ELEMENT WASHINGTON DC LLC
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.element.com

Part 96 MEASUREMENT REPORT

Applicant Name:
Sony Corporation
1-7-1 Konan Minato-Ku
Tokyo, 108-0075
Japan

Date of Testing:
02/08/2023 - 03/24/2023
Test Report Issue Date:
4/12/2023
Test Site/Location:
Element lab., Columbia, MD, USA
Test Report Serial No.:
1M2302060006-17-R1.PY7

FCC ID:	**PY7-84558E**
APPLICANT:	**Sony Corporation**

Application Type:	Certification
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

Note: This revised Test Report (S/N: 1M2302060006-17-R1.PY7) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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

ACCREDITED
CERT #2041.01

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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 48 Main ANT	20 MHz	QPSK	3560.0 - 3690.0	0.123	20.91	17M9G7D
		16QAM	3560.0 - 3690.0	0.104	20.16	18M0W7D
	15 MHz	QPSK	3557.5 - 3692.5	0.140	21.46	13M5G7D
		16QAM	3557.5 - 3692.5	0.105	20.20	13M5W7D
	10 MHz	QPSK	3555.0 - 3695.0	0.130	21.15	9M02G7D
		16QAM	3555.0 - 3695.0	0.110	20.42	8M99W7D
	5 MHz	QPSK	3552.5 - 3697.5	0.129	21.12	4M52G7D
		16QAM	3552.5 - 3697.5	0.103	20.11	4M55W7D

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 48 Sub ANT	20 MHz	QPSK	3560.0 - 3690.0	0.058	17.64	18M0G7D
		16QAM	3560.0 - 3690.0	0.049	16.90	18M0W7D
	15 MHz	QPSK	3557.5 - 3692.5	0.059	17.71	13M5G7D
		16QAM	3557.5 - 3692.5	0.046	16.67	13M5W7D
	10 MHz	QPSK	3555.0 - 3695.0	0.063	18.00	8M99G7D
		16QAM	3555.0 - 3695.0	0.051	17.10	9M00W7D
	5 MHz	QPSK	3552.5 - 3697.5	0.063	18.01	4M51G7D
		16QAM	3552.5 - 3697.5	0.048	16.85	4M51W7D

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

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.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Sony Corporation Portable Handset FCC ID: PY7-84558E**. 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.: 01443, 02904, 02227

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, 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5 and 6 GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer

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: Belkin F7U050 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 0.621 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.

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:

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

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:

$$E_{[dB\mu V/m]} = \text{Measured amplitude level}_{[dBm]} + 107 + \text{Cable Loss}_{[dB]} + \text{Antenna Factor}_{[dB/m]}$$

And

$$EIRP_{[dBm]} = E_{[dB\mu V/m]} + 20\log D - 104.8;$$ where D is the measurement distance in meters.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01 v01r01.

Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI C63.26-2015.

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

5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	AP1-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP1-001
	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			6201525694
Emco	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2023	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	7/20/2021	Biennial	7/20/2023	9203-2178
Espec	SCP-220	Environmental Chamber	5/25/2022	Annual	5/25/2023	OCPS5H0612K05
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	04/20/2021	Biennial	04/20/2023	00125518
ETS Lindgren	3164-10	Quad Ridge Horn 400MHz - 10000MHz	5/10/2021	Biennial	5/10/2023	00166283
Keysight Technologies	N9030A	PXA Signal Analyzer	9/6/2022	Annual	9/6/2023	MY54490576
Keysight Technologies	N9030B	PXA Signal Analyzer, Multi-touch	7/29/2022	Annual	7/29/2023	MY57141001
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/25/2022	Annual	8/25/2023	100348
Rohde & Schwarz	FSW26	2Hz-26.5GHz Signal and Spectrum Analyzer	11/6/2022	Annual	11/6/2023	103187
Sunol Sciences	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.

6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

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

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (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 analzyer. 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.

7.0 TEST RESULTS

7.1 Summary

Company Name: Sony Corporation

FCC ID: PY7-84558E

FCC Classification: Citizens Band End User Devices (CBE)

Mode(s): LTE

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	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 (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
	Frequency Stability	2.1055	Fundamental emissions stay within authorized frequency block	PASS	Section 7.8
	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 7.9
RADIATED	Equivalent Isotropic Radiated Power (EIRP) (EUD)	96.41(b)	23 dBm/10MHz	PASS	Section 7.6
	Radiated Spurious Emissions	2.1053, 96.41(e)	-40 dBm/MHz	PASS	Section 7.7

Table 7-1. Summary of Test Results

Notes:

1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is EMC Software Tool v1.1.

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 x OBW to 3 x OBW
2. RBW = 1% to 5% of the OBW
3. Number of measurement points in sweep ≥ 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.

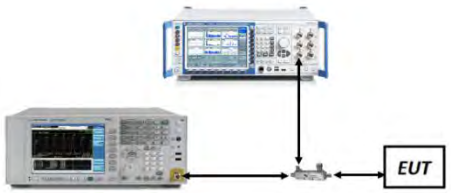


Figure 7-1. Test Instrument & Measurement Setup

Test Notes

1. A-MPR was verified to comply with the "NS_27" 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.

2. All other conducted power measurements are contained in the RF exposure report for this filing.

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	55340	3560.0	1/50	23.37
		55990	3625.0	1/0	23.40
		56640	3690.0	1/50	23.30
	16-QAM	55340	3560.0	1/50	23.07
15 MHz	QPSK	55315	3557.5	1/37	23.44
		55990	3625.0	1/74	23.56
		56665	3692.5	1/37	23.23
	16-QAM	55315	3557.5	1/37	22.84
10 MHz	QPSK	55290	3555.0	1/49	23.73
		55990	3625.0	1/49	23.65
		56690	3695.0	1/0	23.53
	16-QAM	55290	3555.0	1/49	23.27
5 MHz	QPSK	55265	3552.5	1/12	23.74
		55990	3625.0	1/12	23.76
		56715	3697.5	1/24	23.40
	16-QAM	55265	3552.5	1/12	23.02

Table 7-2. Conducted Power Output Data (LTE Band 48 – Sub Ant)

Test Case	NS	MCC	MNC	Channel BW [MHz]	Channel Frequency [MHz]	RB Size	RB Offset	A-MPR [dB]	Modulation	MPR [dB]	Maximum Target Output Power [dBm]	A-MPR Measured Power [dBm]
1	NS_01	310	01	20	3560	100	0	≤ 3	QPSK	0	24.00	19.97
									16-QAM	1	23.00	19.11

Table 7-3. Conducted Power Output Data – With A-MPR (LTE Band 48 – Main Ant)

Test Case	NS	MCC	MNC	Channel BW [MHz]	Channel Frequency [MHz]	RB Size	RB Offset	A-MPR [dB]	Modulation	MPR [dB]	Maximum Target Output Power [dBm]	A-MPR Measured Power [dBm]
1	NS_01	310	01	20	3560	100	0	≤ 3	QPSK	0	23.00	18.87
									16-QAM	1	22.00	17.78
2				20	3690	100	0	≤ 3	QPSK	0	23.00	18.42
									16-QAM	1	22.00	17.40
3	NS_01	310	01	15	3560	75	0	≤ 3	QPSK	0	23.00	18.93
									16-QAM	1	22.00	17.85
4				15	3690	75	0	≤ 3	QPSK	0	23.00	18.99
									16-QAM	1	22.00	17.69

Table 7-4. Conducted Power Output Data – With A-MPR (LTE Band 48 – Sub Ant)

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 ≥ 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.

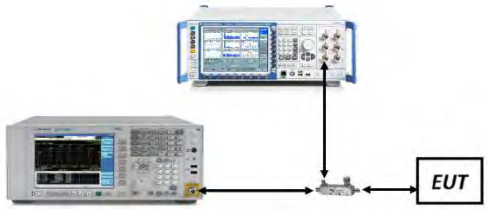
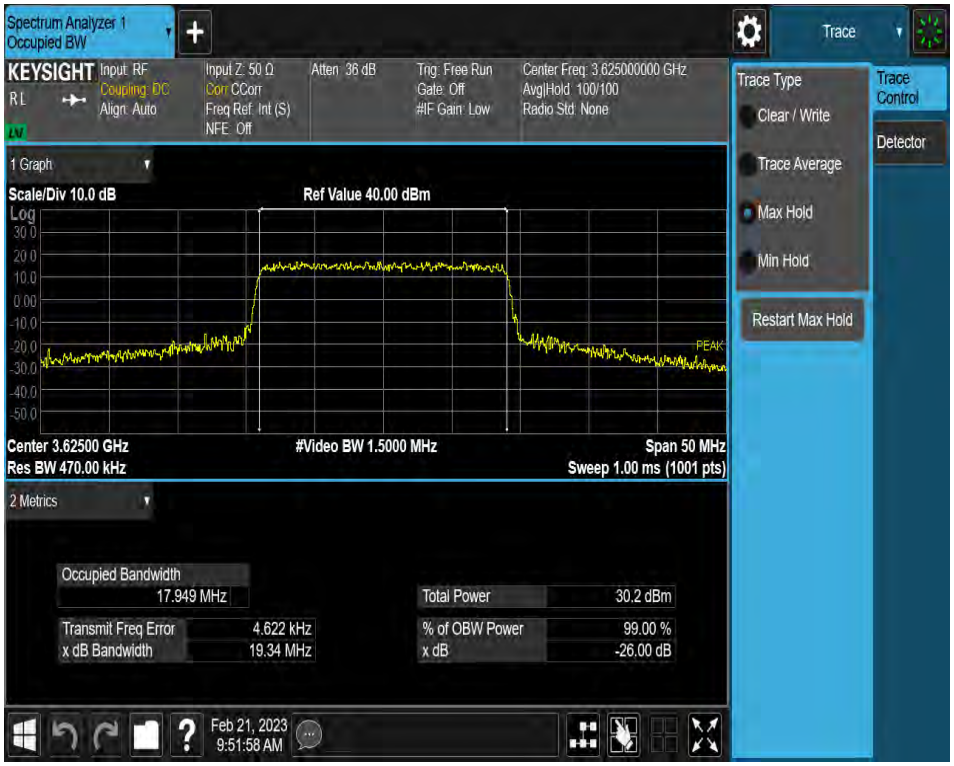


Figure 7-2. Test Instrument & Measurement Setup

Test Notes

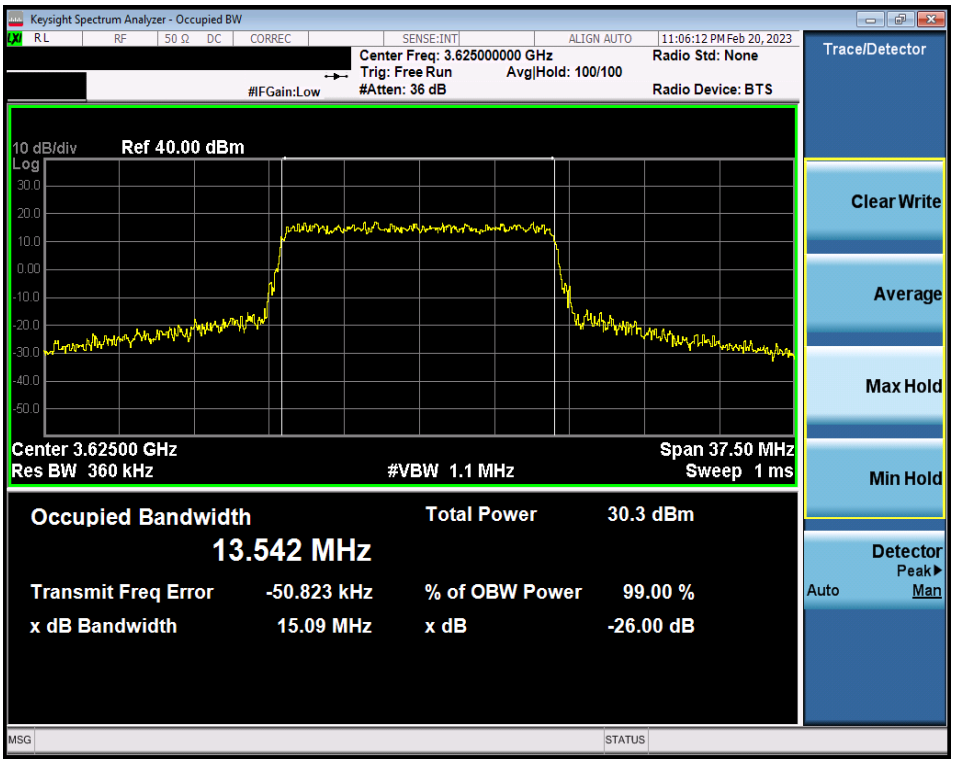
None

LTE Band 48 – Main Ant

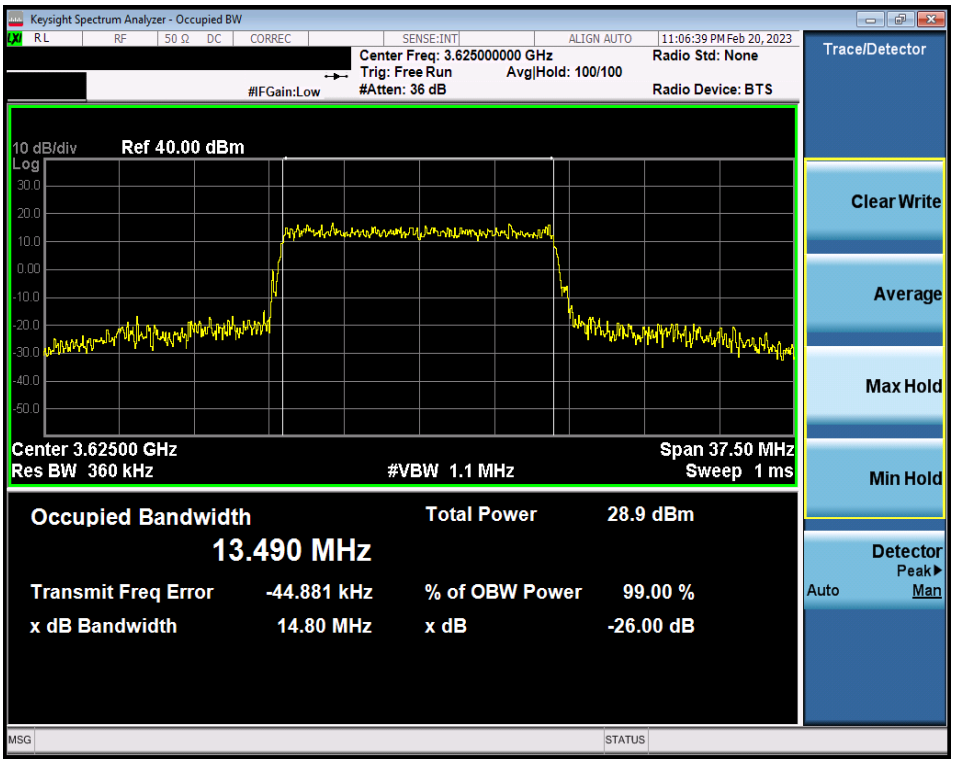


Plot 7-1. Occupied Bandwidth Plot (LTE Band 48 - 20MHz QPSK - Full RB Configuration - Main Ant)

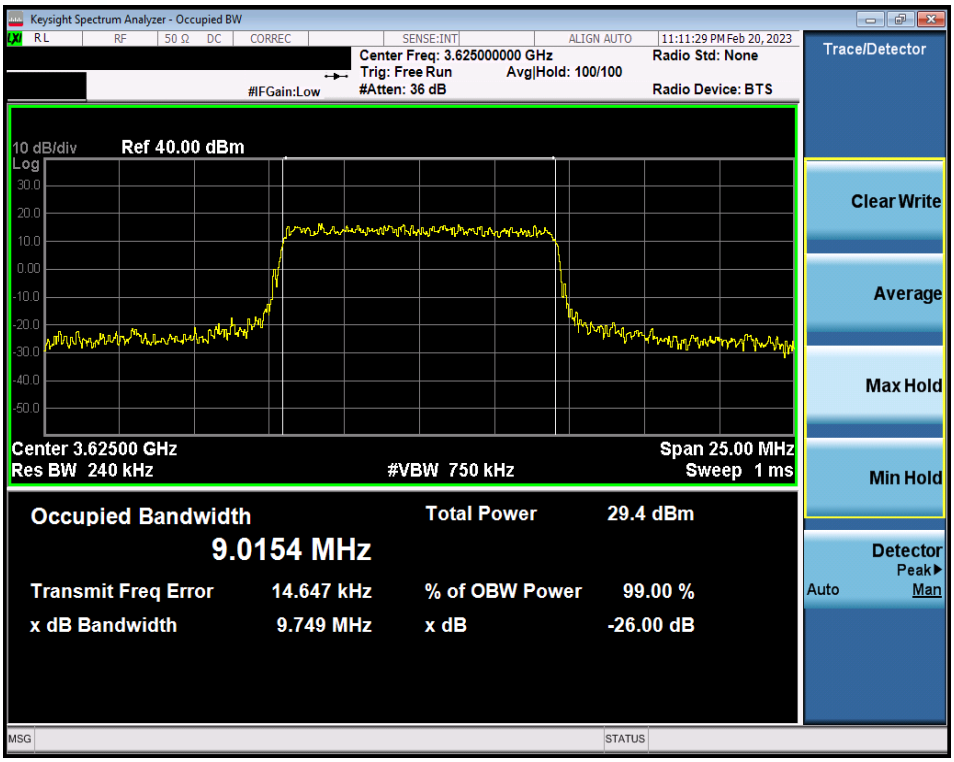
Plot 7-2. Occupied Bandwidth Plot (LTE Band 48 - 20MHz 16-QAM - Full RB Configuration - Main Ant)



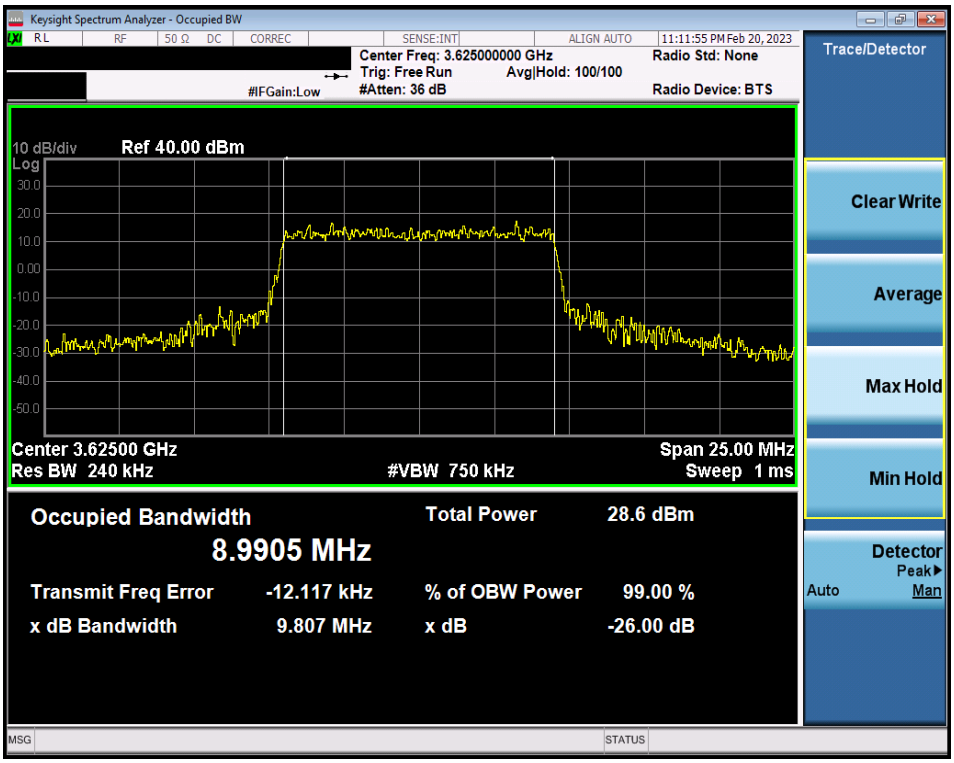
Plot 7-3. Occupied Bandwidth Plot (LTE Band 48 - 15MHz QPSK - Full RB Configuration - Main Ant)



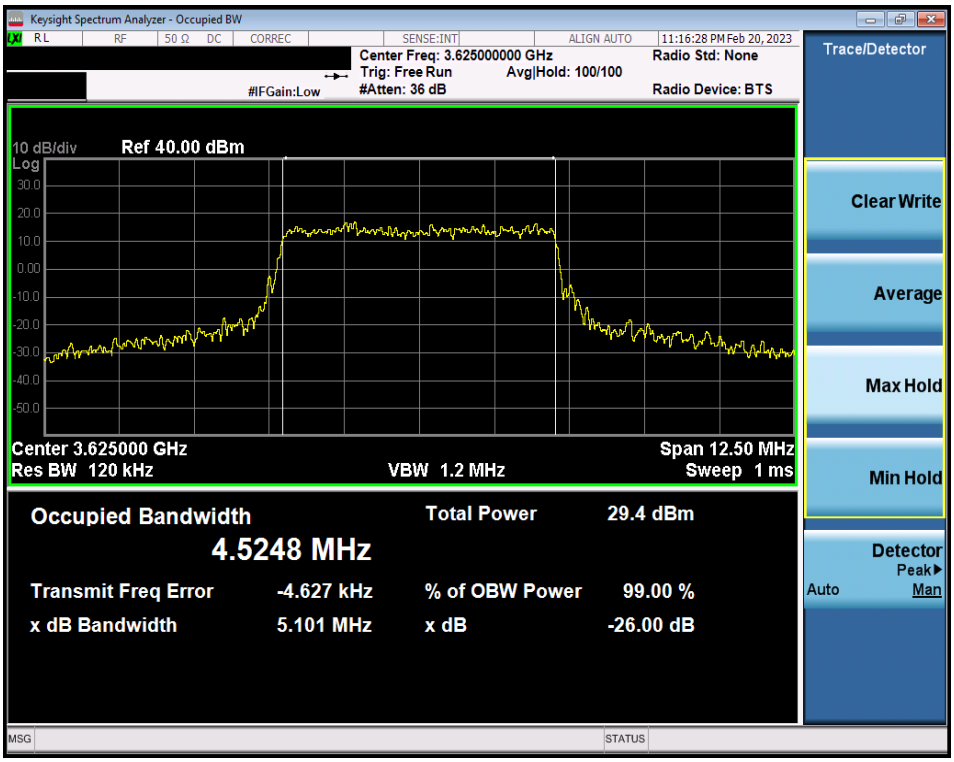
Plot 7-4. Occupied Bandwidth Plot (LTE Band 48 - 15MHz 16-QAM - Full RB Configuration - Main Ant)



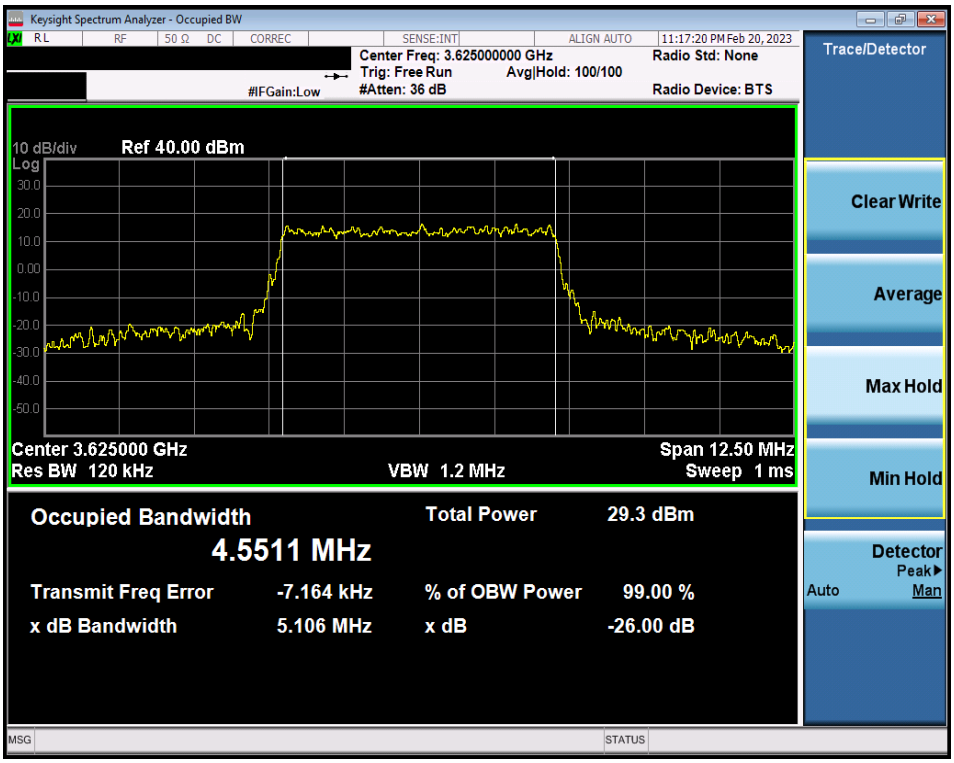
Plot 7-5. Occupied Bandwidth Plot (LTE Band 48 - 10MHz QPSK - Full RB Configuration - Main Ant)



Plot 7-6. Occupied Bandwidth Plot (LTE Band 48 - 10MHz 16-QAM - Full RB Configuration - Main Ant)

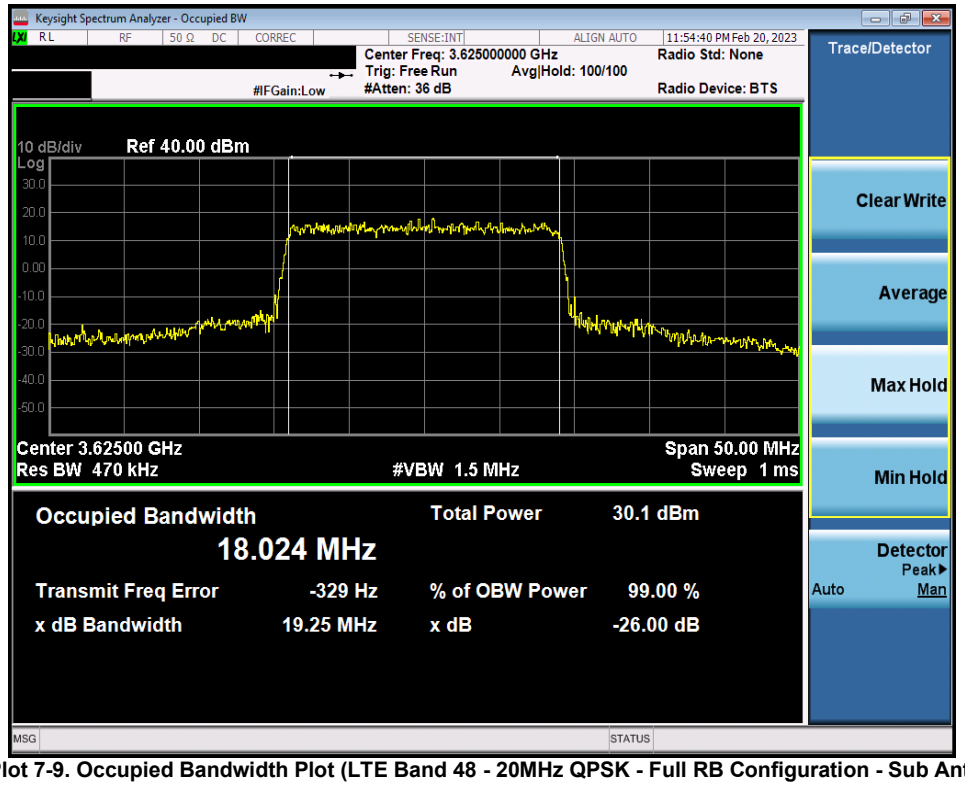


Plot 7-7. Occupied Bandwidth Plot (LTE Band 48 - 5MHz QPSK - Full RB Configuration - Main Ant)

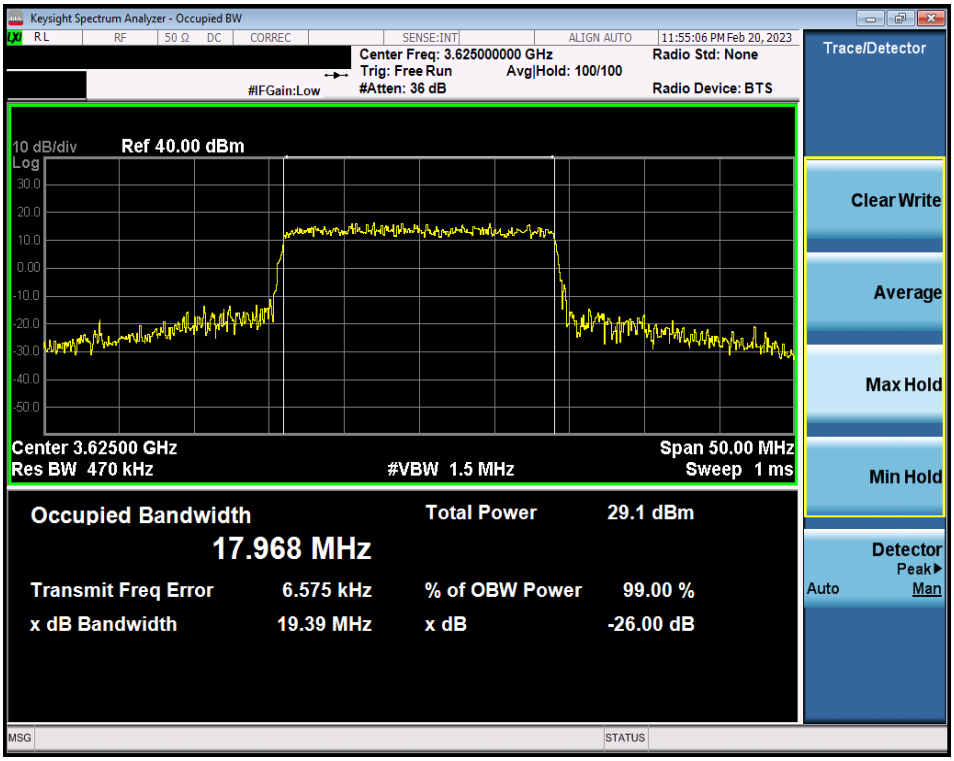


Plot 7-8. Occupied Bandwidth Plot (LTE Band 48 - 5MHz 16-QAM - Full RB Configuration - Main Ant)

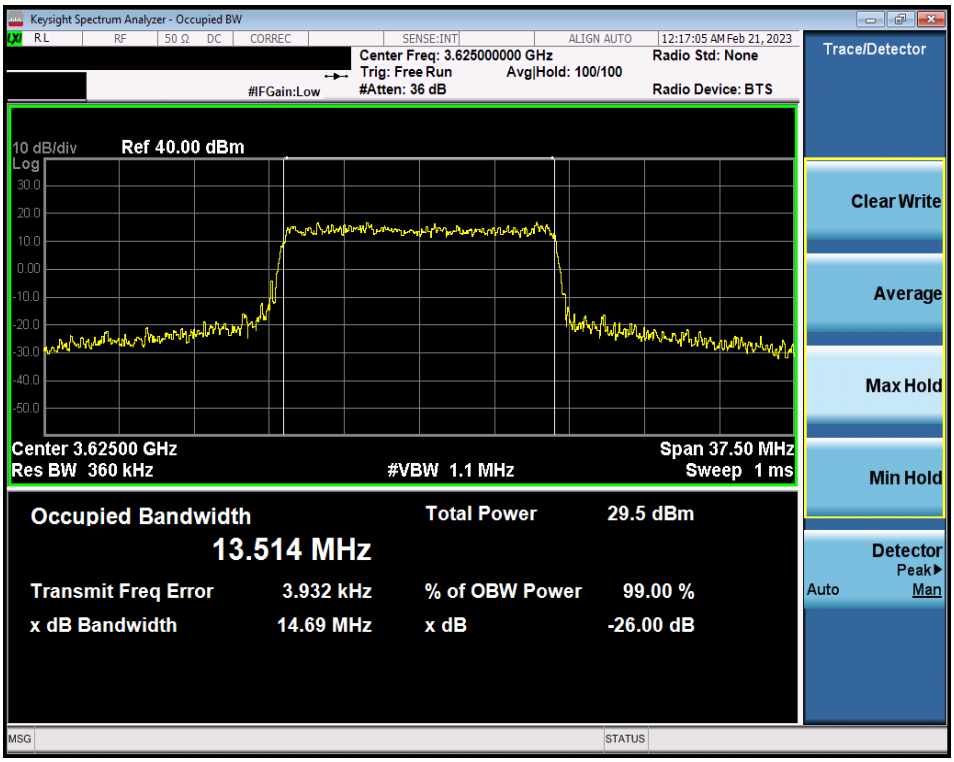
LTE Band 48 – Sub Ant



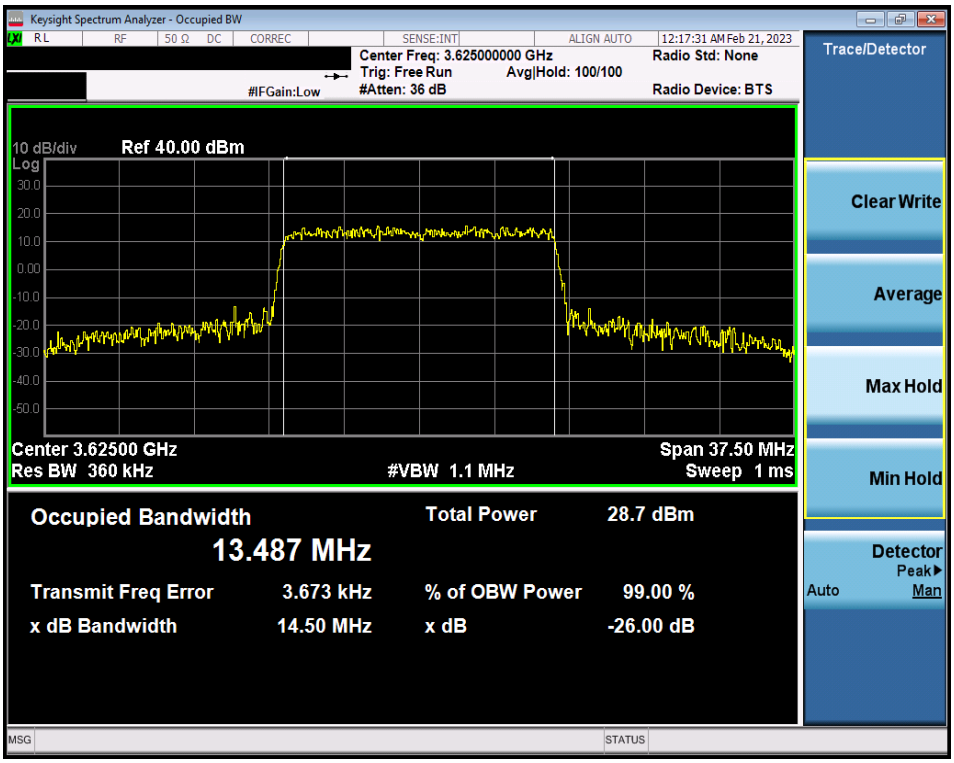
Plot 7-9. Occupied Bandwidth Plot (LTE Band 48 - 20MHz QPSK - Full RB Configuration - Sub Ant)



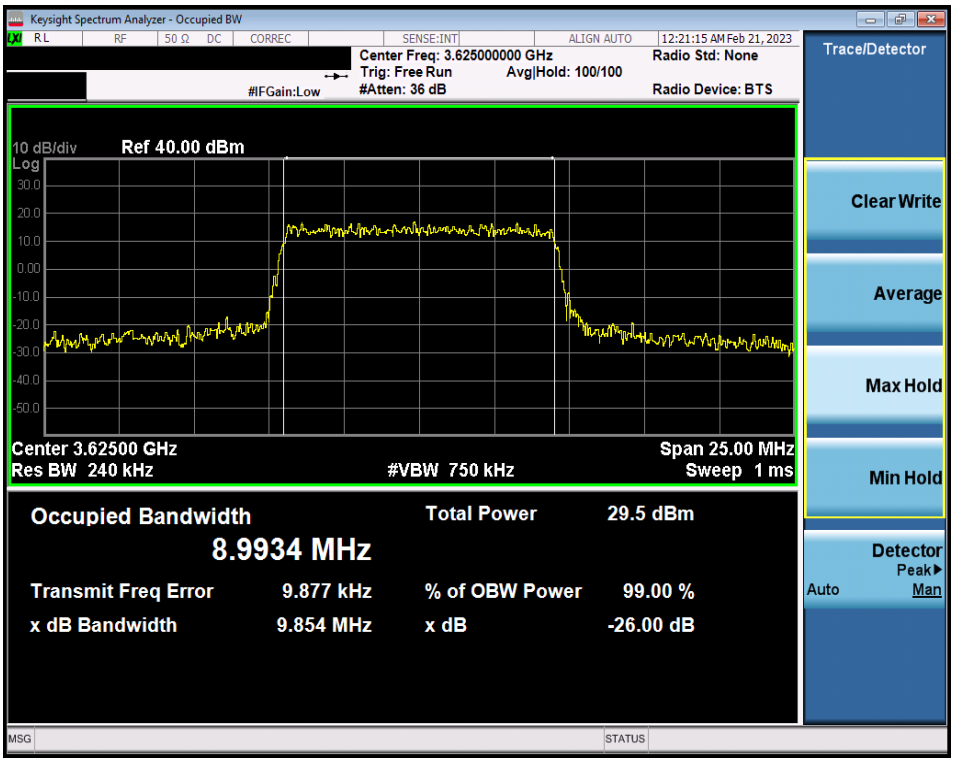
Plot 7-10. Occupied Bandwidth Plot (LTE Band 48 - 20MHz 16-QAM - Full RB Configuration - Sub Ant)



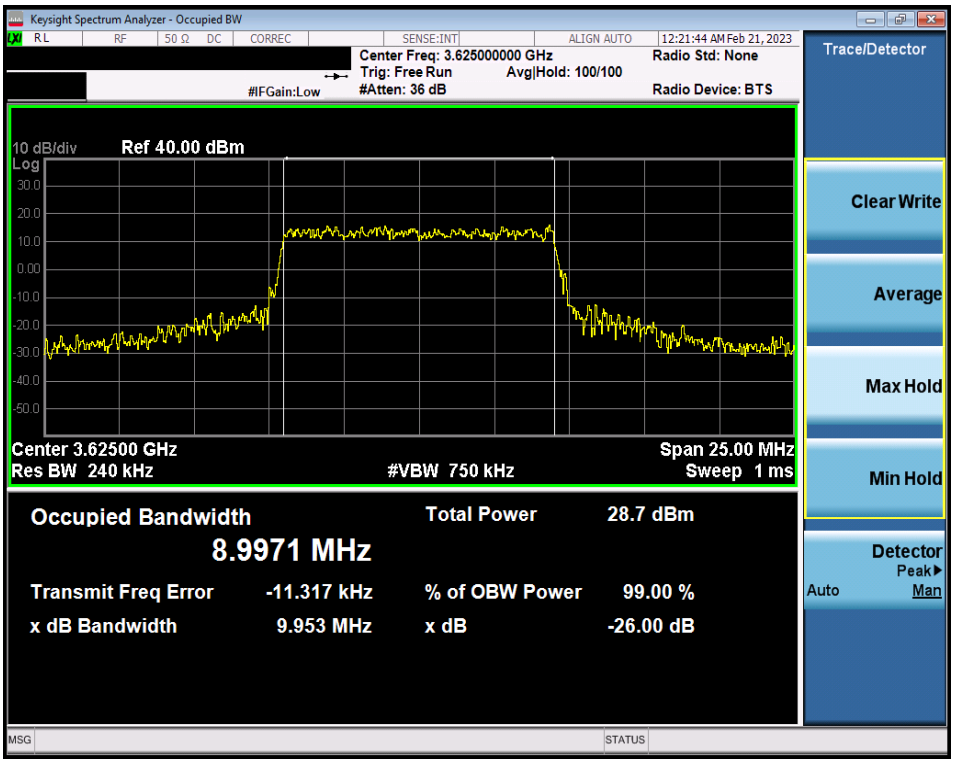
Plot 7-11. Occupied Bandwidth Plot (LTE Band 48 - 15MHz QPSK - Full RB Configuration - Sub Ant)



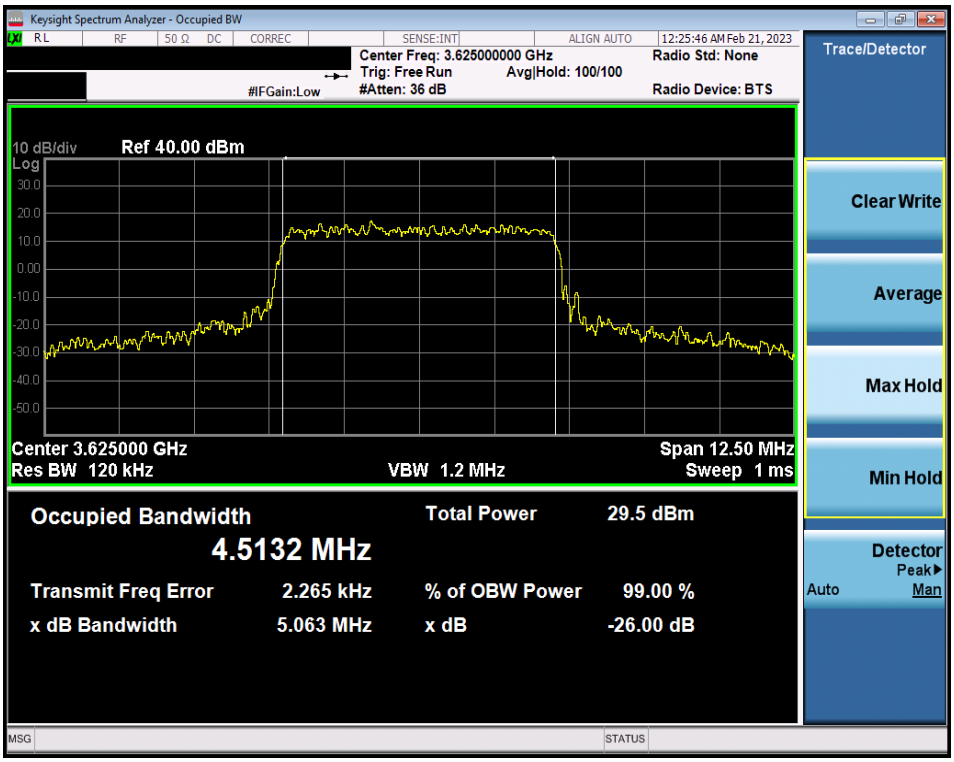
Plot 7-12. Occupied Bandwidth Plot (LTE Band 48 - 15MHz 16-QAM - Full RB Configuration - Sub Ant)



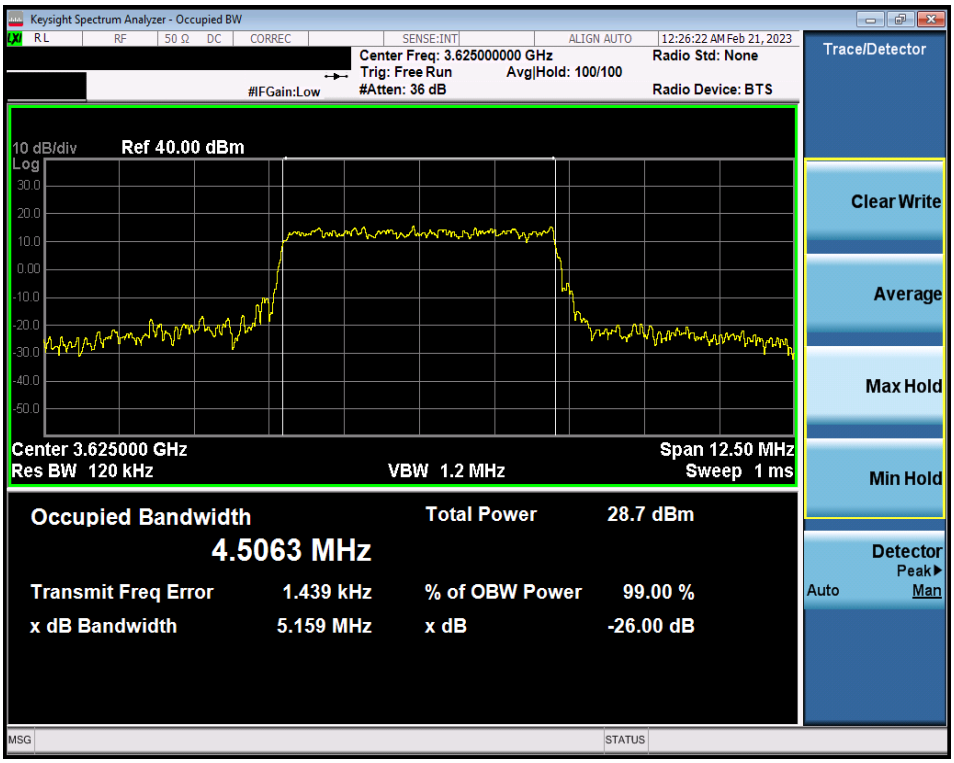
Plot 7-13. Occupied Bandwidth Plot (LTE Band 48 - 10MHz QPSK - Full RB Configuration - Sub Ant)



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



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



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

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 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

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

Test Procedure Used

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.

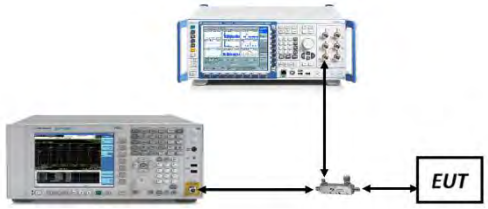


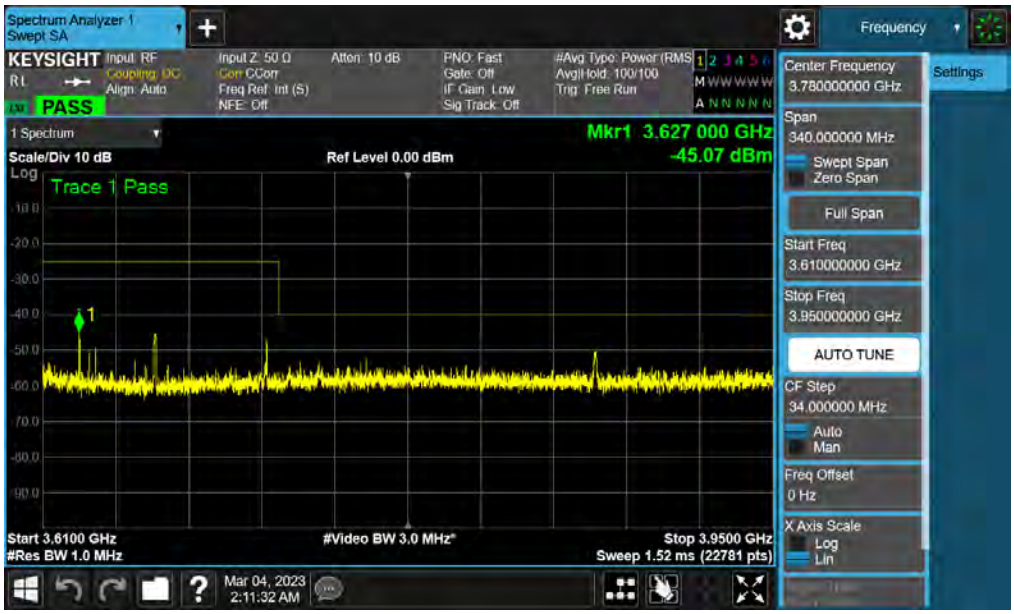
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

1. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz.
2. A notch filter was used to evaluate the frequency range of 3.95GHz to 18GHz. All other frequency ranges were not evaluated with the notch filter.
3. Conducted spurious emissions above 24GHz are covered by the radiated spurious emissions measurements.

LTE Band 48 – Main Ant

Plot 7-17. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Main Ant)



Plot 7-18. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Main Ant)

Plot 7-19. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Main Ant)

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

Plot 7-21. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Mid Channel - Main Ant)

Plot 7-22. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Mid Channel - Main Ant)

Plot 7-23. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Mid Channel - Main Ant)

Plot 7-24. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Mid Channel - Main Ant)

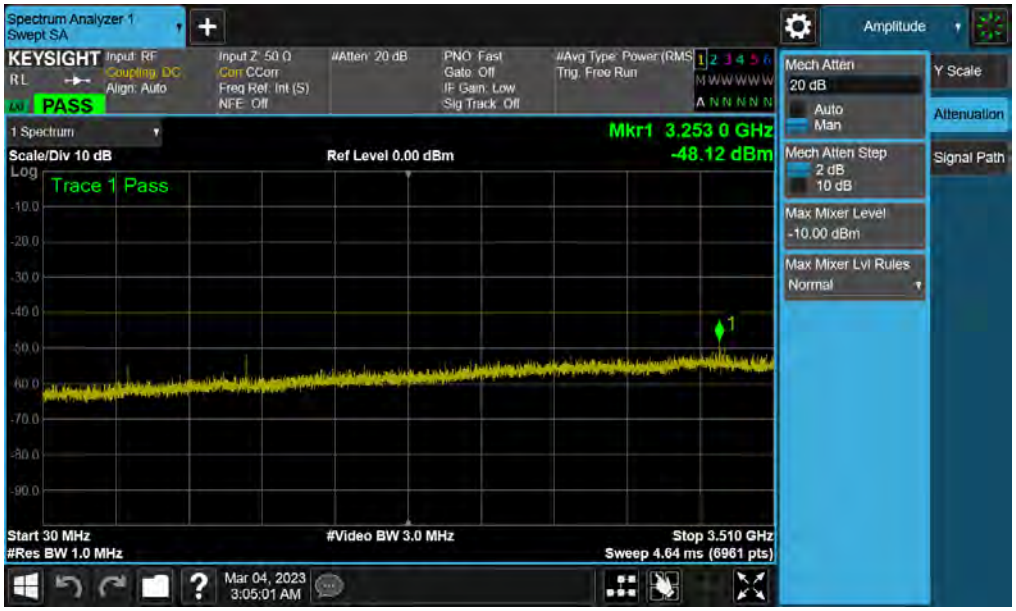
Plot 7-25. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - High Channel - Main Ant)

Plot 7-26. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - High Channel - Main Ant)

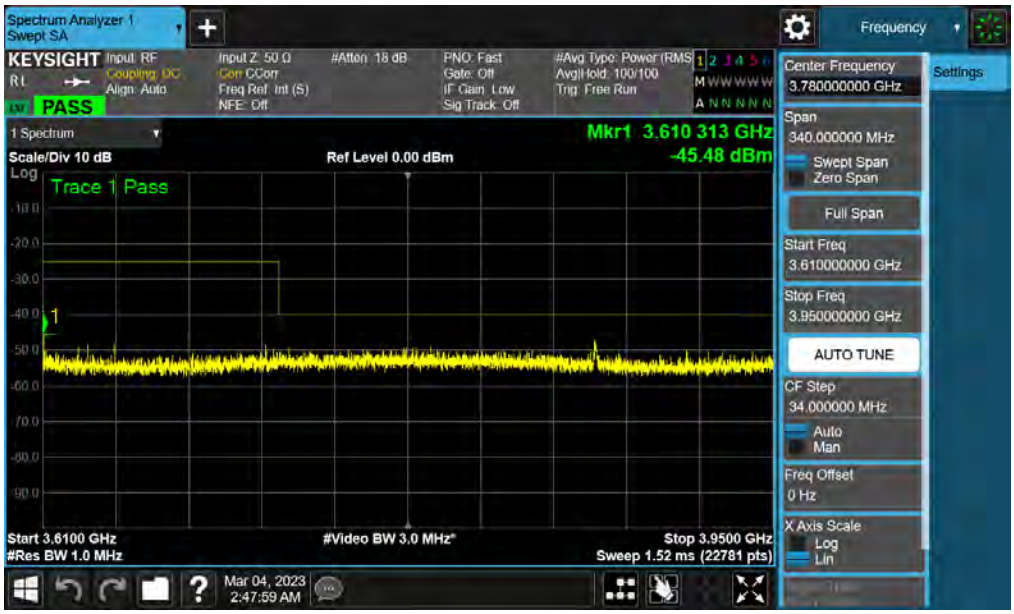
Plot 7-27. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - High Channel - Main Ant)

Plot 7-28. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - High Channel - Main Ant)

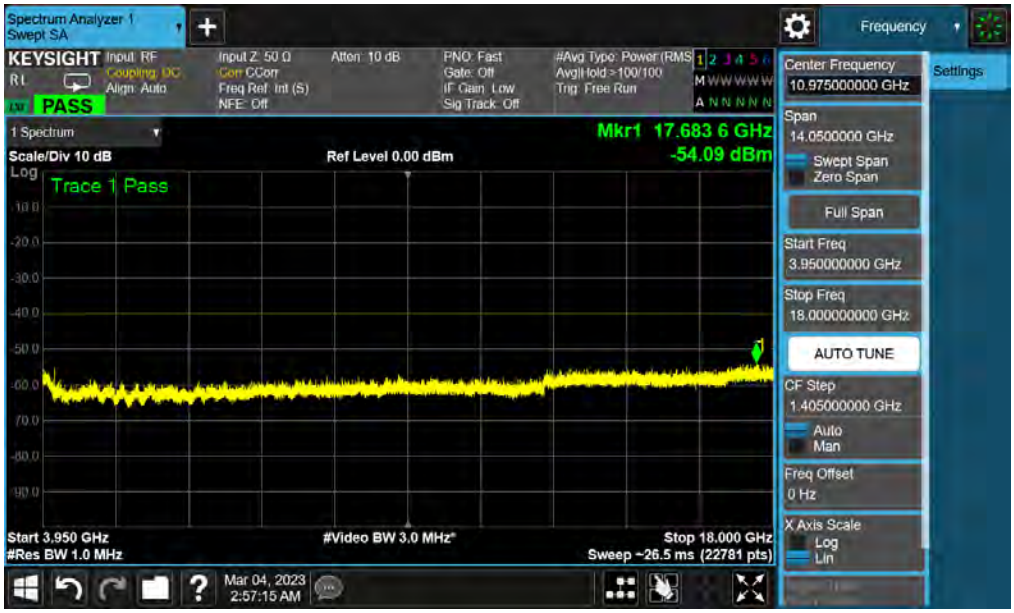
LTE Band 48 – Sub Ant



Plot 7-29. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Sub Ant)



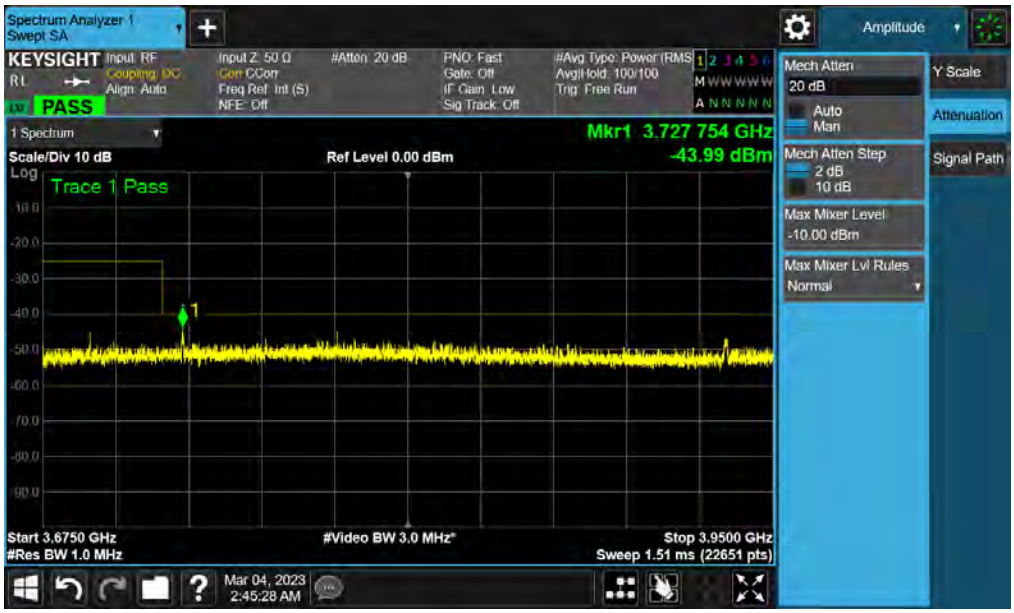
Plot 7-30. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Sub Ant)



Plot 7-31. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Sub Ant)

Plot 7-32. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Sub Ant)

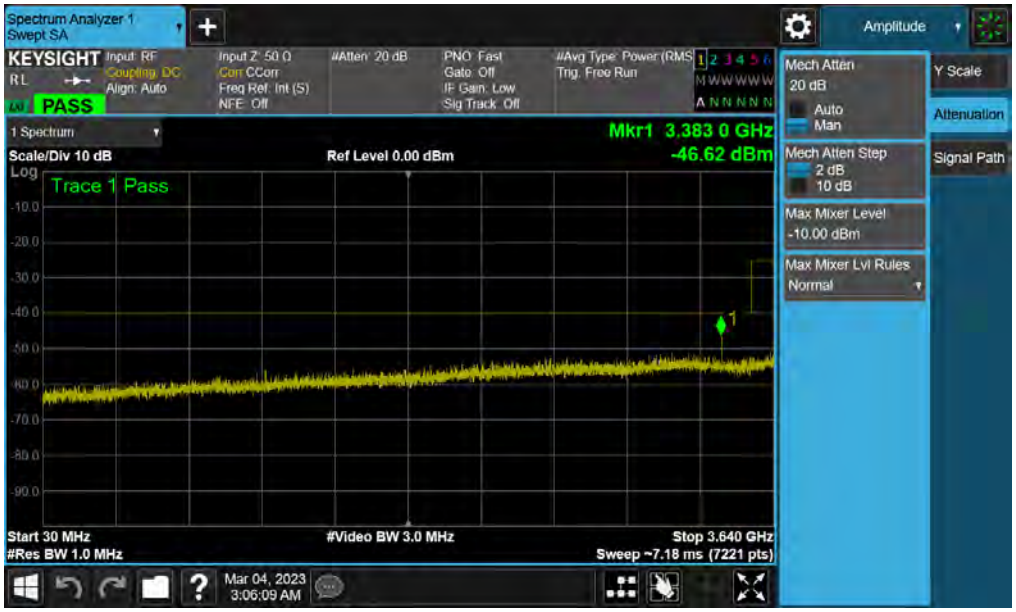
Plot 7-33. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Mid Channel - Sub Ant)



Plot 7-34. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Mid Channel - Sub Ant)

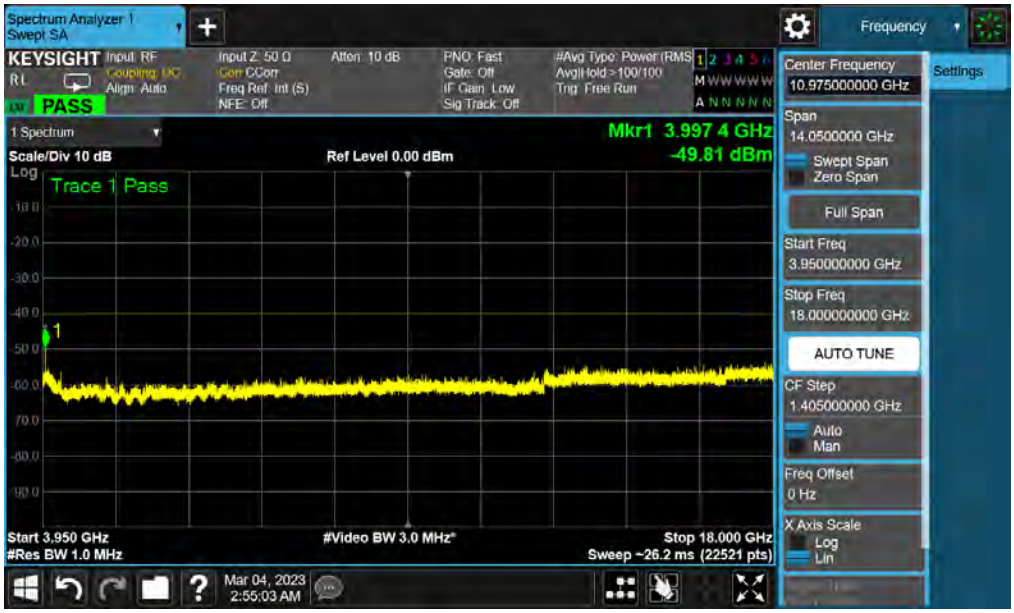
Plot 7-35. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Mid Channel - Sub Ant)

Plot 7-36. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - Mid Channel - Sub Ant)



Plot 7-37. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - High Channel - Sub Ant)

Plot 7-38. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - High Channel - Sub Ant)



Plot 7-39. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - High Channel - Sub Ant)

Plot 7-40. Conducted Spurious Plot (LTE Band 48 - 20MHz QPSK - High Channel - Sub Ant)

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 ≥ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x 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.

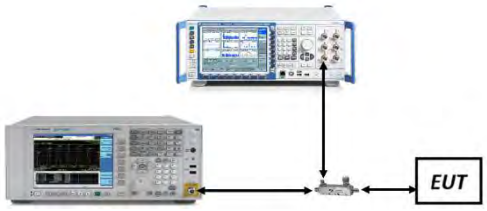


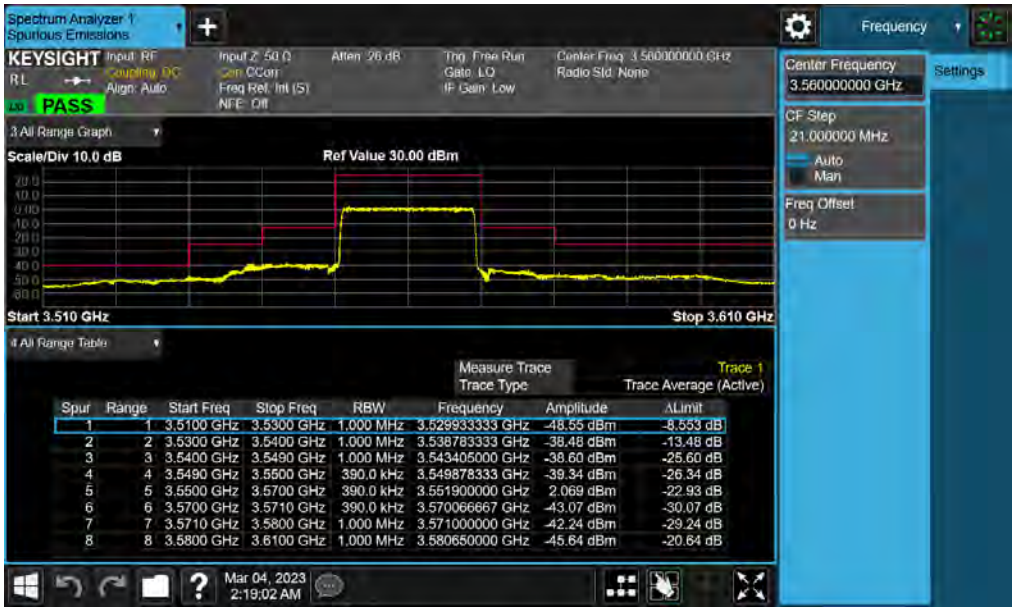
Figure 7-4. Test Instrument & Measurement Setup

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. A-MPR is applied for conducted band edge measurements.

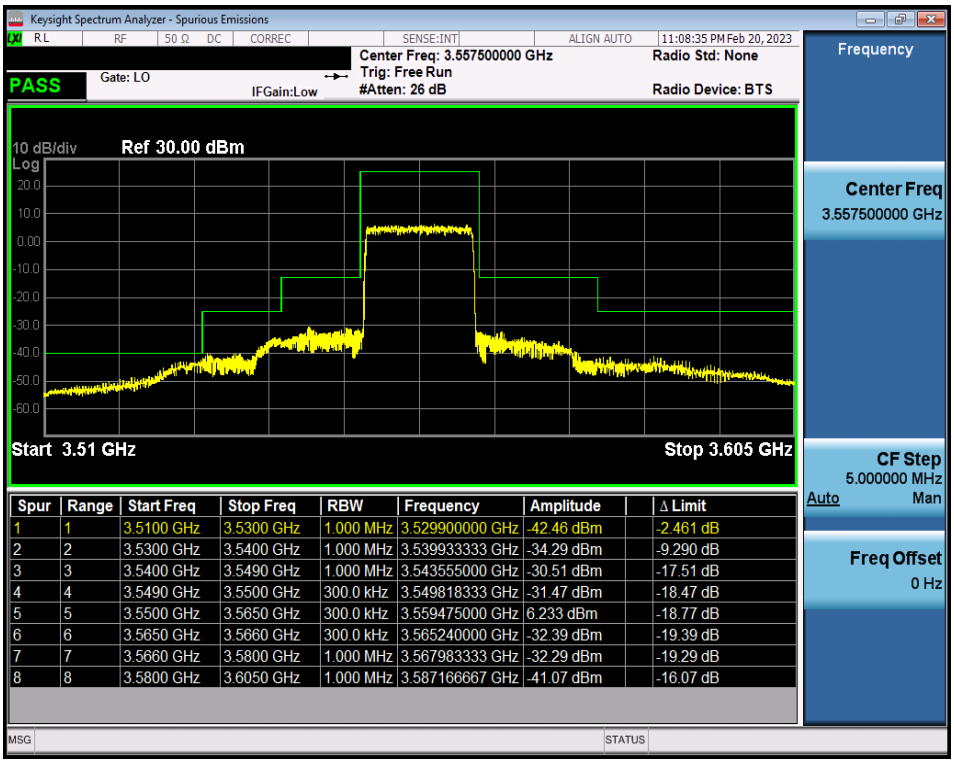
LTE Band 48 – Main Ant



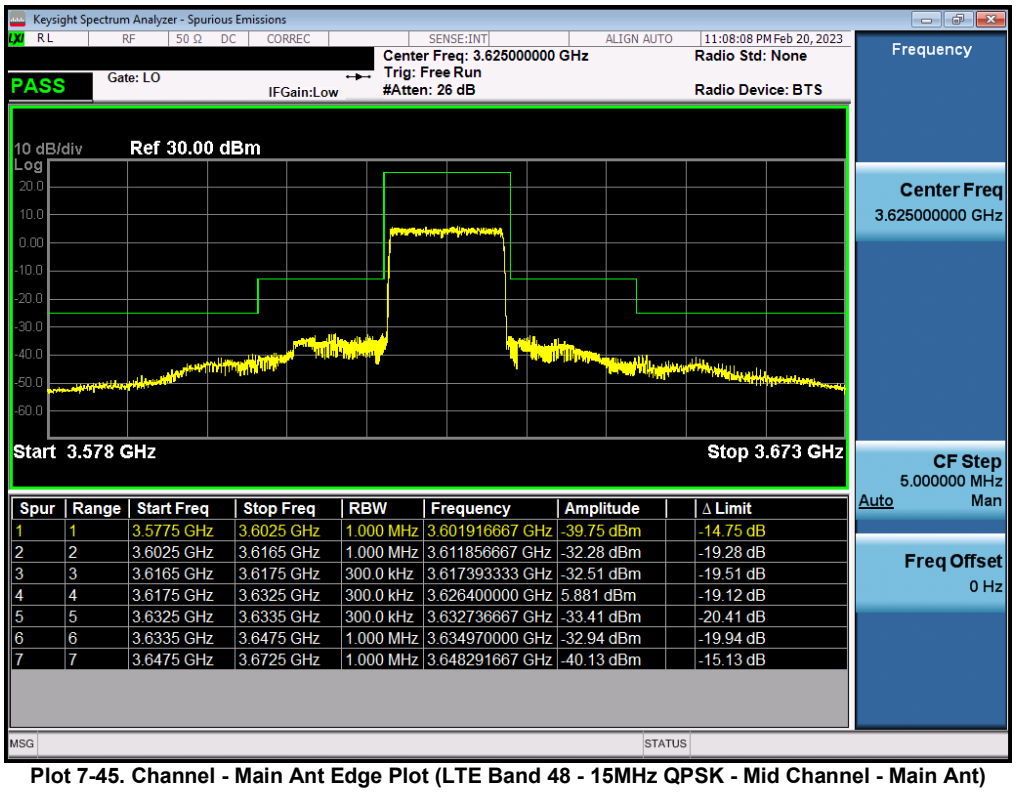
Plot 7-41. Channel - Main Ant Edge Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Main Ant)

Plot 7-42. Channel - Main Ant Edge Plot (LTE Band 48 - 20MHz QPSK - Mid Channel - Main Ant)

Plot 7-43. Channel - Main Ant Edge Plot (LTE Band 48 - 20MHz QPSK - High Channel - Main Ant)

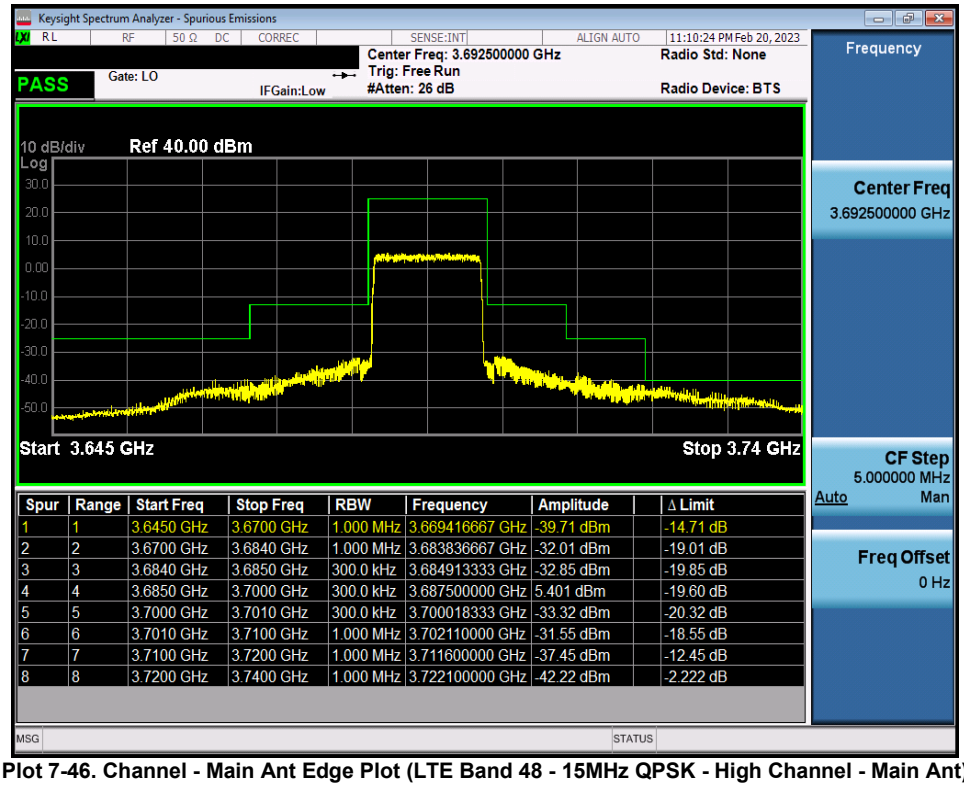


Plot 7-44. Channel - Main Ant Edge Plot (LTE Band 48 - 15MHz QPSK - Low Channel - Main Ant)



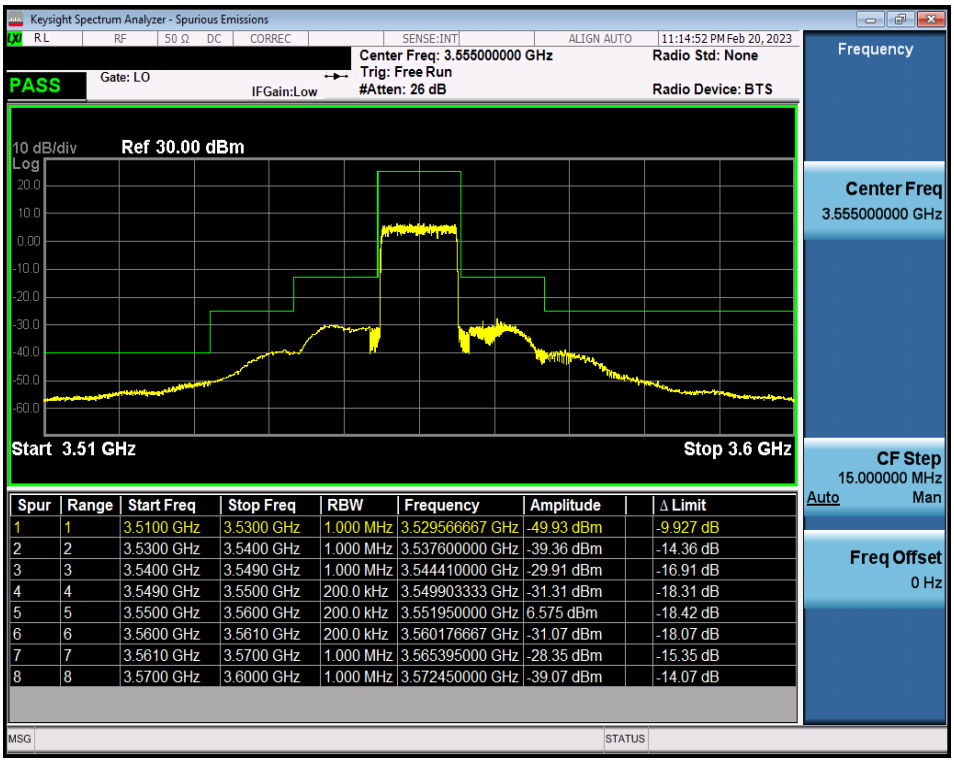
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.5775 GHz	3.6025 GHz	1.000 MHz	3.601916667 GHz	-39.75 dBm	-14.75 dB
2	2	3.6025 GHz	3.6165 GHz	1.000 MHz	3.611856667 GHz	-32.28 dBm	-19.28 dB
3	3	3.6165 GHz	3.6175 GHz	300.0 kHz	3.617393333 GHz	-32.51 dBm	-19.51 dB
4	4	3.6175 GHz	3.6325 GHz	300.0 kHz	3.626400000 GHz	5.881 dBm	-19.12 dB
5	5	3.6325 GHz	3.6335 GHz	300.0 kHz	3.632736667 GHz	-33.41 dBm	-20.41 dB
6	6	3.6335 GHz	3.6475 GHz	1.000 MHz	3.634970000 GHz	-32.94 dBm	-19.94 dB
7	7	3.6475 GHz	3.6725 GHz	1.000 MHz	3.648291667 GHz	-40.13 dBm	-15.13 dB

Plot 7-45. Channel - Main Ant Edge Plot (LTE Band 48 - 15MHz QPSK - Mid Channel - Main Ant)



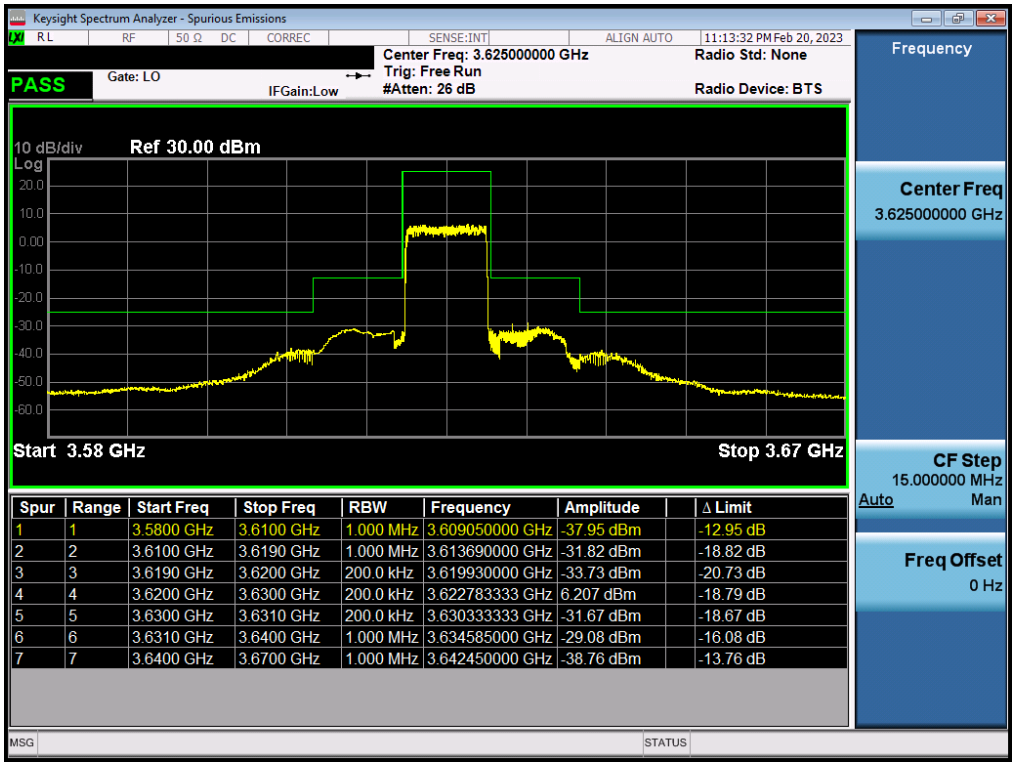
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.6450 GHz	3.6700 GHz	1.000 MHz	3.669416667 GHz	-39.71 dBm	-14.71 dB
2	2	3.6700 GHz	3.6840 GHz	1.000 MHz	3.683836667 GHz	-32.01 dBm	-19.01 dB
3	3	3.6840 GHz	3.6850 GHz	300.0 kHz	3.684913333 GHz	-32.85 dBm	-19.85 dB
4	4	3.6850 GHz	3.7000 GHz	300.0 kHz	3.687500000 GHz	5.401 dBm	-19.60 dB
5	5	3.7000 GHz	3.7010 GHz	300.0 kHz	3.700018333 GHz	-33.32 dBm	-20.32 dB
6	6	3.7010 GHz	3.7100 GHz	1.000 MHz	3.702110000 GHz	-31.55 dBm	-18.55 dB
7	7	3.7100 GHz	3.7200 GHz	1.000 MHz	3.711600000 GHz	-37.45 dBm	-12.45 dB
8	8	3.7200 GHz	3.7400 GHz	1.000 MHz	3.722100000 GHz	-42.22 dBm	-2.222 dB

Plot 7-46. Channel - Main Ant Edge Plot (LTE Band 48 - 15MHz QPSK - High Channel - Main Ant)



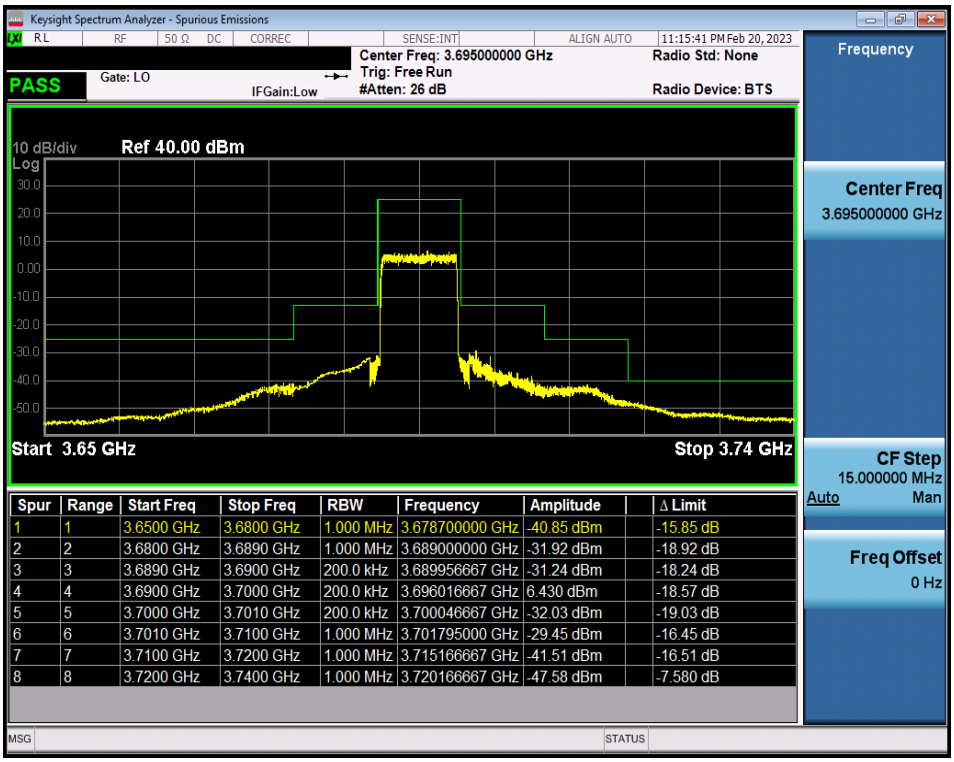
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.5100 GHz	3.5300 GHz	1.000 MHz	3.529566667 GHz	-49.93 dBm	-9.927 dB
2	2	3.5300 GHz	3.5400 GHz	1.000 MHz	3.537600000 GHz	-39.36 dBm	-14.36 dB
3	3	3.5400 GHz	3.5490 GHz	1.000 MHz	3.544410000 GHz	-29.91 dBm	-16.91 dB
4	4	3.5490 GHz	3.5500 GHz	200.0 kHz	3.549903333 GHz	-31.31 dBm	-18.31 dB
5	5	3.5500 GHz	3.5600 GHz	200.0 kHz	3.551950000 GHz	6.575 dBm	-18.42 dB
6	6	3.5600 GHz	3.5610 GHz	200.0 kHz	3.560176667 GHz	-31.07 dBm	-18.07 dB
7	7	3.5610 GHz	3.5700 GHz	1.000 MHz	3.565395000 GHz	-28.35 dBm	-15.35 dB
8	8	3.5700 GHz	3.6000 GHz	1.000 MHz	3.572450000 GHz	-39.07 dBm	-14.07 dB

Plot 7-47. Channel - Main Ant Edge Plot (LTE Band 48 - 10MHz QPSK - Low Channel - Main Ant)



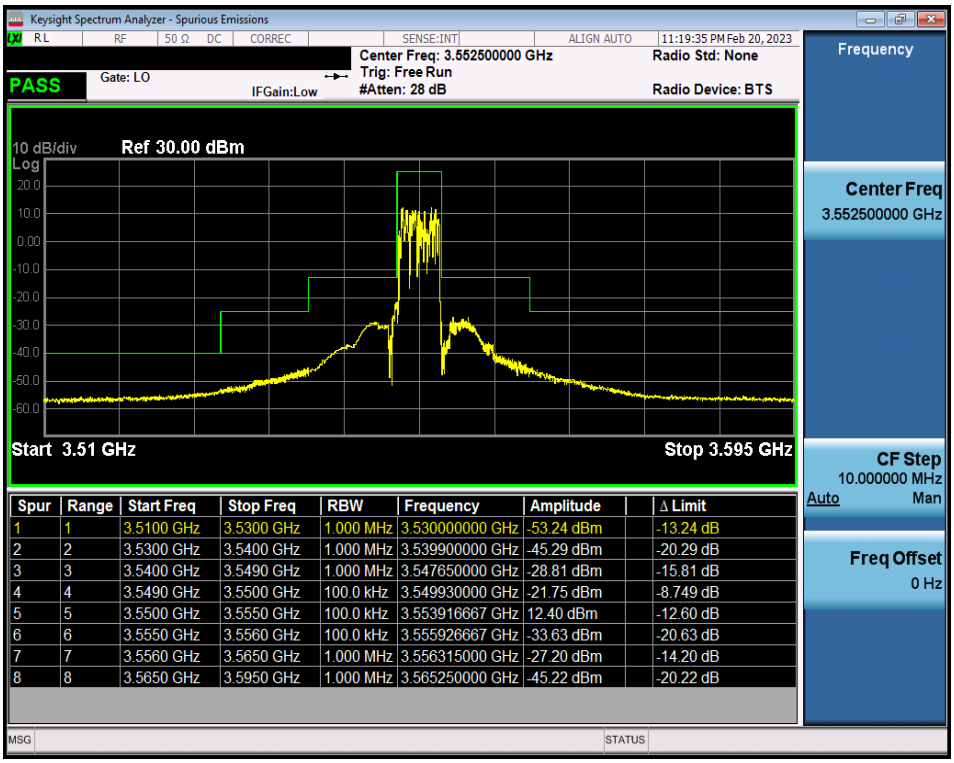
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.5800 GHz	3.6100 GHz	1.000 MHz	3.609050000 GHz	-37.95 dBm	-12.95 dB
2	2	3.6100 GHz	3.6190 GHz	1.000 MHz	3.613690000 GHz	-31.82 dBm	-18.82 dB
3	3	3.6190 GHz	3.6200 GHz	200.0 kHz	3.619930000 GHz	-33.73 dBm	-20.73 dB
4	4	3.6200 GHz	3.6300 GHz	200.0 kHz	3.622783333 GHz	6.207 dBm	-18.79 dB
5	5	3.6300 GHz	3.6310 GHz	200.0 kHz	3.630333333 GHz	-31.67 dBm	-18.67 dB
6	6	3.6310 GHz	3.6400 GHz	1.000 MHz	3.634585000 GHz	-29.08 dBm	-16.08 dB
7	7	3.6400 GHz	3.6700 GHz	1.000 MHz	3.642450000 GHz	-38.76 dBm	-13.76 dB

Plot 7-48. Channel - Main Ant Edge Plot (LTE Band 48 - 10MHz QPSK - Mid Channel - Main Ant)



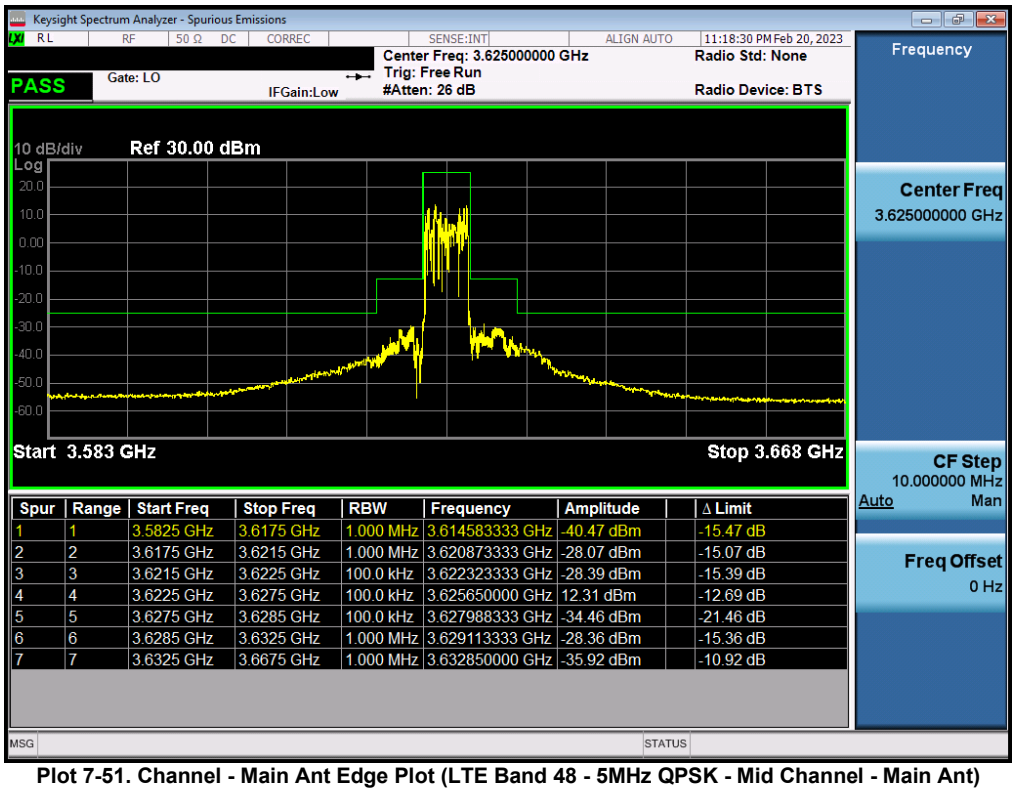
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.6500 GHz	3.6800 GHz	1.000 MHz	3.678700000 GHz	-40.85 dBm	-15.85 dB
2	2	3.6800 GHz	3.6890 GHz	1.000 MHz	3.689000000 GHz	-31.92 dBm	-18.92 dB
3	3	3.6890 GHz	3.6900 GHz	200.0 kHz	3.689956667 GHz	-31.24 dBm	-18.24 dB
4	4	3.6900 GHz	3.7000 GHz	200.0 kHz	3.696016667 GHz	6.430 dBm	-18.57 dB
5	5	3.7000 GHz	3.7010 GHz	200.0 kHz	3.700046667 GHz	-32.03 dBm	-19.03 dB
6	6	3.7010 GHz	3.7100 GHz	1.000 MHz	3.701795000 GHz	-29.45 dBm	-16.45 dB
7	7	3.7100 GHz	3.7200 GHz	1.000 MHz	3.715166667 GHz	-41.51 dBm	-16.51 dB
8	8	3.7200 GHz	3.7400 GHz	1.000 MHz	3.720166667 GHz	-47.58 dBm	-7.580 dB

Plot 7-49. Channel - Main Ant Edge Plot (LTE Band 48 - 10MHz QPSK - High Channel - Main Ant)



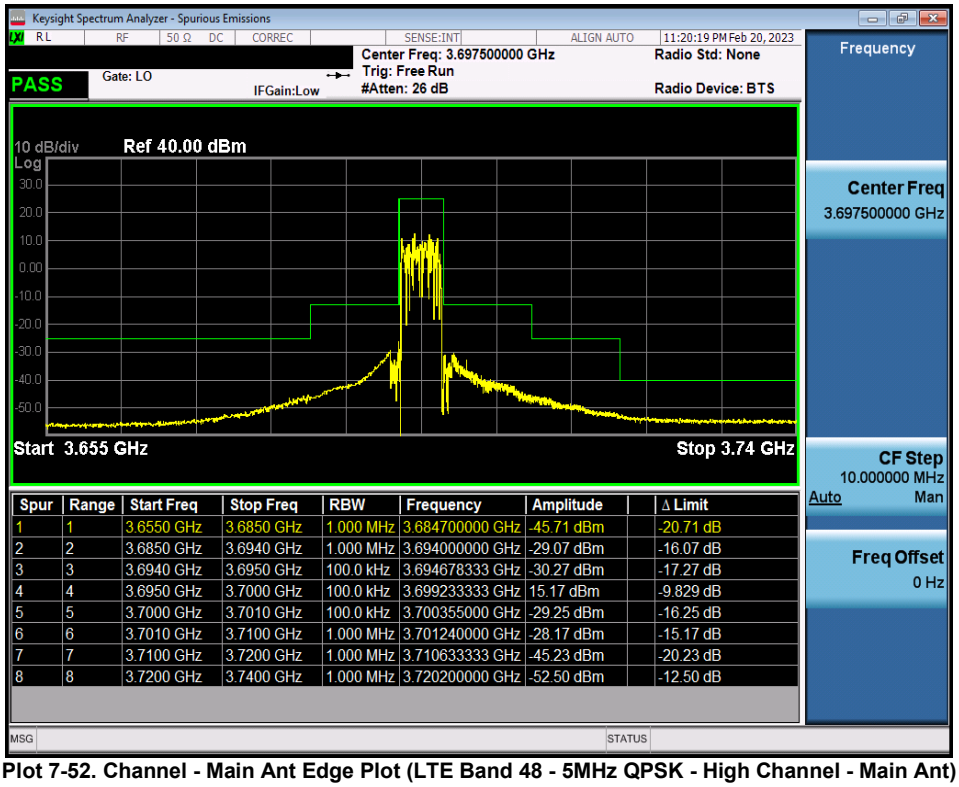
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.5100 GHz	3.5300 GHz	1.000 MHz	3.530000000 GHz	-53.24 dBm	-13.24 dB
2	2	3.5300 GHz	3.5400 GHz	1.000 MHz	3.539900000 GHz	-45.29 dBm	-20.29 dB
3	3	3.5400 GHz	3.5490 GHz	1.000 MHz	3.547650000 GHz	-28.81 dBm	-15.81 dB
4	4	3.5490 GHz	3.5500 GHz	100.0 kHz	3.549930000 GHz	-21.75 dBm	-8.749 dB
5	5	3.5500 GHz	3.5550 GHz	100.0 kHz	3.553916667 GHz	12.40 dBm	-12.60 dB
6	6	3.5550 GHz	3.5560 GHz	100.0 kHz	3.555926667 GHz	-33.63 dBm	-20.63 dB
7	7	3.5560 GHz	3.5650 GHz	1.000 MHz	3.556315000 GHz	-27.20 dBm	-14.20 dB
8	8	3.5650 GHz	3.5950 GHz	1.000 MHz	3.565250000 GHz	-45.22 dBm	-20.22 dB

Plot 7-50. Channel - Main Ant Edge Plot (LTE Band 48 - 5MHz QPSK - Low Channel - Main Ant)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.5825 GHz	3.6175 GHz	1.000 MHz	3.614583333 GHz	-40.47 dBm	-15.47 dB
2	2	3.6175 GHz	3.6215 GHz	1.000 MHz	3.620873333 GHz	-28.07 dBm	-15.07 dB
3	3	3.6215 GHz	3.6225 GHz	100.0 kHz	3.622323333 GHz	-28.39 dBm	-15.39 dB
4	4	3.6225 GHz	3.6275 GHz	100.0 kHz	3.625650000 GHz	12.31 dBm	-12.69 dB
5	5	3.6275 GHz	3.6285 GHz	100.0 kHz	3.627988333 GHz	-34.46 dBm	-21.46 dB
6	6	3.6285 GHz	3.6325 GHz	1.000 MHz	3.629113333 GHz	-28.36 dBm	-15.36 dB
7	7	3.6325 GHz	3.6675 GHz	1.000 MHz	3.632850000 GHz	-35.92 dBm	-10.92 dB

Plot 7-51. Channel - Main Ant Edge Plot (LTE Band 48 - 5MHz QPSK - Mid Channel - Main Ant)

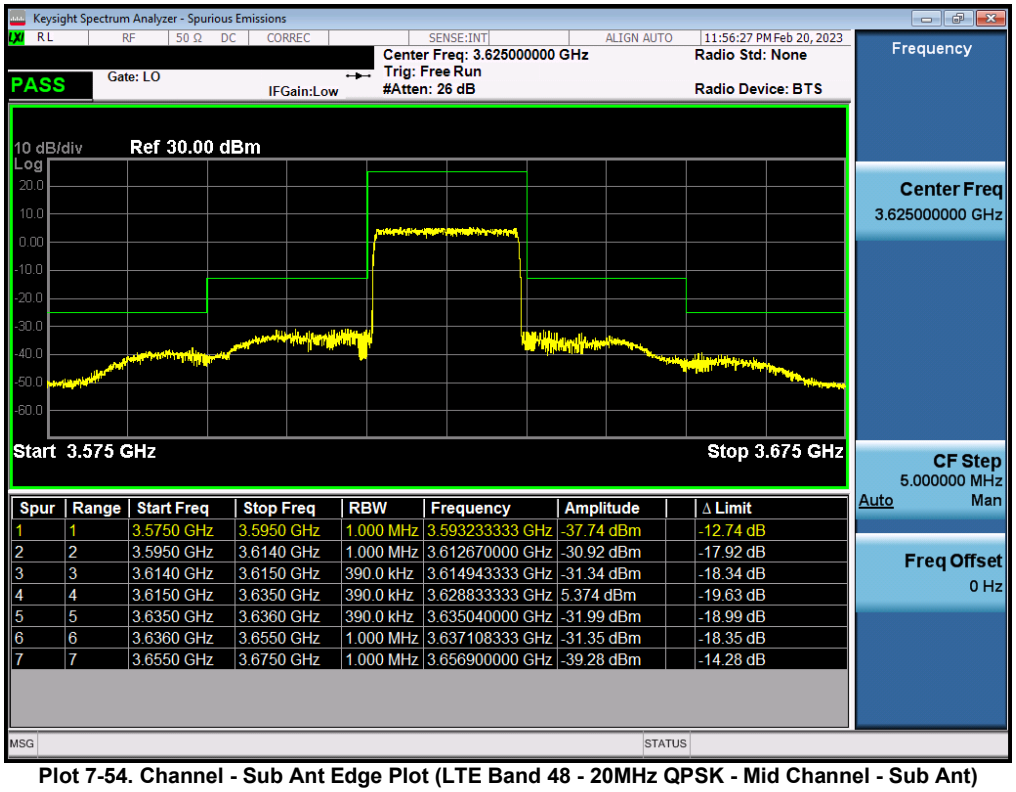


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.6550 GHz	3.6850 GHz	1.000 MHz	3.684700000 GHz	-45.71 dBm	-20.71 dB
2	2	3.6850 GHz	3.6940 GHz	1.000 MHz	3.694000000 GHz	-29.07 dBm	-16.07 dB
3	3	3.6940 GHz	3.6950 GHz	100.0 kHz	3.694678333 GHz	-30.27 dBm	-17.27 dB
4	4	3.6950 GHz	3.7000 GHz	100.0 kHz	3.699233333 GHz	15.17 dBm	-9.829 dB
5	5	3.7000 GHz	3.7010 GHz	100.0 kHz	3.700355000 GHz	-29.25 dBm	-16.25 dB
6	6	3.7010 GHz	3.7100 GHz	1.000 MHz	3.701240000 GHz	-28.17 dBm	-15.17 dB
7	7	3.7100 GHz	3.7200 GHz	1.000 MHz	3.710633333 GHz	-45.23 dBm	-20.23 dB
8	8	3.7200 GHz	3.7400 GHz	1.000 MHz	3.720200000 GHz	-52.50 dBm	-12.50 dB

Plot 7-52. Channel - Main Ant Edge Plot (LTE Band 48 - 5MHz QPSK - High Channel - Main Ant)

LTE Band 48 – Sub Ant

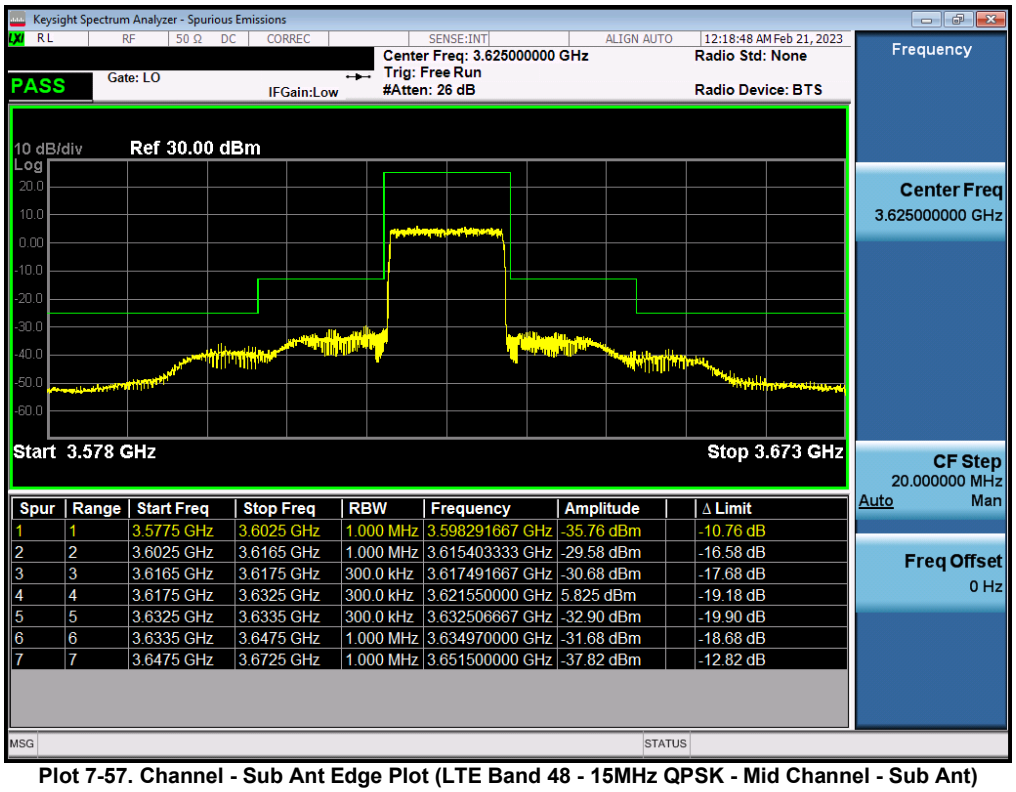
Plot 7-53. Channel - Sub Ant Edge Plot (LTE Band 48 - 20MHz QPSK - Low Channel - Sub Ant)



Plot 7-54. Channel - Sub Ant Edge Plot (LTE Band 48 - 20MHz QPSK - Mid Channel - Sub Ant)

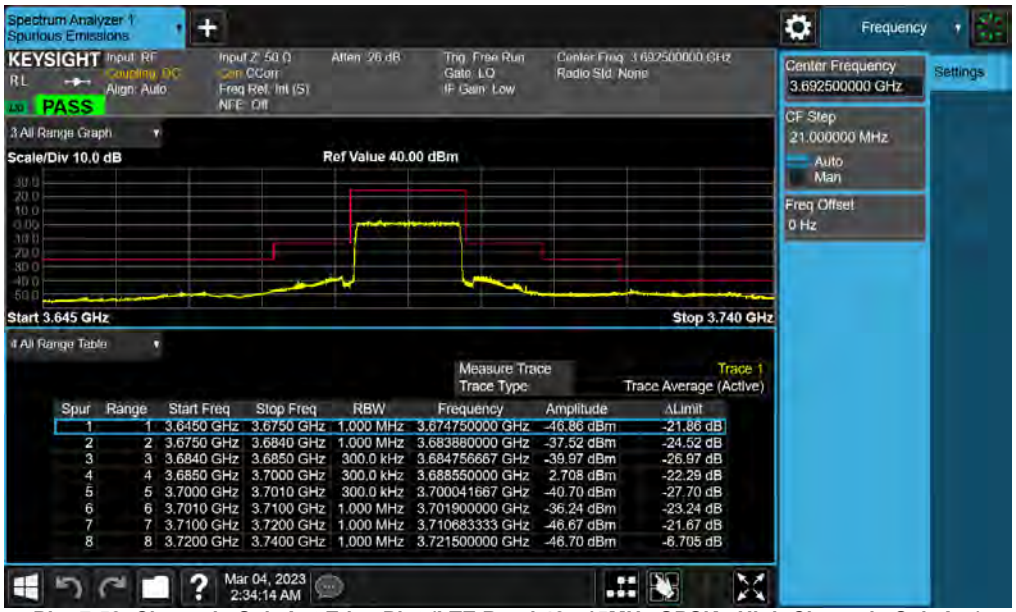
Plot 7-55. Channel - Sub Ant Edge Plot (LTE Band 48 - 20MHz QPSK - High Channel - Sub Ant)

Plot 7-56. Channel - Sub Ant Edge Plot (LTE Band 48 - 15MHz QPSK - Low Channel - Sub Ant)



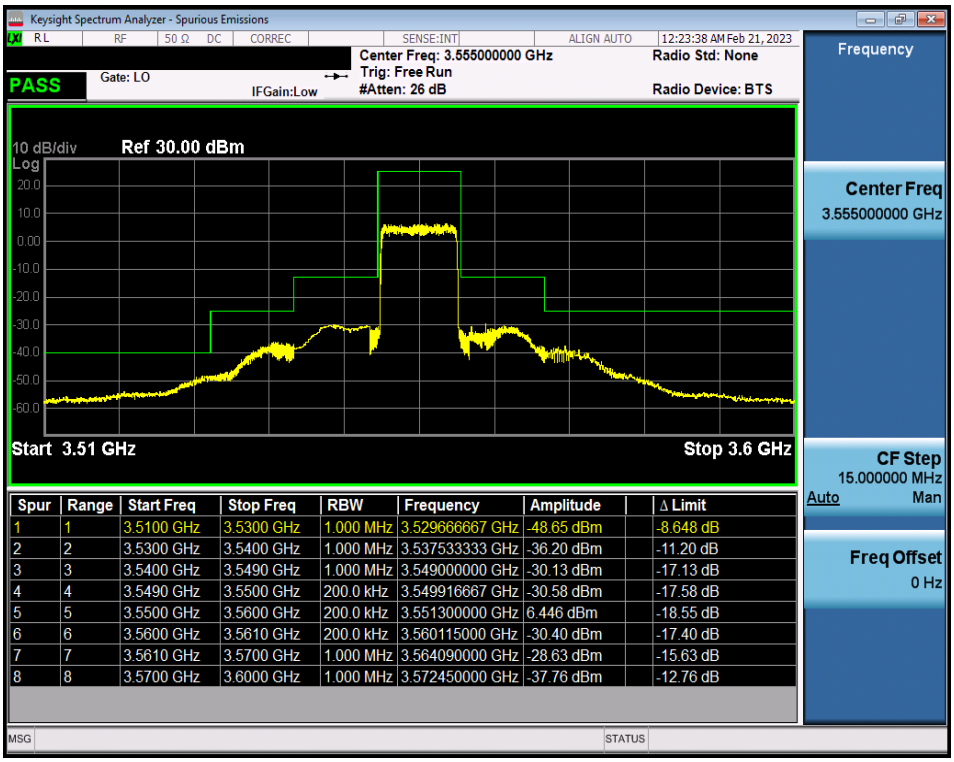
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.5775 GHz	3.6025 GHz	1.000 MHz	3.598291667 GHz	-35.76 dBm	-10.76 dB
2	2	3.6025 GHz	3.6165 GHz	1.000 MHz	3.615403333 GHz	-29.58 dBm	-16.58 dB
3	3	3.6165 GHz	3.6175 GHz	300.0 kHz	3.617491667 GHz	-30.68 dBm	-17.68 dB
4	4	3.6175 GHz	3.6325 GHz	300.0 kHz	3.621550000 GHz	5.825 dBm	-19.18 dB
5	5	3.6325 GHz	3.6335 GHz	300.0 kHz	3.632506667 GHz	-32.90 dBm	-19.90 dB
6	6	3.6335 GHz	3.6475 GHz	1.000 MHz	3.634970000 GHz	-31.68 dBm	-18.68 dB
7	7	3.6475 GHz	3.6725 GHz	1.000 MHz	3.651500000 GHz	-37.82 dBm	-12.82 dB

Plot 7-57. Channel - Sub Ant Edge Plot (LTE Band 48 - 15MHz QPSK - Mid Channel - Sub Ant)



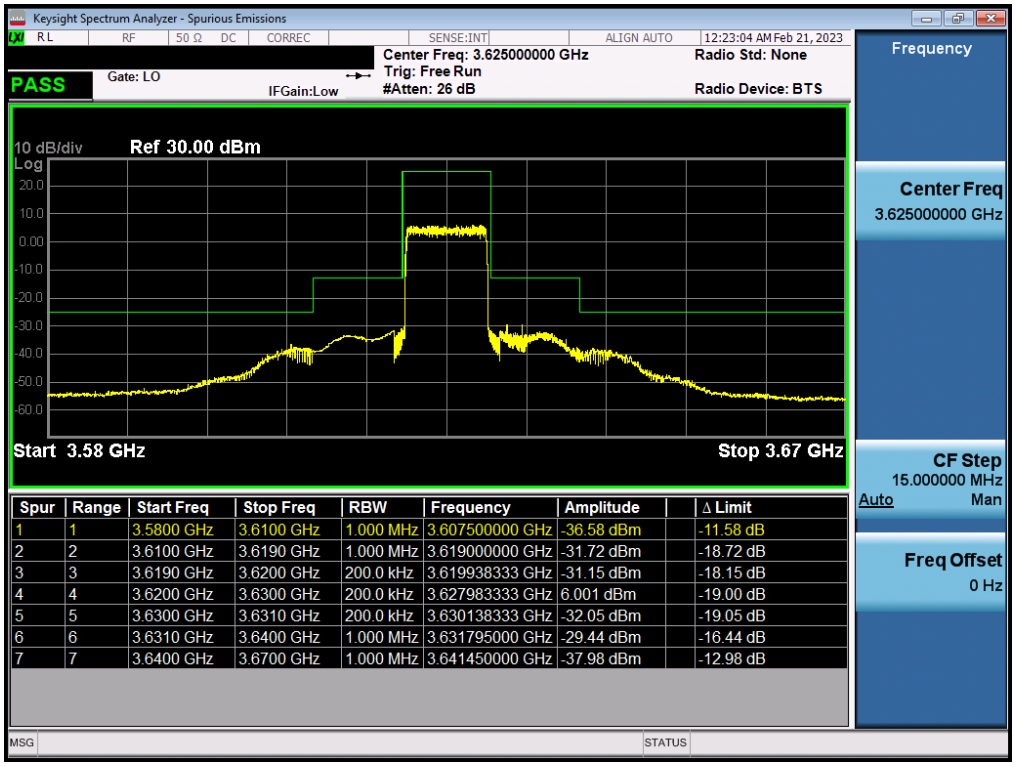
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	ΔLimit
1	1	3.6450 GHz	3.6750 GHz	1.000 MHz	3.674750000 GHz	-46.86 dBm	-21.86 dB
2	2	3.6750 GHz	3.6840 GHz	1.000 MHz	3.683880000 GHz	-37.52 dBm	-24.52 dB
3	3	3.6840 GHz	3.6850 GHz	300.0 kHz	3.684756667 GHz	-39.97 dBm	-26.97 dB
4	4	3.6850 GHz	3.7000 GHz	300.0 kHz	3.688550000 GHz	2.708 dBm	-22.29 dB
5	5	3.7000 GHz	3.7010 GHz	300.0 kHz	3.700041667 GHz	-40.70 dBm	-27.70 dB
6	6	3.7010 GHz	3.7100 GHz	1.000 MHz	3.701900000 GHz	-36.24 dBm	-23.24 dB
7	7	3.7100 GHz	3.7200 GHz	1.000 MHz	3.710683333 GHz	-46.67 dBm	-21.67 dB
8	8	3.7200 GHz	3.7400 GHz	1.000 MHz	3.721500000 GHz	-46.70 dBm	-6.705 dB

Plot 7-58. Channel - Sub Ant Edge Plot (LTE Band 48 - 15MHz QPSK - High Channel - Sub Ant)



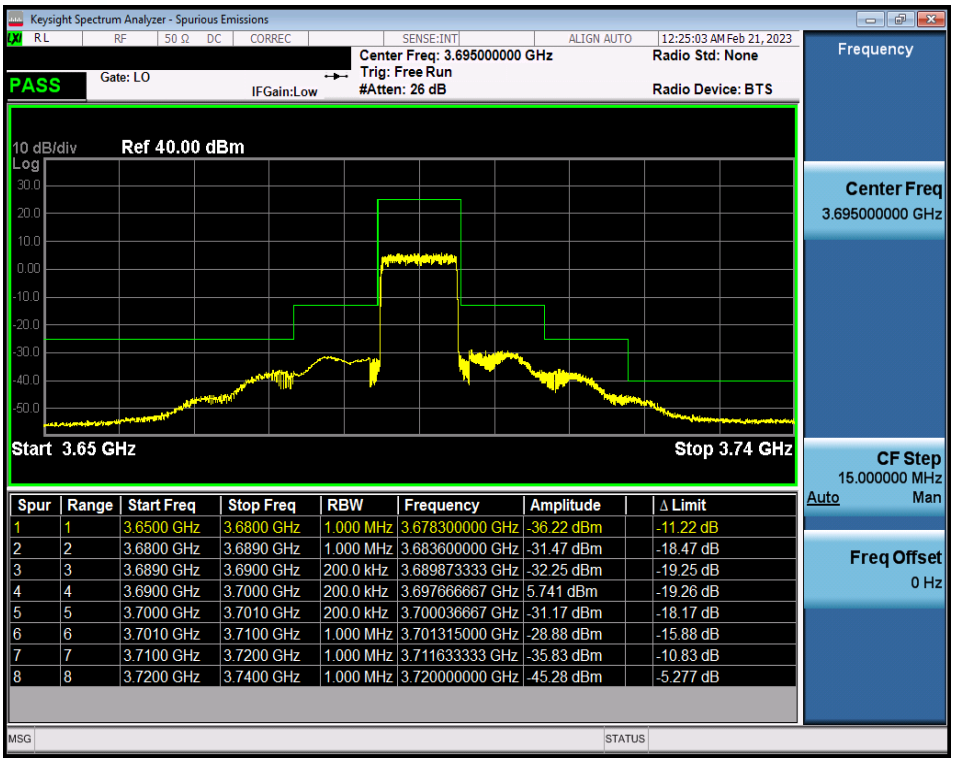
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.5100 GHz	3.5300 GHz	1.000 MHz	3.529666667 GHz	-48.65 dBm	-8.648 dB
2	2	3.5300 GHz	3.5400 GHz	1.000 MHz	3.537533333 GHz	-36.20 dBm	-11.20 dB
3	3	3.5400 GHz	3.5490 GHz	1.000 MHz	3.549000000 GHz	-30.13 dBm	-17.13 dB
4	4	3.5490 GHz	3.5500 GHz	200.0 kHz	3.549916667 GHz	-30.58 dBm	-17.58 dB
5	5	3.5500 GHz	3.5600 GHz	200.0 kHz	3.551300000 GHz	6.446 dBm	-18.55 dB
6	6	3.5600 GHz	3.5610 GHz	200.0 kHz	3.560115000 GHz	-30.40 dBm	-17.40 dB
7	7	3.5610 GHz	3.5700 GHz	1.000 MHz	3.564090000 GHz	-28.63 dBm	-15.63 dB
8	8	3.5700 GHz	3.6000 GHz	1.000 MHz	3.572450000 GHz	-37.76 dBm	-12.76 dB

Plot 7-59. Channel - Sub Ant Edge Plot (LTE Band 48 - 10MHz QPSK - Low Channel - Sub Ant)



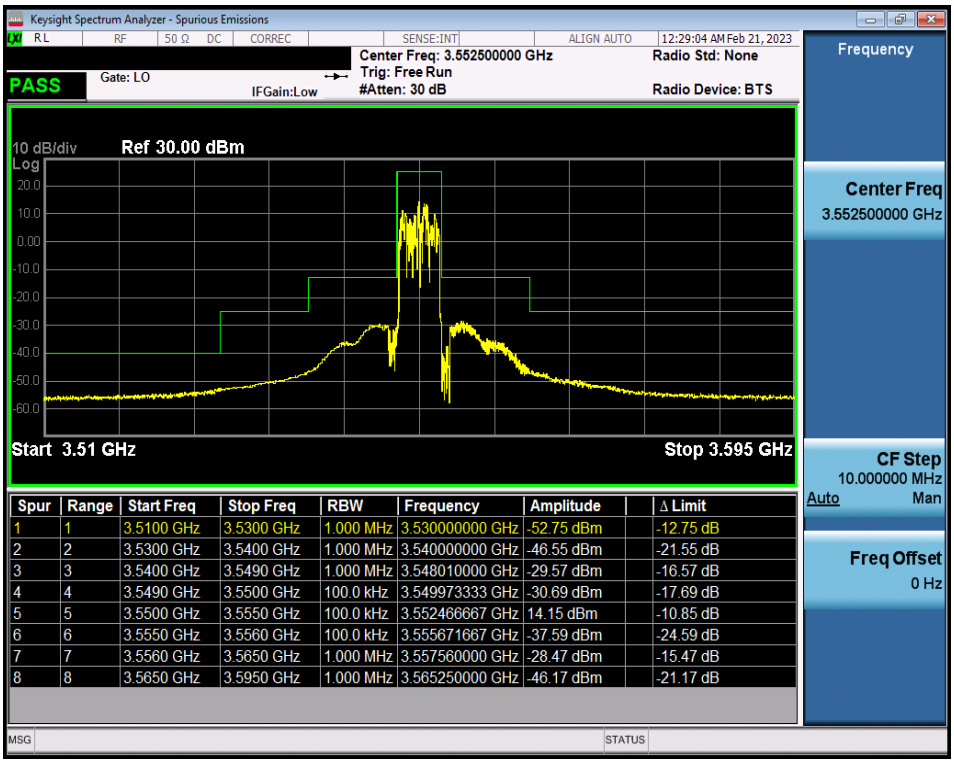
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.5800 GHz	3.6100 GHz	1.000 MHz	3.607500000 GHz	-36.58 dBm	-11.58 dB
2	2	3.6100 GHz	3.6190 GHz	1.000 MHz	3.619000000 GHz	-31.72 dBm	-18.72 dB
3	3	3.6190 GHz	3.6200 GHz	200.0 kHz	3.619938333 GHz	-31.15 dBm	-18.15 dB
4	4	3.6200 GHz	3.6300 GHz	200.0 kHz	3.627983333 GHz	6.001 dBm	-19.00 dB
5	5	3.6300 GHz	3.6310 GHz	200.0 kHz	3.630138333 GHz	-32.05 dBm	-19.05 dB
6	6	3.6310 GHz	3.6400 GHz	1.000 MHz	3.631795000 GHz	-29.44 dBm	-16.44 dB
7	7	3.6400 GHz	3.6700 GHz	1.000 MHz	3.641450000 GHz	-37.98 dBm	-12.98 dB

Plot 7-60. Channel - Sub Ant Edge Plot (LTE Band 48 - 10MHz QPSK - Mid Channel - Sub Ant)



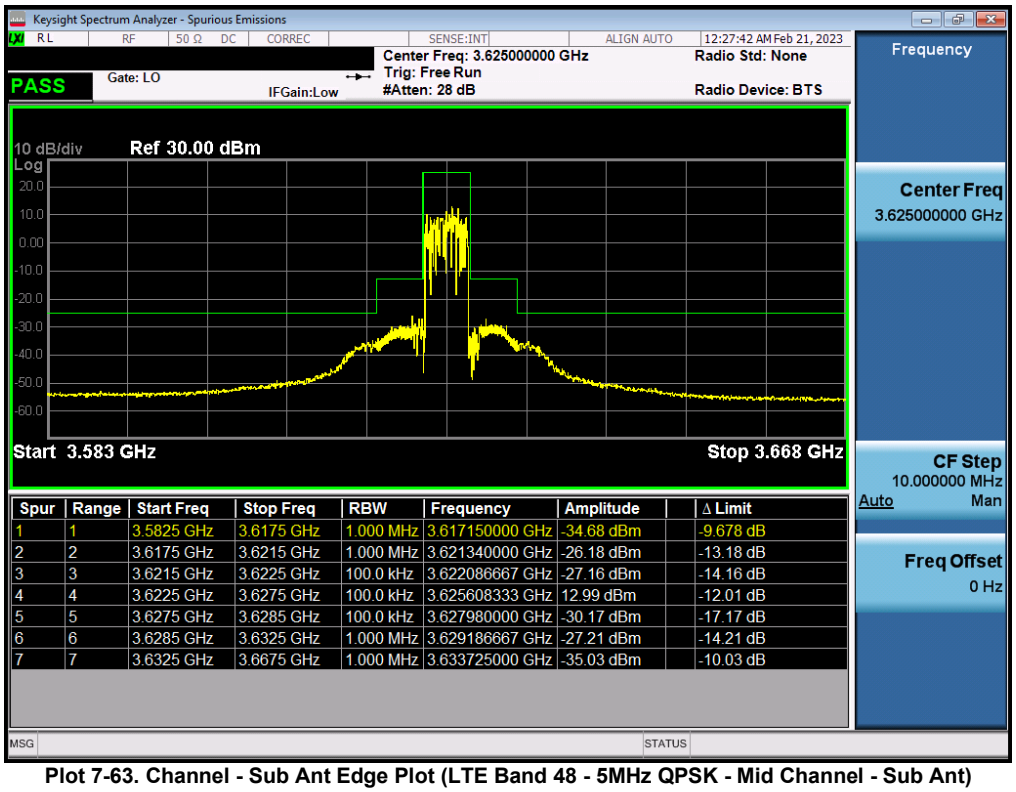
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.6500 GHz	3.6800 GHz	1.000 MHz	3.678300000 GHz	-36.22 dBm	-11.22 dB
2	2	3.6800 GHz	3.6890 GHz	1.000 MHz	3.683600000 GHz	-31.47 dBm	-18.47 dB
3	3	3.6890 GHz	3.6900 GHz	200.0 kHz	3.689873333 GHz	-32.25 dBm	-19.25 dB
4	4	3.6900 GHz	3.7000 GHz	200.0 kHz	3.697666667 GHz	5.741 dBm	-19.26 dB
5	5	3.7000 GHz	3.7010 GHz	200.0 kHz	3.700036667 GHz	-31.17 dBm	-18.17 dB
6	6	3.7010 GHz	3.7100 GHz	1.000 MHz	3.701315000 GHz	-28.88 dBm	-15.88 dB
7	7	3.7100 GHz	3.7200 GHz	1.000 MHz	3.711633333 GHz	-35.83 dBm	-10.83 dB
8	8	3.7200 GHz	3.7400 GHz	1.000 MHz	3.720000000 GHz	-45.28 dBm	-5.277 dB

Plot 7-61. Channel - Sub Ant Edge Plot (LTE Band 48 - 10MHz QPSK - High Channel - Sub Ant)



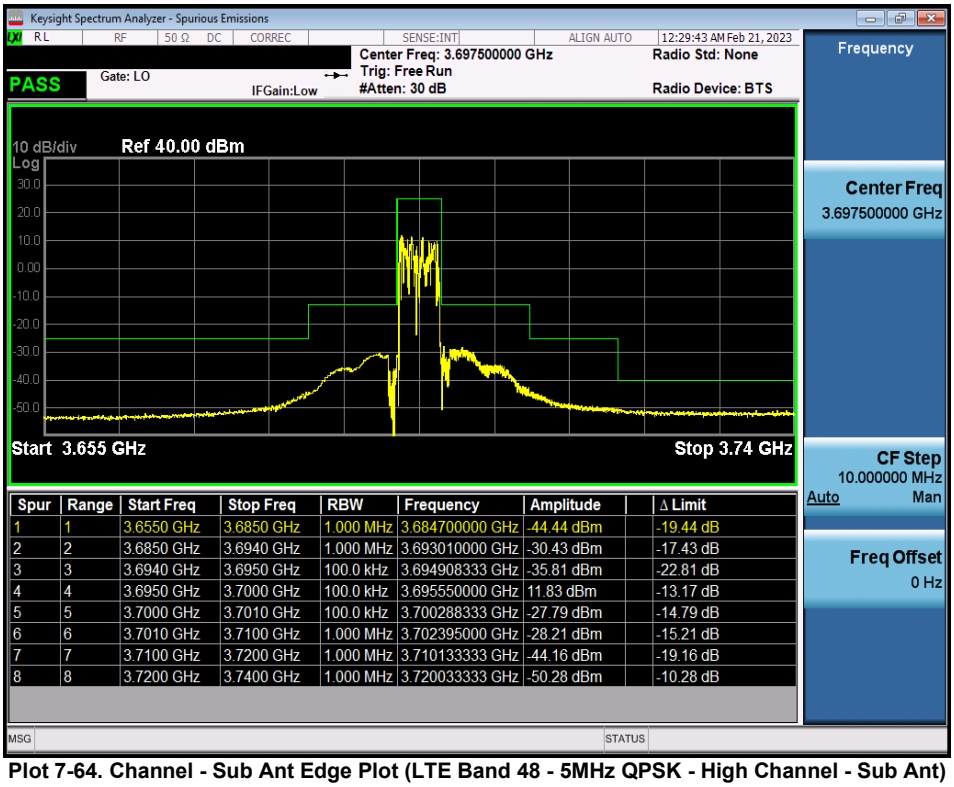
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.5100 GHz	3.5300 GHz	1.000 MHz	3.530000000 GHz	-52.75 dBm	-12.75 dB
2	2	3.5300 GHz	3.5400 GHz	1.000 MHz	3.540000000 GHz	-46.55 dBm	-21.55 dB
3	3	3.5400 GHz	3.5490 GHz	1.000 MHz	3.548010000 GHz	-29.57 dBm	-16.57 dB
4	4	3.5490 GHz	3.5500 GHz	100.0 kHz	3.549973333 GHz	-30.69 dBm	-17.69 dB
5	5	3.5500 GHz	3.5550 GHz	100.0 kHz	3.552466667 GHz	14.15 dBm	-10.85 dB
6	6	3.5550 GHz	3.5560 GHz	100.0 kHz	3.555671667 GHz	-37.59 dBm	-24.59 dB
7	7	3.5560 GHz	3.5650 GHz	1.000 MHz	3.557560000 GHz	-28.47 dBm	-15.47 dB
8	8	3.5650 GHz	3.5950 GHz	1.000 MHz	3.565250000 GHz	-46.17 dBm	-21.17 dB

Plot 7-62. Channel - Sub Ant Edge Plot (LTE Band 48 - 5MHz QPSK - Low Channel - Sub Ant)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.5825 GHz	3.6175 GHz	1.000 MHz	3.617150000 GHz	-34.68 dBm	-9.678 dB
2	2	3.6175 GHz	3.6215 GHz	1.000 MHz	3.621340000 GHz	-26.18 dBm	-13.18 dB
3	3	3.6215 GHz	3.6225 GHz	100.0 kHz	3.622086667 GHz	-27.16 dBm	-14.16 dB
4	4	3.6225 GHz	3.6275 GHz	100.0 kHz	3.625608333 GHz	12.99 dBm	-12.01 dB
5	5	3.6275 GHz	3.6285 GHz	100.0 kHz	3.627980000 GHz	-30.17 dBm	-17.17 dB
6	6	3.6285 GHz	3.6325 GHz	1.000 MHz	3.629186667 GHz	-27.21 dBm	-14.21 dB
7	7	3.6325 GHz	3.6675 GHz	1.000 MHz	3.633725000 GHz	-35.03 dBm	-10.03 dB

Plot 7-63. Channel - Sub Ant Edge Plot (LTE Band 48 - 5MHz QPSK - Mid Channel - Sub Ant)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.6550 GHz	3.6850 GHz	1.000 MHz	3.684700000 GHz	-44.44 dBm	-19.44 dB
2	2	3.6850 GHz	3.6940 GHz	1.000 MHz	3.693010000 GHz	-30.43 dBm	-17.43 dB
3	3	3.6940 GHz	3.6950 GHz	100.0 kHz	3.694908333 GHz	-35.81 dBm	-22.81 dB
4	4	3.6950 GHz	3.7000 GHz	100.0 kHz	3.695550000 GHz	11.83 dBm	-13.17 dB
5	5	3.7000 GHz	3.7010 GHz	100.0 kHz	3.700288333 GHz	-27.79 dBm	-14.79 dB
6	6	3.7010 GHz	3.7100 GHz	1.000 MHz	3.702395000 GHz	-28.21 dBm	-15.21 dB
7	7	3.7100 GHz	3.7200 GHz	1.000 MHz	3.710133333 GHz	-44.16 dBm	-19.16 dB
8	8	3.7200 GHz	3.7400 GHz	1.000 MHz	3.720033333 GHz	-50.28 dBm	-10.28 dB

Plot 7-64. Channel - Sub Ant Edge Plot (LTE Band 48 - 5MHz QPSK - High Channel - Sub Ant)

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 ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration.
8. The integration bandwidth was 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.

Test Setup

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

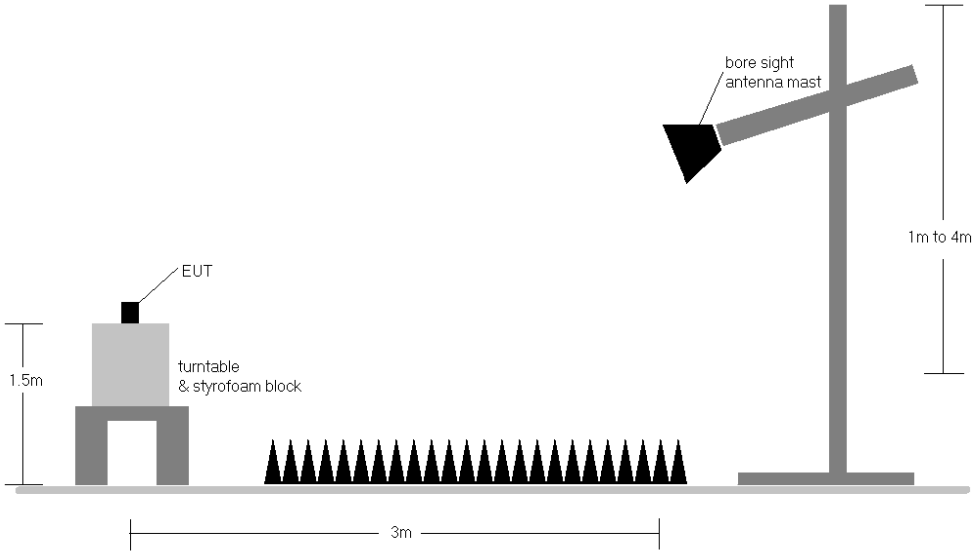


Figure 7-5. Radiated Test Setup >1GHz

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) 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).

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]
20 MHz	QPSK	3560.00	H	102	25	7.37	1 / 99	12.67	20.04	0.101	23.00	-2.96
	QPSK	3625.00	H	103	18	6.77	1 / 99	14.14	**20.91**	**0.123**	23.00	-2.09
	QPSK	3690.00	H	103	26	6.15	1 / 0	13.92	20.07	0.102	23.00	-2.93
	16-QAM	3560.00	H	102	25	7.37	1 / 50	12.07	19.44	0.088	23.00	-3.56
	16-QAM	3625.00	H	103	18	6.77	1 / 99	13.39	20.16	0.104	23.00	-2.84
	16-QAM	3690.00	H	103	26	6.15	1 / 0	13.31	19.46	0.088	23.00	-3.54
15 MHz	QPSK	3557.50	H	102	25	7.40	1 / 9	12.59	19.99	0.100	23.00	-3.01
	QPSK	3625.00	H	103	18	6.77	1 / 9	14.69	**21.46**	**0.140**	23.00	-1.54
	QPSK	3692.50	H	103	26	6.12	1 / 28	13.99	20.11	0.102	23.00	-2.89
	16-QAM	3557.50	H	102	25	7.40	1 / 9	11.60	19.00	0.080	23.00	-4.00
	16-QAM	3625.00	H	103	18	6.77	1 / 28	13.43	20.20	0.105	23.00	-2.80
	16-QAM	3692.50	H	103	26	6.12	1 / 28	12.59	18.71	0.074	23.00	-4.29
10 MHz	QPSK	3555.00	H	102	25	7.43	1 / 12	12.52	19.94	0.099	23.00	-3.06
	QPSK	3625.00	H	103	18	6.77	1 / 17	14.38	**21.15**	**0.130**	23.00	-1.85
	QPSK	3695.00	H	103	26	6.09	1 / 17	13.75	19.85	0.096	23.00	-3.15
	16-QAM	3555.00	H	102	25	7.43	1 / 12	11.67	19.09	0.081	23.00	-3.91
	16-QAM	3625.00	H	103	18	6.77	1 / 17	13.65	20.42	0.110	23.00	-2.58
	16-QAM	3695.00	H	103	26	6.09	1 / 17	12.65	18.75	0.075	23.00	-4.25
5 MHz	QPSK	3552.50	H	102	25	7.45	1 / 5	12.55	20.00	0.100	23.00	-3.00
	QPSK	3625.00	H	103	18	6.77	1 / 5	14.35	**21.12**	**0.129**	23.00	-1.88
	QPSK	3697.50	H	103	26	6.06	1 / 3	13.73	19.80	0.095	23.00	-3.20
	16-QAM	3552.50	H	102	25	7.45	1 / 5	11.88	19.33	0.086	23.00	-3.67
	16-QAM	3625.00	H	103	18	6.77	1 / 5	13.34	20.11	0.103	23.00	-2.89
	16-QAM	3697.50	H	103	26	6.06	1 / 3	12.98	19.05	0.080	23.00	-3.95
20 MHz	QPSK (WCP)	3625.00	H	102	343	6.77	1 / 99	9.38	16.15	0.041	23.00	-6.85

Table 7-5. EIRP Data (LTE Band 48 – Main Ant)

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]
20 MHz	QPSK	3560.00	H	218	15	7.37	1 / 0	10.27	**17.64**	**0.058**	23.00	-5.36
	QPSK	3625.00	H	169	360	6.77	1 / 0	10.08	16.85	0.048	23.00	-6.15
	QPSK	3690.00	H	159	353	6.15	1 / 50	10.70	16.85	0.048	23.00	-6.15
	16-QAM	3560.00	H	218	15	7.37	1 / 50	9.53	16.90	0.049	23.00	-6.10
	16-QAM	3625.00	H	169	360	6.77	1 / 50	9.40	16.17	0.041	23.00	-6.83
	16-QAM	3690.00	H	159	353	6.15	1 / 50	10.09	16.24	0.042	23.00	-6.76
15 MHz	QPSK	3557.50	H	218	15	7.40	1/37	10.31	**17.71**	**0.059**	23.00	-5.29
	QPSK	3625.00	H	169	360	6.77	1/74	10.24	17.01	0.050	23.00	-5.99
	QPSK	3692.50	H	159	353	6.12	1/37	10.66	16.78	0.048	23.00	-6.22
	16-QAM	3557.50	H	218	15	7.40	1/37	9.27	16.67	0.046	23.00	-6.33
	16-QAM	3625.00	H	169	360	6.77	1/74	9.14	15.91	0.039	23.00	-7.09
	16-QAM	3692.50	H	159	353	6.12	1/37	10.43	16.55	0.045	23.00	-6.45
10 MHz	QPSK	3555.00	H	218	15	7.43	1/49	10.58	**18.00**	**0.063**	23.00	-5.00
	QPSK	3625.00	H	169	360	6.77	1/49	10.33	17.10	0.051	23.00	-5.90
	QPSK	3695.00	H	159	353	6.09	1/0	10.98	17.08	0.051	23.00	-5.92
	16-QAM	3555.00	H	218	15	7.43	1/49	9.68	17.10	0.051	23.00	-5.90
	16-QAM	3625.00	H	169	360	6.77	1/49	9.47	16.24	0.042	23.00	-6.76
	16-QAM	3695.00	H	159	353	6.09	1/0	10.81	16.91	0.049	23.00	-6.09
5 MHz	QPSK	3552.50	H	218	15	7.45	1/12	10.56	**18.01**	**0.063**	23.00	-4.99
	QPSK	3625.00	H	169	360	6.77	1/12	10.44	17.21	0.053	23.00	-5.79
	QPSK	3697.50	H	159	353	6.06	1/24	10.88	16.95	0.049	23.00	-6.05
	16-QAM	3552.50	H	218	15	7.45	1/12	9.40	16.85	0.048	23.00	-6.15
	16-QAM	3625.00	H	169	360	6.77	1/12	9.43	16.20	0.042	23.00	-6.80
	16-QAM	3697.50	H	159	353	6.06	1/24	10.57	16.64	0.046	23.00	-6.36
20 MHz	QPSK (WCP)	3560.00	H	198	314	7.37	1 / 0	6.08	**13.45**	**0.022**	23.00	-9.55

Table 7-6. EIRP Data (LTE Band 48 – Sub Ant)

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 ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = 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

Test Setup

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

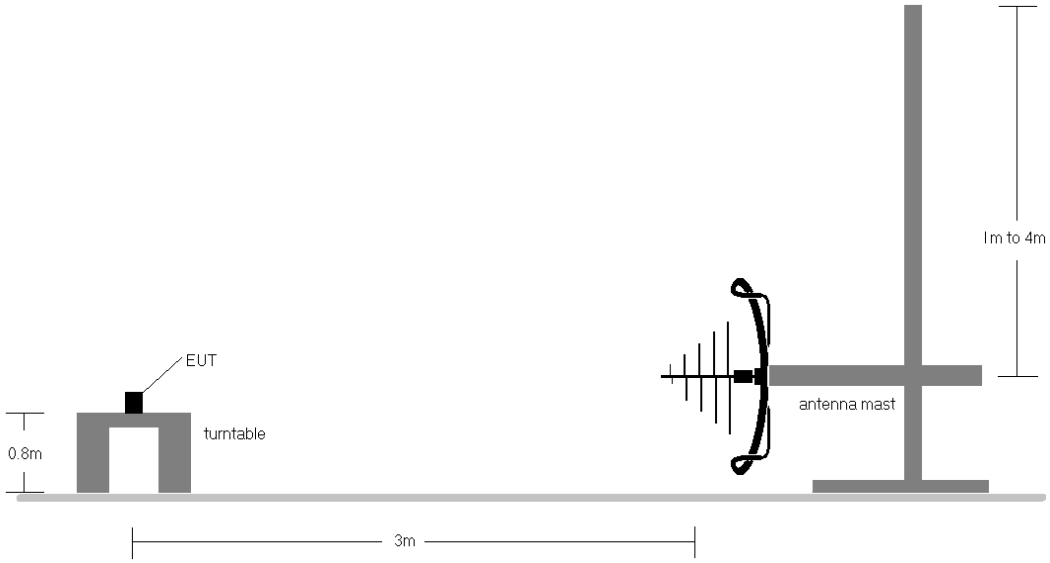


Figure 7-6. Test Instrument & Measurement Setup < 1GHz

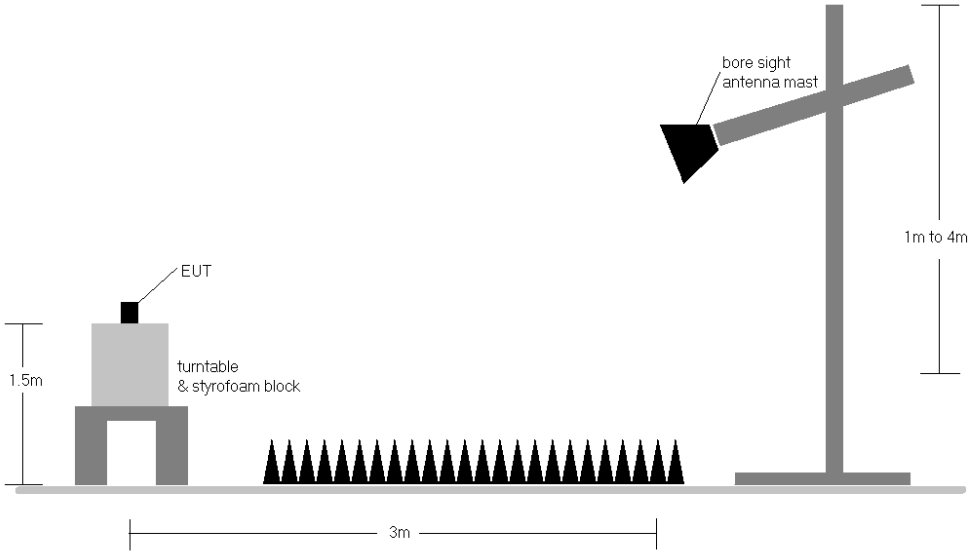


Figure 7-7. Test Instrument & Measurement Setup >1 GHz

Test Notes

1) Field strengths are calculated using the Measurement quantity conversions in ANSI C63.26-2015 Section 5.2.7:
   a) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   b) EIRP (dBm) = E(dBµV/m) + 20logD – 104.8; where D is the measurement distance in meters.

2) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

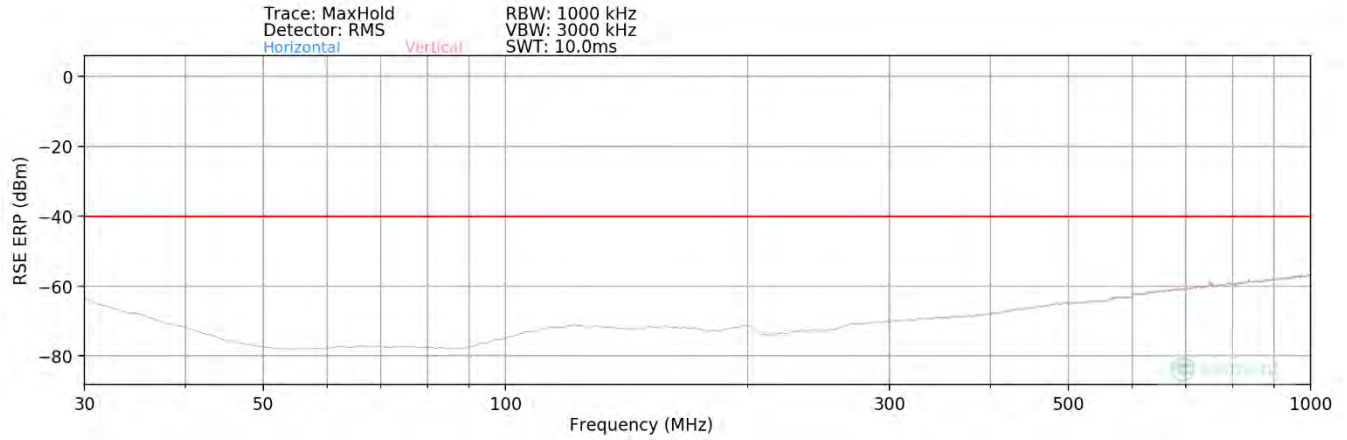
3) This unit was tested with its standard battery.

4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

5) Emissions below 18GHz were measured at a 3-meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

6) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

LTE Band 48 – Main Ant

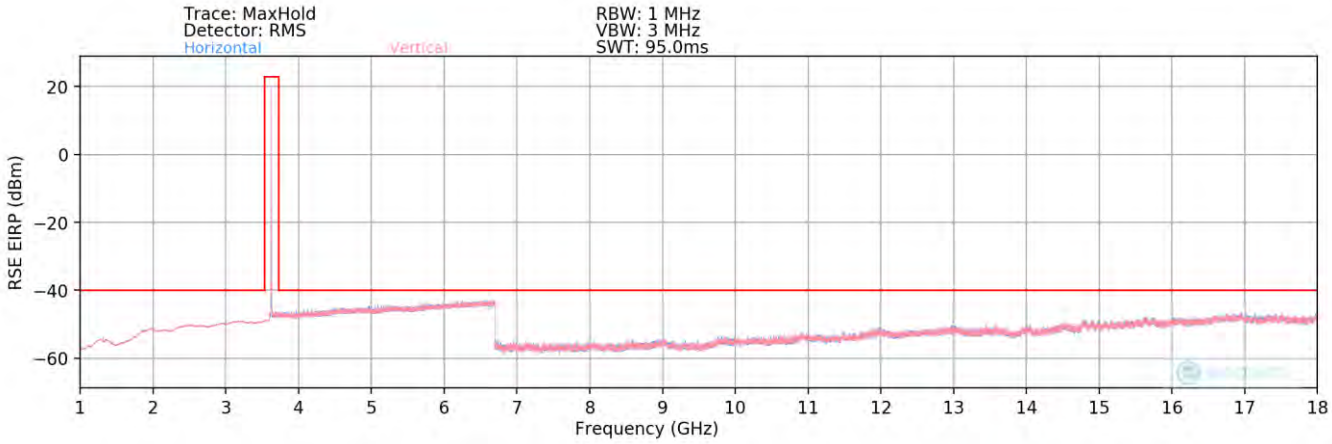


Plot 7-65. Radiated Spurious Plot (LTE Band 48 – Main Ant)

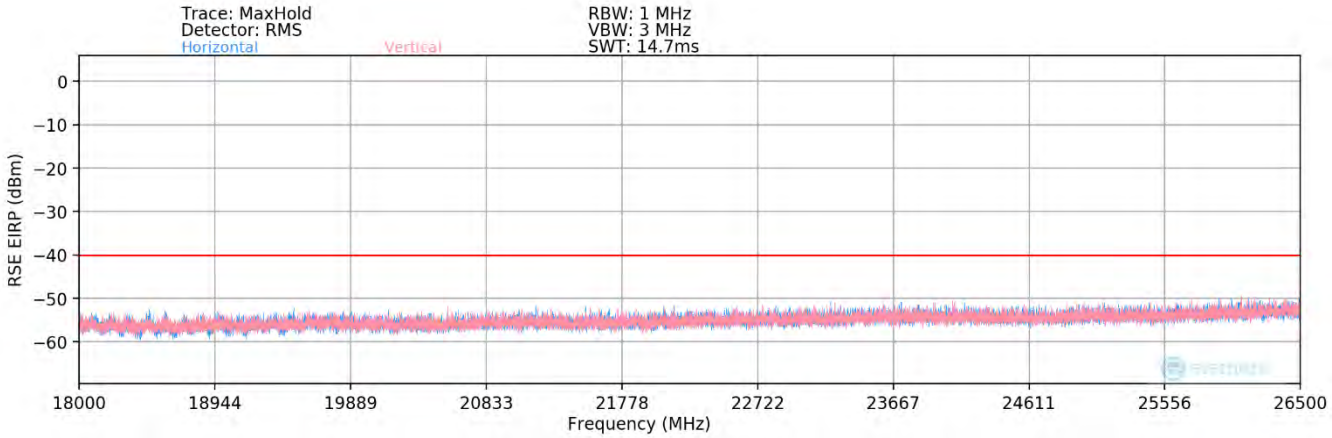
Bandwidth (MHz):	20
Frequency (MHz):	3690.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
225.00	V	-	-	-103.94	18.14	21.20	-76.21	-40.00	-36.21
750.00	V	-	-	-102.93	29.40	33.47	-63.94	-40.00	-23.94

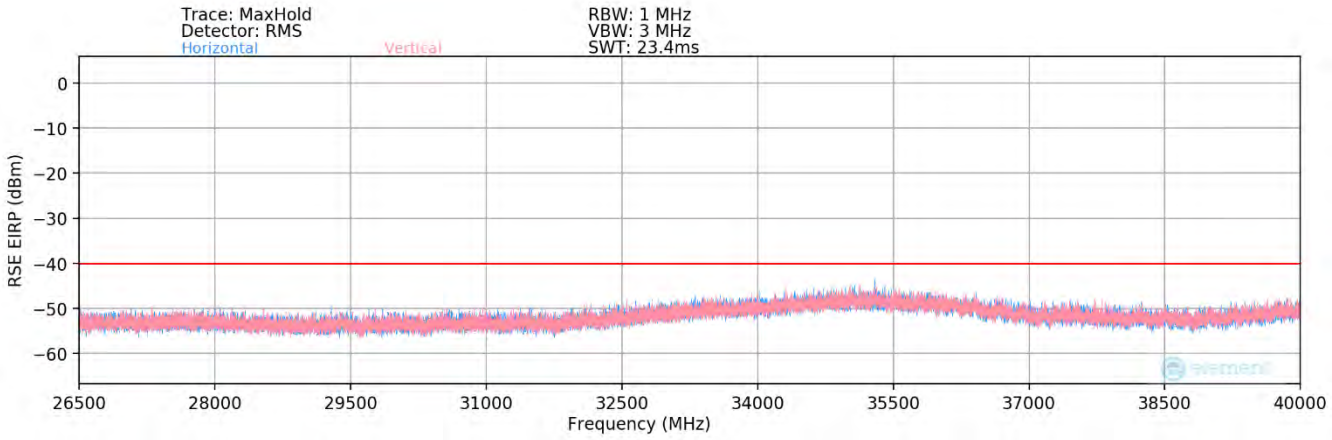
Table 7-7. Radiated Spurious Data (LTE Band 48 – High Channel - Main Ant)



Plot 7-66. Radiated Spurious Plot (LTE Band 48 – Main Ant)



Plot 7-67. Radiated Spurious Plot (LTE Band 48 – Main Ant)



Plot 7-68. Radiated Spurious Plot (LTE Band 48 – Main Ant)

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	H	-	-	-77.37	7.76	37.39	-57.86	-40.00	-17.86
10680.00	H	283	190	-77.43	11.35	40.92	-54.34	-40.00	-14.34
14240.00	H	-	-	-80.28	14.66	41.38	-53.88	-40.00	-13.88
17800.00	H	-	-	-79.88	17.52	44.64	-50.61	-40.00	-10.61

Table 7-8. Radiated Spurious Data (LTE Band 48 – Low Channel - Main Ant)

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	H	-	-	-77.62	7.23	36.61	-58.65	-40.00	-18.65
10875.00	H	-	-	-78.30	11.17	39.87	-55.39	-40.00	-15.39
14500.00	H	-	-	-79.96	15.13	42.17	-53.09	-40.00	-13.09

Table 7-9. Radiated Spurious Data (LTE Band 48 – Mid Channel - Main Ant)

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	H	-	-	-77.77	7.92	37.15	-58.11	-40.00	-18.11
11070.00	H	127	190	-74.64	11.47	43.83	-51.43	-40.00	-11.43
14760.00	H	-	-	-80.07	15.88	42.81	-52.45	-40.00	-12.45

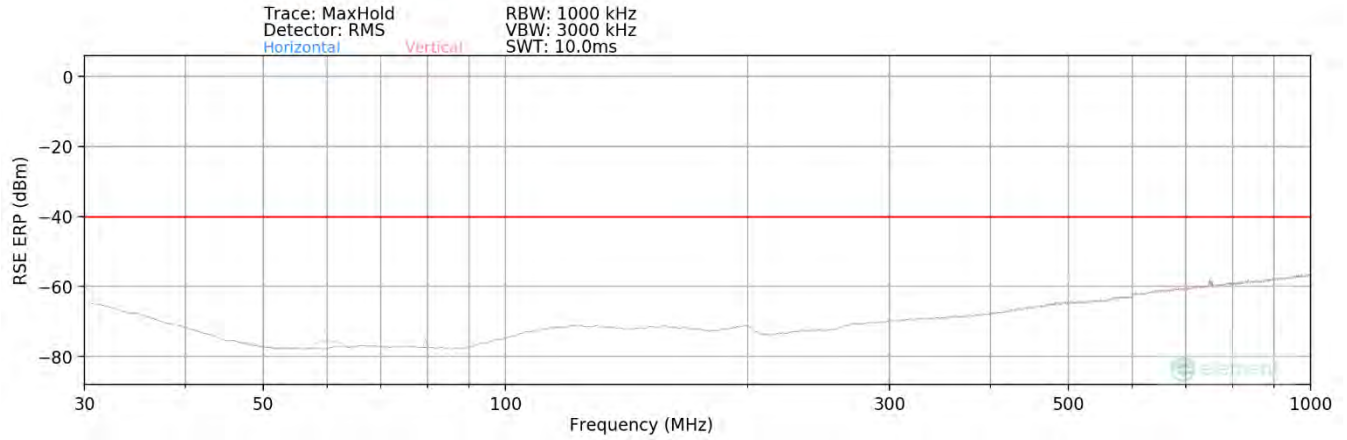
Table 7-10. Radiated Spurious Data (LTE Band 48 – High Channel - Main Ant)

Case:	w/ Wireless Charging Pad
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	H	-	-	-77.61	7.92	37.31	-57.95	-40.00	-17.95
11070.00	H	-	-	-78.85	11.47	39.62	-55.64	-40.00	-15.64
14760.00	H	-	-	-80.25	15.88	42.63	-52.63	-40.00	-12.63

Table 7-11. Radiated Spurious Data with WCP (LTE Band 48 – Main Ant)

LTE Band 48 – Sub Ant

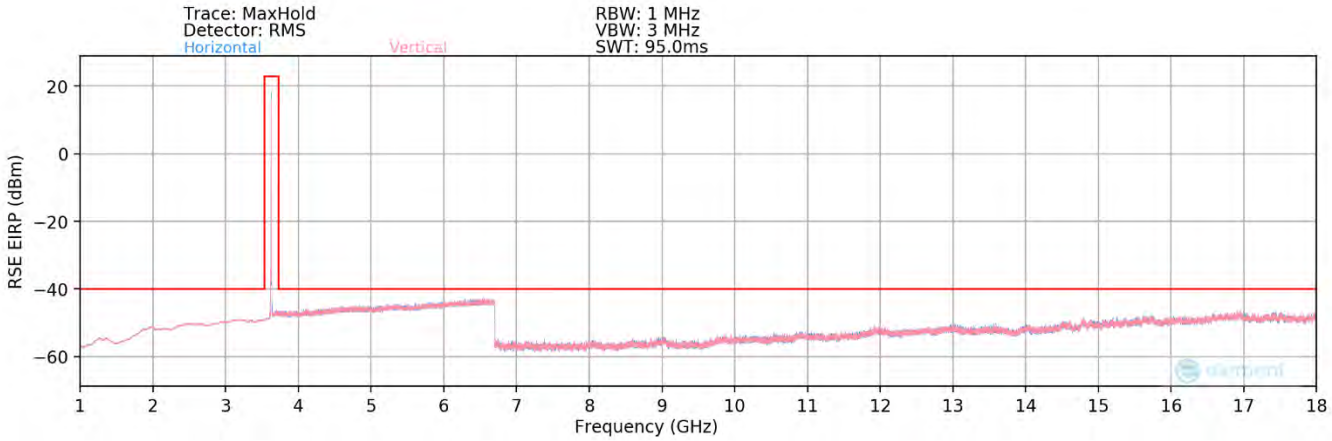


Plot 7-69. Radiated Spurious Plot (LTE Band 48 – Sub Ant)

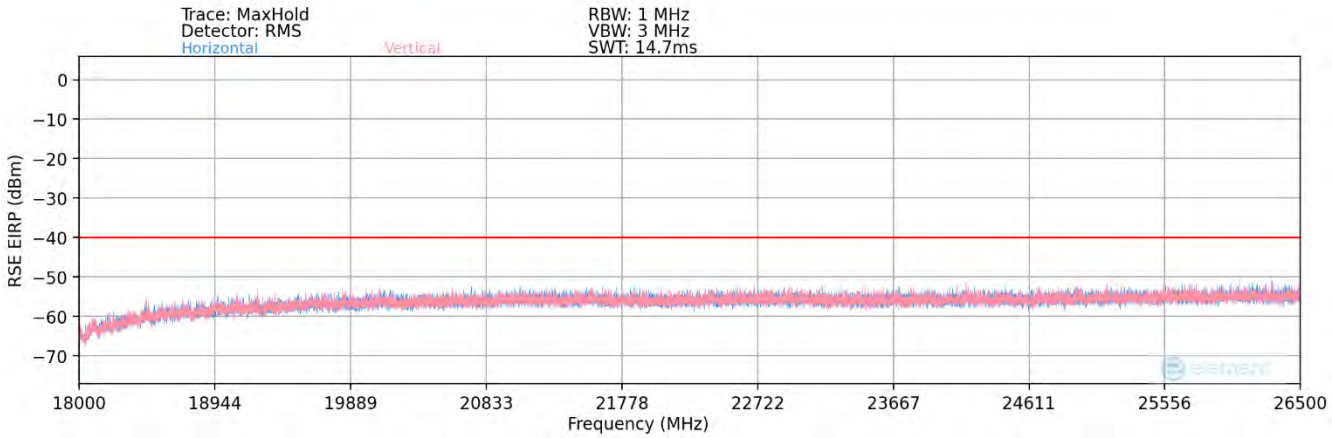
Bandwidth (MHz):	20
Frequency (MHz):	3690.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
62.00	V	142	150	-97.62	14.75	24.13	-73.28	-40.00	-33.28
80.00	V	-	-	-99.86	14.57	21.71	-75.70	-40.00	-35.70
747.80	V	-	-	-94.16	29.19	42.03	-55.38	-40.00	-15.38

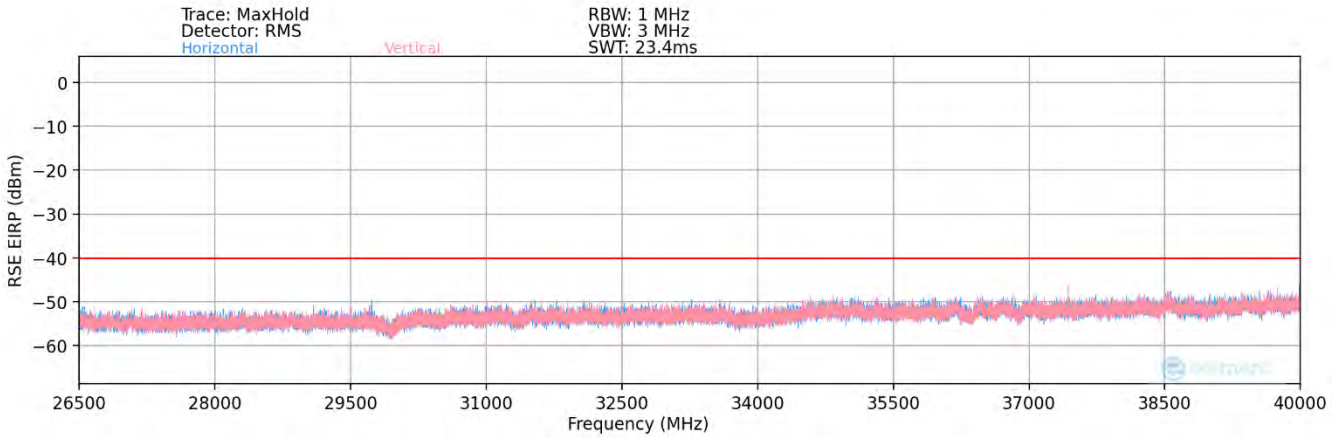
Table 7-12. Radiated Spurious Data (LTE Band 48 – High Channel - Sub Ant)



Plot 7-70. Radiated Spurious Plot (LTE Band 48 – Sub Ant)



Plot 7-71. Radiated Spurious Plot (LTE Band 48 – Sub Ant)



Plot 7-72. Radiated Spurious Plot (LTE Band 48 – Sub Ant)

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	-	-	-77.07	7.76	37.69	-57.56	-40.00	-17.56
10680.00	V	-	-	-79.39	11.35	38.96	-56.30	-40.00	-16.30
14240.00	V	-	-	-79.48	14.66	42.18	-53.08	-40.00	-13.08

Table 7-13. Radiated Spurious Data (LTE Band 48 – Low Channel - Sub Ant)

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	-	-	-77.64	7.23	36.59	-58.67	-40.00	-18.67
10875.00	V	256	25	-76.75	11.17	41.42	-53.84	-40.00	-13.84
14500.00	V	-	-	-80.58	15.13	41.55	-53.71	-40.00	-13.71

Table 7-14. Radiated Spurious Data (LTE Band 48 – Mid Channel - Sub Ant)

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	-	-	-77.63	7.92	37.29	-57.97	-40.00	-17.97
11070.00	V	259	26	-74.74	11.47	43.73	-51.53	-40.00	-11.53
14760.00	V	-	-	-80.17	15.88	42.71	-52.55	-40.00	-12.55

Table 7-15. Radiated Spurious Data (LTE Band 48 – High Channel - Sub Ant)

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	-	-	-77.73	7.92	37.19	-58.07	-40.00	-18.07
11070.00	V	243	185	-75.32	11.47	43.15	-52.11	-40.00	-12.11
14760.00	V	-	-	-80.34	15.88	42.54	-52.72	-40.00	-12.72

Table 7-16. Radiated Spurious Data (LTE Band 48 – High Channel - Sub Ant) – With WCP

7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

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

Test Procedure Used

ANSI C63.26-2015 – Section 5.6

Test Settings

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

Test Setup

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

Test Notes

None

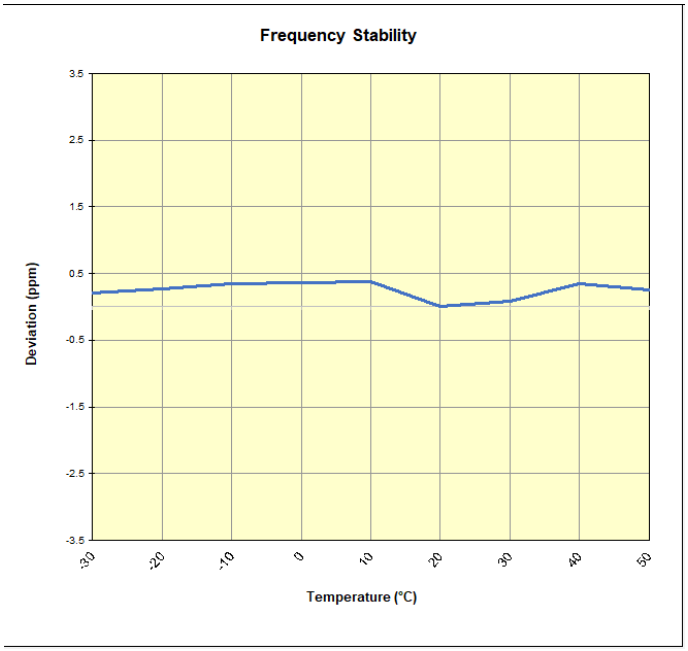
Frequency Stability / Temperature Variation

LTE Band 48

Operating Frequency (Hz):	3,625,000,000
Ref. Voltage (VDC):	4.28

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.28	- 30	3,625,000,840	761	0.0000210
		- 20	3,625,001,047	968	0.0000267
		- 10	3,625,001,335	1,256	0.0000347
		0	3,625,001,405	1,326	0.0000366
		+ 10	3,625,001,455	1,375	0.0000379
		+ 20 (Ref)	3,625,000,079	0	0.0000000
		+ 30	3,625,000,386	306	0.0000085
		+ 40	3,625,001,354	1,275	0.0000352
		+ 50	3,625,001,025	946	0.0000261
Battery Endpoint	3.69	+ 20	3,625,000,071	-9	-0.0000002

Table 7-17. LTE Band 48 Frequency Stability Data



Plot 7-73. LTE Band 48 Frequency Stability Chart

7.9 End User Device Additional Requirement (CBSD Protocol)

Test Overview and Limit

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

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

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

Test Procedure Used

KDB 940660 D01 v03, WINNF-TS-0122 V1.0.2

Test Setup/Method

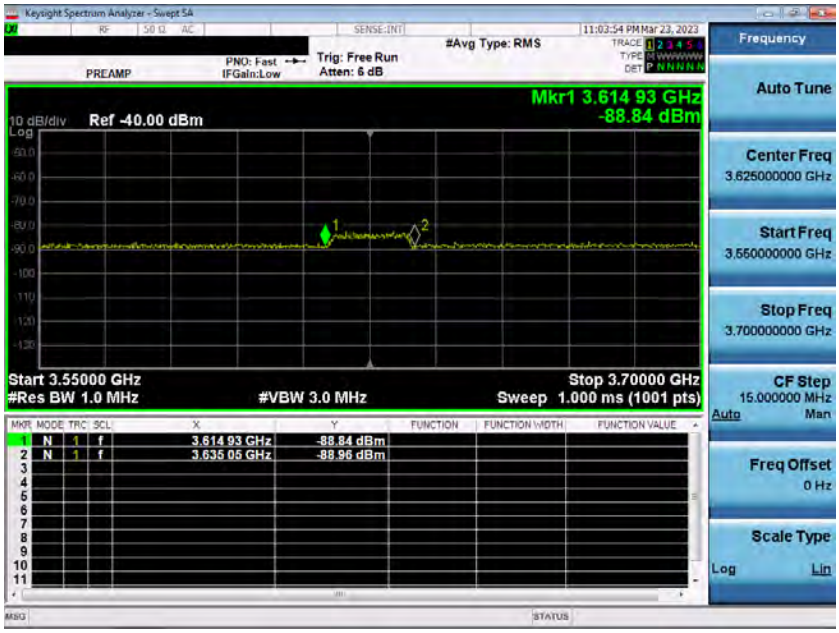
The EUT was connected via an RF cable to a certified CBSD and spectrum analyzer. The following procedure is performed by applying WINNF-TS-0122 CBRS CBSD Test Specification.

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

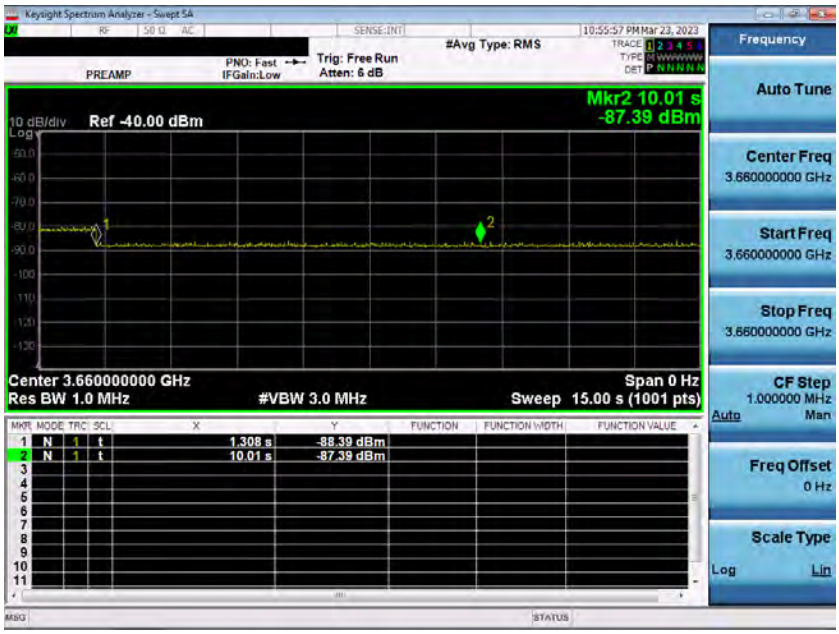
Test Notes

The EUT is an End User Device.

Run#1:



Plot 7-74. Run#1 End User Device Frequency of Operations

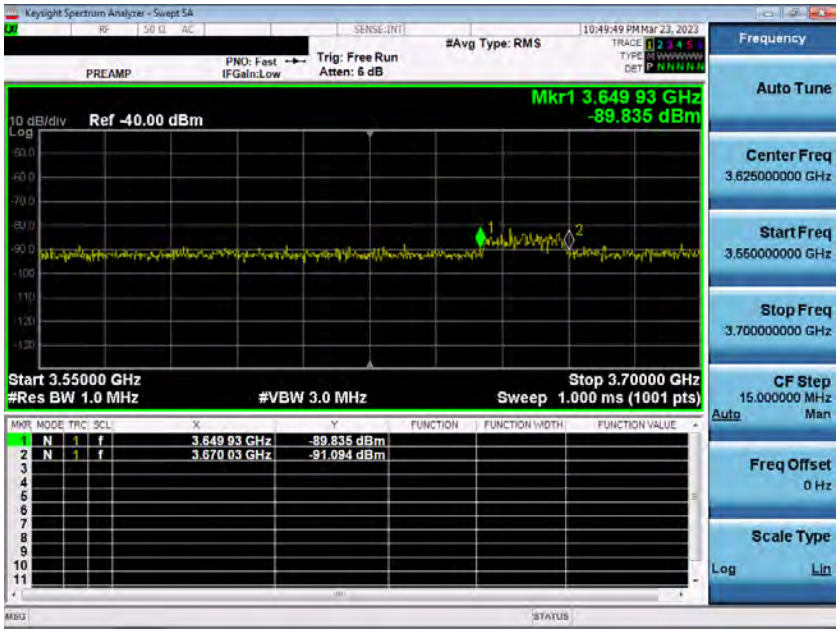


Plot 7-75. Run#1 End User Device Discontinues Operations within 10s

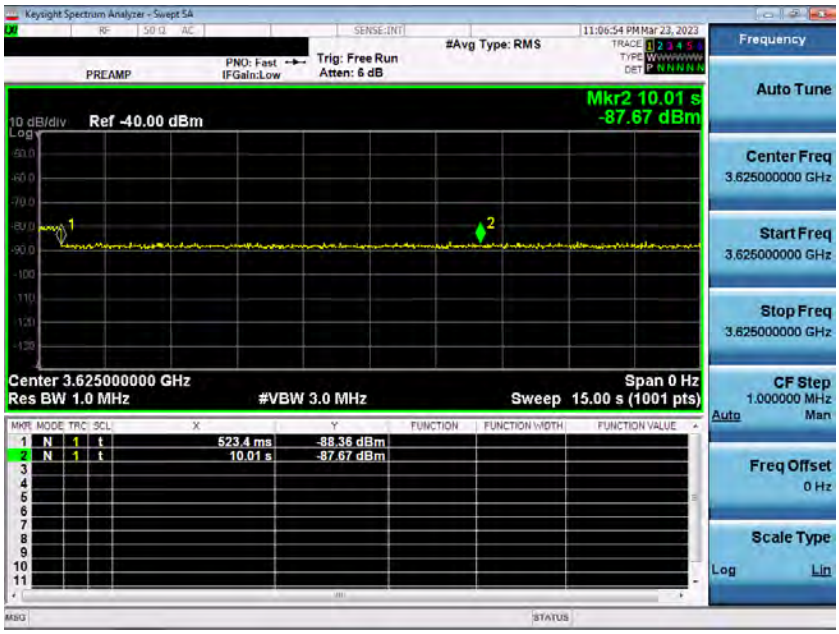
Note:

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

Run#2:



Plot 7-76. Run#2 End User Device Frequency of Operations



Plot 7-77. Run#2 End User Device Discontinues Operations within 10s

Note:

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

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Sony Portable Handset FCC ID: PY7-84558E** complies with all of the End User Device requirements of Part 96 of the FCC Rules for LTE operation only.