



Part 96 MEASUREMENT REPORT

Applicant Name:

Seowon Intech Co., Ltd
69, LS-ro
115beon-gil, Gunpo-si,
Gyeonggi-do, 15809 Korea

Date of Testing:

02/11/2022 ~ 05/25/2022

Test Report Issue Date:

05/25/2022

Test Site/Location:

PCTEST KOREA Lab. Yongin-si,
Gyeonggi-do, Korea

Test Report Serial No.:

1M2202090014-02.V7M

FCC ID:

V7MESLCTGA

APPLICANT:

Seowon Intech Co., Ltd

Application Type:

Certification

Model:

SLC-150T42GA

EUT Type:

Indoor CPE

FCC Classification:

Citizens Band End User Devices (CBE)

FCC Rule Part(s):

96

Test Procedure(s):

ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01,
KDB 940660 D01 v03

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.



Prepared by Ian Kim
Test Engineer





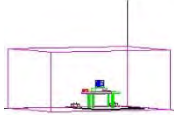

Reviewed by Charles.Shin
Technical Manager

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T A B L E O F C O N T E N T S

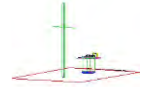
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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 48 (Carrier Aggregation)	40 MHz	QPSK	3570.0 - 3680.0	0.076	18.83	37M7G7D
		QAM	3570.0 - 3680.0	0.081	19.07	37M7W7D
	35 MHz	QPSK	3567.5 - 3682.5	0.075	18.74	32M8G7D
		QAM	3567.5 - 3682.5	0.079	18.97	32M7W7D
	30 MHz	QPSK	3565.0 - 3685.0	0.082	19.16	27M9G7D
		QAM	3565.0 - 3685.0	0.079	18.99	27M9W7D
	25 MHz	QPSK	3562.5 - 3687.5	0.070	18.44	23M0G7D
		QAM	3562.5 - 3687.5	0.075	18.73	23M0W7D
LTE Band 48	20 MHz	QPSK	3560.0 - 3690.0	0.093	19.67	18M0G7D
		QAM	3560.0 - 3690.0	0.097	19.87	18M0W7D
	15 MHz	QPSK	3557.5 - 3692.5	0.086	19.33	13M5G7D
		QAM	3557.5 - 3692.5	0.087	19.40	13M5W7D
	10 MHz	QPSK	3555.0 - 3695.0	0.086	19.36	9M06G7D
		QAM	3555.0 - 3695.0	0.083	19.20	9M00W7D
	5 MHz	QPSK	3552.5 - 3697.5	0.077	18.85	4M52G7D
		QAM	3552.5 - 3697.5	0.084	19.23	4M53W7D

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 REVISION RECORD

Issue Number	Issued Date	Revision History
1M2202090014-02.V7M	05/25/2022	Initial Issue

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2.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.



1.2 PCTEST KOREA Test Location

These measurement tests were conducted at the PCTEST KOREA CO., LTD. facility located at (#1407) 13, Heungdeok 1-ro, Giheung-gu, Yongin-si, Gyeonggi-do 16954, South Korea. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST KOREA CO., LTD. facility located in Yongin-si, Gyeonggi-do, 16954, South Korea.

- PCTEST is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation(A2LA) with Certificate number 2041.04 for Specific Absorption Rate (SAR), where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada (ISED) rules.
- PCTEST KOREA facility is accredited, designated and recognized in accordance with the provision of Radio Wave Act and International Standard ISO/IEC 17025:2017 under the National Radio Research Agency.
 - Designation Number : KR0169
 - Test Firm Registration Number of FCC: 417945
 - Test Firm Registration Number of IC: 26168

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3.0 PRODUCT INFORMATION

3.1 Equipment Description

The Equipment Under Test (EUT) is the **Seowon Intech Co., Ltd, Indoor CPE, FCC ID: V7MESLCTGA**. 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 under Citizens Band End User Devices (CBE).

Test Device Serial No.: 00001, 00002

3.2 Device Capabilities

This device contains the following capabilities:

LTE Band 48 (Single Carrier, two-carrier ULCA), 2.4GHz WIFI (802.11b/g/n), UNII 5GHz (802.11a/n/ac)

3.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.



For two-carrier ULCA measurement, all PCC measurements were made on the primary antenna port and the SCC measurements were made on the 2nd LTE port
A combiner was used for combining both the PCC on the primary antenna port and the SCC on the 2nd LTE port.

3.4 Software and Firmware

The test was conducted with firmware version 2.20.701 installed on the EUT.

3.5 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

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4.0 DESCRIPTION OF TESTS

4.1 Measurement Procedure

The measurement procedures described in the document titled “American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services” (ANSI C63.26-2015) and “Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems” (KDB 971168 D01 v03r01), and “Certification and Test Procedure For Citizens Broadband Radio Service Devices Authorized Under Part 96” (KDB 940660 D01 v03) were used in the measurement of the EUT.

4.2 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 a base station simulator and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Radiated power (EIRP) levels are determined by adding the maximum antenna gain to the measured conducted powers. The maximized power level is recorded using the spectrum analyzer “Channel Power” function with the integration band set to the emissions’ occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.



For radiated spurious emissions measurements, the field strength conversion method is used per the formulas in KDB 971168 Section 5.8.4. Field Strength (EIRP) is calculated using the following formulas:

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

And

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



All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014.

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5.0 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 (\pm dB)
Conducted Bench Top Measurements	1.20
Radiated Disturbance (<1GHz)	3.01
Radiated Disturbance (>1GHz)	5.56
Radiated Disturbance (>18GHz)	3.16

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6.0 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.

Manufacture	Model	Description	Cal Date	Cal interval	Cal Due	Serial Number
KEYSIGHT	N9030B	PXA Signal Analyzer	05/09/2022	Annual	05/08/2023	MY57142018
Rohde & Schwarz	ESW	EMI Test Receiver	07/06/2021	Annual	07/05/2022	101761
Rohde & Schwarz	TS-SFUNIT-Rx	Shielded Filter Unit	01/19/2022	Annual	01/18/2023	102151
AC POWER KOREA	ACPD-60150	DC POWER SUPPLY	01/18/2022	Annual	01/17/2023	DC-1
Schwarzbeck	VULB9162	Broadband TRILOG Antenna	07/13/2021	Biennial	07/12/2023	9162-217
Sunol Sciences	DRH-118	Horn Antenna	01/12/2021	Biennial	01/11/2023	A060215
Sunol Sciences	DRH-118	Horn Antenna	07/14/2021	Biennial	07/13/2023	A102416-1
Schwarzbeck	BBHA 9170	Horn Antenna	09/02/2020	Biennial	09/01/2022	1037
Mini-Circuits	BW-N10W5+	ATTENUATOR	05/09/2022	Annual	05/08/2023	2106
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	07/06/2021	Annual	07/05/2022	166818
Mini-Circuits	TVA-11-422	Amplifier	07/07/2021	Annual	07/06/2022	QA1303002
Rohde & Schwarz	SMF100A	Signal Generator	09/15/2021	Annual	09/14/2022	104154
Rohde & Schwarz	TS-PR1840	Preamplifier	07/07/2021	Annual	07/06/2022	100049
Fairview Microwave	FM2CP1122-10	2.92mm Directional Coupler	07/07/2021	Annual	07/06/2022	1946
WIHTWAVE	-	Directional Coupler	01/19/2022	Annual	01/18/2023	TEMPNO. 2824
SUKSAN TECHNOLOGY	SE-CT-10	Environmental Chamber	09/15/2021	Annual	09/14/2022	191021

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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7.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 4M52G7D

LTE BW = 4.52 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 4M53W7D

LTE BW = 4.53 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 analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 7250 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 25.50 dBm – (-24.80).

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8.0 TEST RESULTS

8.1 Summary



Company Name: Seowon Intech Co., Ltd
FCC ID: V7MESLCTGA
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 8.2
	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 8.3
	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 8.4, 8.5
	Frequency Stability	2.1055	Fundamental emissions stay within authorized frequency block	PASS	Section 8.8
RADIATED	Equivalent Isotropic Radiated Power (EIRP) (EUD)	96.41(b)	23 dBm/10MHz	PASS	Section 8.6
	Radiated Spurious Emissions	2.1053, 96.41(e)	-40 dBm/MHz	PASS	Section 8.7

Table 8-1. 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 PCTEST EMC Software Tool Beta 8, Chamber Control v1.3.1.

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8.2 Conducted Power Output Data

\$2.1046

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.

Test Procedure Used

ANSI C63.26-2015 – Section 5.2.4.4

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 $\geq 2 \times \text{span} / \text{RBW}$
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 over 100 sweeps
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 8-1. Test Instrument & Measurement Setup

Test Notes

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.

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Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	55340	3560.0	1 / 99	16.62
		55990	3625.0	1 / 0	16.58
		56640	3690.0	1 / 99	16.20
	16-QAM	55340	3560.0	1 / 99	16.73
	64-QAM	55340	3560.0	1 / 99	16.89
15 MHz	QPSK	55315	3557.5	1 / 74	16.16
		55990	3625.0	1 / 0	16.49
		56665	3692.5	1 / 74	16.09
	16-QAM	55990	3625.0	1 / 0	16.79
	64-QAM	55990	3625.0	1 / 0	16.34
10 MHz	QPSK	55290	3555.0	1 / 49	16.26
		55990	3625.0	50 / 0	16.32
		56690	3695.0	1 / 49	16.12
	16-QAM	55990	3625.0	50 / 0	16.35
	64-QAM	55990	3625.0	50 / 0	16.32
5 MHz	QPSK	55265	3552.5	1 / 12	15.57
		55990	3625.0	25 / 0	15.96
		56715	3697.5	25 / 0	15.61
	16-QAM	55990	3625.0	1 / 12	16.36
	64-QAM	55990	3625.0	1 / 12	16.58

Table 8-2. Conducted Power Output Data (LTE Band 48)

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Bandwidth	Modulation	PCC			SCC			Conducted Power [dBm]
		Bandwidth [MHz]	Frequency [MHz]	RB / Offset	Bandwidth [MHz]	Frequency [MHz]	RB / Offset	
40 MHz	QPSK	20	3560.0	1 / 99	20	3579.8	1 / 0	16.18
		20	3625.0	1 / 99	20	3644.8	1 / 0	16.21
		20	3690.0	1 / 0	20	3670.2	1 / 99	16.58
	16-QAM	20	3625.0	1 / 99	20	3644.8	1 / 0	16.53
	64-QAM	20	3560.0	1 / 99	20	3579.8	1 / 0	16.58
35 MHz	QPSK	20	3560.0	1 / 99	15	3577.1	1 / 0	15.76
		20	3625.0	1 / 99	15	3642.1	1 / 0	16.12
		20	3690.0	1 / 0	15	3672.9	1 / 74	16.30
	16-QAM	20	3625.0	1 / 99	15	3642.1	1 / 0	16.43
	64-QAM	20	3560.0	1 / 99	15	3577.1	1 / 0	16.30
30 MHz	QPSK	20	3560.0	1 / 99	10	3574.4	1 / 0	16.21
		20	3625.0	1 / 99	10	3639.4	1 / 0	16.54
		20	3690.0	1 / 0	10	3675.6	1 / 49	16.36
	16-QAM	20	3625.0	1 / 99	10	3639.4	1 / 0	16.45
	64-QAM	20	3625.0	1 / 99	10	3639.4	1 / 0	16.22
25 MHz	QPSK	20	3560.0	1 / 99	5	3571.7	1 / 0	15.66
		20	3625.0	1 / 99	5	3636.7	1 / 0	15.82
		20	3690.0	1 / 0	5	3678.3	1 / 24	15.66
	16-QAM	20	3625.0	1 / 99	5	3636.7	1 / 0	16.19
	64-QAM	20	3560.0	1 / 99	5	3571.7	1 / 0	16.13

Table 8-3. Conducted Power Output Data (ULCA LTE Band 48)

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8.3 Occupied Bandwidth

\$2.1049

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 4.2

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW $\geq 3 \times$ 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.

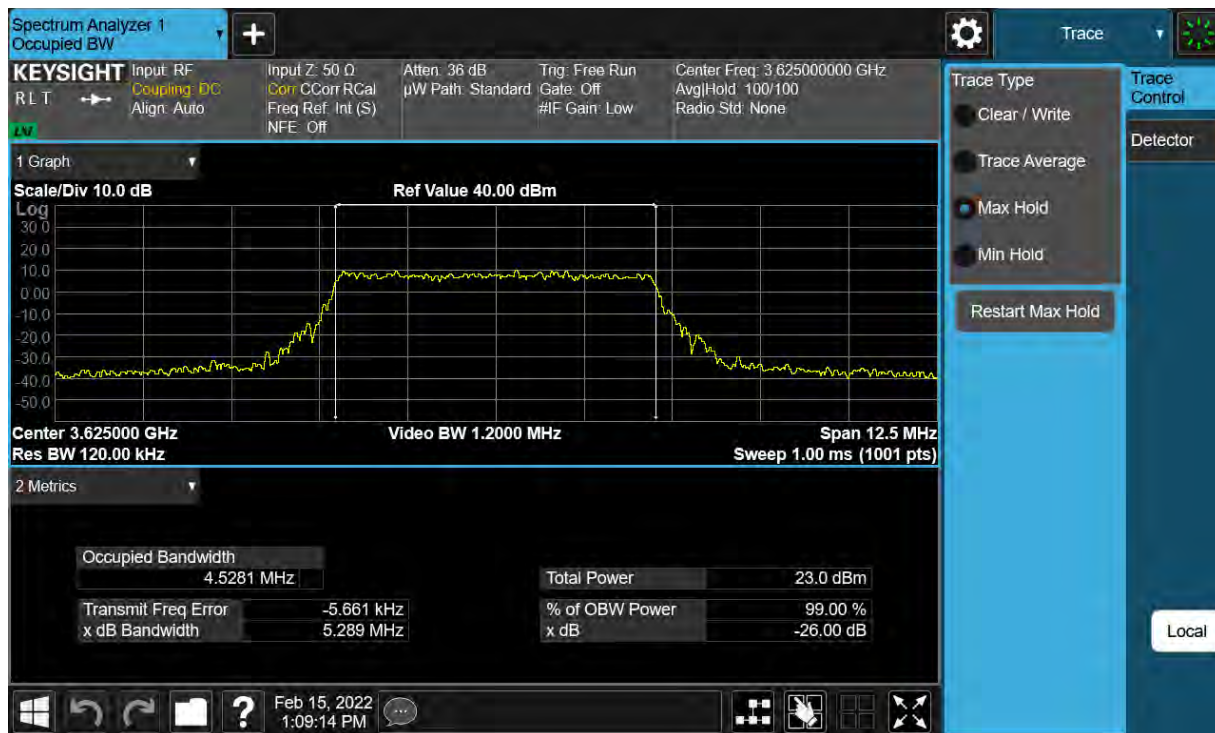
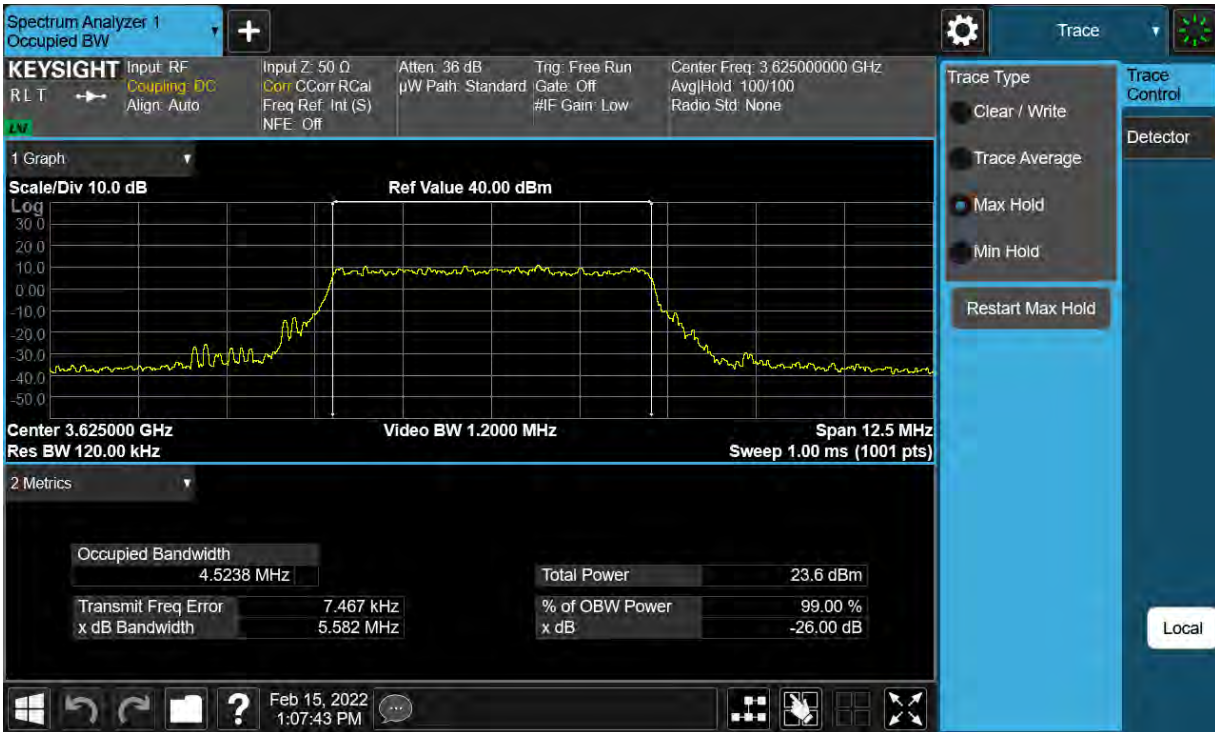


Figure 8-2. Test Instrument & Measurement Setup

Test Notes

None.

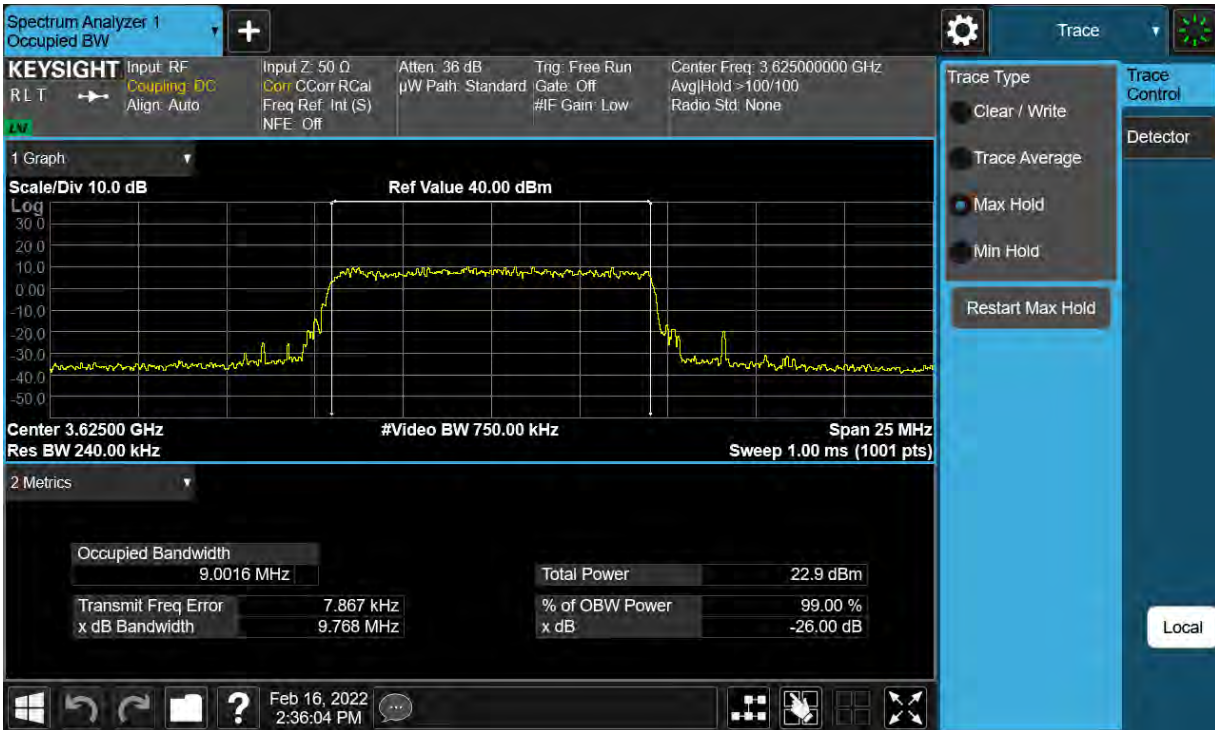
FCC ID: V7MESLCTGA	 PART 96 MEASUREMENT REPORT 	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE
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Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 16 of 63

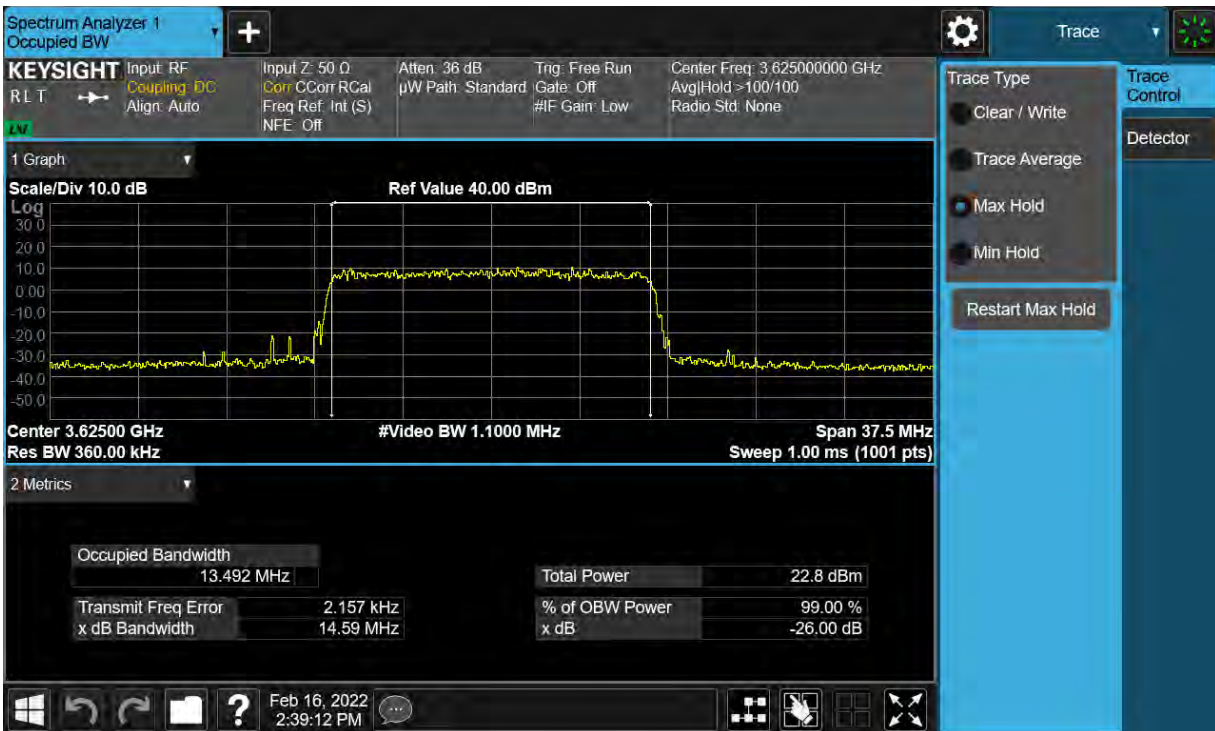
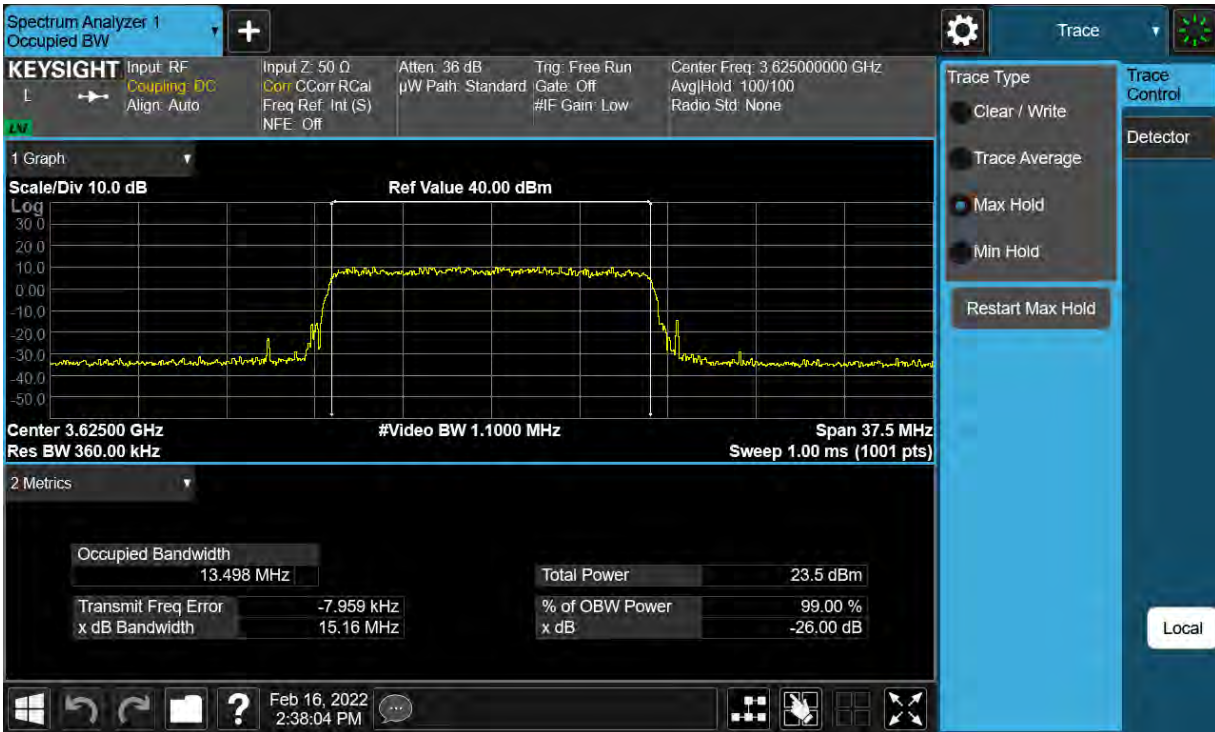


Plot 8-3. Occupied Bandwidth Plot (LTE Band 48 – 10MHz QPSK – Full RB Configuration)

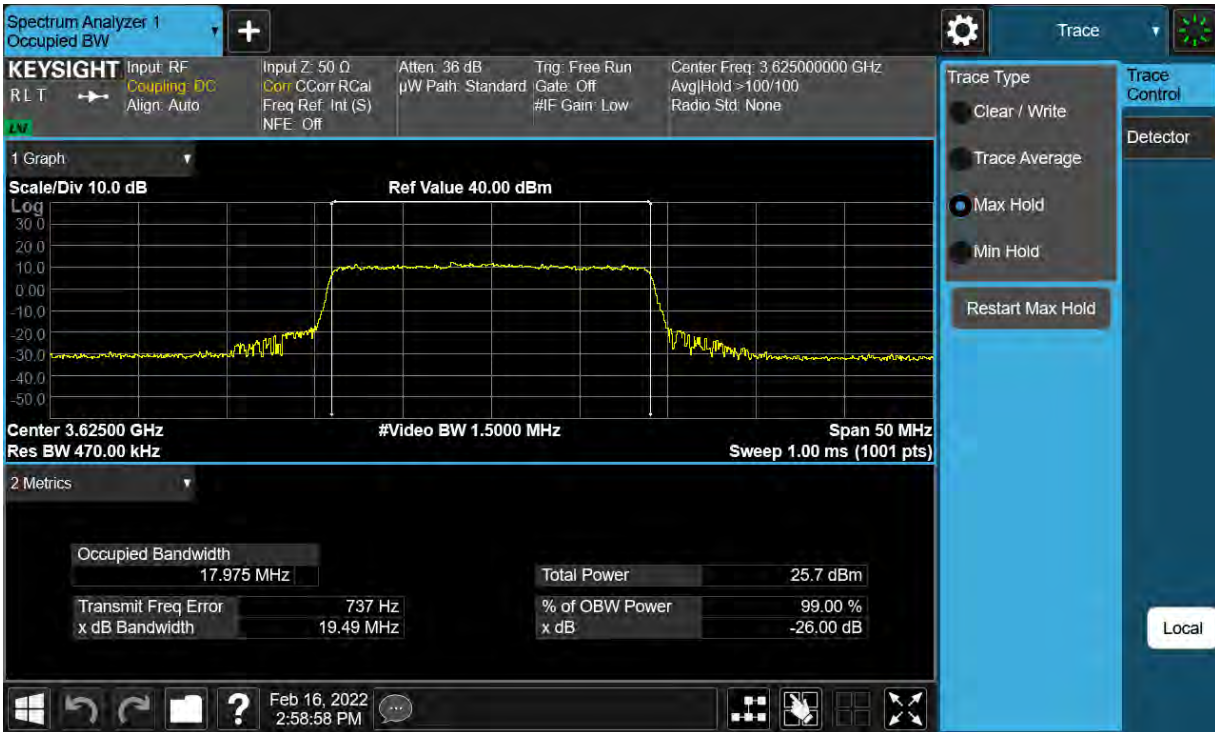


Plot 8-4. Occupied Bandwidth Plot (LTE Band 48 – 10MHz 16QAM – Full RB Configuration)

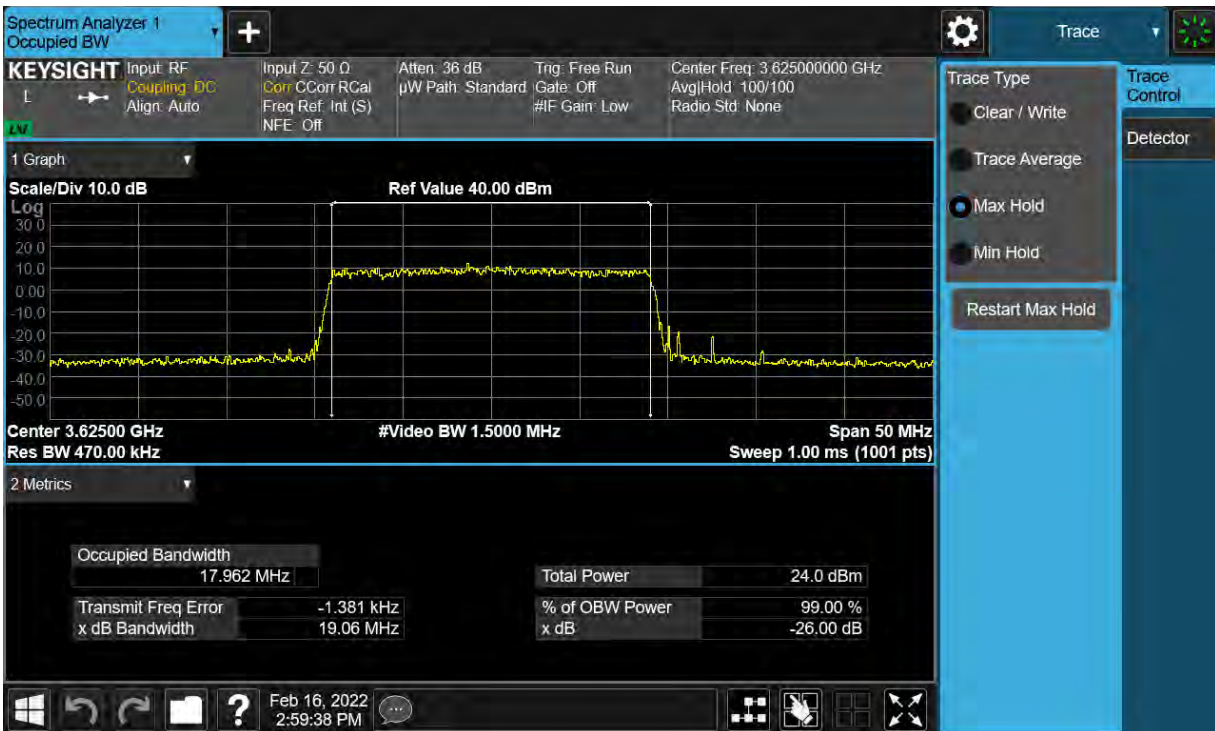
FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 17 of 63



FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 18 of 63

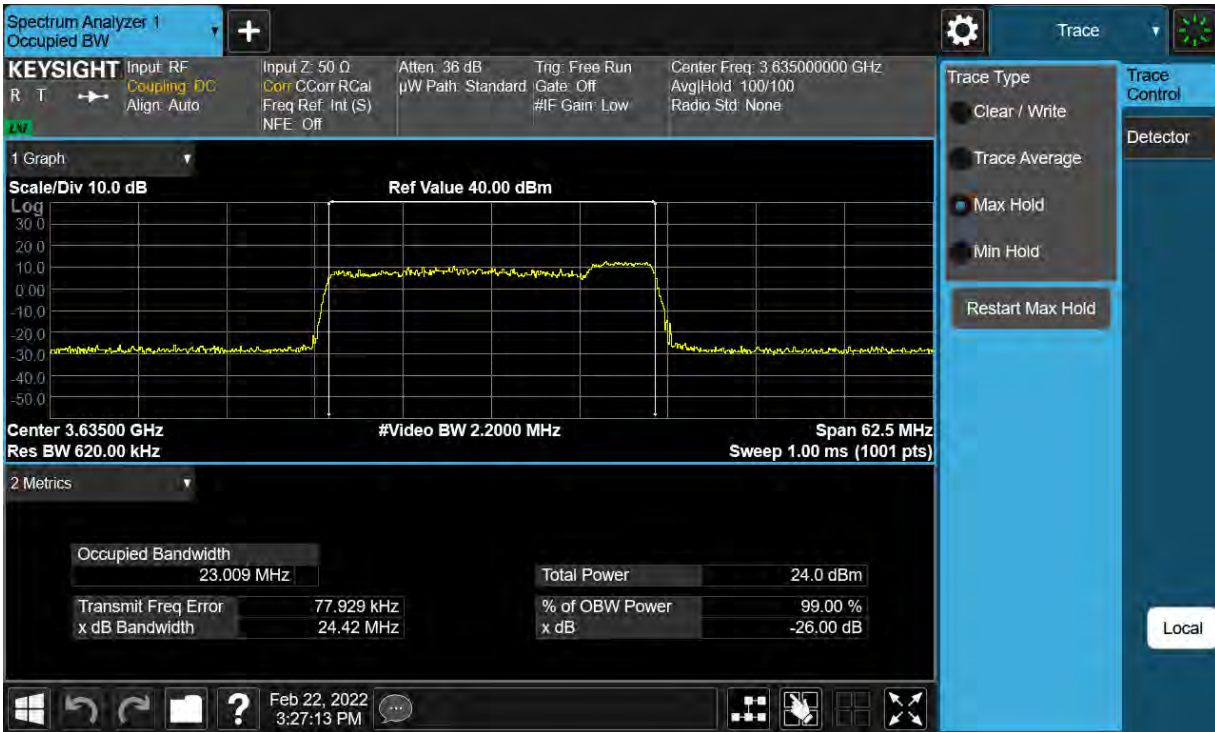


Plot 8-7. Occupied Bandwidth Plot (LTE Band 48 – 20MHz QPSK – Full RB Configuration)

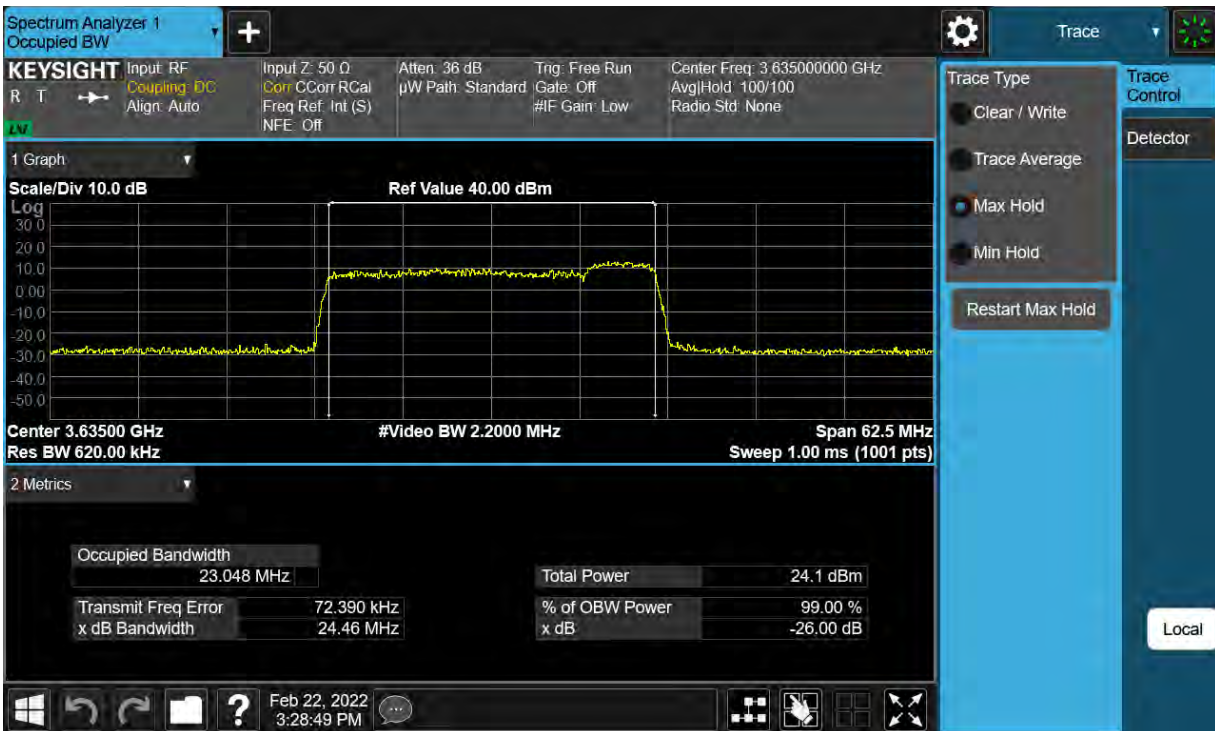


Plot 8-8. Occupied Bandwidth Plot (LTE Band 48 – 20MHz 16QAM – Full RB Configuration)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 19 of 63

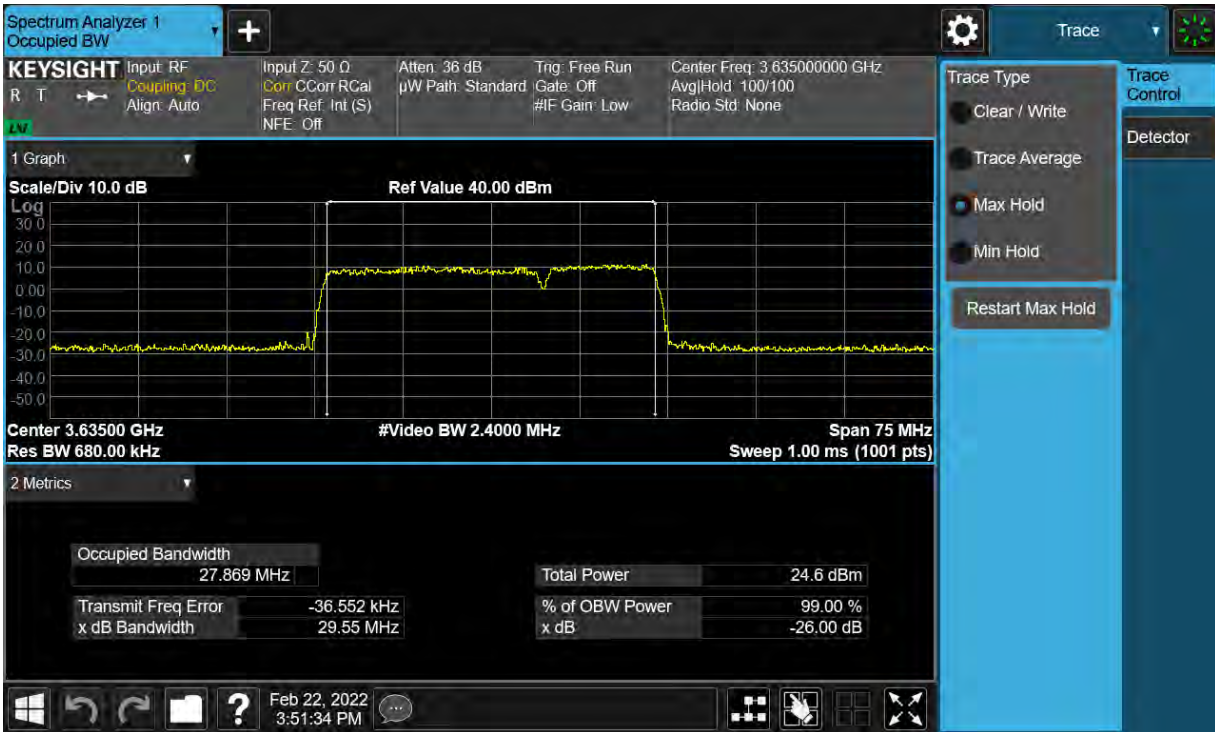


Plot 8-9. Occupied Bandwidth Plot (ULCA LTE Band 48 – 20+5MHz QPSK – Full RB Configuration)

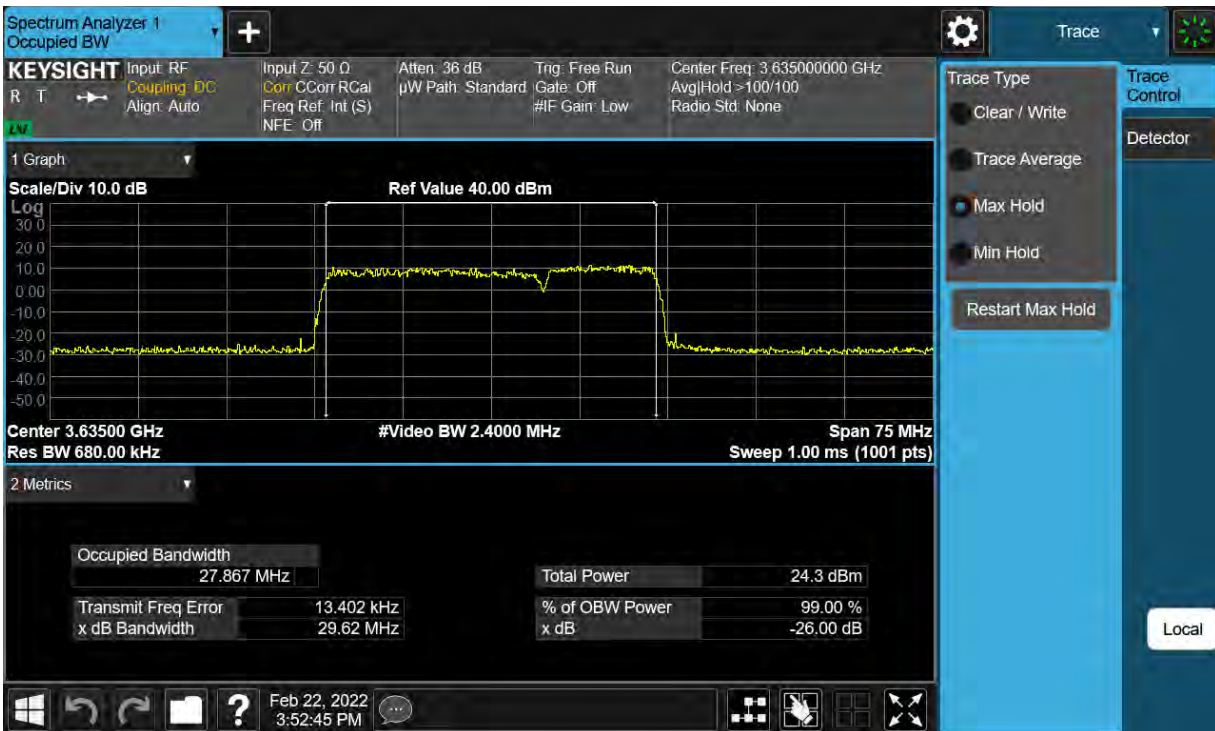


Plot 8-10. Occupied Bandwidth Plot (ULCA LTE Band 48 – 20+5MHz 16QAM – Full RB Configuration)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 20 of 63

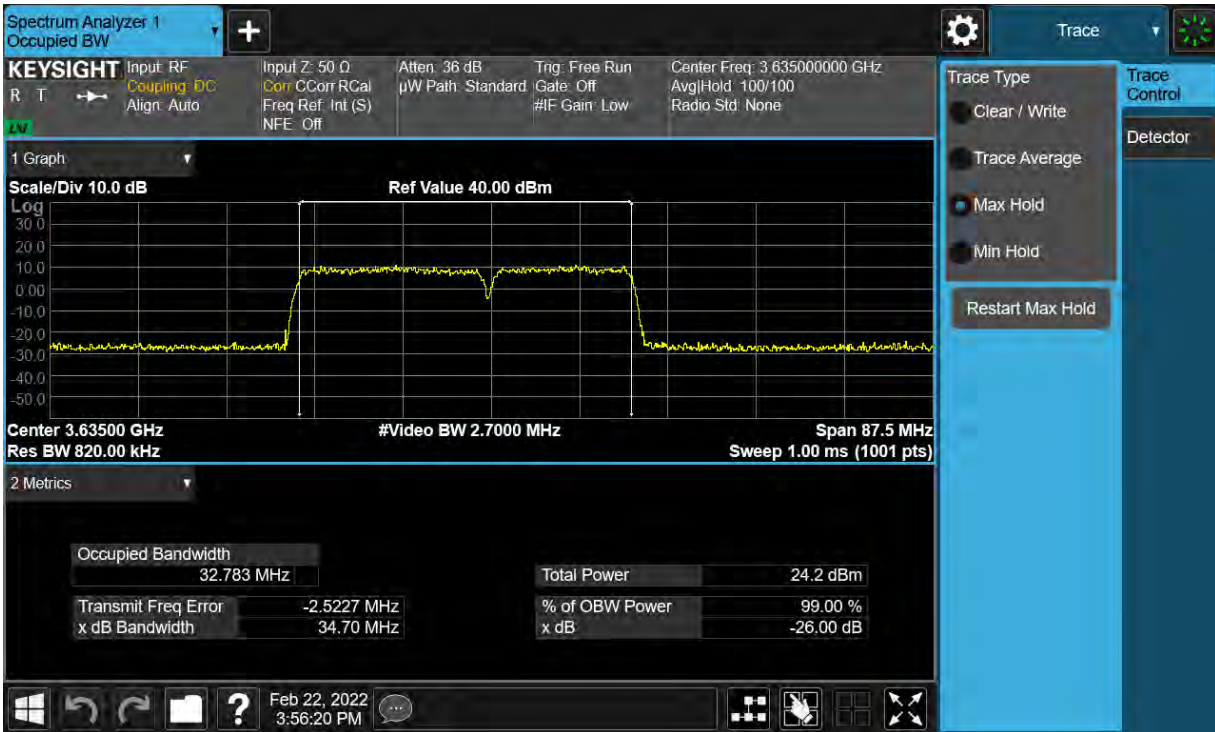


Plot 8-11. Occupied Bandwidth Plot (ULCA LTE Band 48 – 20+10MHz QPSK – Full RB Configuration)

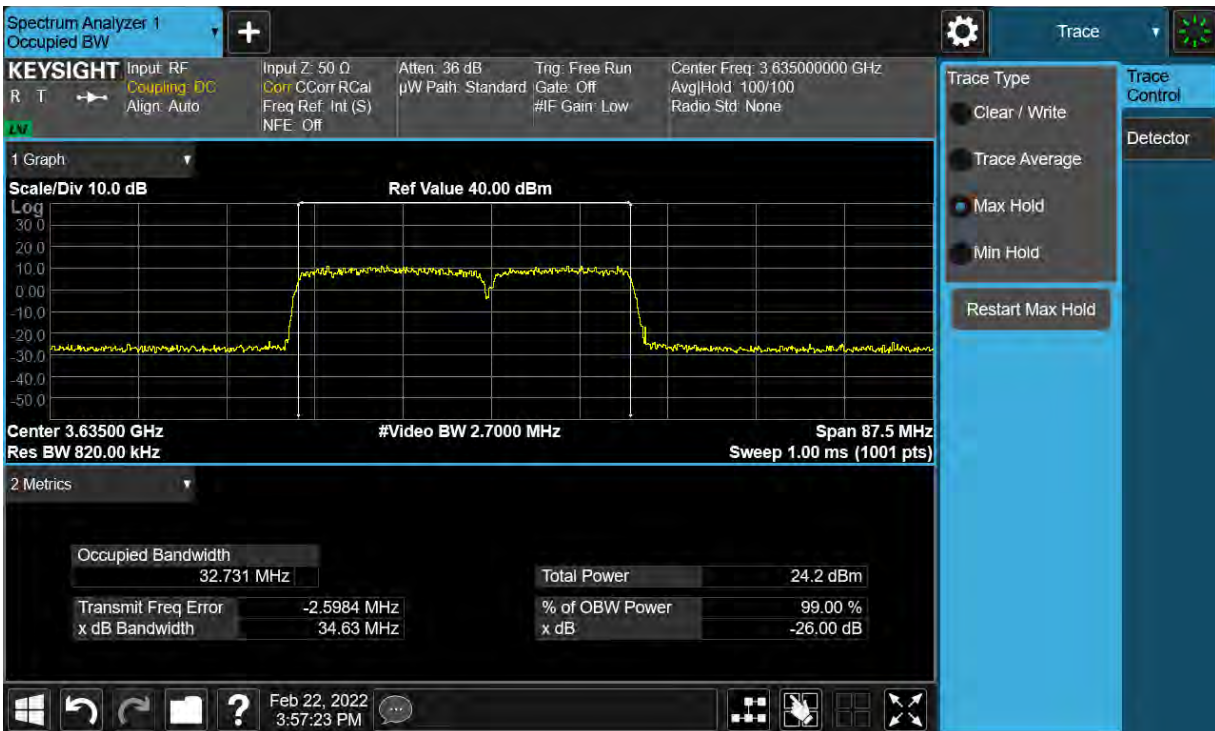


Plot 8-12. Occupied Bandwidth Plot (ULCA LTE Band 48 – 20+10MHz 16QAM – Full RB Configuration)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 21 of 63

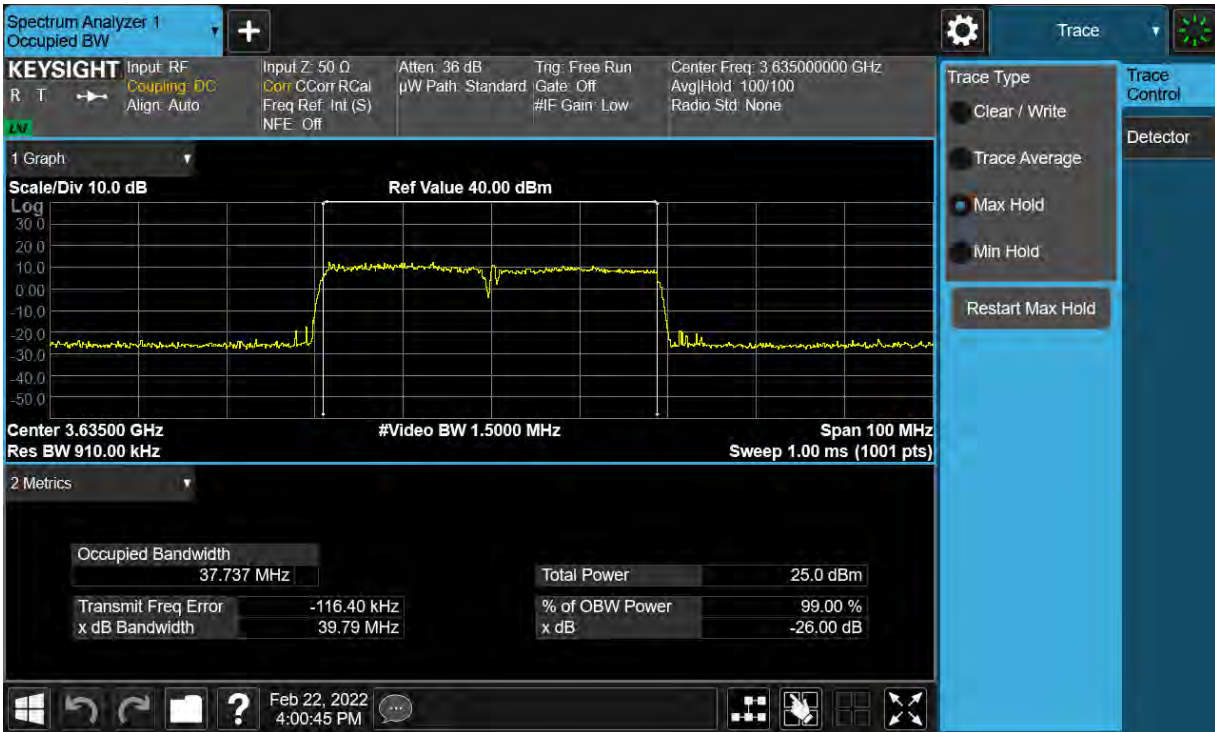


Plot 8-13. Occupied Bandwidth Plot (ULCA LTE Band 48 – 20+15MHz QPSK – Full RB Configuration)

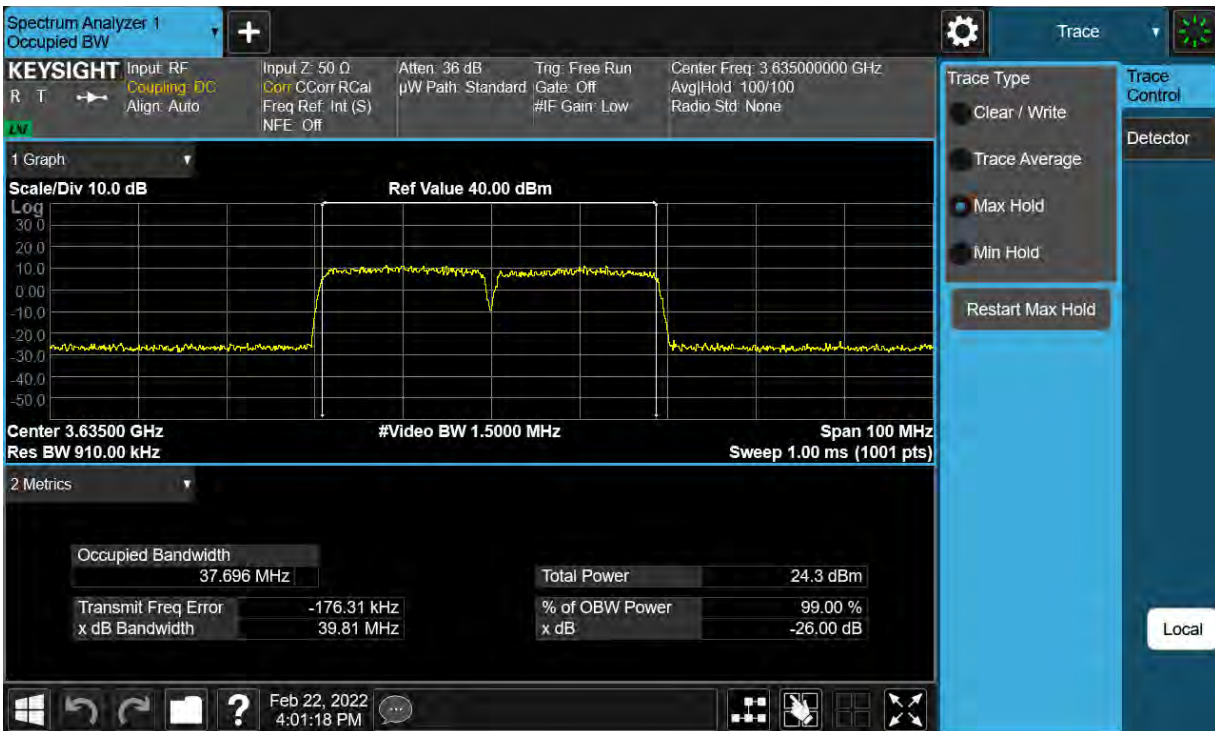


Plot 8-14. Occupied Bandwidth Plot (ULCA LTE Band 48 – 20+15MHz 16QAM – Full RB Configuration)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 22 of 63



Plot 8-15. Occupied Bandwidth Plot (ULCA LTE Band 48 – 20+20MHz QPSK – Full RB Configuration)



Plot 8-16. Occupied Bandwidth Plot (ULCA LTE Band 48 – 20+20MHz 16QAM – Full RB Configuration)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 23 of 63

8.4 Spurious and Harmonic Emissions at Antenna Terminal

\$2.1051 \$96.41(e)

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = 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.

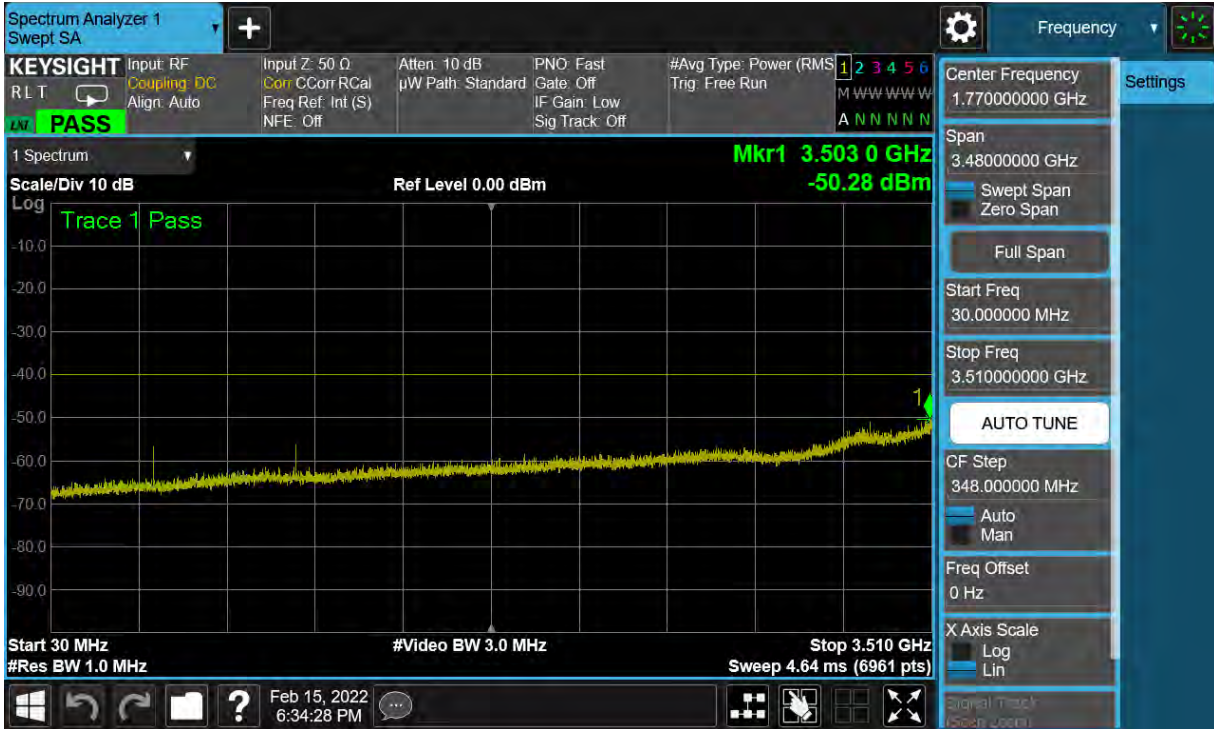


Figure 8-3. Test Instrument & Measurement Setup

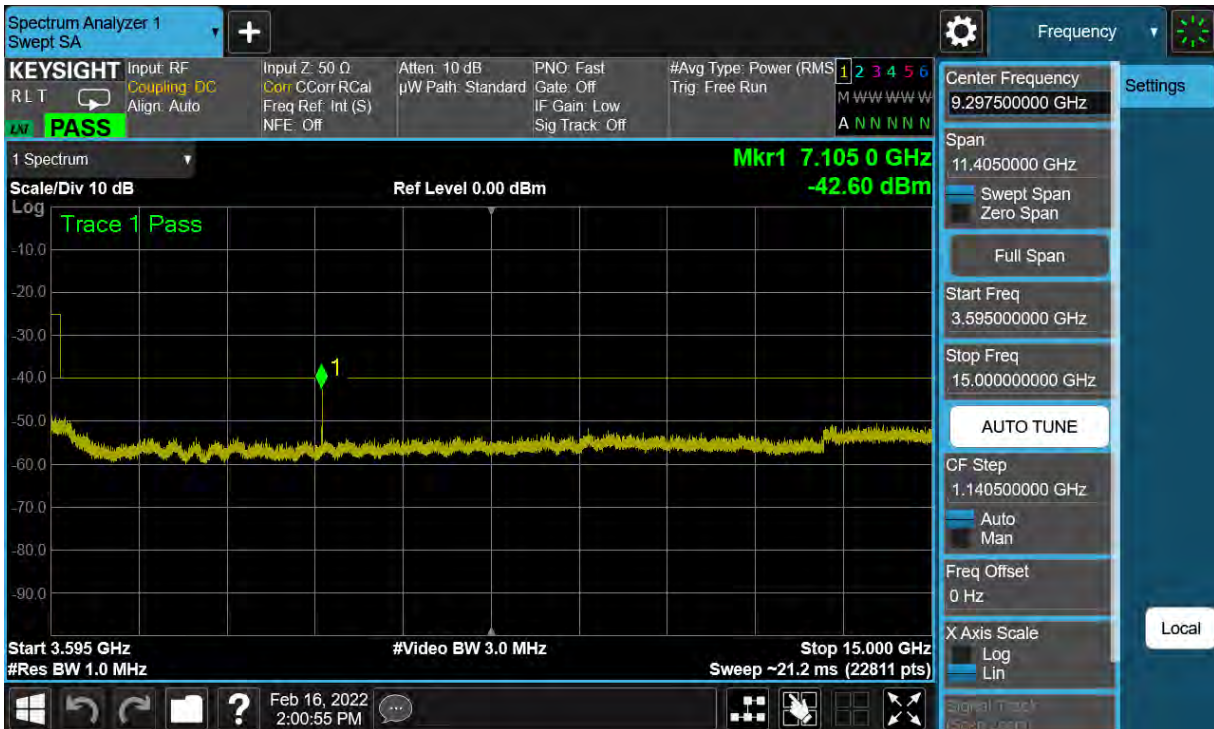
Test Notes

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

FCC ID: V7MESLCTGA	 PART 96 MEASUREMENT REPORT 	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE
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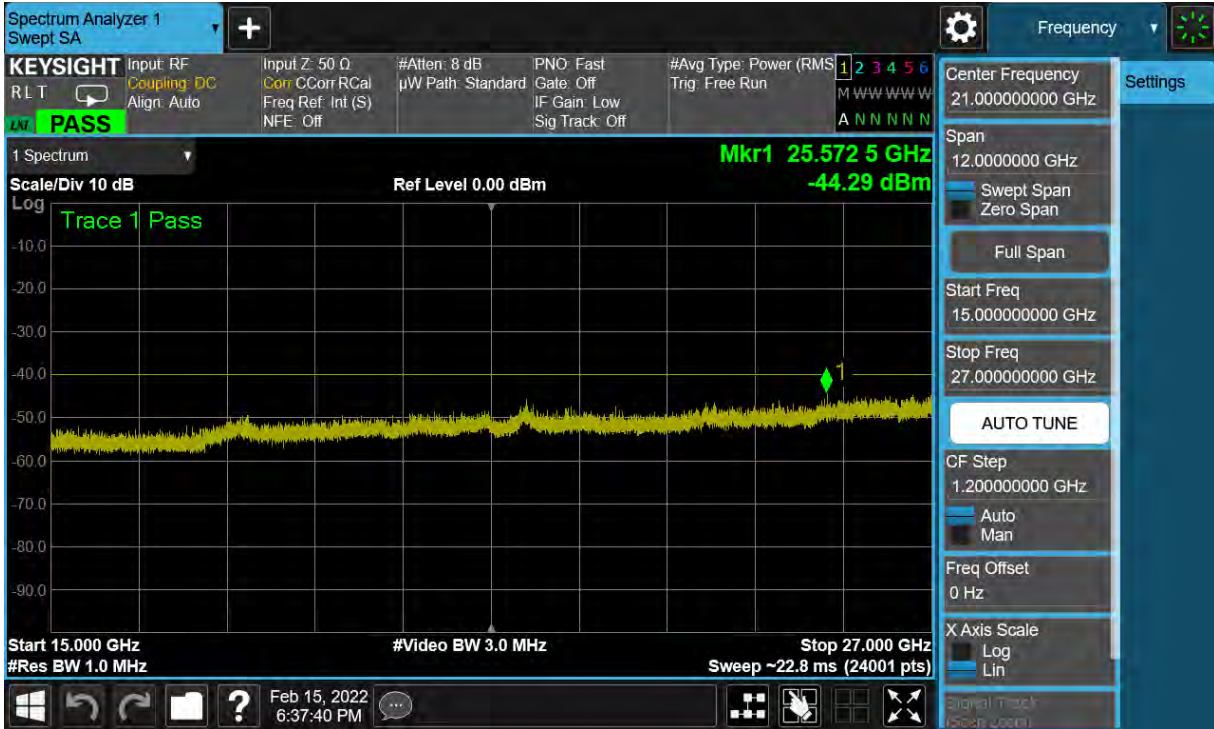


Plot 8-17. Conducted Spurious Plot (LTE Band 48 - 5MHz 64QAM - RB Size 1, RB offset 12 - Low Channel)

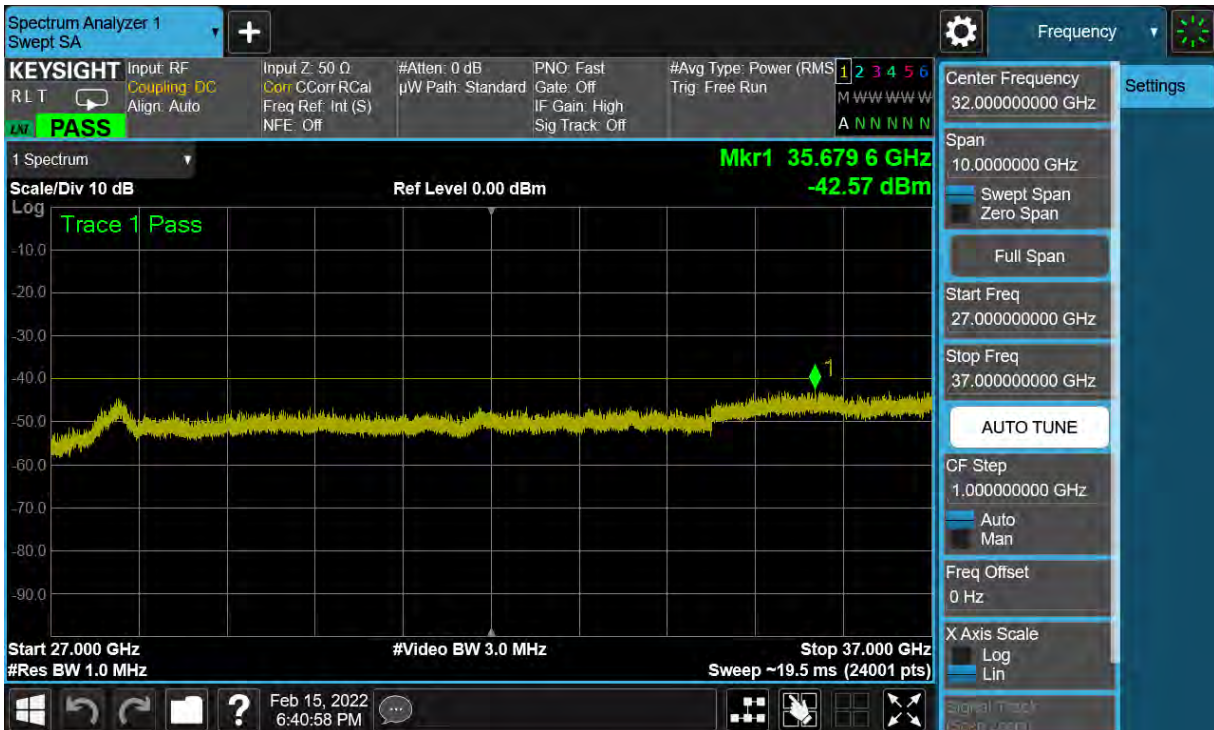


Plot 8-18. Conducted Spurious Plot (LTE Band 48 - 5MHz 64QAM - RB Size 1, RB offset 12 - Low Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 25 of 63

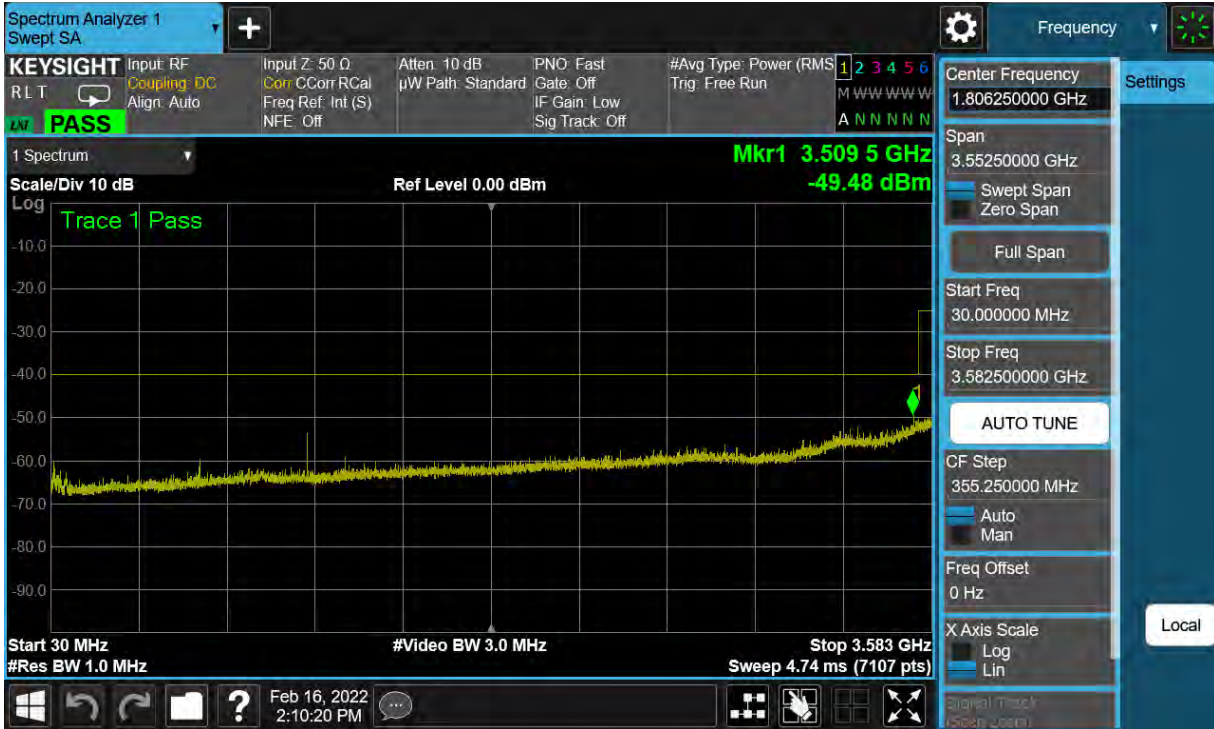


Plot 8-19. Conducted Spurious Plot (LTE Band 48 - 5MHz 64QAM - RB Size 1, RB offset 12 - Low Channel)

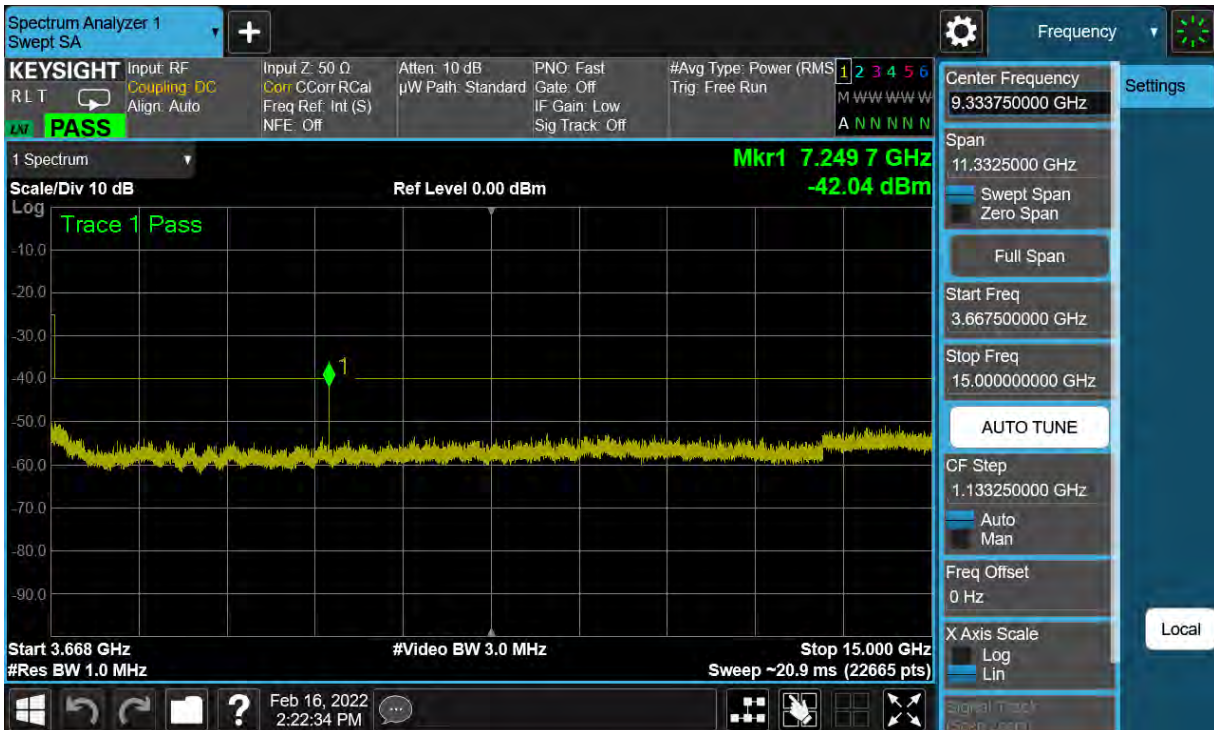


Plot 8-20. Conducted Spurious Plot (LTE Band 48 - 5MHz 64QAM - RB Size 1, RB offset 12 - Low Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 26 of 63

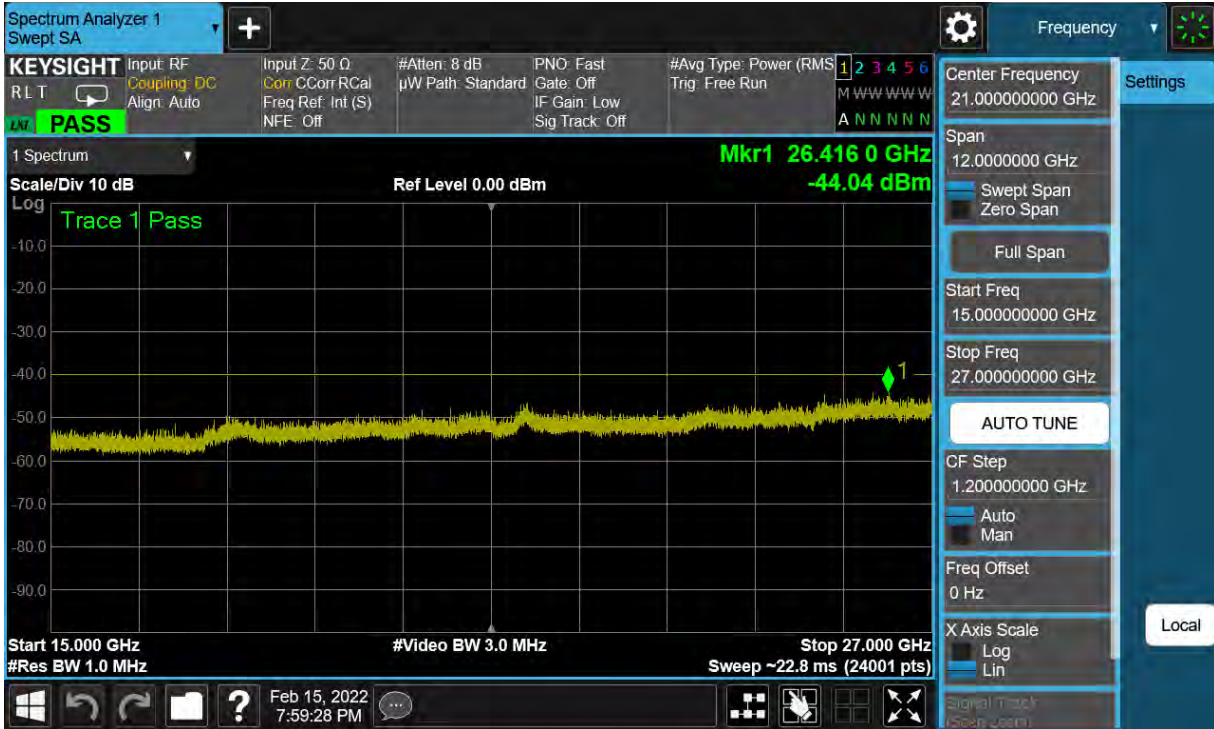


Plot 8-21. Conducted Spurious Plot (LTE Band 48 - 5MHz 16QAM - RB Size 1, RB offset 12 - Mid Channel)

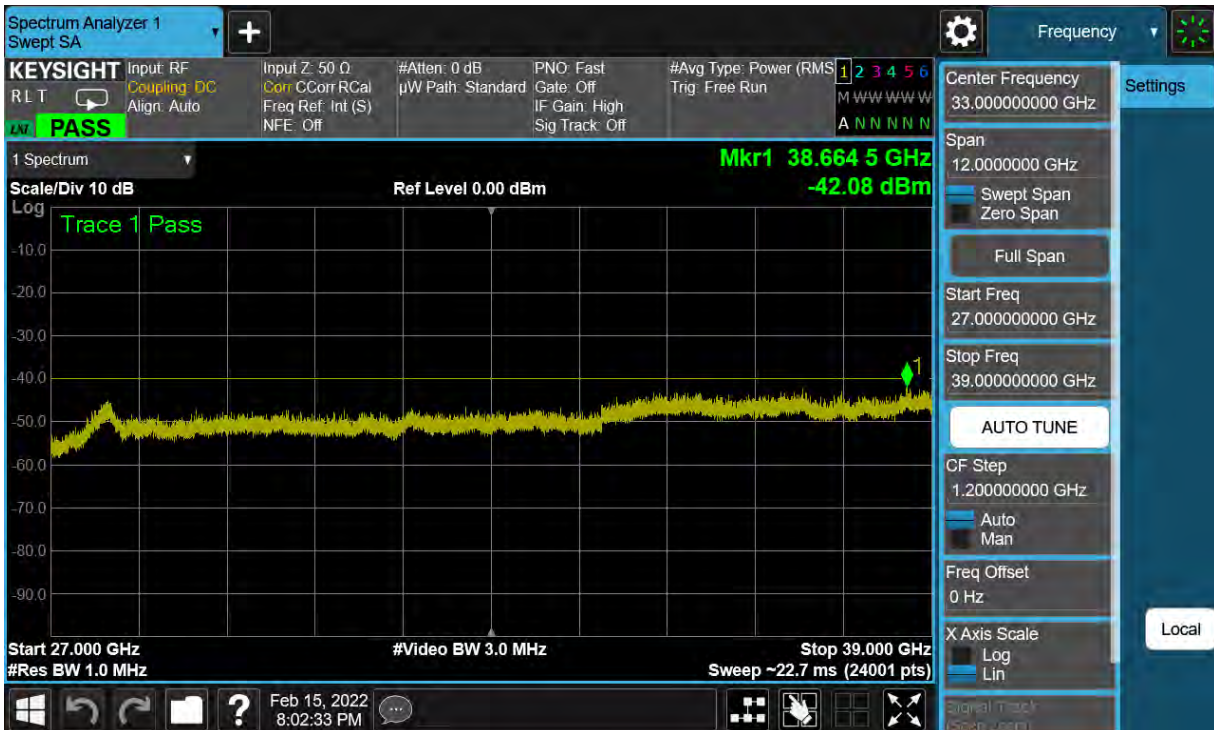


Plot 8-22. Conducted Spurious Plot (LTE Band 48 - 5MHz 16QAM - RB Size 1, RB offset 12 - Mid Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 27 of 63

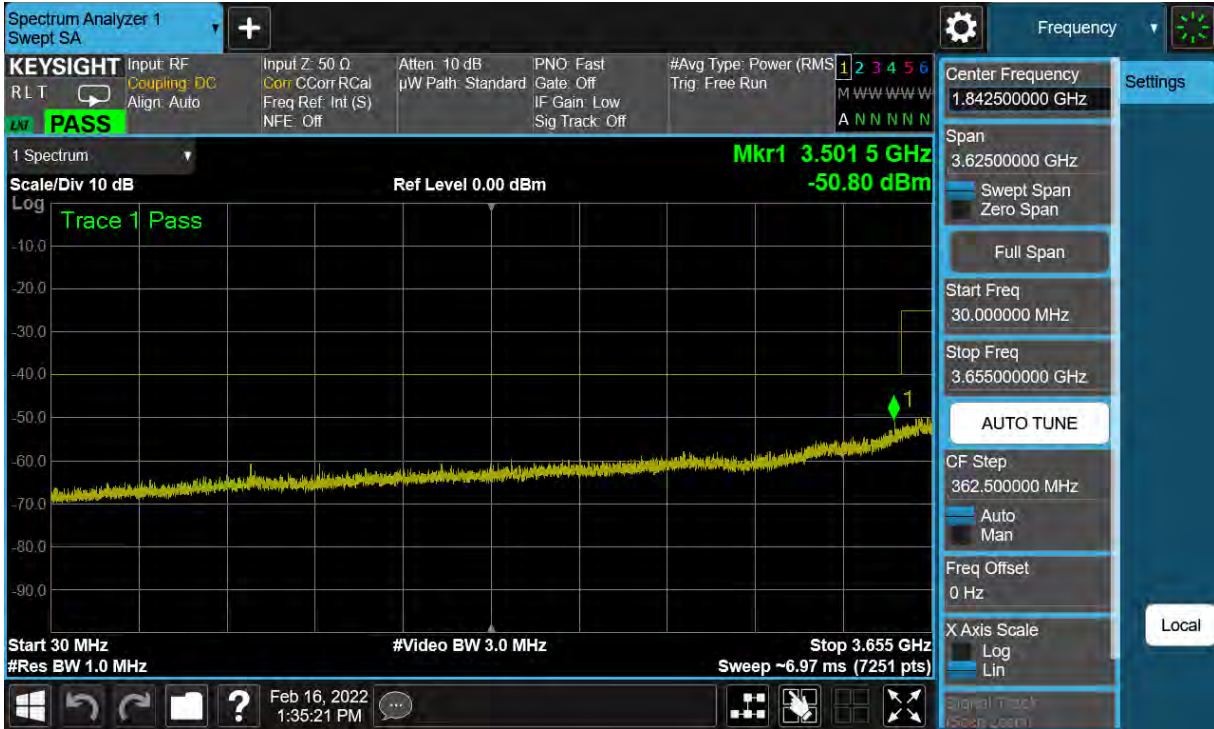


Plot 8-23. Conducted Spurious Plot (LTE Band 48 - 5MHz 16QAM - RB Size 1, RB offset 12 - Mid Channel)

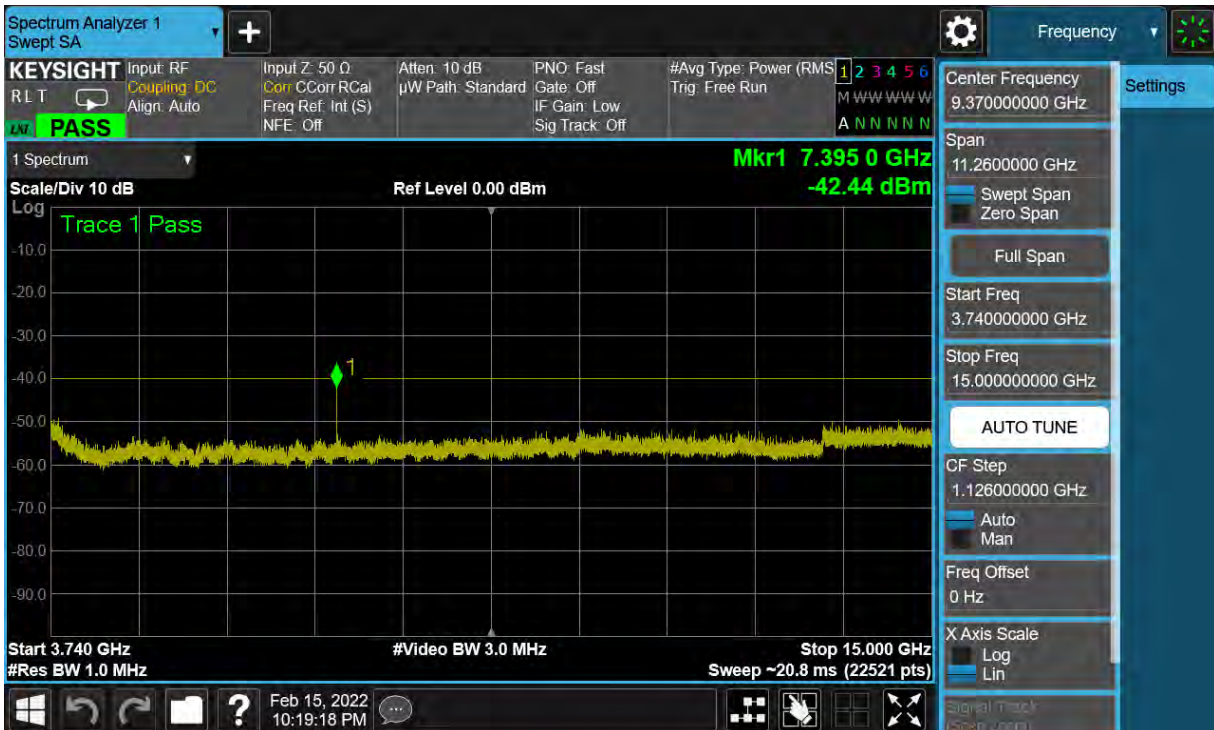


Plot 8-24. Conducted Spurious Plot (LTE Band 48 - 5MHz 16QAM - RB Size 1, RB offset 12 - Mid Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 28 of 63

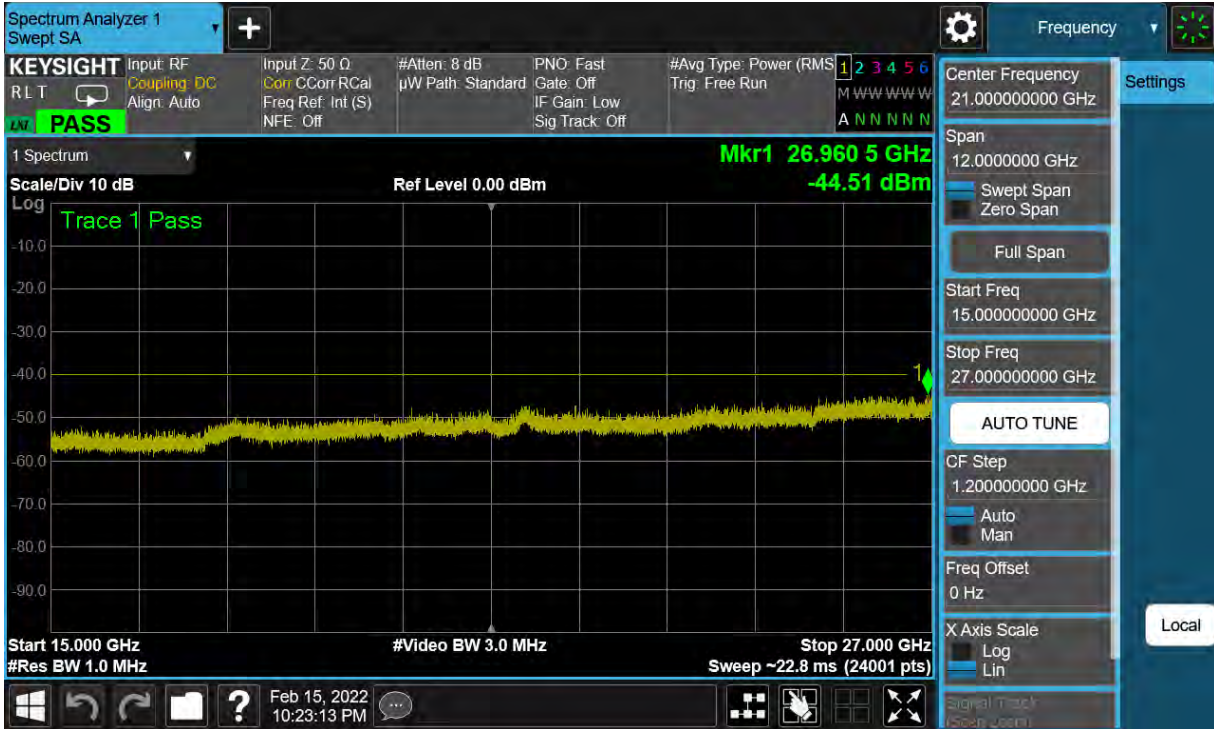


Plot 8-25. Conducted Spurious Plot (LTE Band 48 - 5MHz 16QAM - RB Size 1, RB offset 12 - High Channel)



Plot 8-26. Conducted Spurious Plot (LTE Band 48 - 5MHz 16QAM - RB Size 1, RB offset 12 - High Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 29 of 63

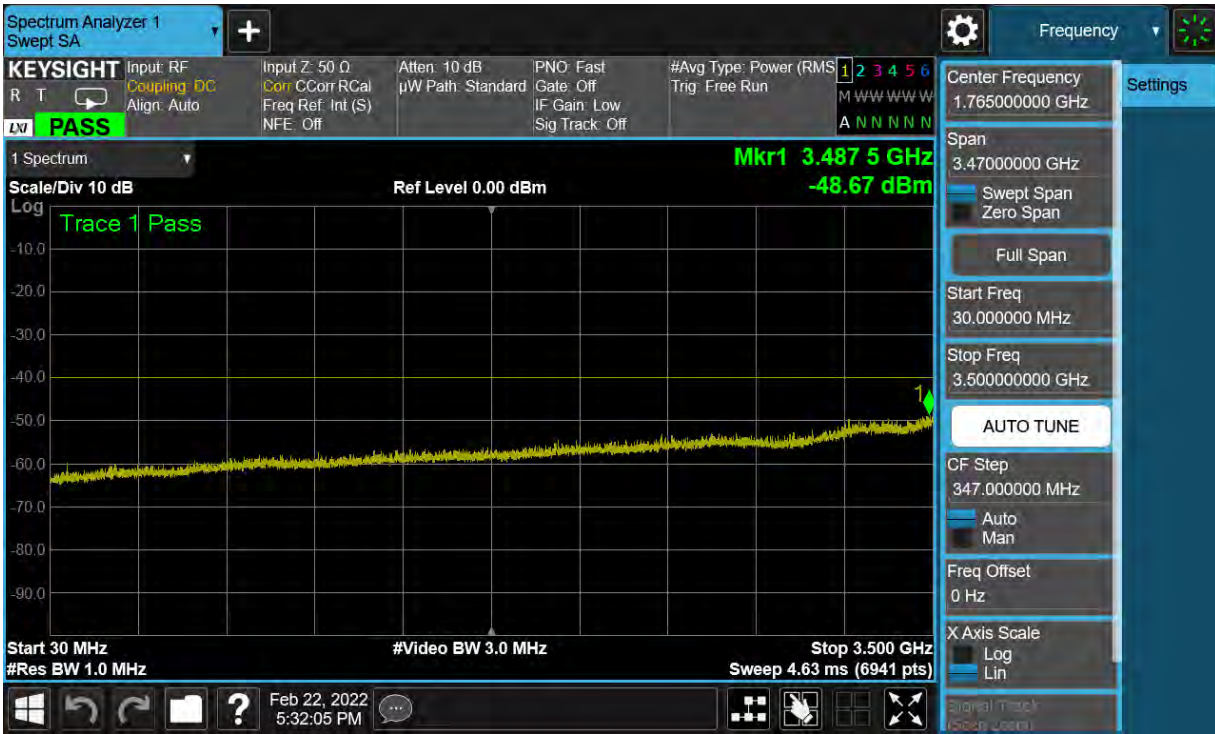


Plot 8-27. Conducted Spurious Plot (LTE Band 48 - 5MHz 16QAM - RB Size 1, RB offset 12 - High Channel)



Plot 8-28. Conducted Spurious Plot (LTE Band 48 - 5MHz 16QAM - RB Size 1, RB offset 12 - High Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 30 of 63

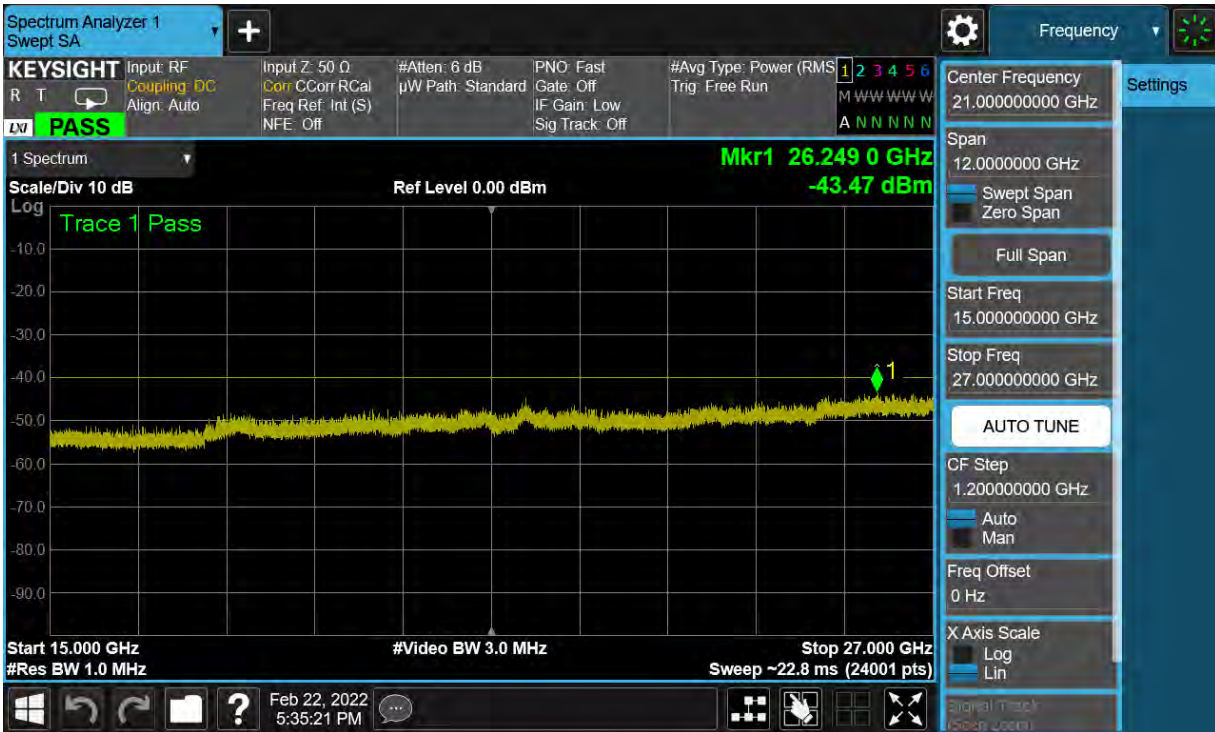


Plot 8-29. Conducted Spurious Plot (ULCA LTE Band 48 – 20+20MHz QPSK – Low Channel)

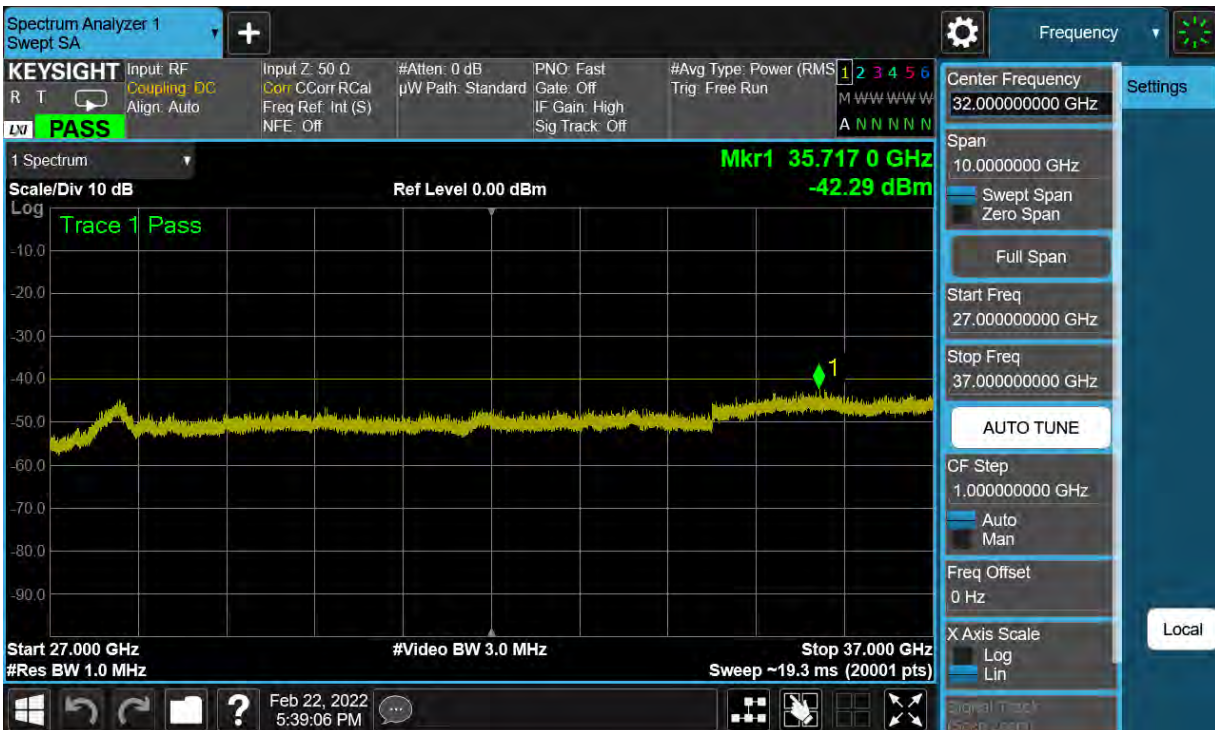


Plot 8-30. Conducted Spurious Plot (ULCA LTE Band 48 – 20+20MHz QPSK – Low Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 31 of 63



Plot 8-31. Conducted Spurious Plot (ULCA LTE Band 48 – 20+20MHz QPSK – Low Channel)

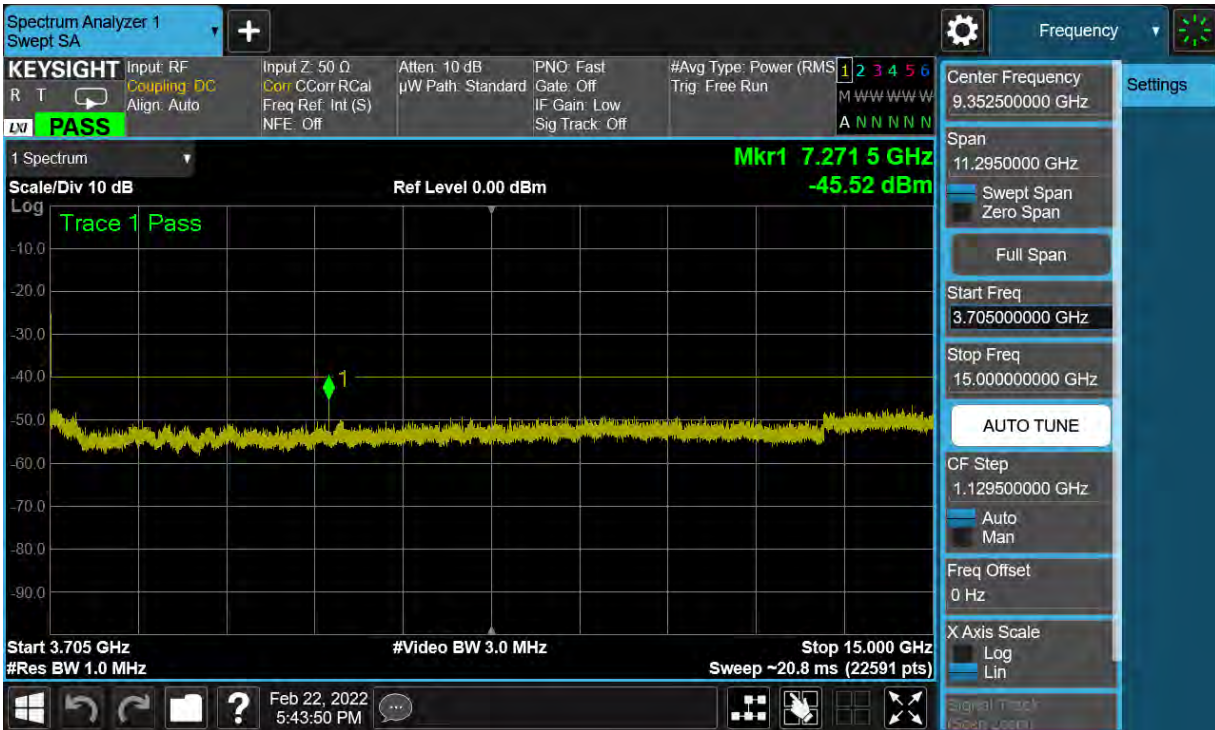


Plot 8-32. Conducted Spurious Plot (ULCA LTE Band 48 – 20+20MHz QPSK – Low Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 32 of 63



Plot 8-33. Conducted Spurious Plot (ULCA LTE Band 48 – 20+20MHz QPSK – Mid Channel)

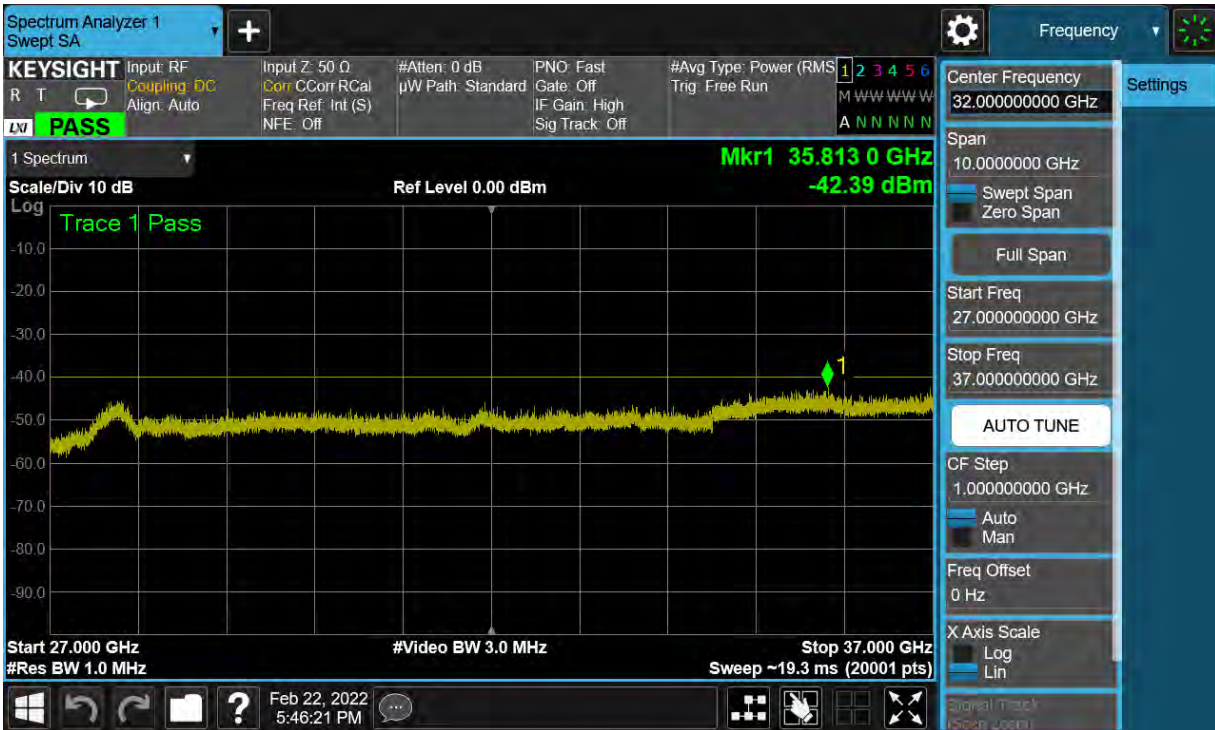


Plot 8-34. Conducted Spurious Plot (ULCA LTE Band 48 – 20+20MHz QPSK – Mid Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 33 of 63

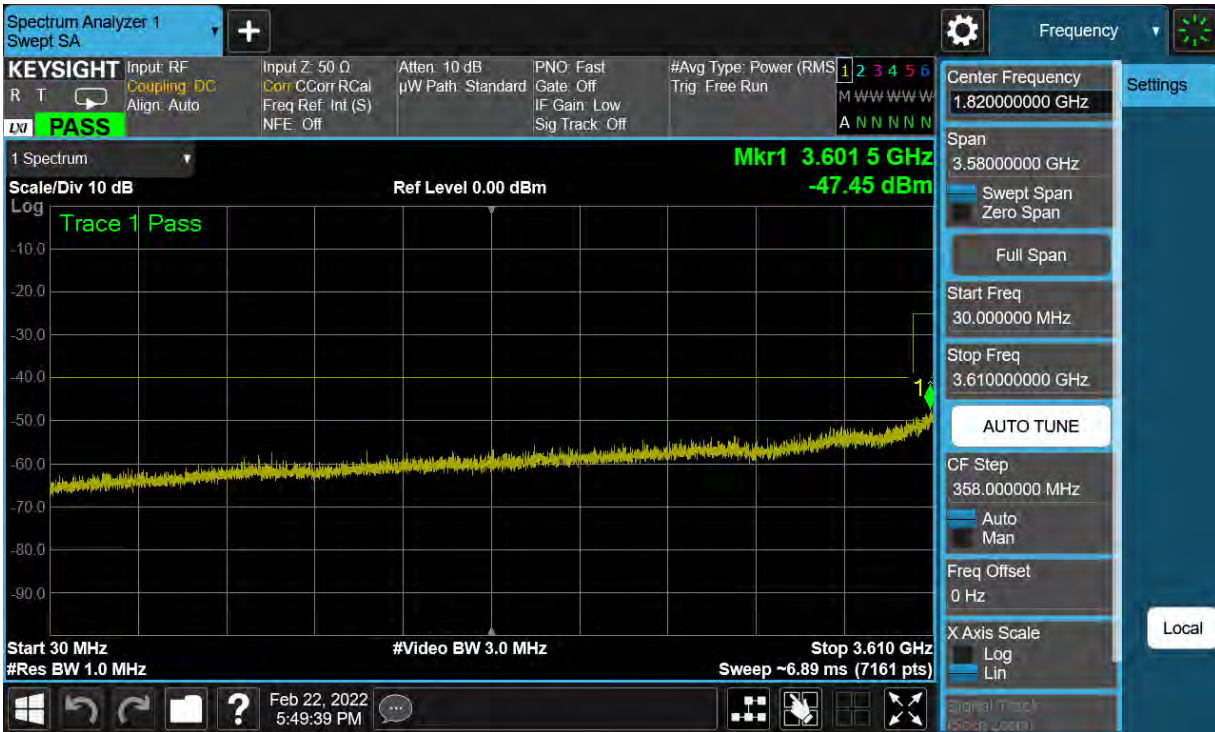


Plot 8-35. Conducted Spurious Plot (ULCA LTE Band 48 – 20+20MHz QPSK – Mid Channel)

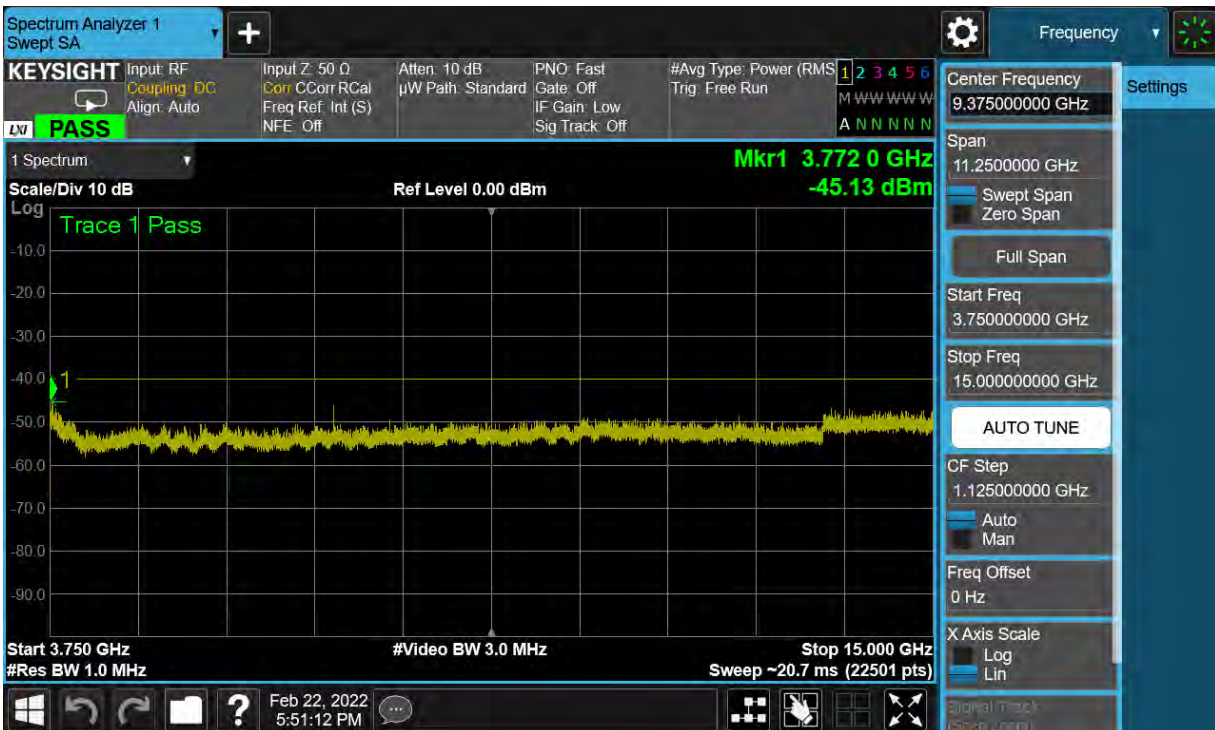


Plot 8-36. Conducted Spurious Plot (ULCA LTE Band 48 – 20+20MHz QPSK – Mid Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 34 of 63

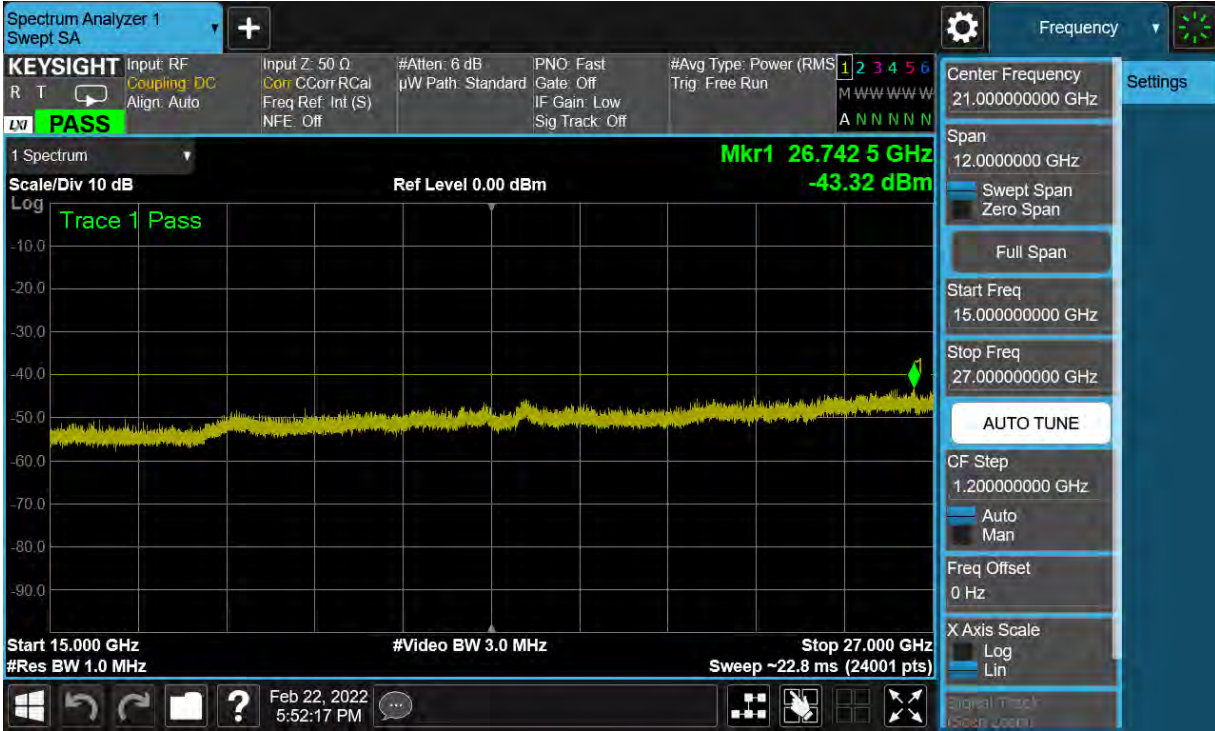


Plot 8-37. Conducted Spurious Plot (ULCA LTE Band 48 – 20+20MHz QPSK – High Channel)



Plot 8-38. Conducted Spurious Plot (ULCA LTE Band 48 – 20+20MHz QPSK – High Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 35 of 63



Plot 8-39. Conducted Spurious Plot (ULCA LTE Band 48 – 20+20MHz QPSK – High Channel)



Plot 8-40. Conducted Spurious Plot (ULCA LTE Band 48 – 20+20MHz QPSK – High Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 36 of 63

8.5 Band Edge Emissions at Antenna Terminal

§2.1051 §96.41(e)(ii)

Test Overview

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

The conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0 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

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW \geq 1% of the emission bandwidth
4. VBW \geq 3 x RBW
5. Detector = RMS
6. Number of sweep points \geq 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.

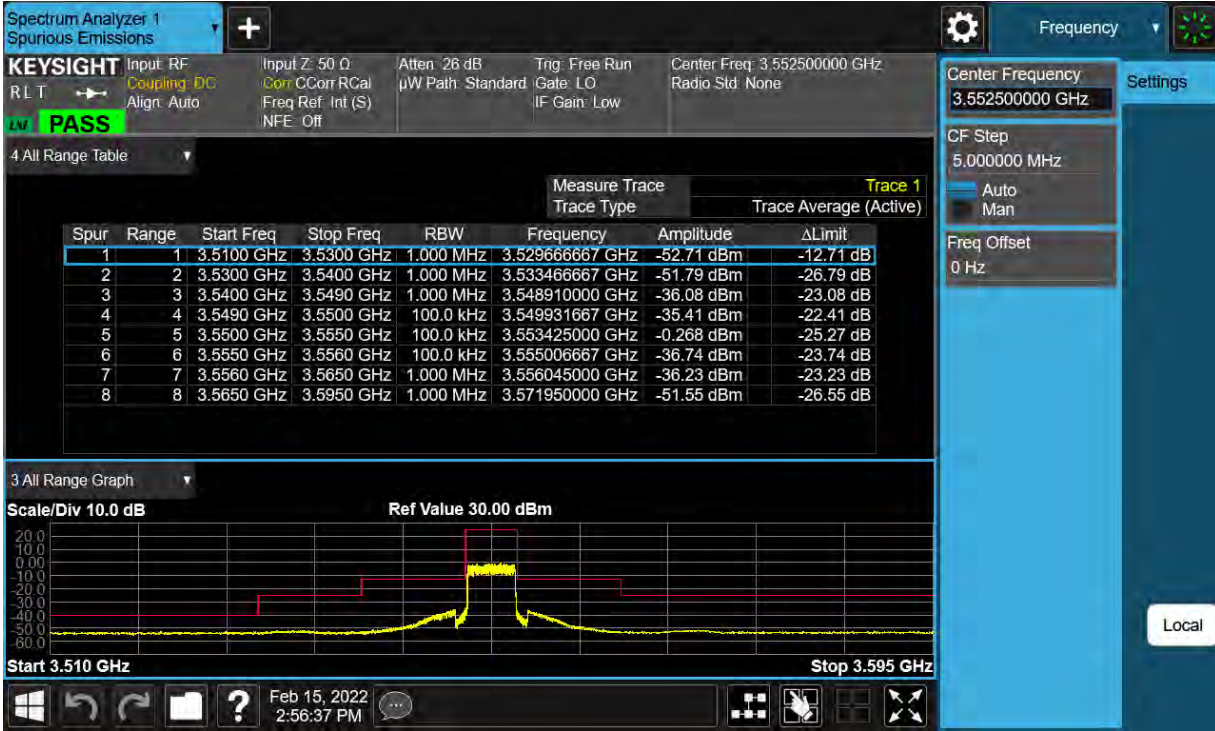


Figure 8-4. Test Instrument & Measurement Setup

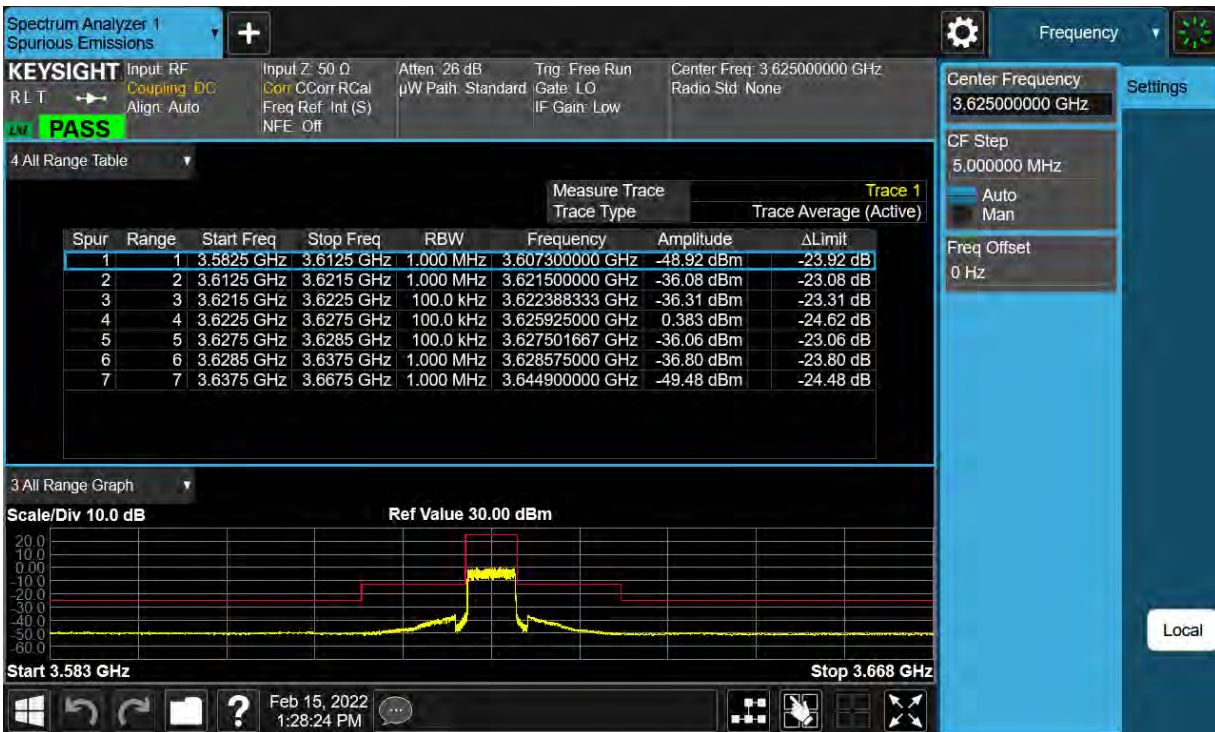
Test Notes

None.

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 37 of 63

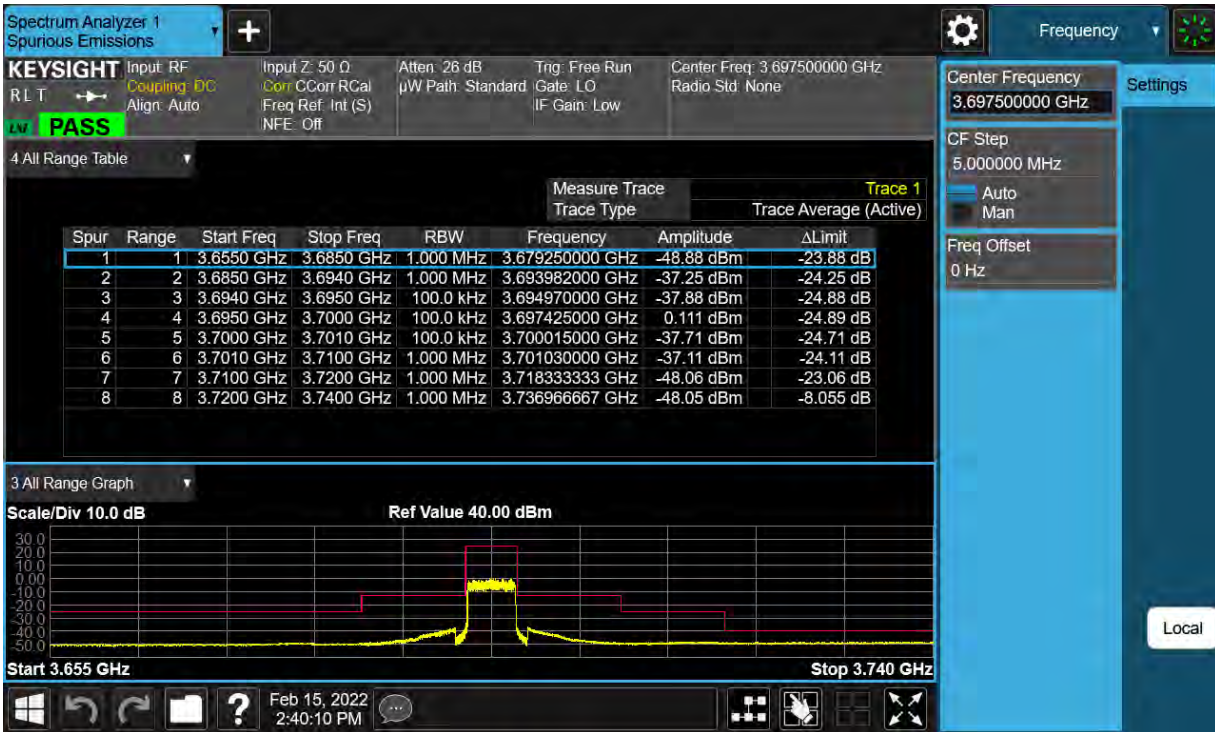


Plot 8-41. Band Edge emissions Plot (LTE Band 48 – 5MHz QPSK – Low Channel)

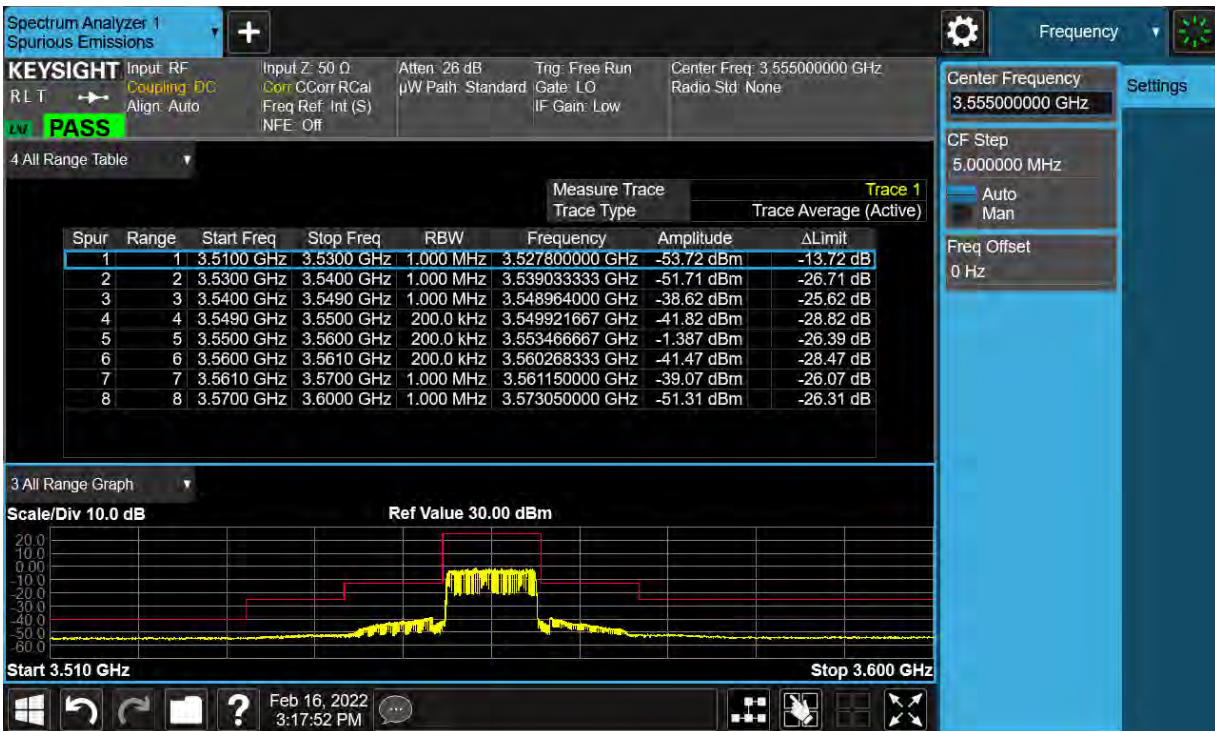


Plot 8-42. Band Edge emissions Plot (LTE Band 48 – 5MHz QPSK – Mid Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 38 of 63

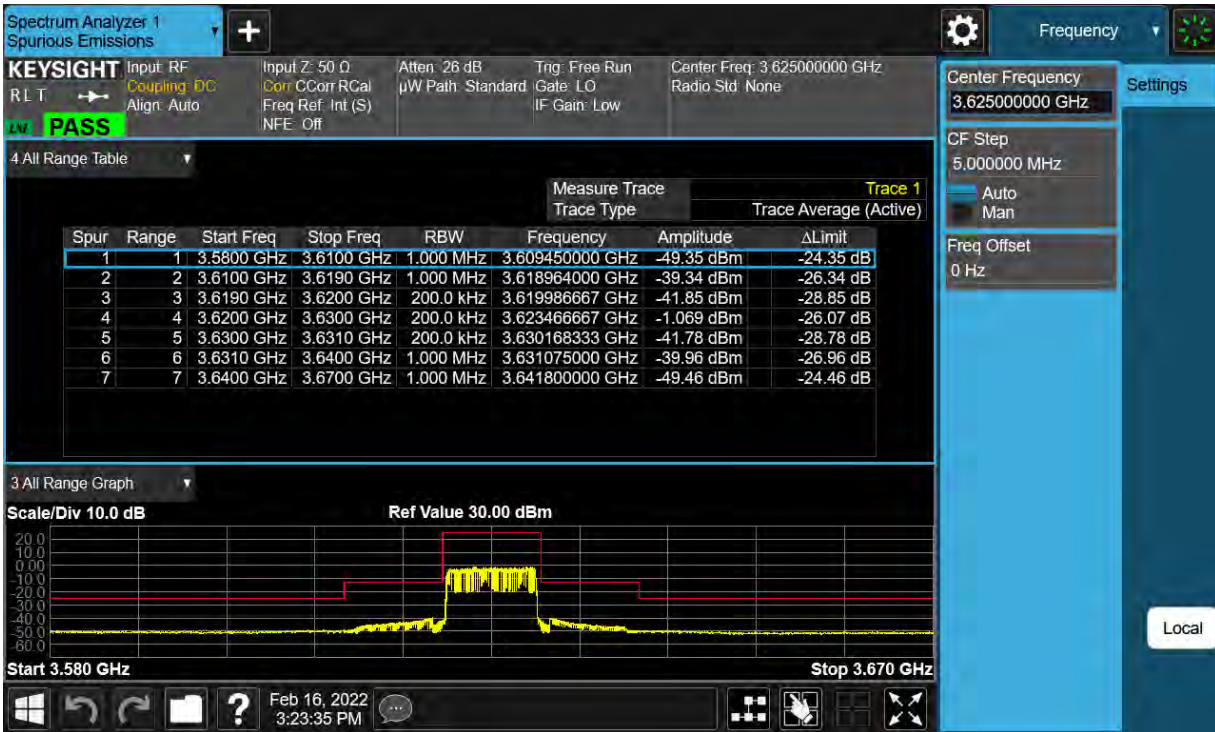


Plot 8-43. Band Edge emissions Plot (LTE Band 48 – 5MHz QPSK – High Channel)

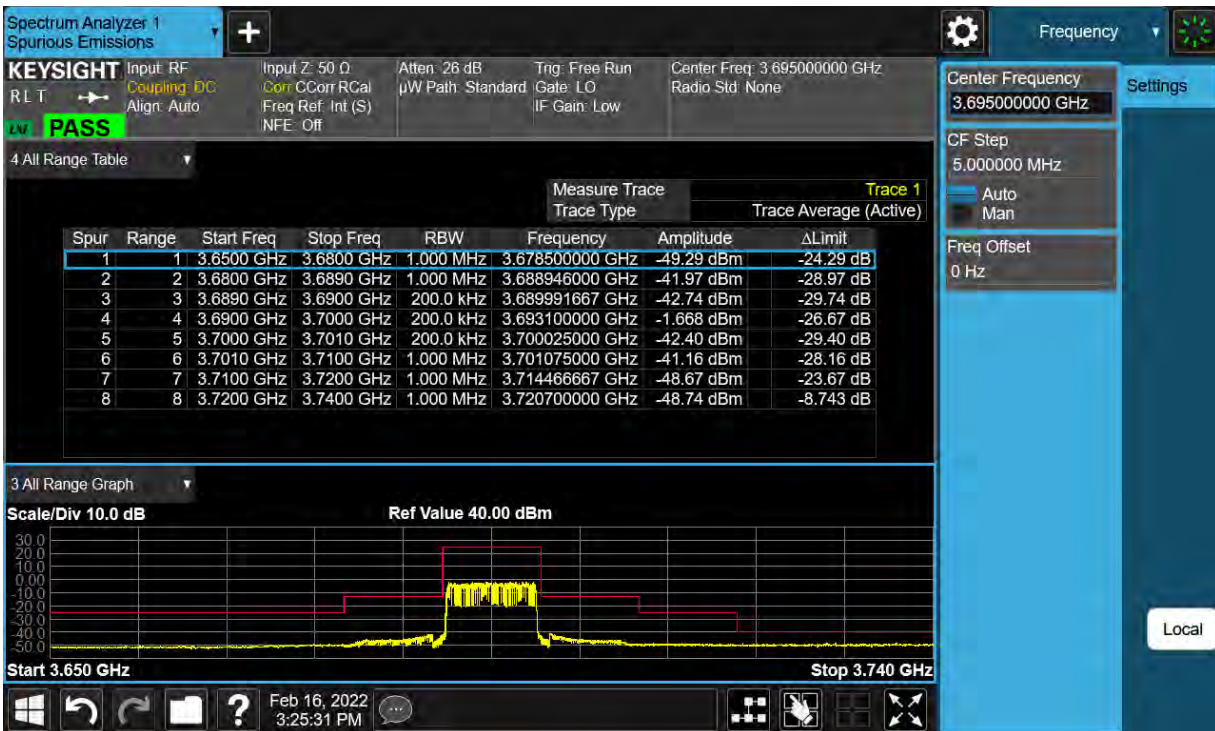


Plot 8-44. Band Edge emissions Plot (LTE Band 48 – 10MHz QPSK – Low Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 39 of 63

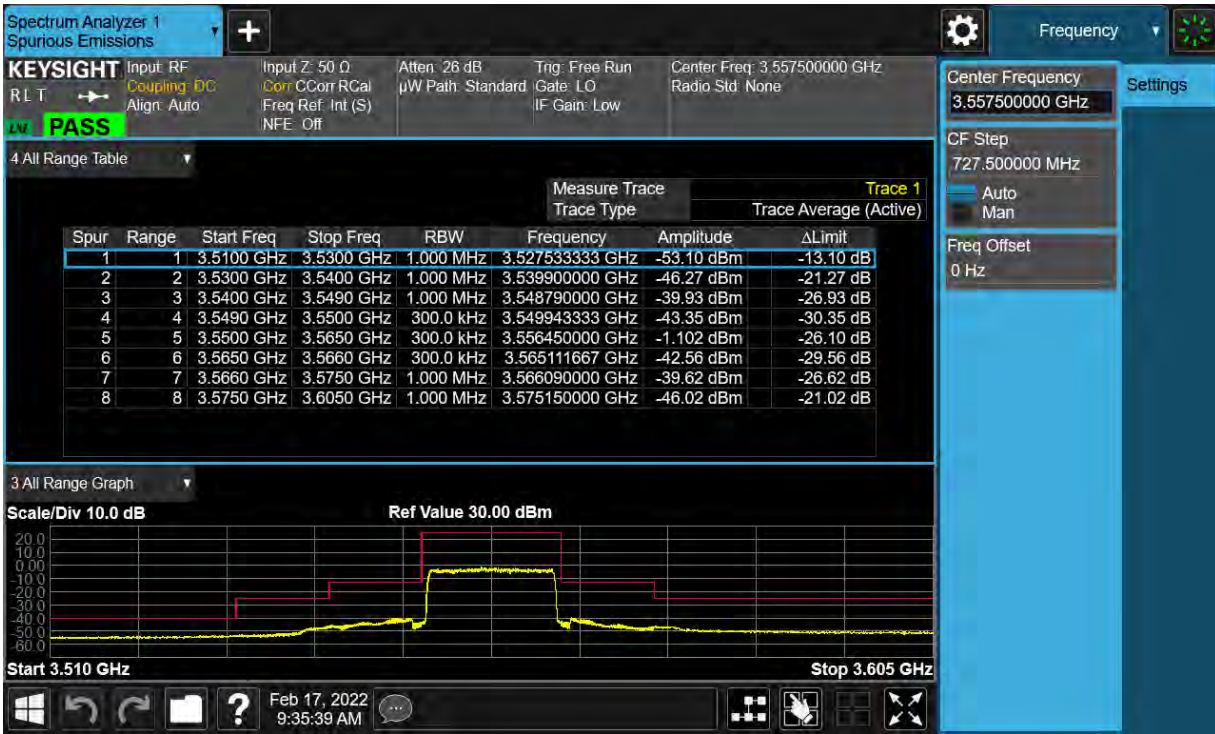


Plot 8-45. Band Edge emissions Plot (LTE Band 48 – 10MHz QPSK – Mid Channel)

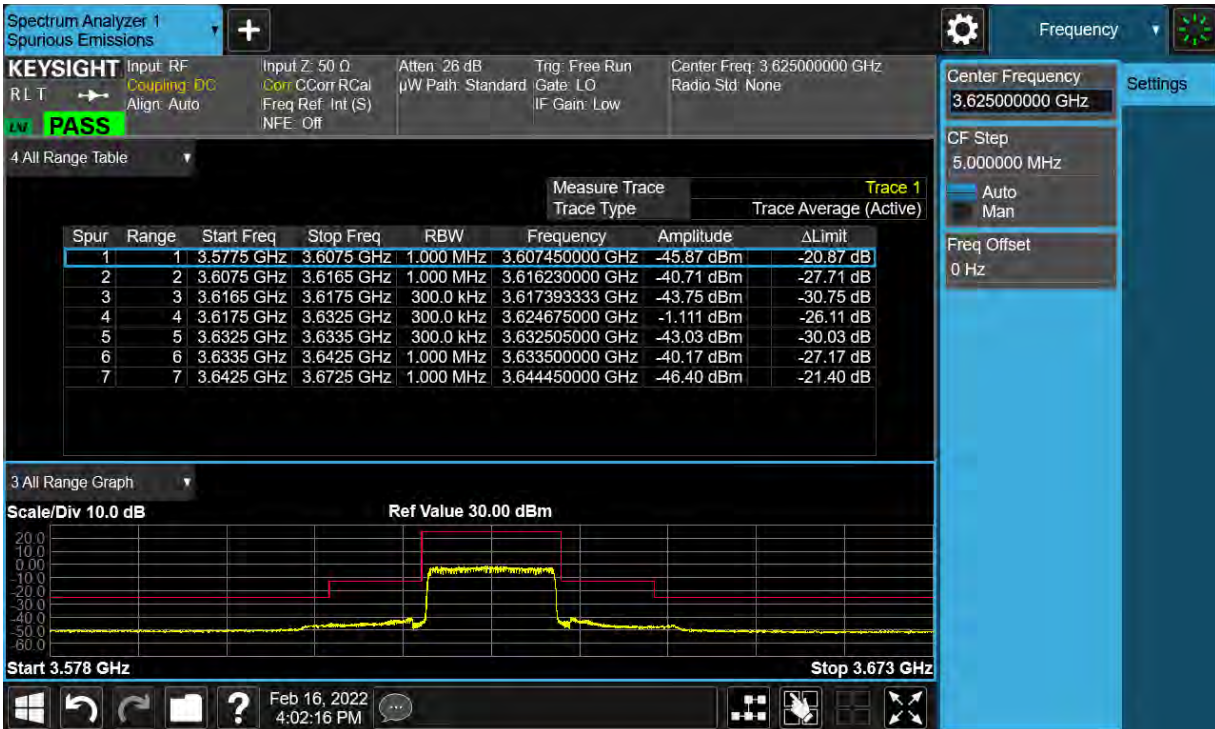


Plot 8-46. Band Edge emissions Plot (LTE Band 48 – 10MHz QPSK – High Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 40 of 63

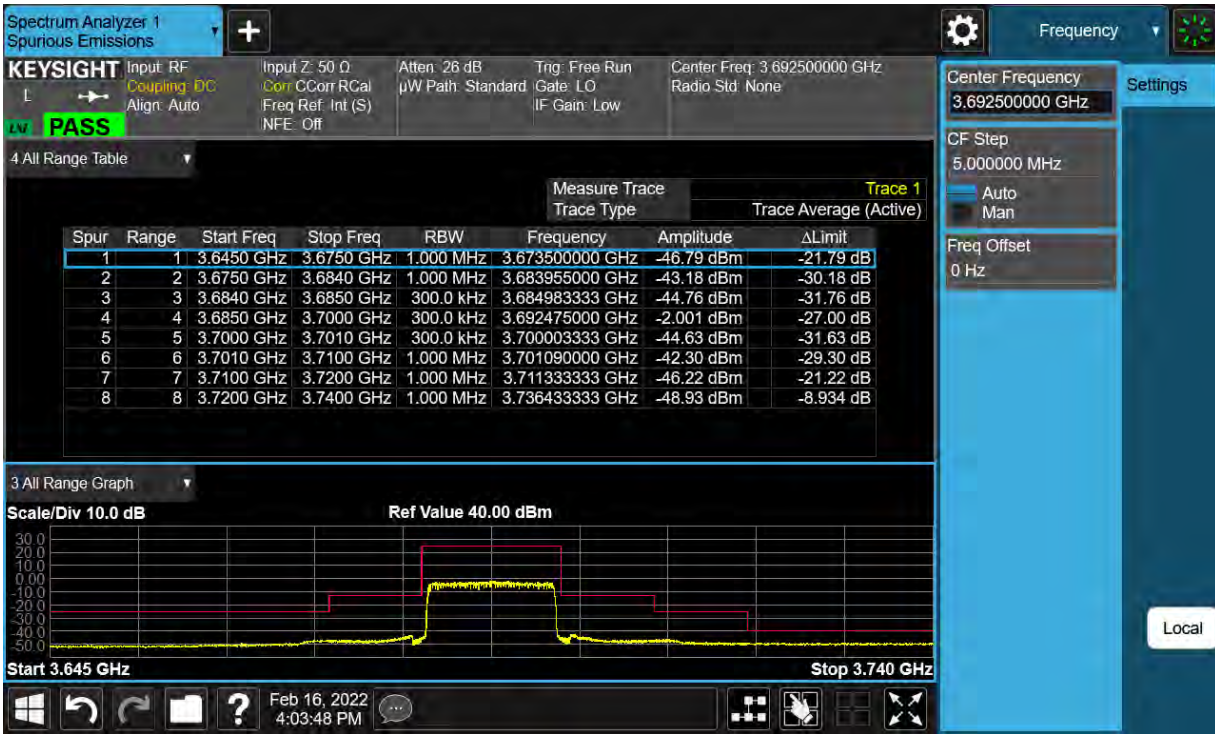


Plot 8-47. Band Edge emissions Plot (LTE Band 48 – 15MHz QPSK – Low Channel)

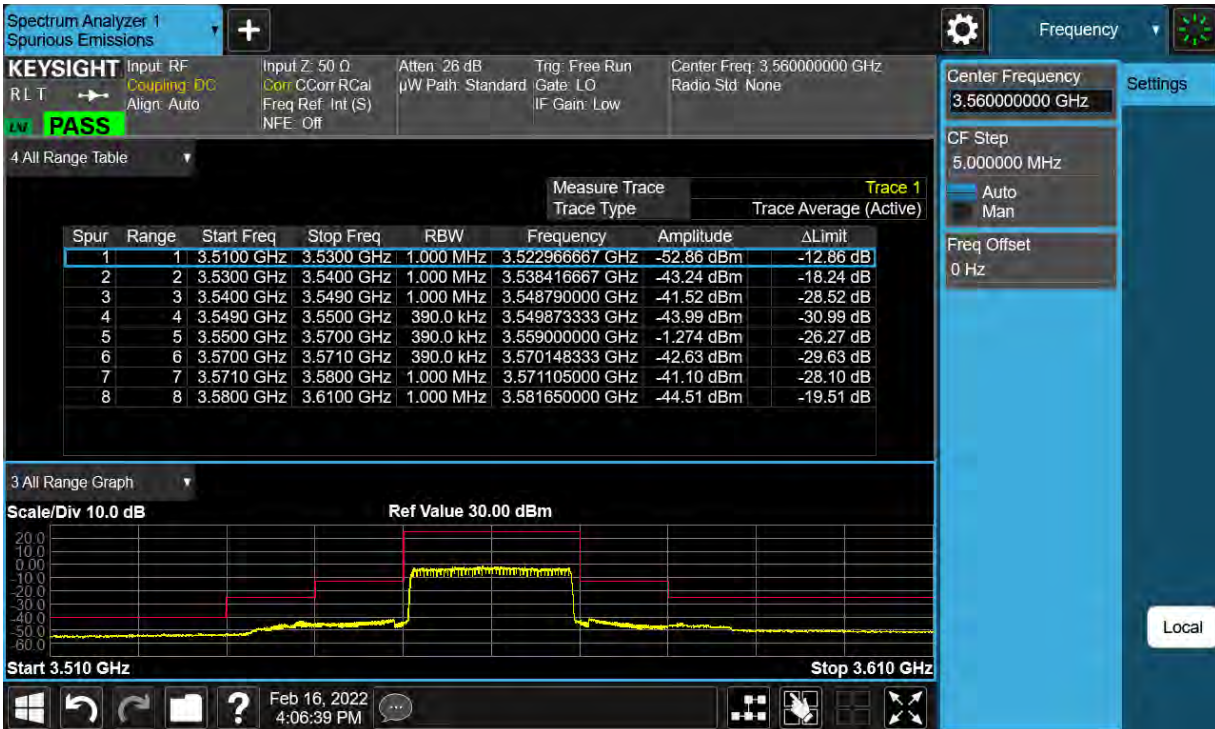


Plot 8-48. Band Edge emissions Plot (LTE Band 48 – 15MHz QPSK – Mid Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 41 of 63

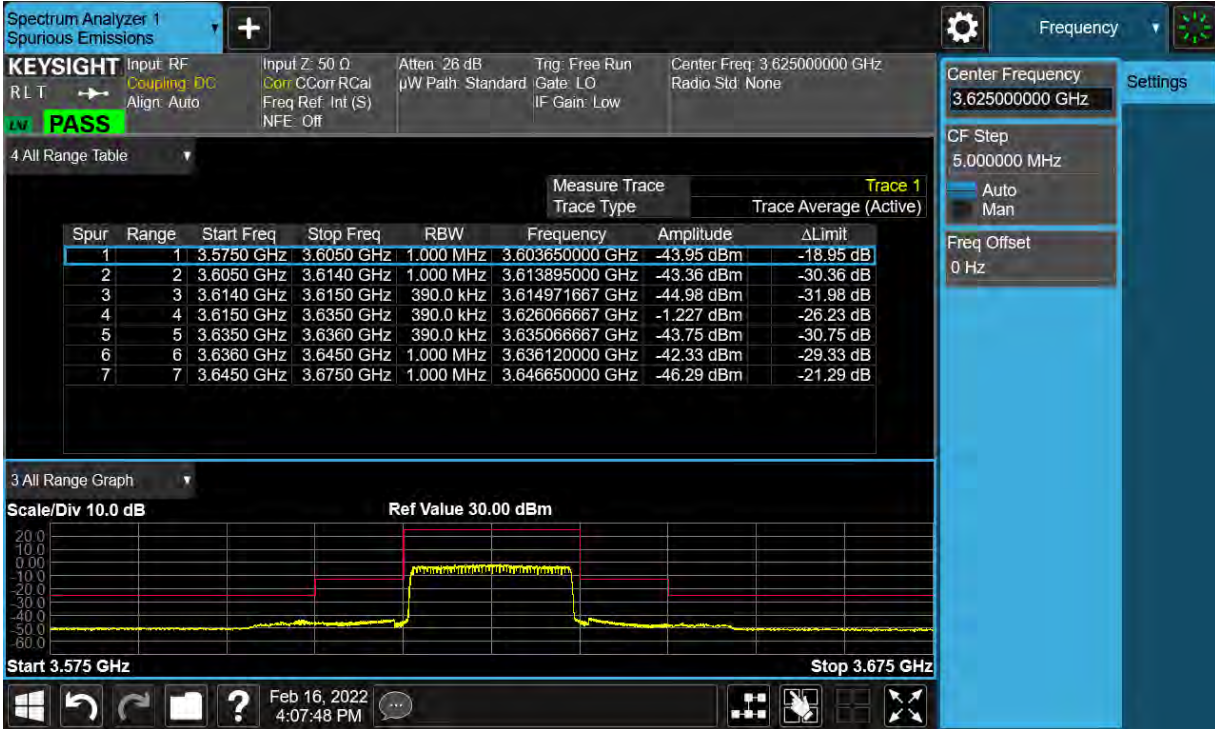


Plot 8-49. Band Edge emissions Plot (LTE Band 48 – 15MHz QPSK – High Channel)

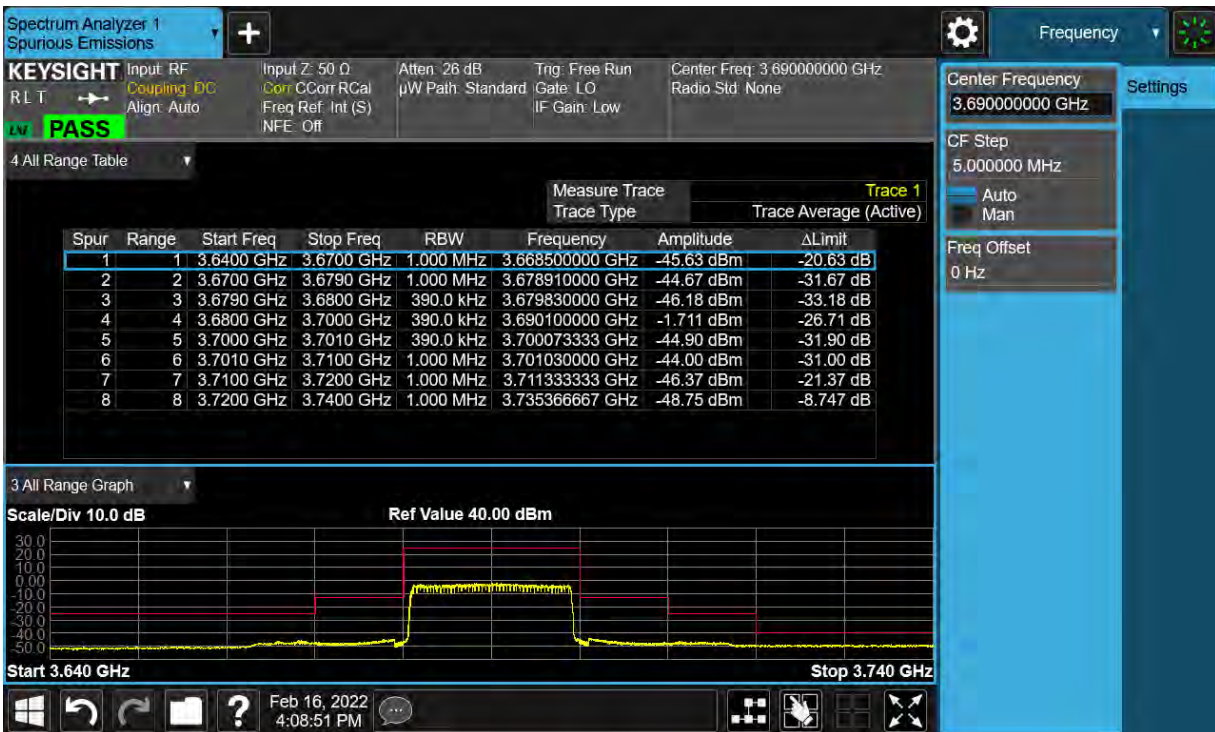


Plot 8-50. Band Edge emissions Plot (LTE Band 48 – 20MHz QPSK – Low Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 42 of 63

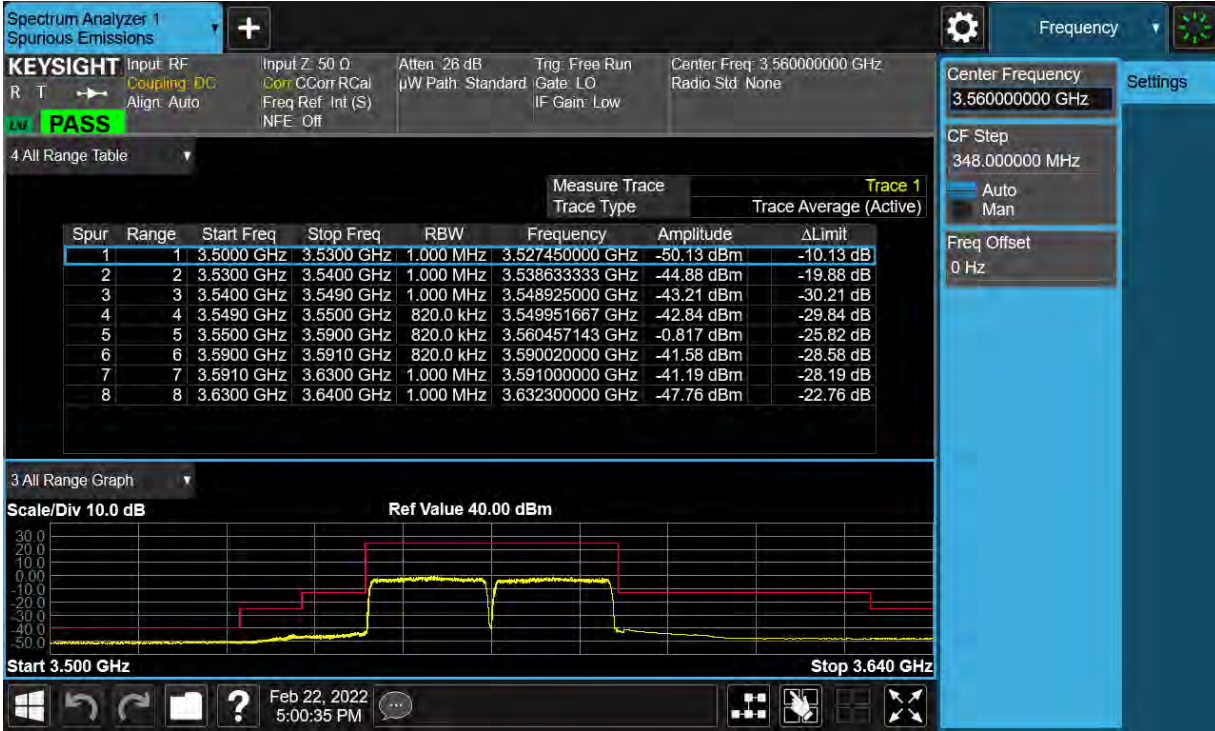


Plot 8-51. Band Edge emissions Plot (LTE Band 48 – 20MHz QPSK – Mid Channel)

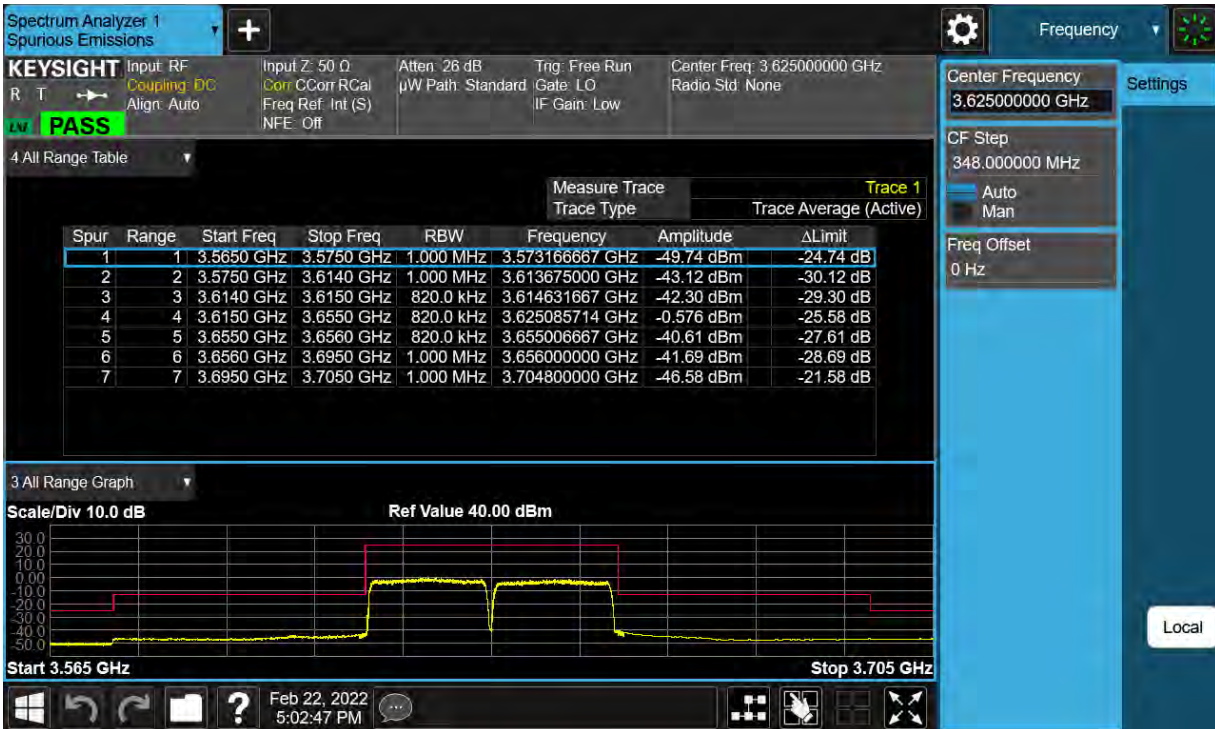


Plot 8-52. Band Edge emissions Plot (LTE Band 48 – 20MHz QPSK – High Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 43 of 63

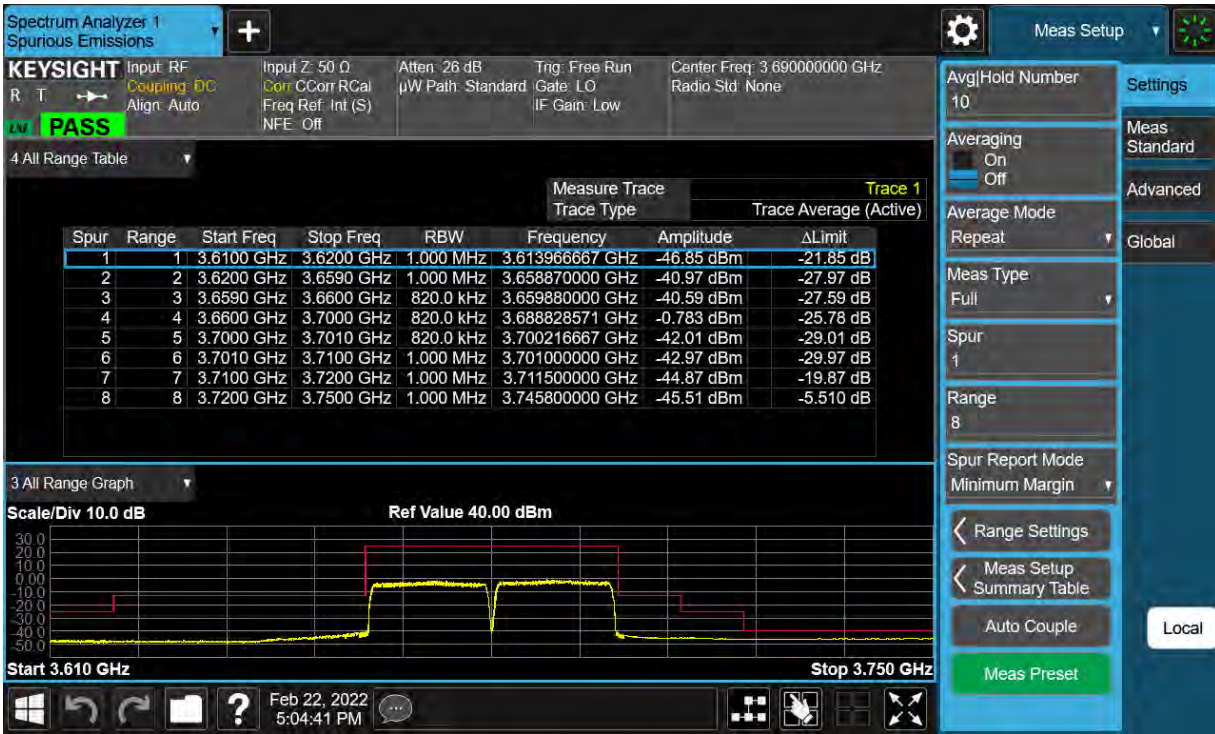


Plot 8-53. Band Edge emissions Plot (ULCA LTE Band 48 – 20+20MHz QPSK – Low Channel)



Plot 8-54. Band Edge emissions Plot (ULCA LTE Band 48 – 20+20MHz QPSK – Mid Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 44 of 63



Plot 8-55. Band Edge emissions Plot (ULCA LTE Band 48 – 20+20MHz QPSK – High Channel)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 45 of 63

8.6 Radiated Power (EIRP)

§96.41(b)

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

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

Test Settings

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

FCC ID: V7MESLCTGA	 PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	 SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 46 of 63

Test Setup

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

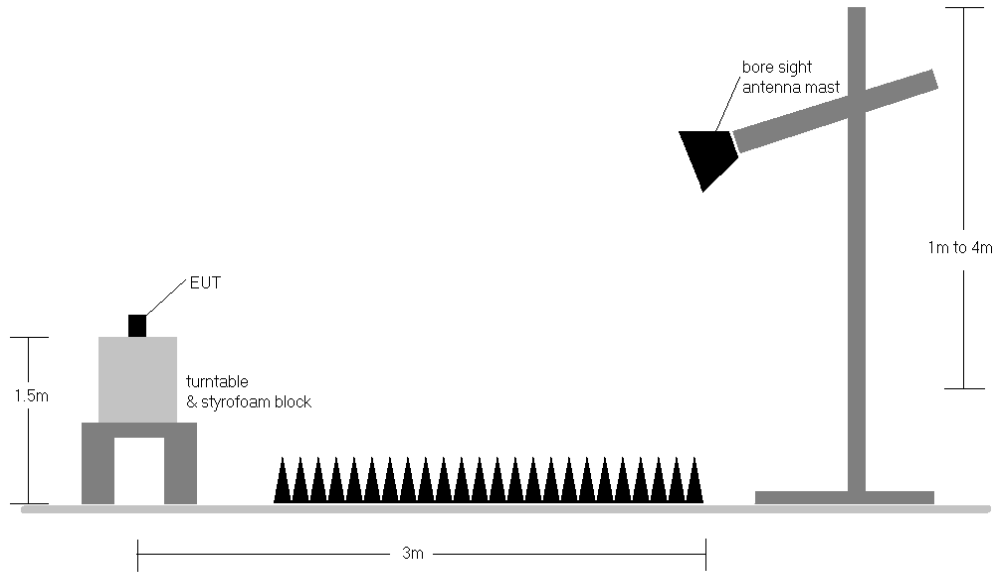


Figure 8-5. Radiated Test Setup >1GHz

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) 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	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	EUT Pol.	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	3560.0	H	X	110	63	9.69	1 / 0	9.98	19.67	0.093	23.00	-3.33
	QPSK	3625.0	H	X	103	62	9.67	1 / 0	9.30	18.97	0.079	23.00	-4.03
	QPSK	3690.0	H	X	119	68	9.66	1 / 99	9.78	19.44	0.088	23.00	-3.56
	16-QAM	3560.0	H	X	110	63	9.69	1 / 0	10.18	19.87	0.097	23.00	-3.13
15 MHz	QPSK	3557.5	H	X	110	63	9.69	1 / 74	9.52	19.21	0.083	23.00	-3.79
	QPSK	3625.0	H	X	103	62	9.67	1 / 0	9.21	18.88	0.077	23.00	-4.12
	QPSK	3692.5	H	X	119	68	9.65	1 / 74	9.68	19.33	0.086	23.00	-3.67
	16-QAM	3625.0	H	X	103	62	9.67	1 / 0	9.73	19.40	0.087	23.00	-3.60
10 MHz	QPSK	3555.0	H	X	110	63	9.69	1 / 49	9.62	19.31	0.085	23.00	-3.69
	QPSK	3625.0	H	X	103	62	9.67	50 / 0	9.04	18.71	0.074	23.00	-4.29
	QPSK	3695.0	H	X	119	68	9.65	1 / 49	9.71	19.36	0.086	23.00	-3.64
	16-QAM	3555.0	H	X	110	63	9.69	50 / 0	9.51	19.20	0.083	23.00	-3.80
5 MHz	QPSK	3552.5	H	X	110	63	9.70	1 / 12	8.92	18.62	0.073	23.00	-4.38
	QPSK	3625.0	H	X	103	62	9.67	25 / 0	8.68	18.35	0.068	23.00	-4.65
	QPSK	3697.5	H	X	119	68	9.65	25 / 0	9.20	18.85	0.077	23.00	-4.15
	64-QAM	3625.0	H	X	103	62	9.67	1 / 12	9.56	19.23	0.084	23.00	-3.77

Table 8-4. EIRP Data (LTE Band 48)

Bandwidth	Modulation	PCC			SCC			Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degrees]	Ant. Gain [dBi]	Substitute Level [dBm]	EIRP [dBm/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
		Bandwidth [MHz]	Frequency [MHz]	RB / Offset	Bandwidth [MHz]	Frequency [MHz]	RB / Offset									
40 MHz	QPSK	20	3560.0	1 / 99	20	3579.8	1 / 0	H	189	149	9.69	8.45	18.14	0.065	23.00	-4.86
		20	3625.0	1 / 99	20	3644.8	1 / 0	H	201	154	9.67	9.16	18.83	0.076	23.00	-4.17
		20	3690.0	1 / 0	20	3670.2	1 / 99	H	183	157	9.66	8.71	18.37	0.069	23.00	-4.63
		16-QAM	20	3625.0	1 / 99	20	3644.8	1 / 0	H	201	154	9.67	9.40	19.07	0.081	23.00
35 MHz	QPSK	20	3557.5	1 / 99	15	3577.1	1 / 0	H	189	149	9.69	8.03	17.72	0.059	23.00	-5.28
		20	3625.0	1 / 99	15	3642.1	1 / 0	H	201	154	9.67	9.07	18.74	0.075	23.00	-4.26
		20	3692.5	1 / 0	15	3672.9	1 / 74	H	183	157	9.65	8.43	18.09	0.064	23.00	-4.91
		16-QAM	20	3625.0	1 / 99	15	3642.1	1 / 0	H	201	154	9.67	9.30	18.97	0.079	23.00
30 MHz	QPSK	20	3555.0	1 / 99	10	3574.4	1 / 0	H	189	149	9.69	8.48	18.17	0.066	23.00	-4.83
		20	3625.0	1 / 99	10	3639.4	1 / 0	H	201	154	9.67	9.49	19.16	0.082	23.00	-3.84
		20	3695.0	1 / 0	10	3678.3	1 / 49	H	183	157	9.65	8.49	18.15	0.065	23.00	-4.85
		16-QAM	20	3625.0	1 / 99	10	3639.4	1 / 0	H	201	154	9.67	9.32	18.99	0.079	23.00
25 MHz	QPSK	20	3552.5	1 / 99	5	3571.7	1 / 0	H	189	149	9.70	7.93	17.62	0.058	23.00	-5.38
		20	3625.0	1 / 99	5	3636.7	1 / 0	H	201	154	9.67	8.77	18.44	0.070	23.00	-4.56
		20	3697.5	1 / 0	5	3678.3	1 / 24	H	183	157	9.65	7.79	17.45	0.056	23.00	-5.55
		16-QAM	20	3625.0	1 / 99	5	3636.7	1 / 0	H	201	154	9.67	9.06	18.73	0.075	23.00

Table 8-5. EIRP Data (ULCA LTE Band 48)

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8.7 Radiated Spurious Emissions Measurements

§2.1053 §96.41(e)

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. The radiated emissions are measured directly from the EUT and the resulting field strength value is converted to an EIRP value for comparison with the limit.

Test Procedures Used

ANSI C63.26-2015 – Section 5.5.4

Test Settings

1. RBW = 1MHz
2. VBW $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $\geq 2 \times$ 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

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Test Setup

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

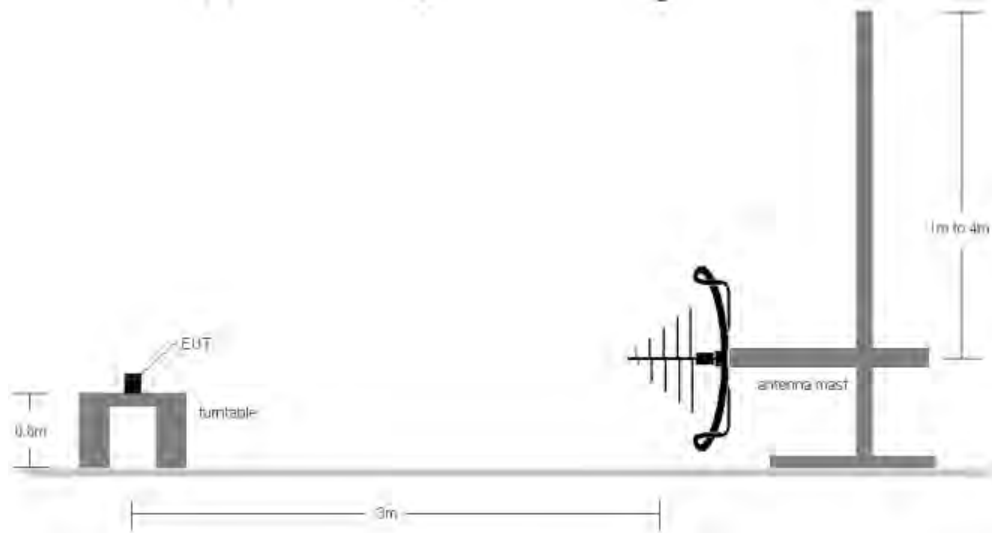


Figure 8-6. Test Instrument & Measurement Setup < 1GHz

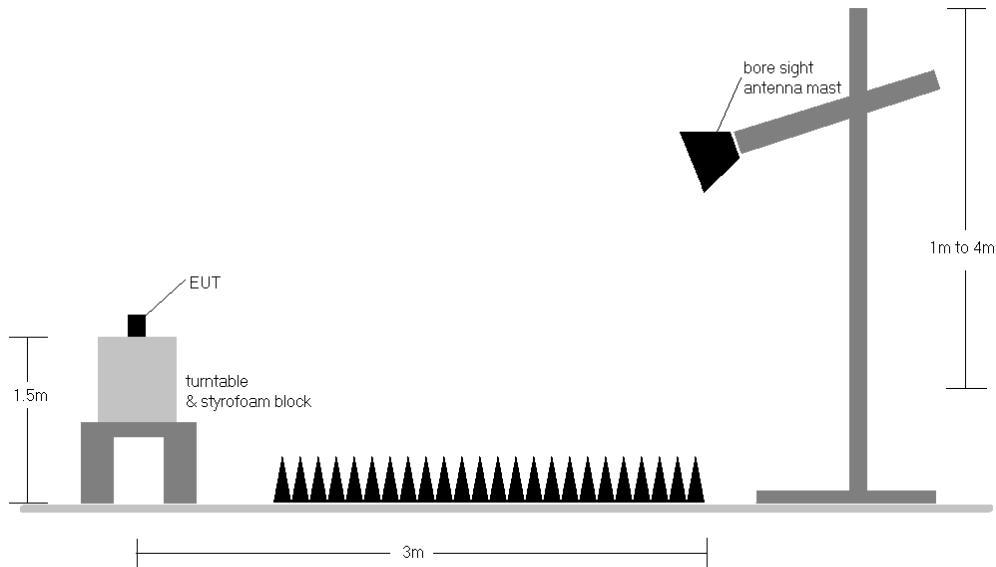


Figure 8-7. Test Instrument & Measurement Setup >1GHz



FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
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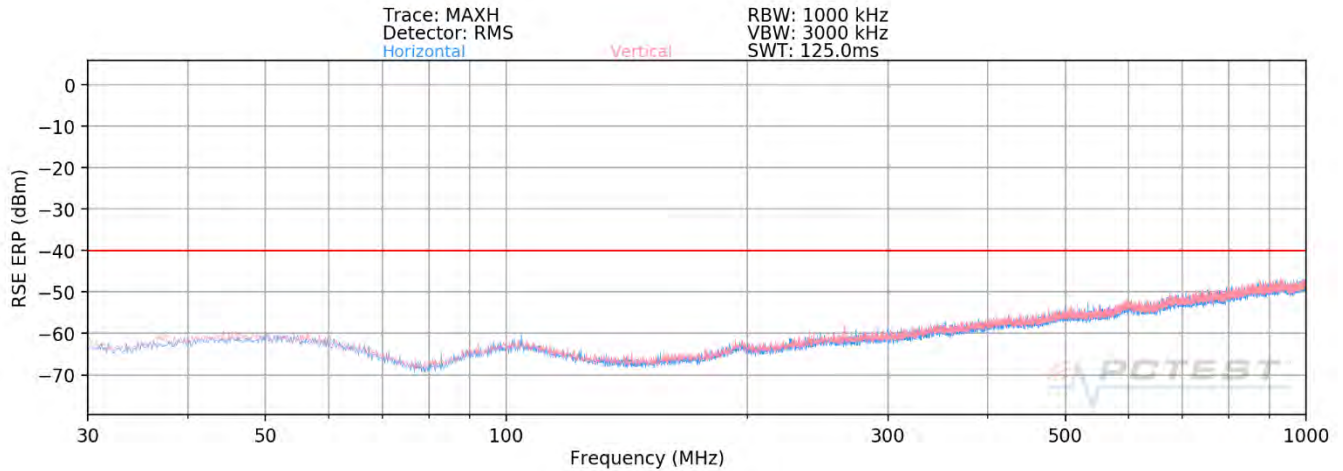
Test Notes

- 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) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 3) 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.
- 4) The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- 5) Per KDB 971168, Field Strength Level (dBμV/m) is converted to EIRP Spurious Emission Level (dBm) using the formula in Section 5.8.4 (d):

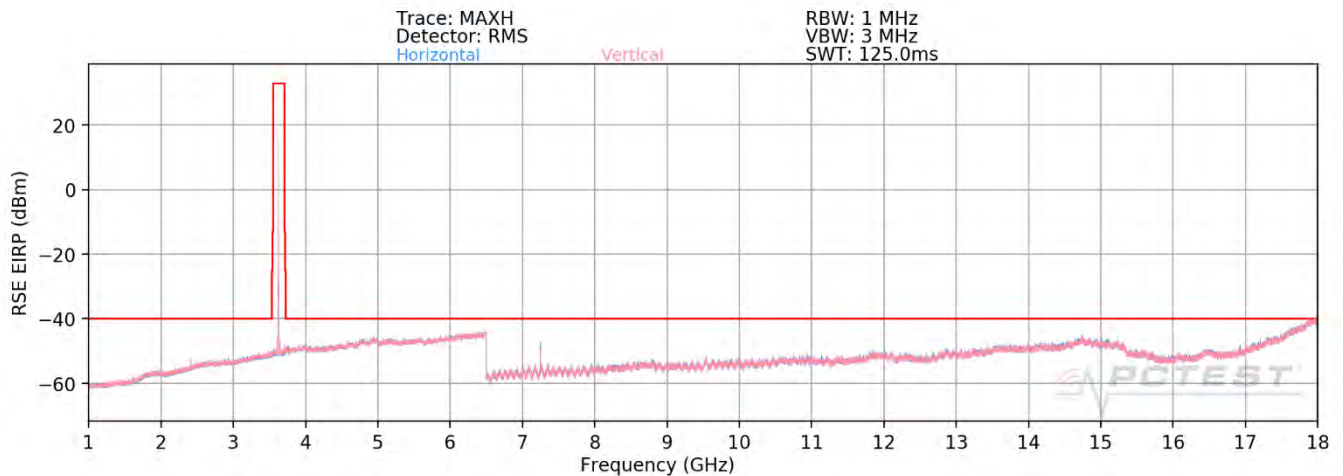
$EIRP \text{ (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20 \log D - 104.8$; where D is the measurement distance in meters

- 6) Spurious emissions shown in Sim TX section are measured while operating LTE B48 and WLAN/UNII at the same time. Spurious emissions from the LTE B48 device, is subject to the rules under which the LTE B48 carrier operates. Spurious emission caused by the WLAN/UNII carrier must meet the requirements of the rules under which the WLAN/UNII carrier operates.
If the spurious emission is caused by the simultaneous operation of both devices, the limit is the highest level allowed by either rule part.

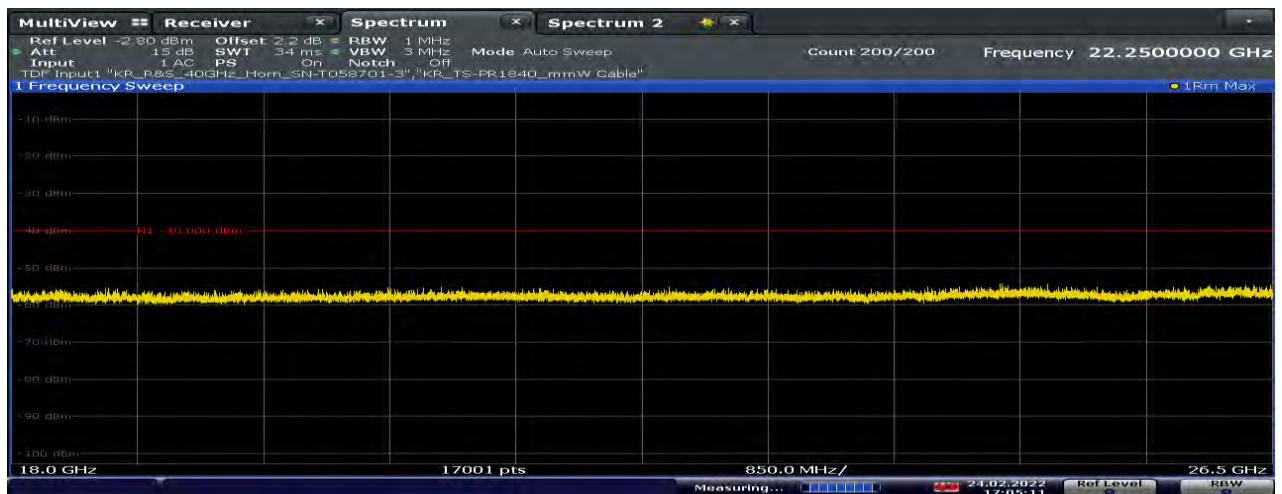
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Plot 8-56. Radiated Spurious Plot 0.03 – 1GHz (LTE Band 48)

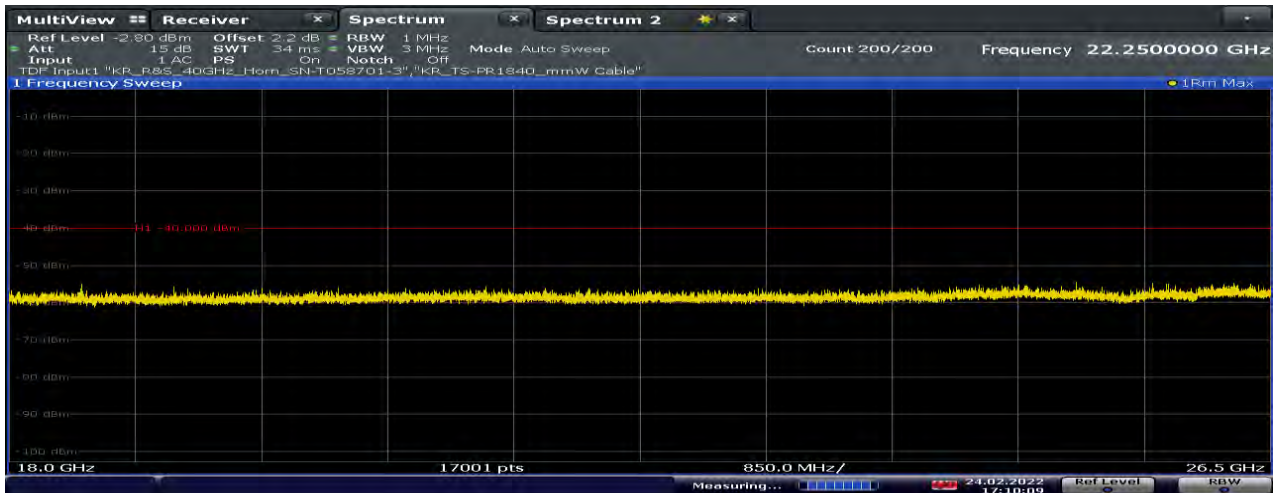


Plot 8-57. Radiated Spurious Plot 1 – 18GHz (LTE Band 48)

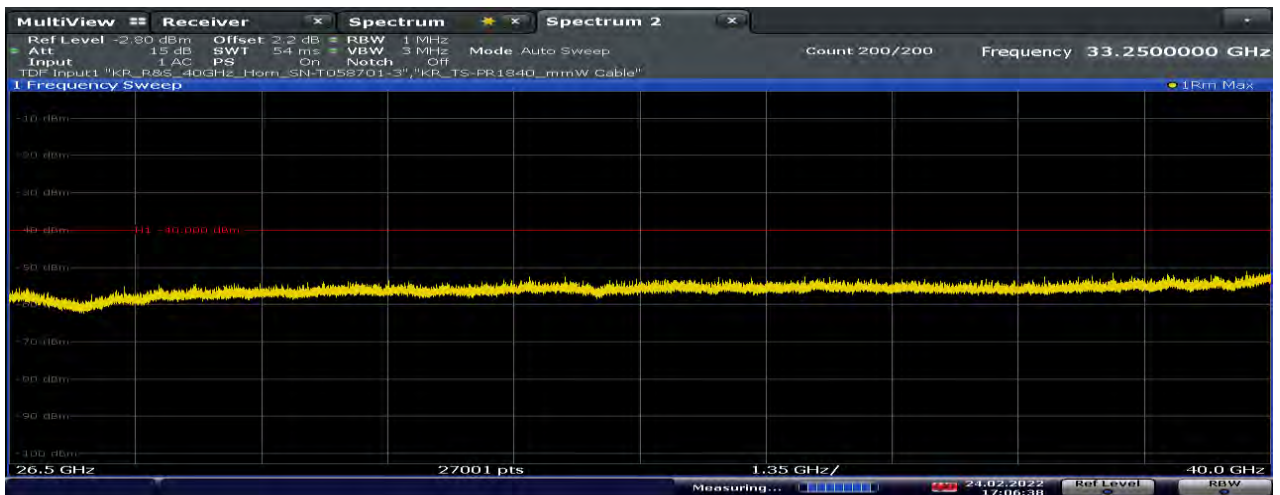


Plot 8-58. Radiated Spurious Plot 18 – 26.5GHz (LTE Band 48 – Ant. Pol H)

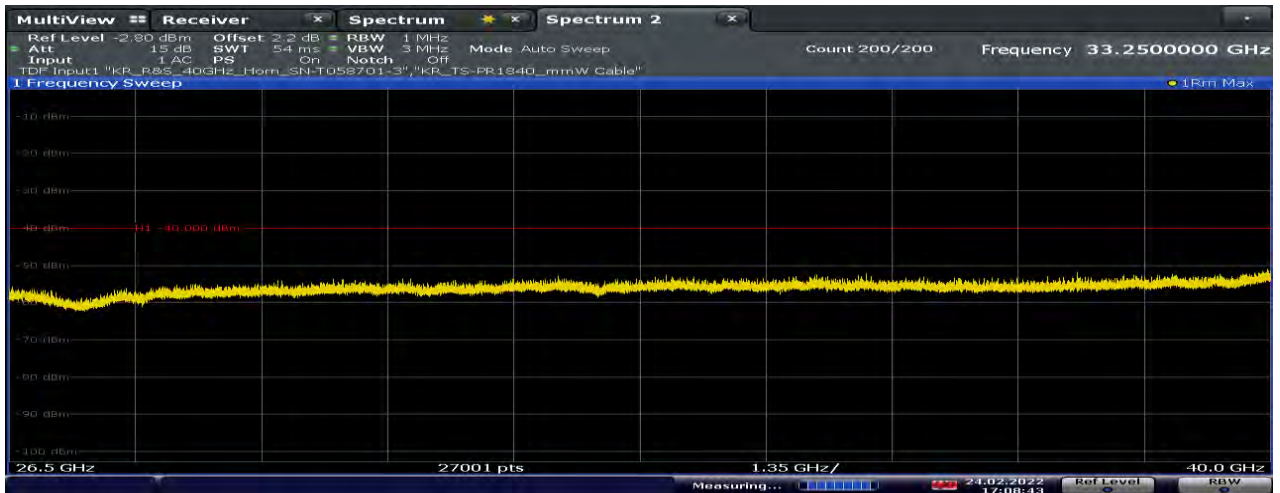
FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
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Plot 8-59. Radiated Spurious Plot 18 – 26.5GHz (LTE Band 48 – Ant. Pol V)



Plot 8-60. Radiated Spurious Plot 26.5 – 40GHz (LTE Band 48 – Ant. Pol H)



Plot 8-61. Radiated Spurious Plot 26.5 – 40GHz (LTE Band 48 – Ant. Pol V)

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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]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7120.00	H	185	360	-65.61	6.57	47.96	-47.30	-40.00	-7.30
10680.00	H	-	-	-81.87	11.84	36.97	-58.29	-40.00	-18.29
14240.00	H	-	-	-82.76	16.69	40.93	-54.32	-40.00	-14.32
17800.00	H	-	-	-83.66	24.31	47.65	-47.61	-40.00	-7.61
21360.00	H	-	-	-54.37	-3.69	48.94	-55.86	-40.00	-15.86
24920.00	H	-	-	-53.36	-2.99	50.65	-54.15	-40.00	-14.15
28480.00	H	150	135	-56.25	-0.97	49.78	-55.02	-40.00	-15.02
32040.00	H	-	-	-56.14	1.36	52.22	-52.58	-40.00	-12.58

Table 8-6. Radiated Spurious Data (LTE Band 48 – Low Channel)

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	164	358	-67.13	7.72	47.59	-47.67	-40.00	-7.67
10875.00	H	-	-	-81.98	12.23	37.25	-58.01	-40.00	-18.01
14500.00	H	-	-	-83.34	18.03	41.69	-53.56	-40.00	-13.56
18125.00	H	-	-	-54.37	-3.18	49.45	-55.35	-40.00	-15.35
21750.00	H	-	-	-53.68	-3.87	49.45	-55.35	-40.00	-15.35
25375.00	H	-	-	-54.33	-3.21	49.46	-55.34	-40.00	-15.34
29000.00	H	150	152	-55.21	-0.52	51.27	-53.53	-40.00	-13.53
32625.00	H	-	-	-56.39	0.66	51.27	-53.53	-40.00	-13.53

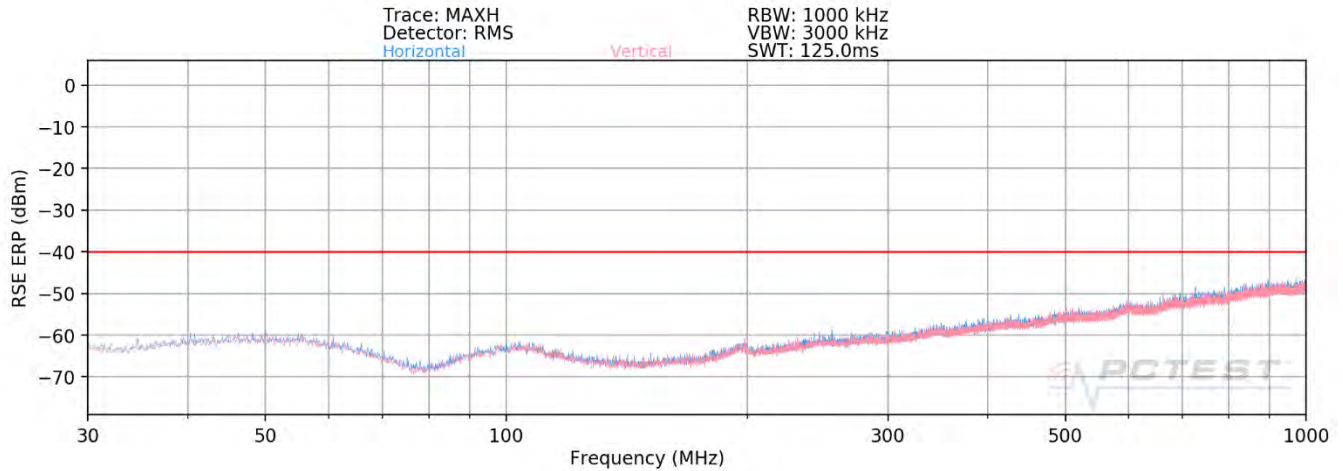
Table 8-7. Radiated Spurious Data (LTE Band 48 – Mid Channel)

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

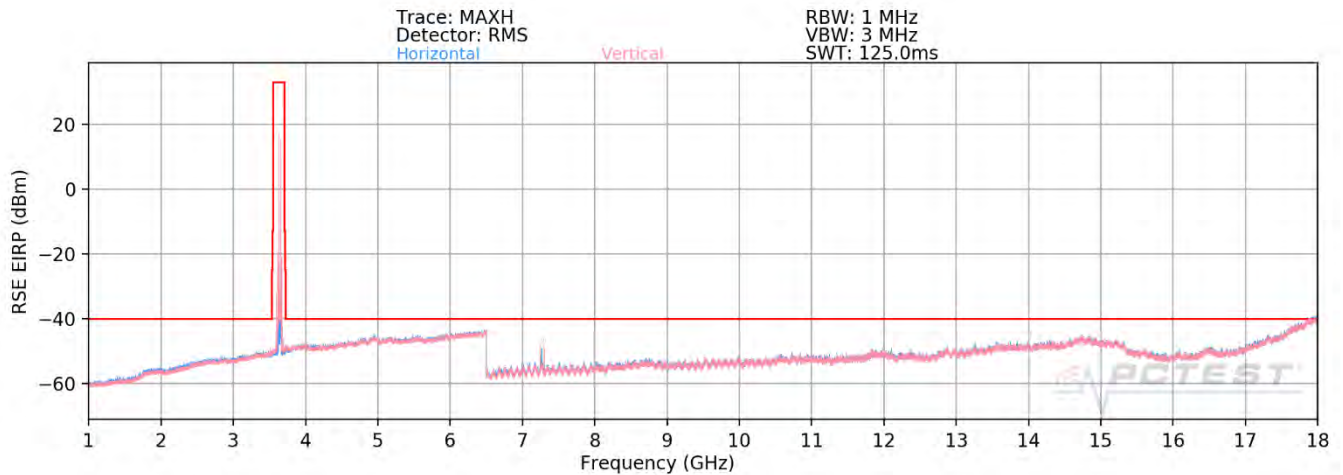
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7380.00	H	148	257	-69.22	7.29	45.07	-50.19	-40.00	-10.19
11070.00	H	-	-	-82.45	12.70	37.25	-58.01	-40.00	-18.01
14760.00	H	-	-	-83.62	19.66	43.04	-52.22	-40.00	-12.22
18450.00	H	-	-	-53.31	-3.30	50.39	-54.41	-40.00	-14.41
22140.00	H	-	-	-53.89	-3.95	49.16	-55.64	-40.00	-15.64
25830.00	H	-	-	-52.72	-3.11	51.17	-53.63	-40.00	-13.63
29520.00	H	150	138	-56.20	0.23	51.03	-53.77	-40.00	-13.77
33210.00	H	-	-	-55.49	0.08	51.59	-53.21	-40.00	-13.21

Table 8-8. Radiated Spurious Data (LTE Band 48 – High Channel)

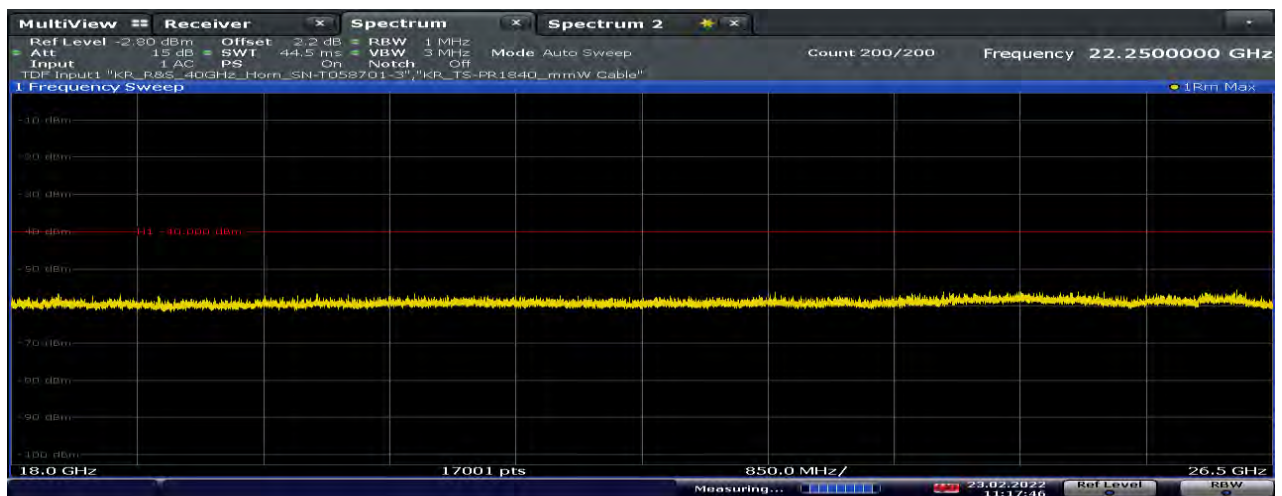
FCC ID: V7MESLCTGA	 PART 96 MEASUREMENT REPORT 	Approved by: Technical Manager
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Plot 8-62. Radiated Spurious Plot 0.03 – 1GHz (ULCA LTE Band 48 - PCC/SCC: 1 RB)

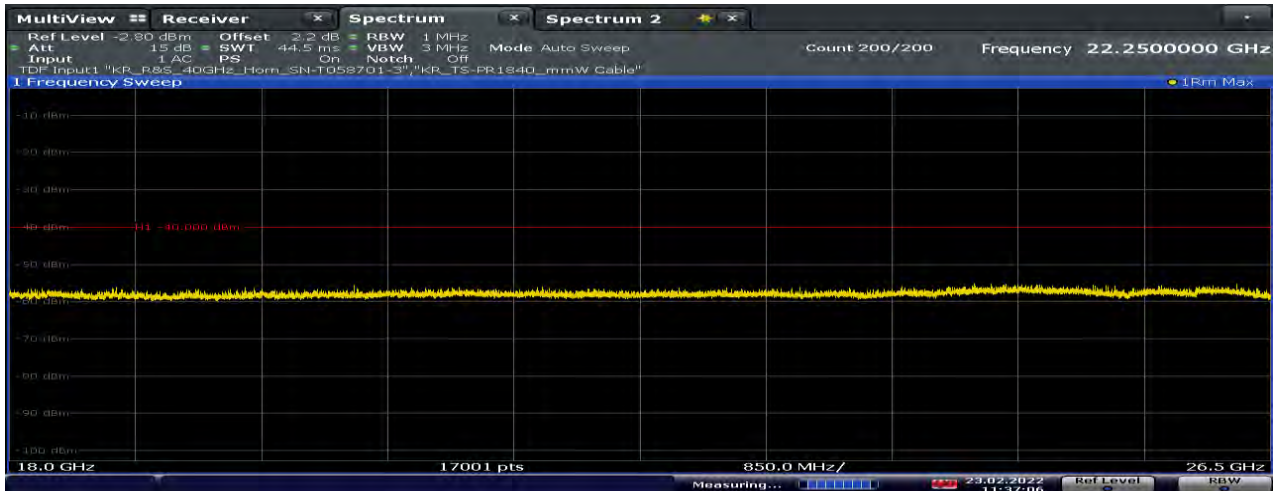


Plot 8-63. Radiated Spurious Plot 1 – 18GHz (ULCA LTE Band 48 - PCC/SCC: 1 RB)

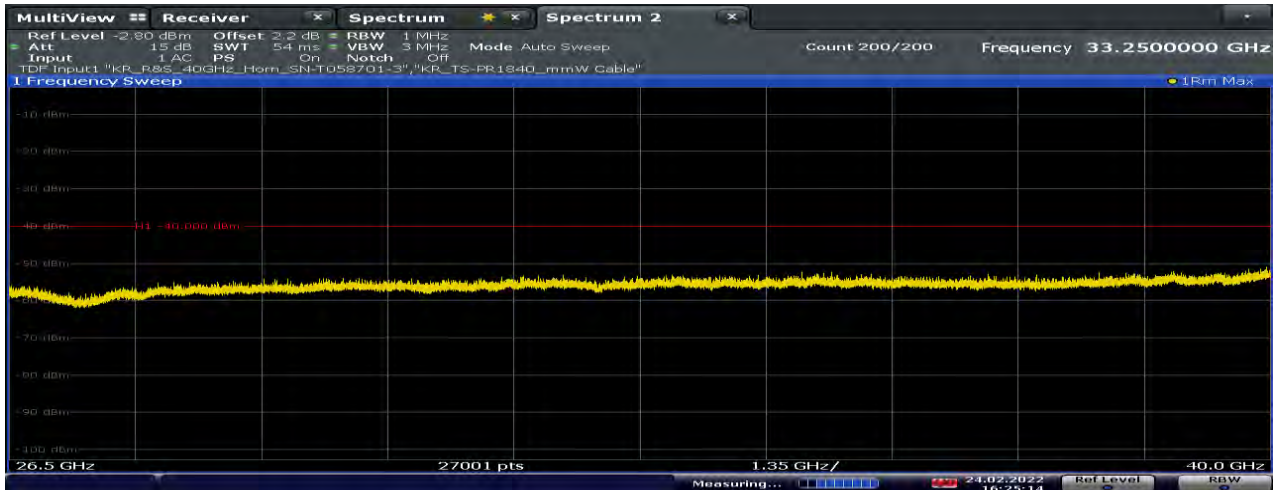


Plot 8-64. Radiated Spurious Plot 18 – 26.5GHz (ULCA LTE Band 48 - Ant. Pol H - PCC/SCC: 1 RB)

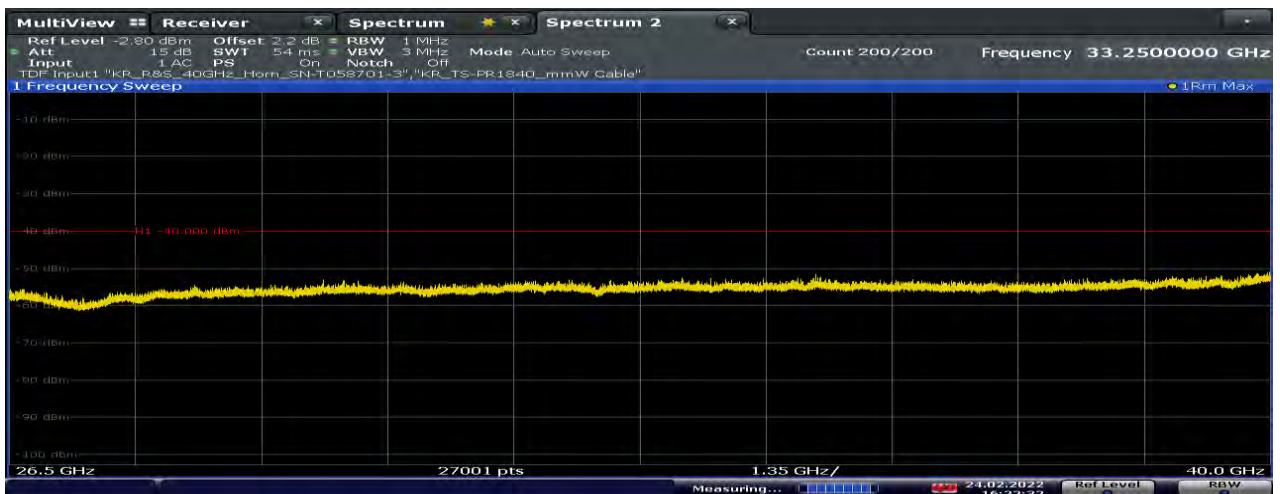
FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE		Page 55 of 63



Plot 8-65. Radiated Spurious Plot 18 – 26.5GHz (ULCA LTE Band 48 - Ant. Pol V - PCC/SCC: 1 RB)



Plot 8-66. Radiated Spurious Plot 26.5 – 40GHz (ULCA LTE Band 48 - Ant. Pol H - PCC/SCC: 1 RB)



Plot 8-67. Radiated Spurious Plot 26.5 – 40GHz (ULCA LTE Band 48 - Ant. Pol V - PCC/SCC: 1 RB)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
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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]
7159.60	H	199	303	-62.21	7.13	51.92	-43.34	-40.00	-3.34
10739.40	H	-	-	-80.99	12.52	38.53	-56.73	-40.00	-16.73
14319.20	H	-	-	-81.95	17.12	42.17	-53.09	-40.00	-13.09
17899.00	H	-	-	-84.22	26.53	49.31	-45.94	-40.00	-5.94

Table 8-9. Radiated Spurious Data (ULCA LTE Band 48 – Low Channel)

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]
7289.60	H	199	301	-62.89	7.43	51.54	-43.72	-40.00	-3.72
10934.40	H	-	-	-81.25	12.45	38.20	-57.06	-40.00	-17.06
14579.20	H	-	-	-82.28	18.67	43.39	-51.87	-40.00	-11.87

Table 8-10. Radiated Spurious Data (ULCA LTE Band 48 – Mid Channel)

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]
7340.40	H	216	304	-61.88	7.55	52.67	-42.59	-40.00	-2.59
11010.60	H	-	-	-80.65	12.64	38.99	-56.26	-40.00	-16.26
14680.80	H	-	-	-82.81	19.04	43.23	-52.02	-40.00	-12.02

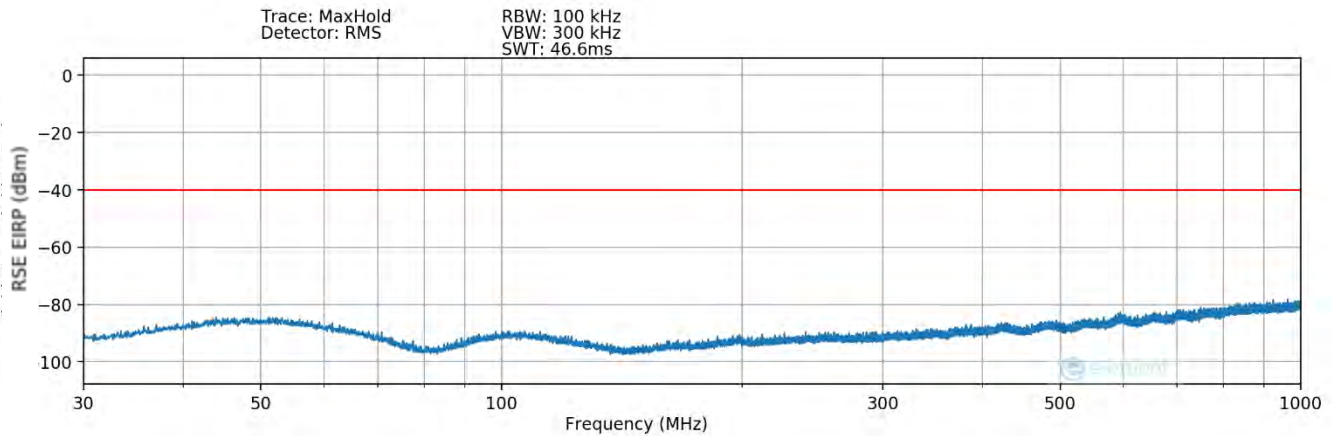
Table 8-11. Radiated Spurious Data (ULCA LTE Band 48 – High Channel)

FCC ID: V7MESLCTGA	 PART 96 MEASUREMENT REPORT 	Approved by: Technical Manager
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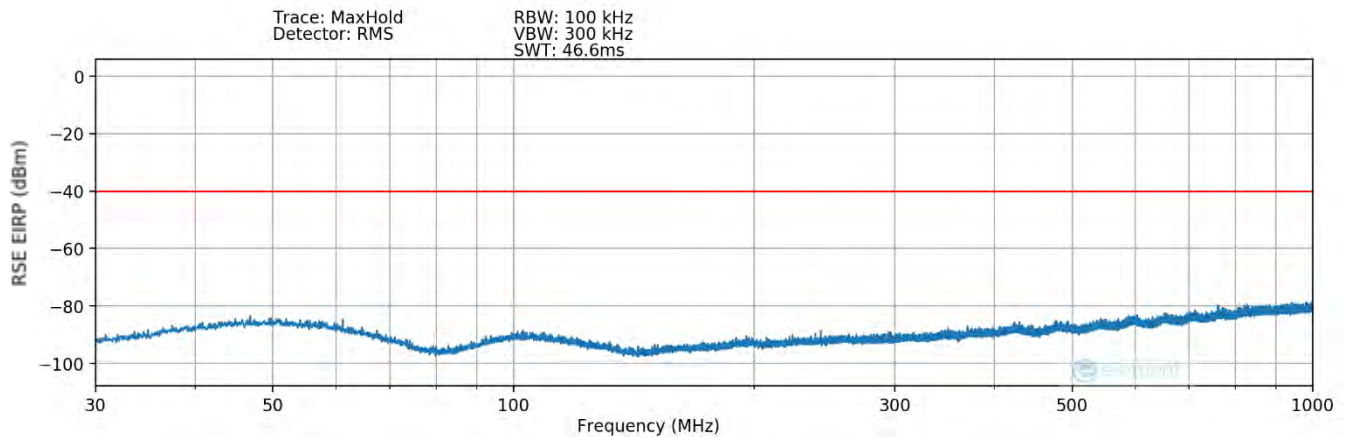
Simultaneous TX Radiated Spurious Emissions Measurements

Description	LTE (Band 48)	2.4 GHz WLAN	5 GHz WLAN
Channel	55990	6	100
Operation Frequency (MHz)	3625	2437	5500
Mode/Modulation	QPSK/1RB/20MHz	802.11b/1Mbps	802.11a/6Mbps



Table 8-12. Worst case Simultaneous Teansmission Configuration

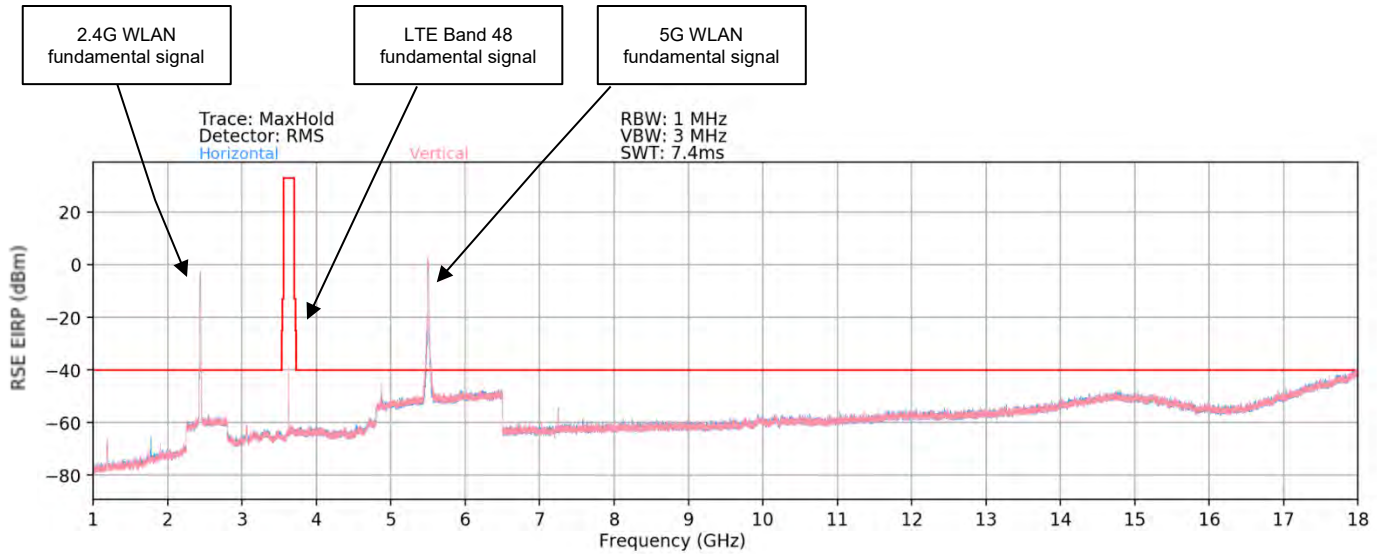


Plot 8-68. Radiated Spurious Plot 0.03 – 1GHz (Simultaneous Teansmission– Ant. Pol H)

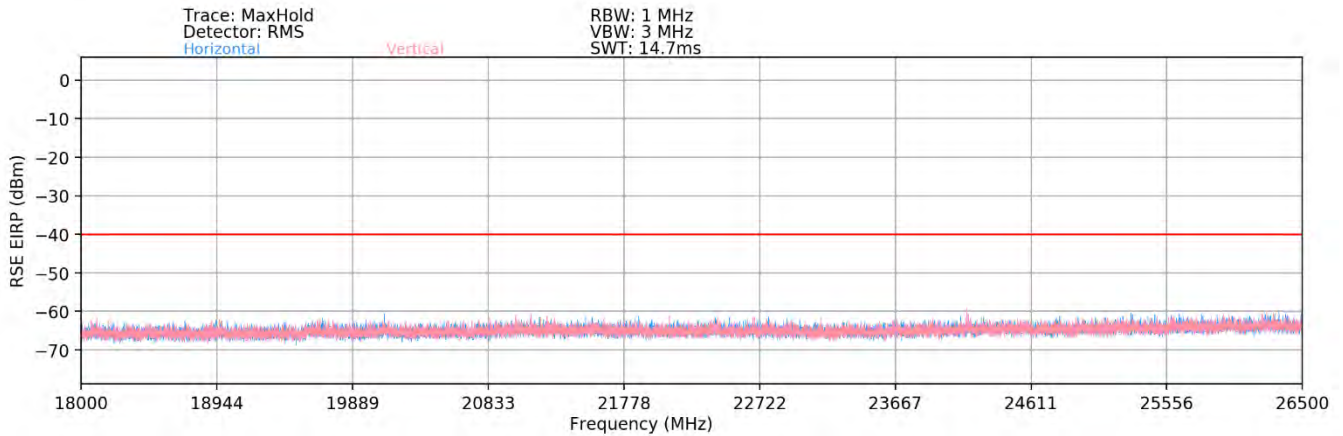


Plot 8-69. Radiated Spurious Plot 0.03 – 1GHz (Simultaneous Teansmission– Ant. Pol V)

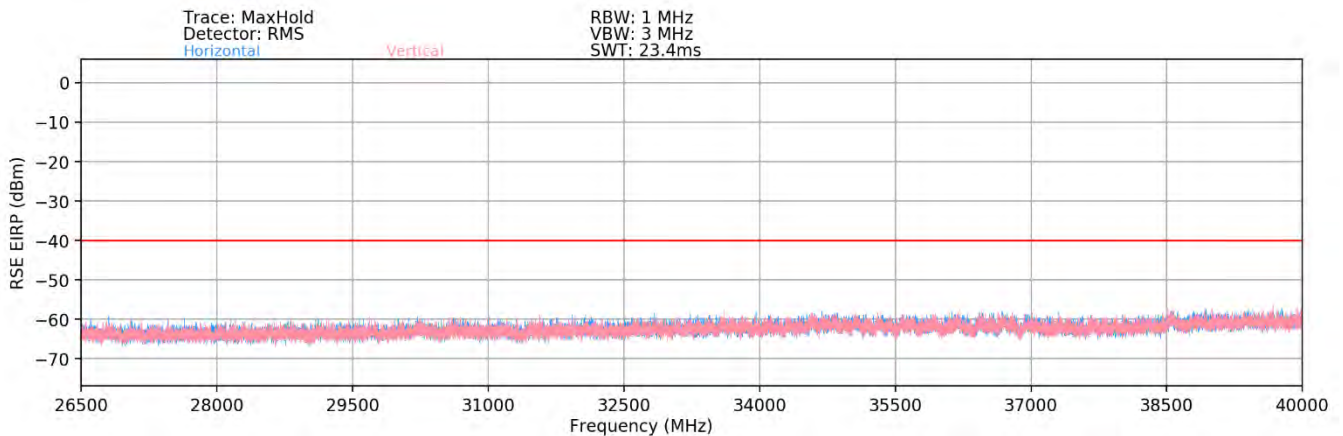
FCC ID: V7MESLCTGA	 PART 96 MEASUREMENT REPORT 	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE
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Plot 8-70. Radiated Spurious Plot 1 – 18GHz (Simultaneous Teansmission)



Plot 8-71. Radiated Spurious Plot 18 – 26.5GHz (Simultaneous Teansmission)





Plot 8-72. Radiated Spurious Plot 26.5 – 40GHz (Simultaneous Teansmission)

FCC ID: V7MESLCTGA	PCTEST Proud to be part of element	PART 96 MEASUREMENT REPORT	SEOWON INTECH	Approved by: Technical Manager
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Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP [dBm]	Field Strength Limit [dBμV/m]	EIRP Limit [dBm]	Margin [dB]
956.55	Peak	V	-	-	-76.06	-2.98	27.96	-	46.00	-	-18.04
1189.50	Average	V	280	259	-60.77	-5.71	40.53	-54.74	-	-40.00	-14.74
1776.00	Average	H	-	-	-67.63	-2.07	37.30	-57.96	-	-40.00	-17.96
3064.00	Average	H	-	-	-69.92	3.12	40.20	-55.06	-	-40.00	-15.06
4874.00	Average	V	221	345	-78.78	19.01	47.23		53.98	-	-6.75
4874.00	Peak	V	221	345	-69.97	19.01	56.04		73.98	-	-17.94
7250.00	Average	H	134	312	-71.04	14.07	50.03	-45.23	-	-40.00	-5.23

Table 8-13. Radiated Spurious Data (Simultaneous Teansmission)

FCC ID: V7MESLCTGA	 PART 96 MEASUREMENT REPORT 	Approved by: Technical Manager
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8.8 Frequency Stability / Temperature Variation

\$2.1055

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

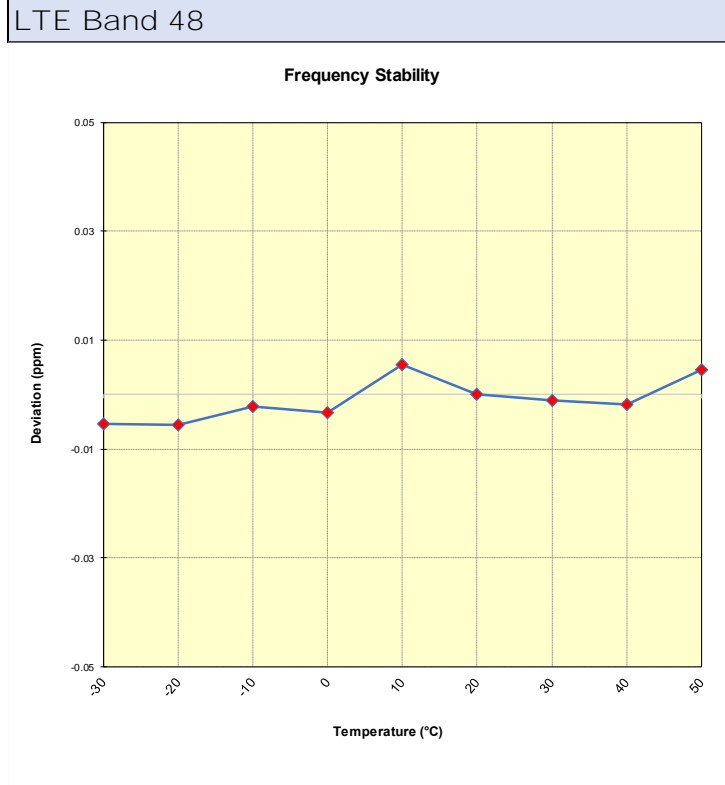
FCC ID: V7MESLCTGA	 PART 96 MEASUREMENT REPORT 	Approved by: Technical Manager
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LTE Band 48

Operating Frequency (Hz):	3,625,000,000
Ref. Voltage (VDC):	12.00

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	12.00	- 30	3,625,000,007	-19	-0.0000005
		- 20	3,625,000,006	-20	-0.0000006
		- 10	3,625,000,019	-8	-0.0000002
		0	3,625,000,014	-12	-0.0000003
		+ 10	3,625,000,047	20	0.0000006
		+ 20 (Ref)	3,625,000,026	0	0.0000000
		+ 30	3,625,000,023	-4	-0.0000001
		+ 40	3,625,000,020	-7	-0.0000002
		+ 50	3,625,000,043	16	0.0000005
85 %	10.20	+ 20	3,625,000,025	-1	0.0000000
115 %	13.80	+ 20	3,625,000,023	-4	-0.0000001

Table 8-14. Frequency stability Data (LTE Band 48)





Plot 8-73. Frequency stability Plot (LTE Band 48)

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9.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Seowon Intech Co., Ltd, Indoor CPE, FCC ID: V7MESLCTGA**. complies with all of the End User Device requirements of Part 96 of the FCC Rules for LTE operation only.

FCC ID: V7MESLCTGA	 PART 96 MEASUREMENT REPORT 	Approved by: Technical Manager
Test Report S/N: 1M2202090014-02.V7M	Test Dates: 02/11/2022 ~ 05/25/2022	EUT Type: Indoor CPE
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