-43.58	-40	-3.58
		High	15,000.0 - 27,000.0	-50.30	-40	-10.30
		High	27,000.0 - 37,000.0	-47.45	-40	-7.45

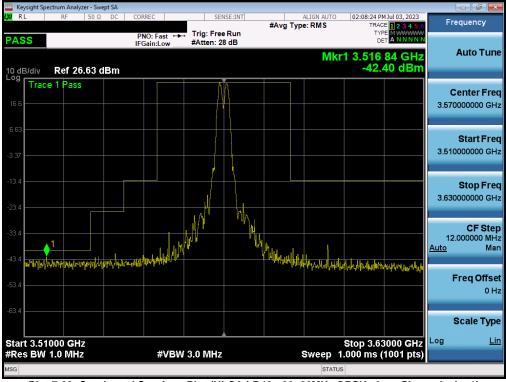
Table 7-7. Spurious and Harmonic Emissions Test Result (LTE ULCA Band 48)



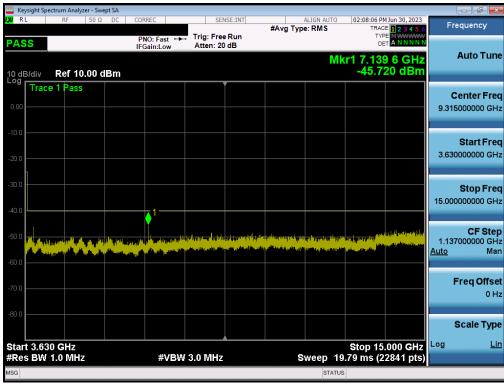
Plot 7-29. Conducted Spurious Plot (ULCA LB48 - 20+20MHz QPSK - Low Channel - Ant1)

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Plot 7-30. Conducted Spurious Plot (ULCA LB48 - 20+20MHz QPSK - Low Channel - Ant1)



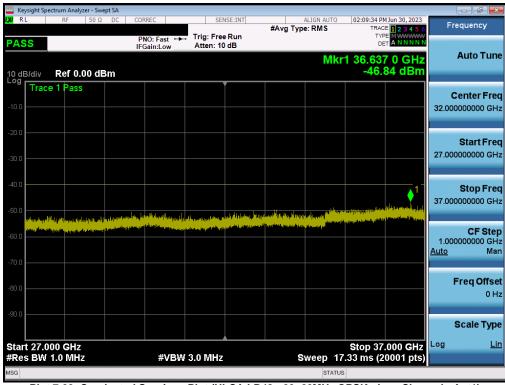
Plot 7-31. Conducted Spurious Plot (ULCA LB48 - 20+20MHz QPSK - Low Channel - Ant1)

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		n Analyzer - Sw										- 7 ×
L <mark>XI</mark> RL		RF 50 Ω	2 DC	CORREC	SE	NSE:INT	#Avg Typ	ALIGN AUTO		1 Jun 30, 2023	Fre	quency
PAS	S			PNO: Fast IFGain:Low	↔ Trig: Fre Atten: 1				TYP DE			Auto Tune
10 dB Log r	ldiv R	ef 0.00 d	Bm					Mkr	1 26.269 -50.09	9 5 GHz 91 dBm		Auto Tune
	Trace 1	Pass				Ĭ						enter Freq
-10.0											21.000	000000 GHz
-20.0												Start Freq
-30.0											15.000	000000 GHz
-40.0												Stop Freq
-50.0										1 1	27.000	000000 GHz
-60.0 🖊	الم والعام العام العام العام ال	and the property of	angegalagen		and a second billing of the second billing of the second billing of the second billing of the second billing of		a and a state of the		n againte againte againn Na Anna Againte againn	Contraction of the second		CF Step
-70.0	all als for the line of a	A Lot the other will	n allan <sup>all</sup> andi	roughter of the second							1.200 <u>Auto</u>	000000 GHz Man
-80.0 -											F	req Offset
												0 Hz
-90.0											5	Scale Type
	15.000 BW 1.0			#\/	BW 3.0 MHz	<u> </u>		ween 20	Stop 27. ).80 ms (24	000 GHz	Log	Lin
#IRCES	-DW 1.0	IVII 12		#VI	599 3.0 IVIN2		3	status		too r pis)		
				. <u>.</u> .								

Plot 7-32. Conducted Spurious Plot (ULCA LB48 - 20+20MHz QPSK - Low Channel - Ant1)



Plot 7-33. Conducted Spurious Plot (ULCA LB48 - 20+20MHz QPSK - Low Channel - Ant1)

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# LTE Band 48

Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
LTE Band 48	20MHz	Low	30.0 - 3,510.0	-44.31	-40	-4.31
		Low	3,610.0 - 15,000.0	-45.12	-40	-5.12
		Low	15,000.0 - 27,000.0	-47.39	-40	-7.39
		Low	27,000.0 - 37,000.0	-44.10	-40	-4.10
		Mid	30.0 - 3,575.0	-44.23	-40	-4.23
		Mid	3,675.0 - 15,000.0	-45.20	-40	-5.20
		Mid	15,000.0 - 27,000.0	-46.60	-40	-6.60
		Mid	27,000.0 - 37,000.0	-46.47	-40	-6.47
		High	30.0 - 3,640.0	-44.89	-40	-4.89
		High	3,740.0 - 15,000.0	-46.16	-40	-6.16
		High	15,000.0 - 27,000.0	-46.16	-40	-6.16
		High	27,000.0 - 37,000.0	-46.53	-40	-6.53

Table 7-8. Spurious and Harmonic Emissions Test Result (LTE Band 48)

	ctrum Analyzer - Swe										
LXI RL	RF 50 Ω	DC CO	DRREC	SE	NSE:INT	#Ava	ALIGN AUTO Type: RMS		M Jun 07, 2023	Free	quency
PASS		l	PNO: Fast ↔ FGain:Low					ואד וס <b>kr1 3.33</b>		Þ	uto Tune
10 dB/div Log	Ref 0.00 dE	3m	_					-44.3	10 dBm		
-10.0	e 1 Pass										e <b>nter Freq</b> 00000 GHz
-20.0											<b>Start Freq</b> 00000 MHz
-40.0	ap day at the state of the state of the	a ana diatrata ha	الفندراء وروا	a na ang ang ang ang ang ang ang ang ang	and the state of the state		piler y do in de stine de bierd				<b>Stop Freq</b> 00000 GHz
-60.0	e pala an	ala da secondo de la consecuencia d		se de parte a culto contra tanà	allaren an elen i.					348.0 <u>Auto</u>	<b>CF Step</b> 00000 MHz Man
-80.0										Fi	e <b>q Offset</b> 0 Hz
-90.0										S	cale Type
Start 30 N #Res BW			#VBV	V 3.0 MHz			Sweep	Stop 3 4.640 ms (	.510 GHz (6961 pts)	Log	<u>Lin</u>
MSG							STATU	IS			

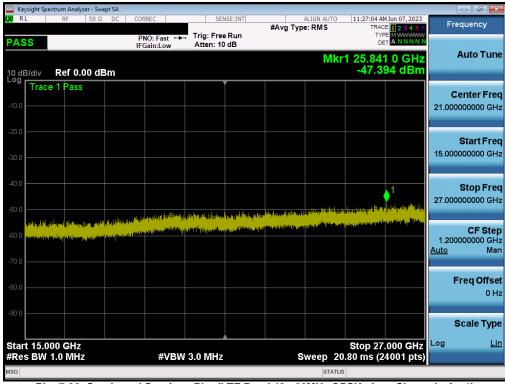
Plot 7-34. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Ant1)

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Keysight Spectrur		•									-   #   - X -
L <mark>XI</mark> RL	RF 50 Ω	DC CO	RREC	SEI	ISE:INT	#Avg Tvp	ALIGN AUTO e: RMS		1 Jun 07, 2023 E 1 2 3 4 5 6	Free	uency
PASS			NO: Fast ↔ Gain:Low	. Trig: Free #Atten: 1		0 /1		TYP De		A	uto Tune
Log	ef 0.00 dE	ßm						kr1 3.85 -45.1	17 dBm		
Trace 1	Pass									Ce	nter Freq
-10.0										9.3050	00000 GHz
-20.0										;	Start Freq
-30.0										3.6100	00000 GHz
-40.0											Stop Freq
-50.0	م. بالد بالد. والمر الد عد ارواد		ide ( <del>Maran</del> hira)	Annen pyleetse	<sub>ter</sub> niku <sub>ti</sub> nagini		and the second	and the state of the	and the second second	15.0000	00000 GHz
-60.0	المراكد المراكب	and the second second second	li alla di manta fatt	naiheadha alba dha	نگنی، اکثر الحرواندی ا	u di kana kana kana kana kana kana kana kan	antifa Universitäiset	de la su priter	(FIRMULT DATE)		CF Step
-80.0										1.1390 <u>Auto</u>	00000 GHz Man
-70.0											
-80.0										Fi	eq Offset 0 Hz
-90.0											
											cale Type
Start 3.610 G #Res BW 1.0			#VBM	3.0 MHz			ween _1	Stop 15 9.74 ms (2	.000 GHz 2781 nts)	Log	<u>Lin</u>
MSG	DM1112						STATU		2101 pt3)		

Plot 7-35. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Ant1)



Plot 7-36. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Ant1)

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		ctrum A	nalyzer - Sw	ept SA										
LXI RI	L	RF	50 Ω	DC	COR	REC	SE	NSE:INT	#Avg Typ	ALIGN AUTO e: RMS		M Jun 07, 2023	Frequ	iency
PAS	S					0: Fast ↔	Trig: Fre				TY	PE MWWWWW ET A N N N N N		
					IFG	ain:Low	Atten: 1	J 86					Au	ito Tune
10 dE	Ridio	Pof	0.00 dE	Rm						IVII	44.1 kr1 kr1	00 dBm		
Log		e 1 Pa						Ť						
														ter Freq
-10.0													32.00000	0000 GHz
-20.0														
-20.0													St	art Freq
-30.0													27.00000	0000 GHz
-40.0												<b>↓</b> 1 ——	St	op Freq
								L		ماملە	ւ լ.ա.) թեթանումներին	NULLAPORPOLISM		0000 GHz
-50.0			ייייאר איז איז		11.11			ter den e		na sing si sa s Na si sa s	tradict classics of a first	. Maleinikieri,		
	1960 AL	والمتك حطة	أالاواد ومقاطع	L production			a sette programme	n paga da kana kana kana kana kana kana kana	a data manga m Na kang manga ma	and man				CF Step
-60.0													1.00000	0000 GHz
-70.0													Auto	Man
10.0													_	
-80.0													Fre	<b>q Offset</b> 0 Hz
														0 H2
-90.0														
													Sca	ale Type
Star	t 27.0	00 GI	Iz								Stop 37		Log	Lin
#Re	s BW	1.0 M	Hz			#VBV	V 3.0 MHz		S	weep	17.60 ms (2	24001 pts)		
MSG										STAT	TUS			

Plot 7-37. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Ant1)

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# NR Band n48

Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
NR Band n48	40MHz	Low	30.0 - 3,510.0	-47.17	-40	-7.17
		Low	3,610.0 - 15,000.0	-45.14	-40	-5.14
		Low	15,000.0 - 27,000.0	-51.82	-40	-11.82
		Low	27,000.0 - 37,000.0	-49.90	-40	-9.90
		Mid	30.0 - 3,510.0	-48.63	-40	-8.63
		Mid	3,740.0 - 15,000.0	-45.11	-40	-5.11
		Mid	15,000.0 - 27,000.0	-51.22	-40	-11.22
		Mid	27,000.0 - 37,000.0	-46.85	-40	-6.85
		High	30.0 - 3,640.0	-49.56	-40	-9.56
		High	3,740.0 - 15,000.0	-46.34	-40	-6.34
		High	15,000.0 - 27,000.0	-50.45	-40	-10.45
		High	27,000.0 - 37,000.0	-47.13	-40	-7.13

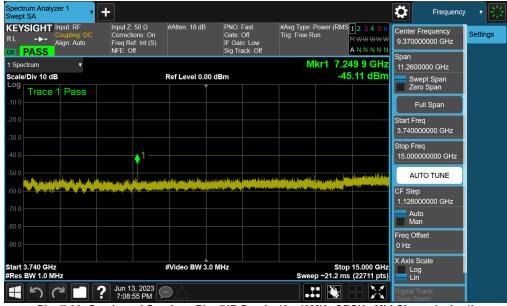
Table 7-9. Spurious and Harmonic Emissions Test Result (LTE ULCA Band 48)



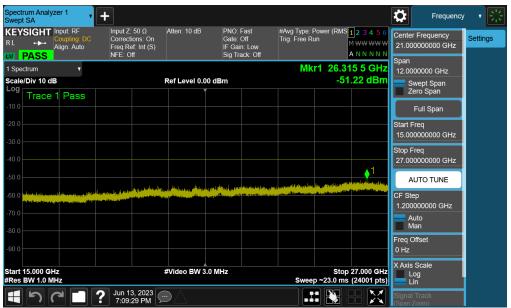
Plot 7-38. Conducted Spurious Plot (NR Band n48 - 40MHz QPSK - Mid Channel - Ant1)

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Plot 7-39. Conducted Spurious Plot (NR Band n48 - 40MHz QPSK - Mid Channel - Ant1)



Plot 7-40. Conducted Spurious Plot (NR Band n48 - 40MHz QPSK - Mid Channel - Ant1)

FCC ID: A3LSMS711U		PART 96 MEASUREMENT REPORT					
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Spectrum Analyzer 1 Swept SA	+					Frequency	· · · · · · · · · · · · · · · · · · ·
KEYSIGHT     Input: RF       L     Coupling: DC       Align: Auto	Input Ζ: 50 Ω #, Corrections: On Freq Ref: Int (S) NFE: Off	C	PNO: Fast Gate: Off F Gain: Low Sig Track: Off	#Avg Type: Power (RM: Trig: Free Run	S <mark>1</mark> 23456 M <del>WWWW</del> ANNNNN	Center Frequency 33.000000000 GHz Span	Settings
1 Spectrum				Mkr1 38.		12.0000000 GHz	
Scale/Div 10 dB	Re	ef Level 0.00 dBn	n	-4	6.85 dBm	Swept Span Zero Span	
-10.0 Trace 1 Pass						Full Span	
						Start Freq 27.000000000 GHz	
					1-	Stop Freq 39.000000000 GHz	
	to constitute the late	. States and a state of the state of the states of the sta	k de andere son de stangenste side en bie	and the second		AUTO TUNE	
-60.0	ne ne kalen postan en la sinten en la sena e La seña frega esta el seña el seña en la sena en la seña en la seña el seña el seña el seña el seña el seña el s	<u>مرض الكندين بالاستأمر بين الكن</u>	a de la constanti de			CF Step 1.200000000 GHz	
						Auto Man	
						Freq Offset 0 Hz	
Start 27.000 GHz #Res BW 1.0 MHz	#\	/ideo BW 3.0 MH:	2	Sto Sweep ~22.9 m	p 39.000 GHz is (24001 pts)	X Axis Scale Log Lin	
<b>1</b> 561	<b>?</b> Jun 13, 2023 7:10:16 PM					Signal Track (Span Zoom)	

Plot 7-41. Conducted Spurious Plot (NR Band n48 - 40MHz QPSK - Mid Channel - Ant1)

FCC ID: A3LSMS711U		Approved by: Technical Manager			
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## 7.5 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 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 an End User Device, 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 to B MHz (where B is the bandwidth in MHz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B MHz below the lower CBSD-assigned channel edge. At all frequencies greater than B MHz above the upper CBSD assigned channel edge and less than B MHz below the lower CBSD-assigned channel edge, the conducted power of any end user device emission shall not exceed -25 dBm/MHz. The conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

#### Test Procedure Used

ANSI C63.26-2015 - Section 5.7.3

#### **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 7-4. Test Instrument & Measurement Setup

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#### Test Notes

- 1. Per 96.41(e)(3)(i), compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's authorized frequency channel, a resolution bandwidth of no less than one percent of the fundamental emission bandwidth 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 reference bandwidth (i.e., 1 MHz or 1 percent of emission bandwidth, as specified). The fundamental 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. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

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#### Level Limit Margin Bandwidth Channel **Test Case** [dBm] [dBm] [dB] LTE Band 48 20+20MHz Low Band Edge -45.02-40 -5.02 ULCA Mid Band Edge -41.39 -13 -28.39 High Band Edge -49.69-40 -9.69 20+15MHz Low Band Edge -46.13-40 -6.13 Band Edge Mid -40.22 -13 -27.22 High Band Edge -49.51 -40 -9.51 -46.69 20+10MHz Band Edge -40 Low -6.69 Mid Band Edge -39.40-13 -26.40High Band Edge -50.44 -40 -10.44 20+5MHz Band Edge -48.40 Low -40 -8.40 Band Edge Mid -51.32 -25 -26.32 High Band Edge -51.91 -40 -11.91

Table 7-10. Band Edge Emissions Test Result (LTE ULCA Band 48)

RL	F	n Analyzer - Spur F 50 Ω re: LO	DC C	CORREC	Trig:	SENSE:INT er Freq: 3.570000 Free Run en: 26 dB	0000 GHz	ALIGN AUTO	02:35:40 P Radio Std Radio Dev		Frequency
og	div	Ref 40.00		IFGain:Lo	Jw #/ 110				Nucle Bet		
0.0 0.0 0.0											Center Fre 3.570000000 GI
0.0 0.0		المنجاب وريعان									
0.0											
0.0 tart	3.5 GH								Stop	3.64 GHz	CF Ste 730.000000 Mi
194 <b>5</b>				p Freq	RBW	Frequency	Ampl	litude	Stop	3.64 GHz	
tart	Range	z Start Freq 3.5000 GHz	Stop z 3.53	00 GHz	1.000 MHz	3.529400000	GHz -45.02	2 dBm	∆ Limit -5.019 dE		730.000000 M
art	Range	Z Start Freq 3.5000 GHz 3.5300 GHz	<b>Stop</b> z 3.530 z 3.540	00 GHz 00 GHz	1.000 MHz 1.000 MHz	3.529400000 0 3.539750000 0	GHz -45.02 GHz -42.71	2 dBm 1 dBm	∆ Limit -5.019 dE -17.71 dB		730.000000 M <u>Auto</u> M
art	<b>Range</b> 1 2 3	Z 3.5000 GHz 3.5300 GHz 3.5300 GHz 3.5400 GHz	<b>Stop</b> z 3.530 z 3.540 z 3.549	00 GHz 00 GHz 90 GHz	1.000 MHz 1.000 MHz 1.000 MHz	3.529400000 ( 3.539750000 ( 3.548910000 (	GHz -45.02 GHz -42.71 GHz -40.63	2 dBm 1 dBm 3 dBm	∆ Limit -5.019 dE -17.71 dE -27.63 dE		730.000000 M <u>Auto</u> M Freq Offs
art	Range 1 2 3 4	Z 3.5000 GHz 3.5300 GHz 3.5400 GHz 3.5400 GHz 3.5490 GHz	<b>Stop</b> z 3.530 z 3.540 z 3.549 z 3.550	00 GHz 00 GHz 90 GHz 00 GHz	1.000 MHz 1.000 MHz 1.000 MHz 820.0 kHz	3.529400000 (           3.539750000 (           3.548910000 (           3.549715000 (	GHz -45.02 GHz -42.71 GHz -40.63 GHz -40.84	2 dBm 1 dBm 3 dBm 4 dBm	△ Limit -5.019 dE -17.71 dE -27.63 dE -27.84 dE		730.000000 M <u>Auto</u> M Freq Offs
tart	Range 1 2 3 4 5	Z 3.5000 GHz 3.5300 GHz 3.5400 GHz 3.5400 GHz 3.5490 GHz 3.5500 GHz	<b>Stop</b> z 3.530 z 3.540 z 3.549 z 3.550 z 3.590	00 GHz 00 GHz 90 GHz 00 GHz 00 GHz	1.000 MHz 1.000 MHz 1.000 MHz 820.0 KHz 820.0 KHz	3.529400000 (           3.539750000 (           3.548910000 (           3.548910000 (           3.549715000 (           3.564200000 (	GHz -45.02 GHz -42.71 GHz -40.63 GHz -40.84 GHz 2.236	2 dBm 1 dBm 3 dBm 4 dBm dBm	△ Limit -5.019 dE -17.71 dE -27.63 dE -27.84 dE -22.76 dE		730.000000 M <u>Auto</u> M Freq Offs
tart	Range 1 2 3 4 5 6	Z 3.5000 GHz 3.5300 GHz 3.5400 GHz 3.5400 GHz 3.5500 GHz 3.5500 GHz	<b>Stop</b> z 3.53( z 3.54( z 3.55( z 3.59( z 3.59) z 3.59	00 GHz 00 GHz 90 GHz 00 GHz 00 GHz 10 GHz	1.000 MHz 1.000 MHz 1.000 MHz 820.0 kHz 820.0 kHz 820.0 kHz	3.529400000 (           3.539750000 (           3.548910000 (           3.549715000 (           3.549715000 (           3.564200000 (           3.590200000 (	GHz         -45.02           GHz         -42.71           GHz         -40.63           GHz         -40.84           GHz         -2.236           GHz         2.43.49	2 dBm 1 dBm 3 dBm 4 dBm dBm 9 dBm	Δ Limit -5.019 dE -17.71 dB -27.63 dE -27.84 dE -22.76 dE -30.49 dE		730.000000 M <u>Auto</u> M Freq Offs
tart	Range           1           2           3           4           5           6           7	Z 3.5000 GHz 3.5300 GHz 3.5400 GHz 3.5400 GHz 3.5500 GHz 3.5900 GHz 3.5900 GHz 3.5910 GHz	<b>Stop</b> z <b>3.530</b> z <b>3.540</b> z <b>3.540</b> z <b>3.550</b> z <b>3.590</b> z <b>3.590</b> z <b>3.630</b>	00 GHz 00 GHz 90 GHz 00 GHz 00 GHz 10 GHz 00 GHz	1.000 MHz 1.000 MHz 820.0 KHz 820.0 kHz 820.0 kHz 820.0 kHz 1.000 MHz	3.529400000 (           3.539750000 (           3.539750000 (           3.548910000 (           3.549715000 (           3.564200000 (           3.590200000 (           3.59100000 (	GHz         -45.02           GHz         -42.71           GHz         -40.63           GHz         -40.84           GHz         -40.84           GHz         -2.236           GHz         -43.49           GHz         -43.64	2 dBm 1 dBm 3 dBm 4 dBm dBm 9 dBm 4 dBm	Δ Limit -5.019 dE -17.71 dE -27.63 dE -27.84 dE -22.76 dE -30.49 dE -30.64 dE		730.000000 M <u>Auto</u> M Freq Offs
tart	Range 1 2 3 4 5 6	Z 3.5000 GHz 3.5300 GHz 3.5400 GHz 3.5400 GHz 3.5500 GHz 3.5500 GHz	<b>Stop</b> z <b>3.530</b> z <b>3.540</b> z <b>3.540</b> z <b>3.550</b> z <b>3.590</b> z <b>3.590</b> z <b>3.630</b>	00 GHz 00 GHz 90 GHz 00 GHz 00 GHz 10 GHz	1.000 MHz 1.000 MHz 820.0 KHz 820.0 kHz 820.0 kHz 820.0 kHz 1.000 MHz	3.529400000 (           3.539750000 (           3.548910000 (           3.549715000 (           3.549715000 (           3.564200000 (           3.590200000 (	GHz         -45.02           GHz         -42.71           GHz         -40.63           GHz         -40.84           GHz         -40.84           GHz         -2.236           GHz         -43.49           GHz         -43.64	2 dBm 1 dBm 3 dBm 4 dBm dBm 9 dBm 4 dBm	Δ Limit -5.019 dE -17.71 dB -27.63 dE -27.84 dE -22.76 dE -30.49 dE		730.000000 M

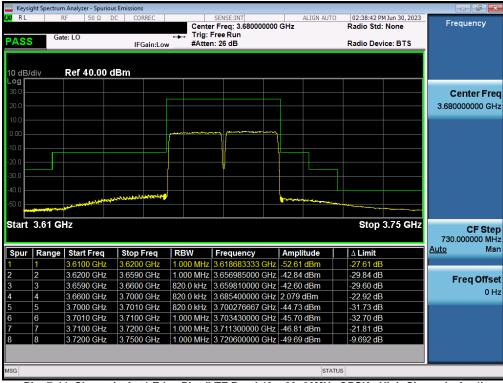
Plot 7-42. Channel - Ant1 Edge Plot (LTE Band 48 - 20+20MHz QPSK - Low Channel - Ant1)

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	RF 50 Ω [	DC CORREC		SENSE:INT	ALIGN AUTO	02:37:02 PM J	un 30, 2023	¢
				r Freq: 3.62500000	) GHz	Radio Std: N	lone	Frequency
ASS <sup>G</sup>	ate: LO	IFGain:Lov		Free Run n: 26 dB		Radio Device	BTS	
		IFGam:Lov	v #Atte	1. 20 GB		Radio Device	e. D13	
0 dB/div	Ref 40.00 d	dBm						
og 0.0								Center Fr
0.0								3.625000000 G
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			per manana and a second and a s	~~	<u>۱</u>			
0.0								
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tart 3.555	GHz					Stop 3.6	95 GHz	
tart 3.555	GHz					Stop 3.6	95 GHz	730.000000 Mi
		Stop Freq	RBW	Frequency	Amplitude	Stop 3.6	95 GHz	730.000000 M
		Stop Freq 3.5650 GHz		Frequency 3.563916667 GHz			95 GHz	730.000000 M
Spur Range	<ul> <li>Start Freq</li> <li>3.5550 GHz</li> <li>3.5650 GHz</li> </ul>	3.5650 GHz 3.6040 GHz	1.000 MHz 1.000 MHz	3.563916667 GHz 3.602050000 GHz	-53.50 dBm -41.39 dBm	∆ Limit	95 GHz	730.000000 MI <u>Auto</u> M
Spur Range	<ul> <li>Start Freq</li> <li>3.5550 GHz</li> <li>3.5650 GHz</li> <li>3.6040 GHz</li> </ul>	3.5650 GHz 3.6040 GHz 3.6050 GHz	1.000 MHz 1.000 MHz 820.0 kHz	3.563916667 GHz 3.602050000 GHz 3.604893333 GHz	-53.50 dBm -41.39 dBm -41.48 dBm	∆ Limit -28.50 dB -28.39 dB -28.48 dB	95 GHz	730.000000 Mi <u>Auto</u> M Freq Offs
Spur   Range 1 2 3 4	<ul> <li>Start Freq</li> <li>3.5550 GHz</li> <li>3.5650 GHz</li> <li>3.6040 GHz</li> <li>3.6050 GHz</li> </ul>	3.5650 GHz 3.6040 GHz 3.6050 GHz 3.6450 GHz	1.000 MHz 1.000 MHz 820.0 kHz 820.0 kHz	3.563916667 GHz 3.602050000 GHz 3.604893333 GHz 3.616800000 GHz	-53.50 dBm -41.39 dBm -41.48 dBm 2.104 dBm	Δ Limit -28.50 dB -28.39 dB -28.48 dB -22.90 dB	95 GHz	730.000000 Mi <u>Auto</u> Mi <b>Freq Offs</b>
Spur   Range 1 2 3 4 5	<ul> <li>Start Freq</li> <li>3.5550 GHz</li> <li>3.5650 GHz</li> <li>3.6040 GHz</li> <li>3.6050 GHz</li> <li>3.6050 GHz</li> <li>3.6450 GHz</li> </ul>	3.5650 GHz 3.6040 GHz 3.6050 GHz 3.6450 GHz 3.6460 GHz	1.000 MHz 1.000 MHz 820.0 kHz 820.0 kHz 820.0 kHz	3.563916667 GHz 3.602050000 GHz 3.604893333 GHz 3.616800000 GHz 3.645250000 GHz	-53.50 dBm -41.39 dBm -41.48 dBm 2.104 dBm -43.81 dBm	Δ Limit -28.50 dB -28.39 dB -28.48 dB -22.90 dB -30.81 dB	95 GHz	730.000000 Mi <u>Auto</u> M Freq Offs
Spur   Range 1 2 3 4 5 6	<ul> <li>Start Freq</li> <li>3.5550 GHz</li> <li>3.5650 GHz</li> <li>3.6040 GHz</li> <li>3.6050 GHz</li> <li>3.6450 GHz</li> <li>3.6460 GHz</li> </ul>	3.5650 GHz 3.6040 GHz 3.6050 GHz 3.6450 GHz 3.6460 GHz 3.6850 GHz	1.000 MHz           1.000 MHz           820.0 kHz           820.0 kHz           820.0 kHz           1.000 MHz	3.563916667 GHz 3.602050000 GHz 3.604893333 GHz 3.616800000 GHz 3.645250000 GHz 3.649900000 GHz	-53.50 dBm -41.39 dBm -41.48 dBm 2.104 dBm -43.81 dBm -45.06 dBm	△ Limit -28.50 dB -28.39 dB -28.48 dB -22.90 dB -30.81 dB -32.06 dB	95 GHz	CF Ste 730.00000 MH <u>Auto</u> Mi Freq Offs 0 H
Spur   Range 1 2 3 4 5	<ul> <li>Start Freq</li> <li>3.5550 GHz</li> <li>3.5650 GHz</li> <li>3.6040 GHz</li> <li>3.6050 GHz</li> <li>3.6050 GHz</li> <li>3.6450 GHz</li> </ul>	3.5650 GHz 3.6040 GHz 3.6050 GHz 3.6450 GHz 3.6460 GHz	1.000 MHz           1.000 MHz           820.0 kHz           820.0 kHz           820.0 kHz           1.000 MHz	3.563916667 GHz 3.602050000 GHz 3.604893333 GHz 3.616800000 GHz 3.645250000 GHz	-53.50 dBm -41.39 dBm -41.48 dBm 2.104 dBm -43.81 dBm -45.06 dBm	Δ Limit -28.50 dB -28.39 dB -28.48 dB -22.90 dB -30.81 dB	95 GHz	730.000000 Mi <u>Auto</u> M Freq Offs
Spur   Range 1 2 3 4 5 6	<ul> <li>Start Freq</li> <li>3.5550 GHz</li> <li>3.5650 GHz</li> <li>3.6040 GHz</li> <li>3.6050 GHz</li> <li>3.6450 GHz</li> <li>3.6460 GHz</li> </ul>	3.5650 GHz 3.6040 GHz 3.6050 GHz 3.6450 GHz 3.6460 GHz 3.6850 GHz	1.000 MHz           1.000 MHz           820.0 kHz           820.0 kHz           820.0 kHz           1.000 MHz	3.563916667 GHz 3.602050000 GHz 3.604893333 GHz 3.616800000 GHz 3.645250000 GHz 3.649900000 GHz	-53.50 dBm -41.39 dBm -41.48 dBm 2.104 dBm -43.81 dBm -45.06 dBm	△ Limit -28.50 dB -28.39 dB -28.48 dB -22.90 dB -30.81 dB -32.06 dB	95 GHz	730.000000 Mi <u>Auto</u> M Freq Offs
Spur   Range 1 2 3 4 5 6	<ul> <li>Start Freq</li> <li>3.5550 GHz</li> <li>3.5650 GHz</li> <li>3.6040 GHz</li> <li>3.6050 GHz</li> <li>3.6450 GHz</li> <li>3.6460 GHz</li> </ul>	3.5650 GHz 3.6040 GHz 3.6050 GHz 3.6450 GHz 3.6460 GHz 3.6850 GHz	1.000 MHz           1.000 MHz           820.0 kHz           820.0 kHz           820.0 kHz           1.000 MHz	3.563916667 GHz 3.602050000 GHz 3.604893333 GHz 3.616800000 GHz 3.645250000 GHz 3.649900000 GHz	-53.50 dBm -41.39 dBm -41.48 dBm 2.104 dBm -43.81 dBm -45.06 dBm	△ Limit -28.50 dB -28.39 dB -28.48 dB -22.90 dB -30.81 dB -32.06 dB	95 GHz	730.000000 Mi <u>Auto</u> M Freq Offs

Plot 7-43. Channel - Ant1 Edge Plot (LTE Band 48 – 20+20MHz QPSK - Mid Channel - Ant1)



Plot 7-44. Channel - Ant1 Edge Plot (LTE Band 48 – 20+20MHz QPSK - High Channel - Ant1)

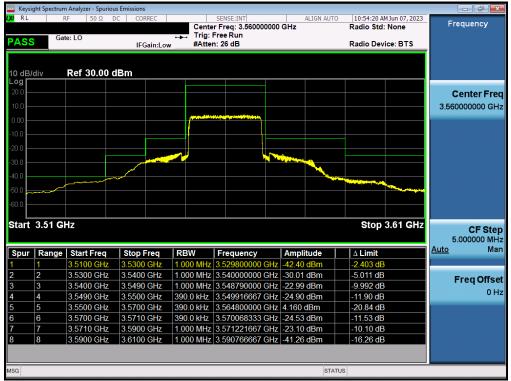
FCC ID: A3LSMS711U		PART 96 MEASUREMENT REPORT				
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# LTE Band 48

Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
LTE Band 48	20MHz	Low	Band Edge	-42.40	-40	-2.40
		Mid	Band Edge	-24.64	-13	-11.64
		High	Band Edge	-28.24	-25	-3.24
	15MHz	Low	Band Edge	-42.90	-40	-2.90
		Mid	Band Edge	-21.27	-13	-8.27
		High	Band Edge	-43.74	-40	-3.74
	10MHz	Low	Band Edge	-20.44	-13	-7.44
		Mid	Band Edge	-21.91	-13	-8.91
		High	Band Edge	-21.24	-13	-8.24
	5MHz	Low	Band Edge	-18.88	-13	-5.88
		Mid	Band Edge	-20.33	-13	-7.33
		High	Band Edge	-19.96	-13	-6.96

Table 7-11. Band Edge Emissions Test Result (LTE Band 48)



Plot 7-45. Channel - Ant1 Edge Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Ant1)

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🔤 Keysiı <b>X</b> RL		n Analyzer - Spurion F 50 Ω 1	us Emissions DC CORREC		SENSE:INT	ALIGN A	AUTO 10:43:18 A Radio Std:	MJun 07, 2023	Frequency
PASS	Gat	e: LO	IFGain:Lo		Free Run n: 26 dB		Radio Dev	ice: BTS	
10 dB/	div	Ref 30.00 (	dBm						
Log 20.0									Center Fred
10.0									3.625000000 GH
0.00 —									
-10.0									
-20.0									
-30.0 -			A CONTRACTOR	www.	¥	The second s			
-40.0 —			- Aller				<u> </u>		
-50.0		and the second designed in the second	·				A CONTRACTOR OF A CONTRACTOR		
-60.0									
Start	3.575 C	SHz					Stop 3	.675 GHz	CF Step 5.000000 MHz
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	∆ Limit		<u>Auto</u> Mar
1	1	3.5750 GHz	3.5950 GHz		3.591500000 GI		-19.03 dB		
2	2	3.5950 GHz	3.6140 GHz		3.614000000 GH		-11.64 dB		Freq Offse
3	3	3.6140 GHz	3.6150 GHz		3.614885000 GH		-13.82 dB		0 Hz
4 5	4 5	3.6150 GHz 3.6350 GHz	3.6350 GHz 3.6360 GHz		3.618366667 GI 3.635076667 GI		-21.61 dB		
5 6	5 6	3.6350 GHZ 3.6360 GHZ	3.6550 GHz		3.636000000 GH		-13.03 dB		
7	7	3.6550 GHz	3.6750 GHz		3.655166667 GI		-19.37 dB		
ASG						į.	STATUS		
100					t /I TE Dand			d Chann	

Plot 7-46. Channel - Ant1 Edge Plot (LTE Band 48 - 20MHz QPSK - Mid Channel - Ant1)



Plot 7-47. Channel - Ant1 Edge Plot (LTE Band 48 - 20MHz QPSK - High Channel - Ant1)

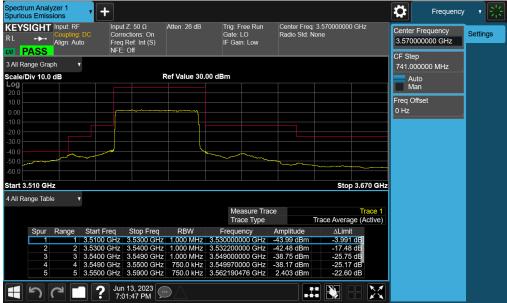
FCC ID: A3LSMS711U		PART 96 MEASUREMENT REPORT				
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## NR Band n48

Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
NR Band n48	40MHz	Low	Band Edge	-43.99	-40	-3.99
		Mid	Band Edge	-52.55	-25	-27.55
		High	Band Edge	-46.29	-40	-6.29
	30MHz	Low	Band Edge	-44.99	-40	-4.99
		Mid	Band Edge	-40.11	-13	-27.11
		High	Band Edge	-48.55	-40	-8.55
	20MHz	Low	Band Edge	-49.44	-40	-9.44
		Mid	Band Edge	-44.44	-25	-19.44
		High	Band Edge	-52.42	-40	-12.42
	10MHz	Low	Band Edge	-54.83	-40	-14.83
		Mid	Band Edge	-35.54	-13	-22.54
		High	Band Edge	-54.02	-40	-14.02

Table 7-12. Band Edge Emissions Test Result (NR Band n48)



Plot 7-48. Channel Edge Plot (NR Band n48 - 40MHz QPSK - Low Channel - Ant1)

FCC ID: A3LSMS711U		PART 96 MEASUREMENT REPORT				
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YSIGHT Input: RF Coupling Align: Au PASS	DC Corr	t Z: 50 Ω ections: On Ref: Int (S) · Off	Atten: 26 dB	Gate:	ree Run LO n: Low	Center Freq Radio Std: N	: 3.625000000 None	GHz	3.62500	requency 00000 GHz	Settings
Il Range Graph									CF Step 5.00000		
ale/Div 10.0 dB			Ref Value 30.0	00 dBm					Auto Man		
					-,				Freq Offs 0 Hz	set	
0.0											
					-						
0.0											
Il Range Table							Stop	3.700 GHz			
ili Range Table					asure Trac ce Type		Trace Avera	Trace 1			
Spur Range	Start Freg	Stop Freg	RBW	Freque		Amplitude	Trace Avera				
1 1			1.000 MHz			-52.55 dBm	-27.55				
	3.5650 GHz					-45.38 dBm	-32.38				
	3.6040 GHz					-44.54 dBm	-31.54				
4 4 5 5	3.6050 GHz 3.6450 GHz					1.579 dBm -45.27 dBm	-23.42 -32.27				
		13 2023		3.0431000		-43.27 dBm					

Plot 7-49. Channel Edge Plot (NR Band n48 - 40MHz QPSK - Mid Channel - Ant1)

Spectrum Analyzer 1 Spurious Emissions	• +					Frequency 🔻 🔆
KEYSIGHT       Input: RF         RL       ↔         Align: Auto         Image: Comparison of the second s	C Input Z: 50 Ω Corrections: On Freq Ref: Int (S) NFE: Off	Atten: 26 dB	Trig: Free Run Gate: LO IF Gain: Low	Center Freq: 3.6799800 Radio Std: None	00 GHz	Center Frequency 3.679980000 GHz
3 All Range Graph	, ,			1		CF Step 348.000000 MHz
Scale/Div 10.0 dB		Ref Value 40.00 c	dBm			Auto
Log 30.0						Man
20.0						Freq Offset 0 Hz
0.00						
-10.0		(	Y			
-20.0						
-30.0						
-40.0			h			
-50.0						
Start 3.580 GHz				Sto	op 3.760 GHz	
4 All Range Table 🔹 🔻						
			Measure Trace	•	Trace 1	
			Trace Type	Trace Aver	age (Active)	
	Start Freq Stop Freq	RBW		Amplitude 🛛 🗠 Lin		
	3.5800 GHz 3.6200 GHz				0 dB	
	3.6200 GHz 3.6590 GHz 3.6590 GHz 3.6600 GHz			41.74 dBm -28.7 40.82 dBm -27.8		
	3.6600 GHz 3.7000 GHz				37 dB	
	3.7000 GHz 3.7010 GHz			40.74 dBm -27.7		
100	Jun 13, 2023 7:16:13 PM					

Plot 7-50. Channel Edge Plot (NR Band n48 - 40MHz QPSK - High Channel - Ant1)

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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 C63.26-2015 with the EUT transmitting into an integral antenna. Measurements are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

#### Test Procedures Used

ANSI C63.26-2015 - Section 5.2.4.4

#### **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
- 3. VBW  $\geq$  3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points  $\geq 2 \times \text{span} / \text{RBW}$
- 6. Detector = RMS
- 7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". 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 set equal to 10MHz. 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.

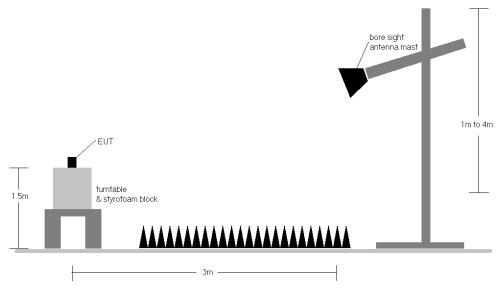


Figure 7-5. Radiated Test Setup >1GHz

#### 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.
- 3) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.
- 4) 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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Bandwidth	width Modulation		PCC			SCC		Ant. Pol.	Antenna	Antenna Turntable Azimuth	Ant. Gain	Substitute	EIRP	EIRP	EIRP Limit	Margin
Bandwidth	wodulation	Bandwidth [MHz]	Frequency [MHz]	RB / Offset	Bandwidth [MHz]	Frequency [MHz]	RB / Offset	[H/V]	Height [cm]	[degrees]	[dBi]	Level [dBm]	[dBm/10MHz]	[Watts/10MHz]	[dBm/10MHz]	[dB]
N		20	3560.0	1/99	20	3579.8	1/0	Н	102	320	6.51	13.55	20.06	0.101	23.0	-2.94
MHz	QPSK	20	3625.0	1 / 99	20	3644.8	1/0	Н	102	319	6.70	12.65	19.35	0.086	23.0	-3.65
40 1		20	3690.0	1/0	20	3670.2	1/99	Н	103	318	6.86	12.03	18.89	0.077	23.0	-4.11
4	16-QAM	20	3560.0	1 / 99	20	3579.8	1/0	Н	102	320	6.51	12.51	19.02	0.080	23.0	-3.98
N		20	3557.5	1 / 99	15	3577.1	1/0	Н	102	320	6.51	13.20	19.71	0.094	23.0	-3.29
MHz	QPSK	20	3625.0	1 / 99	15	3642.1	1/0	Н	102	319	6.70	12.59	19.28	0.085	23.0	-3.72
35		20	3692.5	1/0	15	3672.9	1 / 74	Н	103	318	6.86	11.97	18.83	0.076	23.0	-4.17
ŝ	16-QAM	20	3692.5	1/0	15	3672.9	1/74	Н	103	318	6.86	11.30	18.16	0.065	23.0	-4.84
N		20	3555.0	1 / 99	10	3574.4	1/0	Н	102	320	6.50	13.16	19.67	0.093	23.0	-3.33
MHz	QPSK	20	3625.0	1 / 99	10	3639.4	1/0	Н	102	319	6.70	12.34	19.04	0.080	23.0	-3.96
30 1		20	3695.0	1/0	10	3678.3	1 / 49	Н	103	318	6.86	11.96	18.83	0.076	23.0	-4.17
°,	16-QAM	20	3695.0	1/0	10	3678.3	1 / 49	Н	103	318	6.86	11.26	18.13	0.065	23.0	-4.87
N		20	3552.5	1 / 99	5	3571.7	1/0	Н	102	320	6.50	13.39	19.88	0.097	23.0	-3.12
MHz	QPSK	20	3625.0	1 / 99	5	3636.7	1/0	Н	102	319	6.70	12.48	19.18	0.083	23.0	-3.82
25		20	3697.5	1/0	5	3678.3	1/24	Н	103	318	6.87	12.02	18.89	0.077	23.0	-4.11
3	16-QAM	20	3552.5	1 / 99	5	3571.7	1/0	Н	102	320	6.50	12.28	18.78	0.076	23.0	-4.22

Table 7-13. EIRP Data (LTE ULCA Band 48)

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/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
z	QPSK	3560.00	Н	112	317	6.51	1 / 99	14.28	20.79	0.120	23.00	-2.21
MHz	QPSK	3625.00	Н	107	316	6.70	1/0	13.31	20.01	0.100	23.00	-2.99
20 1	QPSK	3690.00	Н	103	316	6.86	1 / 50	12.47	19.33	0.086	23.00	-3.67
2	16-QAM	3560.00	Н	112	317	6.51	1 / 99	13.32	19.83	0.096	23.00	-3.17
z	QPSK	3557.50	Н	112	317	6.51	1 / 74	14.39	20.90	0.123	23.00	-2.10
MHz	QPSK	3625.00	Н	107	316	6.70	1 / 74	13.27	19.97	0.099	23.00	-3.03
5	QPSK	3692.50	Н	103	316	6.86	1 / 74	12.21	19.07	0.081	23.00	-3.93
~	16-QAM	3557.50	Н	112	317	6.51	1 / 74	13.49	20.00	0.100	23.00	-3.00
N	QPSK	3555.00	Н	112	317	6.50	1 / 49	13.93	20.43	0.110	23.00	-2.57
MHz	QPSK	3625.00	Н	107	316	6.70	1 / 49	13.43	20.13	0.103	23.00	-2.87
10 1	QPSK	3695.00	Н	103	316	6.86	1 / 49	12.39	19.25	0.084	23.00	-3.75
-	16-QAM	3555.00	Н	112	317	6.50	1 / 49	12.97	19.48	0.089	23.00	-3.52
N	QPSK	3552.50	Н	112	317	6.50	1 / 12	14.18	20.67	0.117	23.00	-2.33
MHz	QPSK	3625.00	Н	107	316	6.70	1 / 24	13.08	19.77	0.095	23.00	-3.23
5 M	QPSK	3697.50	Н	103	316	6.87	1 / 24	12.71	19.58	0.091	23.00	-3.42
	16-QAM	3552.50	Н	112	317	6.50	1 / 12	13.06	19.56	0.090	23.00	-3.44
20 MHz	QPSK (WCP)	3560.00	Н	105	336	6.51	1 / 50	11.67	18.18	0.066	23.00	-4.82

Table 7-14. EIRP Data (LTE Band 48)

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/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
	π/2 BPSK	3570.00	Н	130	315	6.53	1/1	14.43	20.96	0.125	23.00	-2.04
	π/2 BPSK	3625.00	Н	127	316	6.70	1 / 53	13.62	20.32	0.108	23.00	-2.68
F	π/2 BPSK	3680.00	Н	124	313	6.84	1/1	12.85	19.69	0.093	23.00	-3.31
40 MHz	QPSK	3570.00	Н	130	315	6.53	1/1	14.41	20.94	0.124	23.00	-2.06
40	QPSK	3625.00	н	127	316	6.70	1 / 53	13.51	20.21	0.105	23.00	-2.79
	QPSK	3680.00	Н	124	313	6.84	1/1	12.77	19.61	0.091	23.00	-3.39
	16-QAM	3570.00	Н	130	315	6.53	1 / 53	13.78	20.31	0.107	23.00	-2.69
	π/2 BPSK	3565.00	Н	130	315	6.52	1 / 76	14.42	20.94	0.124	23.00	-2.06
	π/2 BPSK	3625.00	Н	127	316	6.70	1 / 39	13.57	20.27	0.106	23.00	-2.73
F	π/2 BPSK	3685.00	Н	124	313	6.85	1/1	12.90	19.75	0.094	23.00	-3.25
30 MHz	QPSK	3565.00	Н	130	315	6.52	1 / 76	14.37	20.89	0.123	23.00	-2.11
30	QPSK	3625.00	Н	127	316	6.70	1 / 39	13.44	20.14	0.103	23.00	-2.86
	QPSK	3685.00	Н	124	313	6.85	1/1	12.85	19.70	0.093	23.00	-3.30
	16-QAM	3565.00	Н	130	315	6.52	1 / 76	13.72	20.24	0.106	23.00	-2.76
	π/2 BPSK	3560.00	Н	130	315	6.51	1 / 49	14.25	20.76	0.119	23.00	-2.24
	π/2 BPSK	3625.00	Н	127	316	6.70	1 / 49	13.48	20.18	0.104	23.00	-2.82
20 MHz	π/2 BPSK	3690.00	Н	124	313	6.86	1 / 49	12.72	19.57	0.091	23.00	-3.43
Σ	QPSK	3560.00	Н	130	315	6.51	1 / 49	14.19	20.70	0.118	23.00	-2.30
20	QPSK	3625.00	Н	127	316	6.70	1 / 49	13.32	20.02	0.100	23.00	-2.98
	QPSK	3690.00	Н	124	313	6.86	1 / 49	12.64	19.49	0.089	23.00	-3.51
	16-QAM	3560.00	Н	130	315	6.51	1 / 49	13.56	20.07	0.102	23.00	-2.93
	TT/2 BPSK	3555.00	Н	130	315	6.50	1 / 12	13.98	20.48	0.112	23.00	-2.52
	π/2 BPSK	3625.00	Н	127	316	6.70	1 / 22	13.34	20.04	0.101	23.00	-2.96
10 MHz	π/2 BPSK	3695.00	Н	124	313	6.86	1/1	12.62	19.48	0.089	23.00	-3.52
Σ	QPSK	3555.00	Н	130	315	6.50	1 / 12	13.99	20.49	0.112	23.00	-2.51
10	QPSK	3625.00	Н	127	316	6.70	1 / 22	13.22	19.92	0.098	23.00	-3.08
	QPSK	3695.00	Н	124	313	6.86	1/1	12.55	19.41	0.087	23.00	-3.59
	16-QAM	3555.00	Н	130	315	6.50	1 / 12	13.26	19.76	0.095	23.00	-3.24
40 MHz	QPSK (CP-OFDM)	3570.00	Н	130	315	6.53	1 / 53	13.34	19.87	0.097	23.00	-3.13
40 11112	QPSK (WCP)	3570.00	Н	198	317	6.53	1 / 53	13.45	19.98	0.100	23.00	-3.02

Table 7-15. EIRP Data (NR Band n48)

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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 ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using hybrid (biconical/log) 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**

ANSI C63.26-2015 - Section 5.5.4

#### **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
- Trace mode = Max Hold (In cases where the level is within 2dB of the limit, the final measurement is taken using triggering/gating and trace averaging.)
- 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.

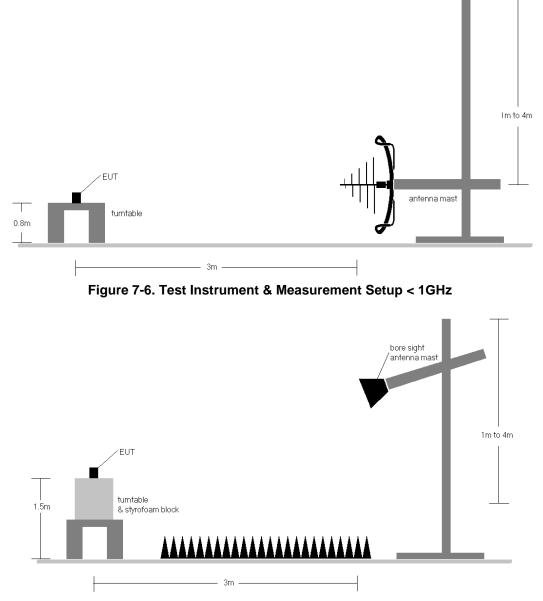


Figure 7-7. Test Instrument & Measurement Setup >1 GHz

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#### Test Notes

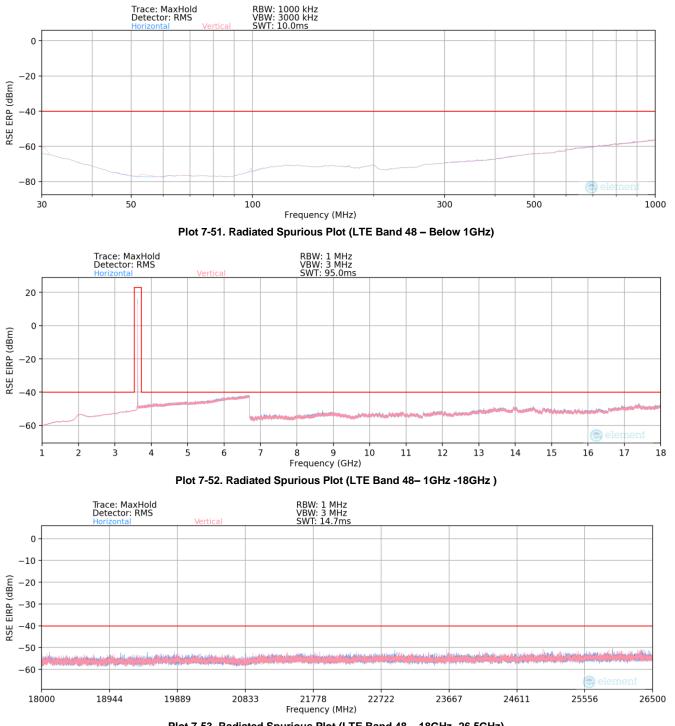
- 1) Field strengths are calculated using the Measurement quantity conversions in ANSI C63.26-2015 Section 5.2.7:
  - a)  $E(dB\mu V/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m) b) EIRP (dBm) = E(dB\mu V/m) + 20logD 104.8; where D is the measurement distance in meters.$
- 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) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.
- 8) Spurious emission in EN-DC Operating mode with Sub 6GHz NR carrier as well as an LTE carrier (anchor) has been checked and was found to not to be the worst case.

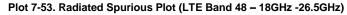
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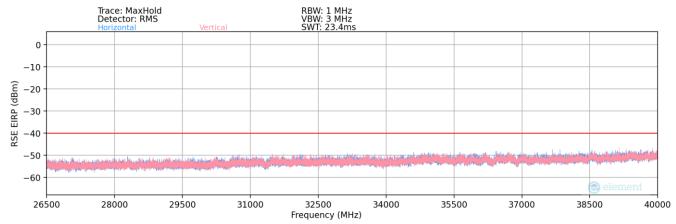
# LTE Band 48





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Bandwidth (MHz):	20
Frequency (MHz):	3560.0
Modulation Signal:	QPSK
RB Config (Size / 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]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
195.18	V	-	-	-96.09	19.28	30.19	-67.22	-40.00	-27.22
	T-1.1. 7	40 De	0	/ // TE D					

Table 7-16. Radiated Spurious Data (LTE Band 48 – Below 1GHz - Ant1)

Bandwidth (MHz):	20
Frequency (MHz):	3560.0
Modulation Signal:	QPSK
RB Config (Size / 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]
7120.00	V	135	206	-73.10	9.26	43.16	-52.09	-40.00	-12.09
10680.00	V	-	-	-81.87	12.33	37.46	-57.79	-40.00	-17.79
14240.00	V	-	-	-81.69	16.01	41.32	-53.94	-40.00	-13.94
17800.00	V	-	-	-82.18	17.28	42.10	-53.16	-40.00	-13.16

Table 7-17. Radiated Spurious Data (LTE Band 48 – Low Channel - Ant1)

Bandwidth (MHz):	20
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / 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]
7250.00	V	122	200	-73.30	9.18	42.88	-52.38	-40.00	-12.38
10875.00	V	-	-	-80.98	11.95	37.97	-57.29	-40.00	-17.29
14500.00	V	-	-	-81.61	15.94	41.33	-53.92	-40.00	-13.92

Table 7-18. Radiated Spurious Data (LTE Band 48 – Mid Channel - Ant1)

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Bandwidth (MHz):	20
Frequency (MHz):	3690.0
Modulation Signal:	QPSK
RB Config (Size / 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]
7380.00	V	141	207	-76.71	9.82	40.11	-55.15	-40.00	-15.15
11070.00	V	-	-	-80.74	12.05	38.31	-56.94	-40.00	-16.94
14760.00	V	-	-	-82.31	15.62	40.31	-54.95	-40.00	-14.95

Table 7-19. Radiated Spurious Data (LTE Band 48 – High Channel - Ant1)

Case:	w/ Wireless Charging Pad
Bandwidth (MHz):	20
Frequency (MHz):	3560.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 50

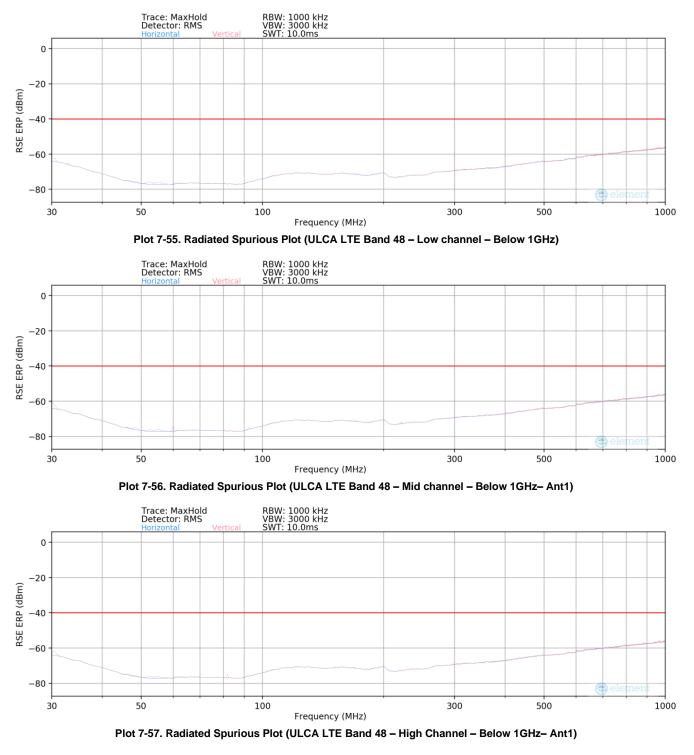
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7120.00	V	195	354	-76.96	9.26	39.30	-55.95	-40.00	-15.95
10680.00	V	-	-	-81.85	12.33	37.48	-57.77	-40.00	-17.77
14240.00	V	-	-	-81.58	16.01	41.43	-53.83	-40.00	-13.83
17800.00	V	-	-	-82.22	17.28	42.06	-53.20	-40.00	-13.20

Table 7-20. Radiated Spurious Data with WCP (LTE Band 48)

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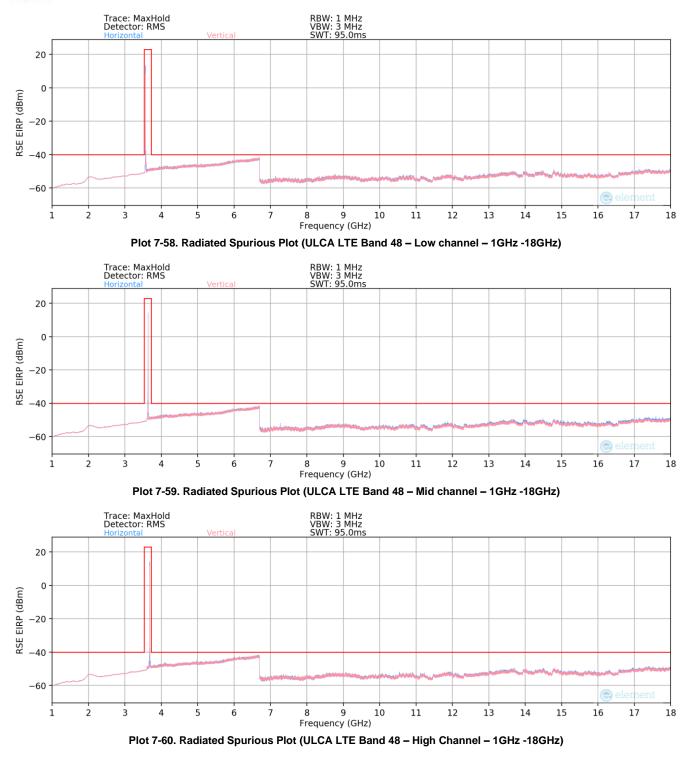


# ULCA LTE Band 48



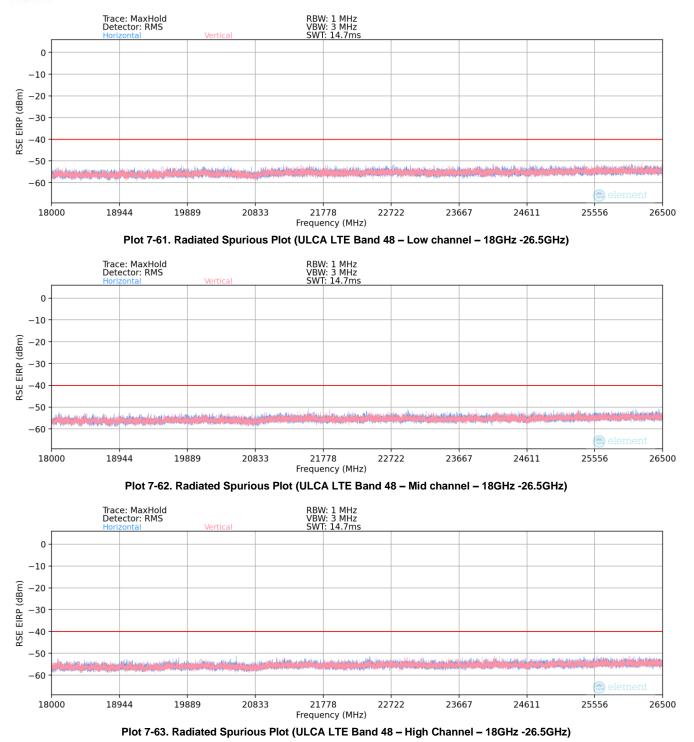
FCC ID: A3LSMS711U		PART 96 MEASUREMENT REPORT		
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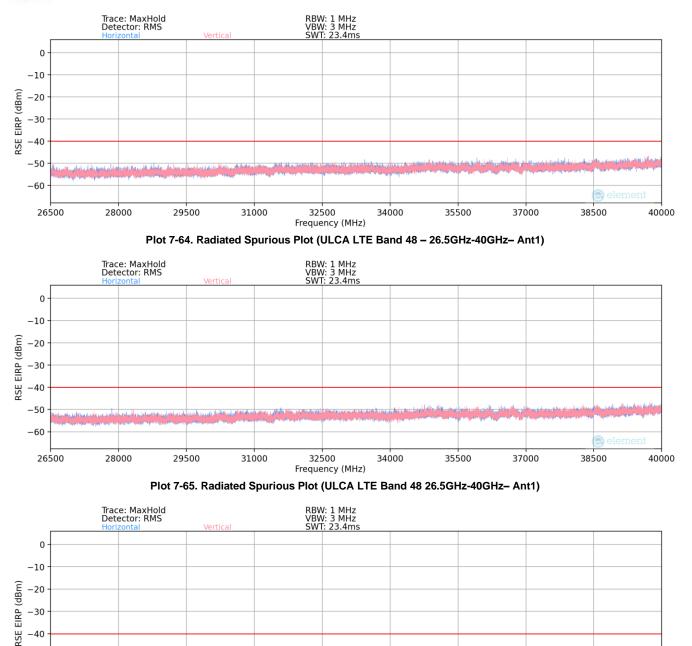
FCC ID: A3LSMS711U		PART 96 MEASUREMENT REPORT			
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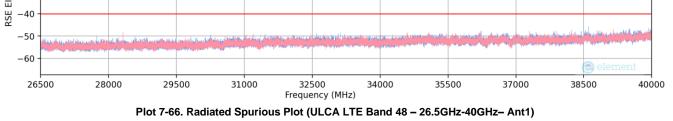




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Bandwidth (MHz):	20
Frequency (MHz):	3560.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
195.18	V	-	-	-96.09	19.28	30.19	-67.22	-40.00	-27.22

Table 7-21. Radiated Spurious Data (ULCA LTE Band 48 – Below 1GHz - Ant1)

PCC Bandwidth (MHz):	20	
PCC Frequency (MHz):	3560.0	
PCC RB / Offset:	1/99	
SCC Bandwidth (MHz):	20	
SCC Frequency (MHz):	3579.8	
SCC RB / Offset:	1/0	
Modulation Signal:	QPSK	

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]
7140.00	V	144	204	-72.46	9.62	44.16	-51.10	-40.00	-11.10
10710.00	V	-	-	-79.71	12.33	39.62	-55.63	-40.00	-15.63
14280.00	V	-	-	-80.22	15.60	42.38	-52.88	-40.00	-12.88
17850.00	V	-	-	-80.85	17.64	43.79	-51.47	-40.00	-11.47

Table 7-22. Radiated Spurious Data (ULCA LTE Band 48 – Low Channel - Ant1)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	3625.0
PCC RB / Offset:	1/99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	3644.8
SCC RB / Offset:	1/0
Modulation Signal:	QPSK

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]
7270.00	V	131	193	-71.70	8.83	44.13	-51.13	-40.00	-11.13
10905.00	V	-	-	-78.33	12.51	41.18	-54.08	-40.00	-14.08
14540.00	V	-	-	-79.62	15.62	43.00	-52.26	-40.00	-12.26

Table 7-23. Radiated Spurious Data (ULCA LTE Band 48 – Mid Channel - Ant1)

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PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	3690.0
PCC RB / Offset:	1/99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	3670.2
SCC RB / Offset:	1/0
Modulation Signal:	QPSK

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]
7360.00	V	137	203	-74.23	9.60	42.37	-52.89	-40.00	-12.89
11040.00	V	-	-	-78.79	12.06	40.27	-54.99	-40.00	-14.99
14720.00	V	-	-	-80.60	15.48	41.88	-53.37	-40.00	-13.37

Table 7-24. Radiated Spurious Data (ULCA LTE Band 48 – High Channel - Ant1)

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