



MEASUREMENT REPORT

Part 96 LTE

Applicant Name:
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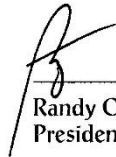
Date of Testing:
05/12- 05/28/2021
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2105060049-01.V7M

FCC ID:	V7MBHSLCTOGA
APPLICANT:	Seowon Intech Co., Ltd

Application Type: Certification
Model: SLC-120S48OGAH
EUT Type: LTE Outdoor CPE
Frequency Range: 3550- 3700MHz
FCC Classification: Citizens Band Category A and B Devices (CBD)
FCC Rule Part(s): 96
Test Procedure(s): ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01, KDB 940660 D01 v02, KDB 484596 D01 v01

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

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


Randy Ortanez
President







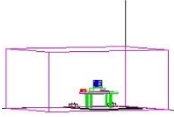
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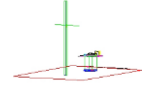
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FCC Part 96



Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 48	20 MHz	QPSK	3560.0 - 3690.0	8.810	39.45	17M8G7D
		16QAM	3560.0 - 3690.0	6.067	37.83	17M8W7D
		64QAM	3560.0 - 3690.0	4.092	36.12	17M9W7D
	15 MHz	QPSK	3557.5 - 3692.5	8.175	39.12	13M3G7D
		16QAM	3557.5 - 3692.5	6.244	37.95	13M2W7D
		64QAM	3557.5 - 3692.5	4.356	36.39	13M4W7D
	10 MHz	QPSK	3555.0 - 3695.0	8.551	39.32	8M87G7D
		16QAM	3555.0 - 3695.0	6.502	38.13	8M88W7D
		64QAM	3555.0 - 3695.0	5.445	37.36	8M79W7D
	5 MHz	QPSK	3552.5 - 3697.5	6.217	37.94	4M47G7D
		16QAM	3552.5 - 3697.5	4.904	36.91	4M47W7D
		64QAM	3552.5 - 3697.5	3.440	35.37	4M44W7D

EUT Overview (LTE B48)

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

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1.0 INTRODUCTION

1.1 Scope

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



1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST located in Columbia, MD 21046, U.S.A.

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

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Seowon LTE Outdoor CPE, FCC ID: V7MBHSLCTOGA**. 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 Category A and B Devices (CBD).

Test Device Serial No.: 00011, 00013, 00012, 00014

2.2 Device Capabilities

This device contains the following capabilities:



LTE B48 (Single Carrier, ULCA)

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

2.4 EMI Suppression Device(s)/Modifications

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

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3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

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

3.2 Radiated Power and Radiated Spurious Emissions

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

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



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

$$P_d [dBm] = P_g [dBm] - \text{cable loss} [dB] + \text{antenna gain} [dBd/dBi]$$

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 $P_g [dBm] - \text{cable loss} [dB]$.

The calculated P_d levels are then compared to the absolute spurious emission limit of -40dBm/MHz for End User Devices.




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.

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4.0 MEASUREMENT UNCERTAINTY

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

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

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5.0 TEST EQUIPMENT CALIBRATION DATA




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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	ETS	EMC Cable and Switch System	3/4/2021	Annual	3/4/2022	ETS
-	LTx5	Licensed Transmitter Cable Set	3/3/2021	Annual	3/3/2022	LTx5
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6201525694
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Keysight Technologies	N9030A	PXA Signal Analyzer	9/2/2020	Annual	9/2/2021	MY55410501
Keysight Technologies	N9030B	PXA Signal Analyzer, Multi-touch	9/17/2020	Annual	9/17/2021	MY57141001
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/9/2020	Annual	9/9/2021	100348

Table 5-1. Test Equipment

Notes:

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

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6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz

W = Amplitude/Angle Modulated



7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 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 1564 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80).

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7.0 TEST RESULTS

7.1 Summary



Company Name: Seowon Intech Co., Ltd
 FCC ID: V7MBHSLCTOGA
 FCC Classification: Citizens Band Category A and B Devices (CBD)
 Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
96.41(b)	Equivalent Isotropic Radiated Power (EIRP)	47 dBm/10MHz	RADIATED	PASS	Section 7.2
2.1053 96.41(e)	Undesirable Emissions	-40 dBm/MHz		PASS	Section 7.3
96.41(e)	Uplink Carrier Aggregation	Undesirable emissions must meet the limits detailed in 96.41(e)	RADIATED	PASS	Section 7.3

Table 7-1. Summary of Radiated 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 "LTE Automation," Version 5.1.
- 5) KDB 484596 D01 was used as guidance for referencing EMC Test Data for this application. All conducted data is referenced from FCC ID: V7MBSLC-120T42OGA . Please see Appendix A for more details and spot check verification test data.

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7.2 Radiated Power (EIRP)

§96.41(b)

Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.



Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW \geq 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points \geq 2 x span / RBW
6. Detector = RMS Average
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

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Test Setup

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

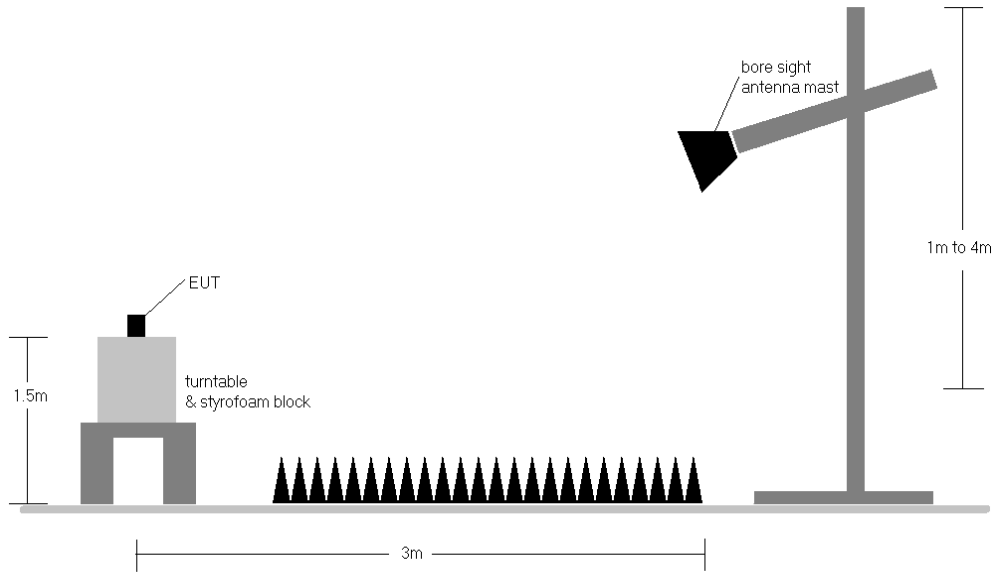




Figure 7-1. Radiated Test Setup >1GHz



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 while powered by a DC Power source.
- 3) The worst case EIRP shown in this section is found with LTE operating only using 1RB. As such, the EIRP/10MHz and full channel EIRP values will be identical since 1RB is fully contained within all available channel bandwidths for LTE Band 48 (i.e. 5, 10, 15, 20MHz).

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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	3560.0	V	175	6	7.24	1 / 0	32.21	39.45	8.810	47.00	-7.55
		3625.0	V	172	2	6.99	1 / 0	32.38	39.37	8.651	47.00	-7.63
		3690.0	V	173	358	6.50	1 / 0	32.71	39.21	8.339	47.00	-7.79
	16-QAM	3560.0	V	175	6	7.24	1 / 0	30.59	37.83	6.067	47.00	-9.17
64-QAM	3560.0	V	175	6	7.24	1 / 0	28.88	36.12	4.092	47.00	-10.88	
15 MHz	QPSK	3557.5	V	178	362	7.24	1 / 0	31.88	39.12	8.175	47.00	-7.88
		3625.0	V	182	353	6.99	1 / 0	31.26	38.25	6.684	47.00	-8.75
		3692.5	V	165	360	6.48	1 / 0	31.86	38.34	6.825	47.00	-8.66
	16-QAM	3557.5	V	178	362	7.24	1 / 0	30.71	37.95	6.244	47.00	-9.05
64-QAM	3625.0	V	182	353	6.99	1 / 0	29.40	36.39	4.356	47.00	-10.61	
10 MHz	QPSK	3555.0	V	158	4	7.25	1 / 0	32.07	39.32	8.551	47.00	-7.68
		3625.0	V	150	262	6.99	1 / 0	31.66	38.65	7.329	47.00	-8.35
		3695.0	V	145	7	6.46	1 / 0	31.43	37.89	6.153	47.00	-9.11
	16-QAM	3555.0	V	158	4	7.25	1 / 0	30.88	38.13	6.502	47.00	-8.87
64-QAM	3555.0	V	158	4	7.25	1 / 0	30.11	37.36	5.445	47.00	-9.64	
5 MHz	QPSK	3552.5	V	148	2	7.26	1 / 12	30.68	37.94	6.217	47.00	-9.06
		3625.0	V	158	8	6.99	1 / 12	30.38	37.37	5.458	47.00	-9.63
		3697.5	V	159	4	6.44	1 / 12	30.49	36.93	4.932	47.00	-10.07
	16-QAM	3552.5	V	148	2	7.26	1 / 12	29.65	36.91	4.904	47.00	-10.09
64-QAM	3552.5	V	148	2	7.26	1 / 12	28.11	35.37	3.440	47.00	-11.63	
20MHz	QPSK (Opposite Pol.)	3560.0	H	140	252	6.99	1 / 0	28.42	35.41	3.476	47.00	-11.59

Table 7-2. EIRP Data (LTE B48- Single Carrier)

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7.3 Radiated Spurious Emissions Measurements

§2.1053 §96.41(e)

Test Overview

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



Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW \geq 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points \geq 2 x span / RBW
5. Detector = RMS
6. Trace mode = 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.

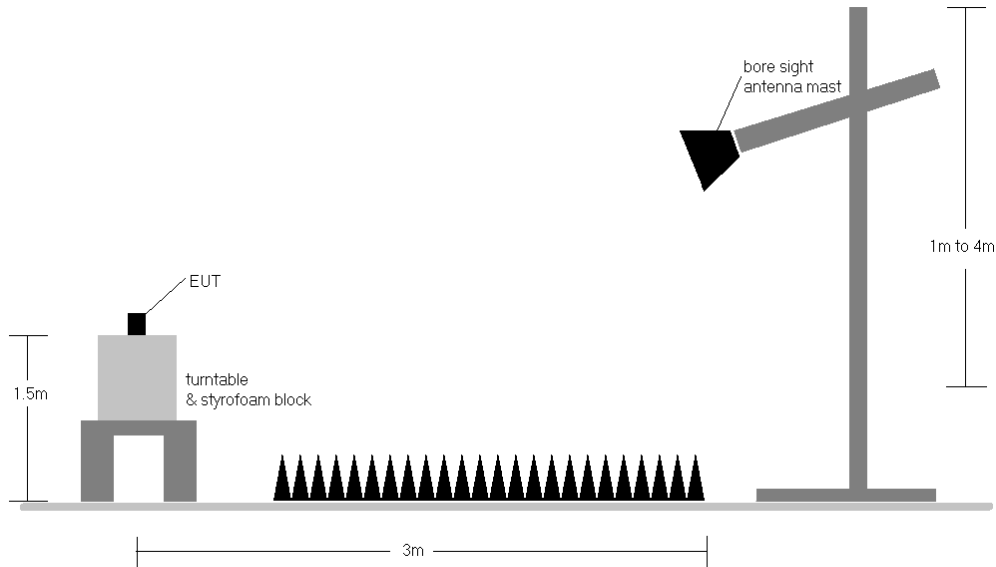


Figure 7-2. Test Instrument & Measurement Setup

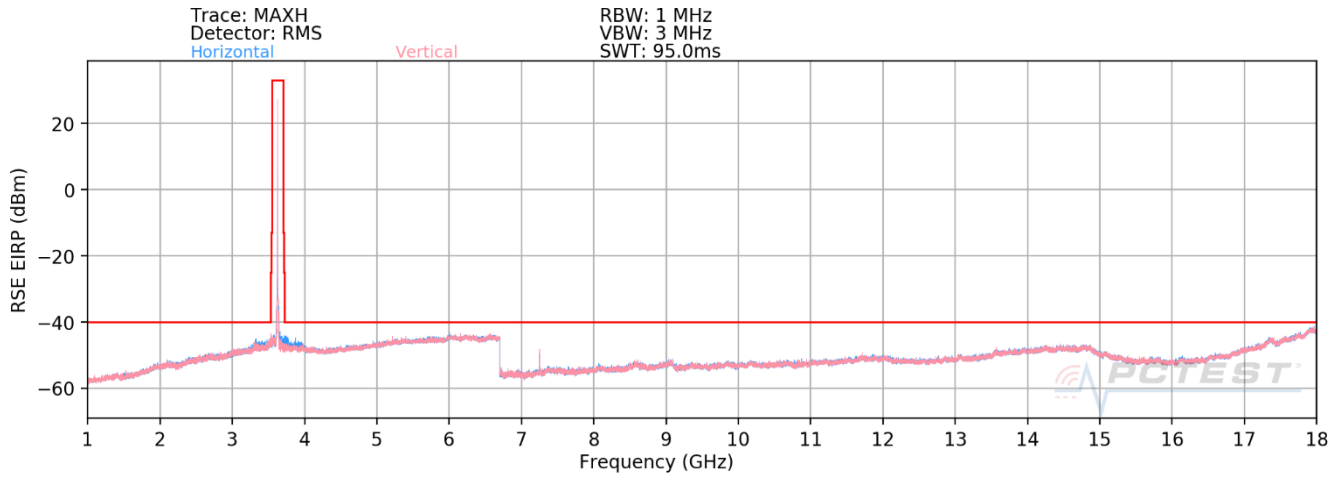
Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested while powered by a DC Power source.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 4) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- 6) 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):

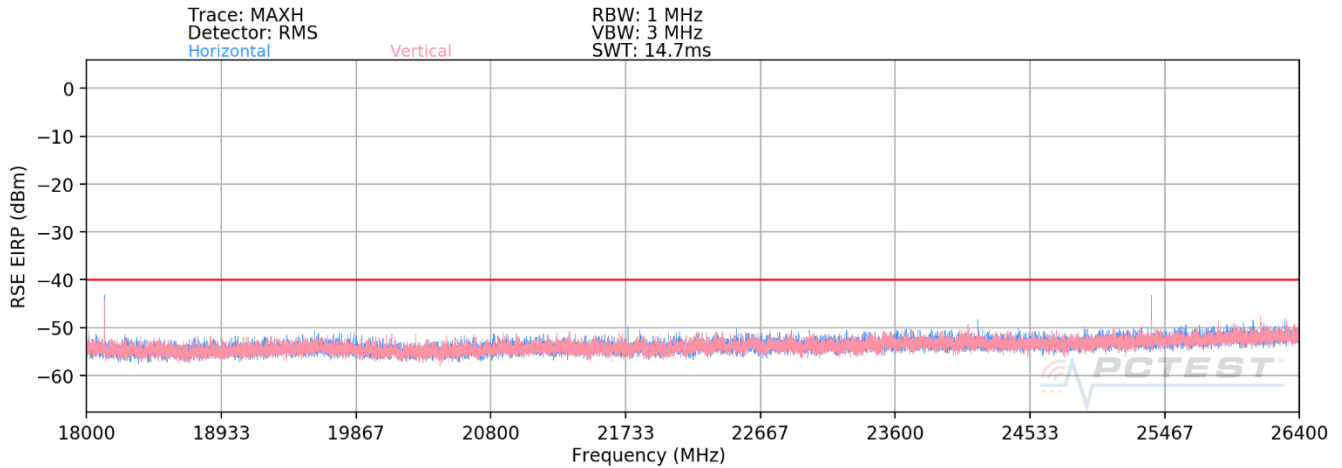
$$\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20 \log D - 104.8; \text{ where } D \text{ is the measurement distance in meters}$$

FCC ID: V7MBHSLCTOGA	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
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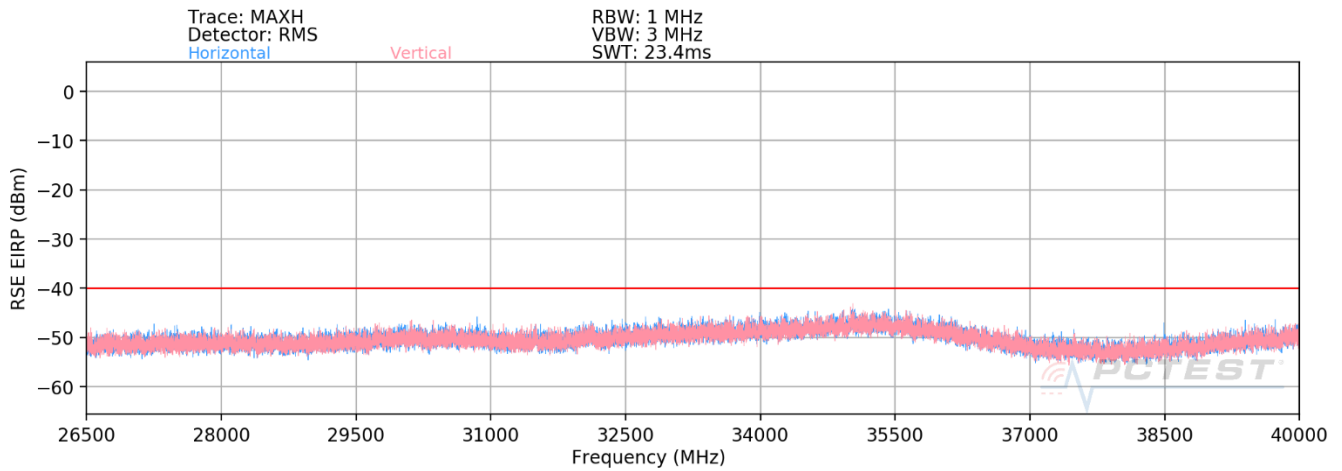
LTE Band 48 (Single Carrier)





Plot 7-1. Mid Channel Radiated Spurious Prescan 1- 18GHz



Plot 7-2. Mid Channel Radiated Spurious Prescan 18- 26GHz



Plot 7-3. Mid Channel Radiated Spurious Prescan 26- 40GHz

FCC ID: V7MBHSLCTOGA		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 16 of 36

Bandwidth (MHz):	20
Frequency (MHz):	3560.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 50
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

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]
7120.0	V	394	345	-75.02	8.55	40.53	-54.72	-40.00	-14.72
10680.0	V	199	146	-76.68	13.24	43.56	-51.70	-40.00	-11.70
14240.0	V	332	257	-79.37	17.36	44.99	-50.27	-40.00	-10.27
17800.0	V	328	19	-80.60	21.11	47.51	-47.75	-40.00	-7.75
21360.0	H	300	236	-52.17	5.10	59.92	-44.88	-40.00	-4.88
24920.0	H	300	279	-49.79	6.43	63.64	-41.16	-40.00	-1.16
28480.0	H	-	-	-57.58	8.38	57.79	-47.01	-40.00	-7.01

Table 7-3. Radiated Spurious Data (LTE Band 48 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 50
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz



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]
7250.0	V	359	119	-75.64	8.71	40.07	-55.19	-40.00	-15.19
10875.0	V	145	150	-70.44	12.39	48.95	-46.31	-40.00	-6.31
14500.0	V	317	229	-77.13	17.20	47.07	-48.19	-40.00	-8.19
18125.0	H	300	28	-46.95	3.74	63.79	-41.01	-40.00	-1.01
21750.0	H	-	-	-58.55	4.86	53.32	-51.48	-40.00	-11.48
25375.0	H	300	346	-52.45	6.58	61.13	-43.67	-40.00	-3.67
29000.0	H	-	-	-57.24	8.90	58.66	-46.14	-40.00	-6.14

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

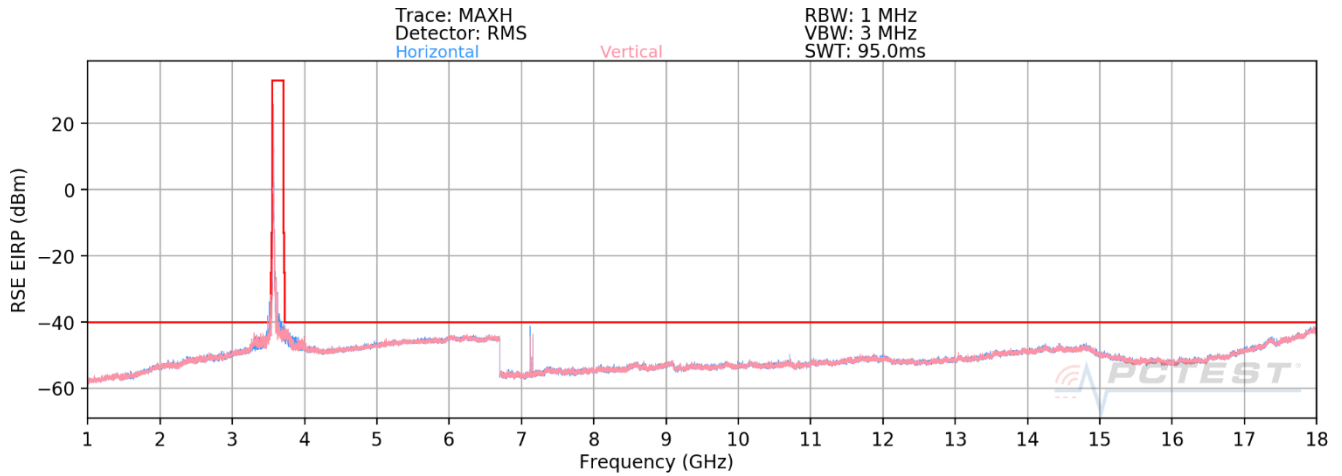
Bandwidth (MHz):	20
Frequency (MHz):	3690.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 50
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

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	113	157	-72.24	10.30	45.06	-50.20	-40.00	-10.20
11070.00	V	140	260	-72.24	12.85	47.61	-47.65	-40.00	-7.65
14760.00	V	310	112	-72.24	17.79	52.55	-42.71	-40.00	-2.71
18450.00	H	300	9	-57.95	3.81	52.87	-51.93	-40.00	-11.93
22140.00	H	-	-	-57.46	5.22	54.76	-50.04	-40.00	-10.04
25830.00	H	300	4	-53.78	6.81	60.03	-44.77	-40.00	-4.77
29520.00	H	-	-	-57.60	9.01	58.41	-46.39	-40.00	-6.39

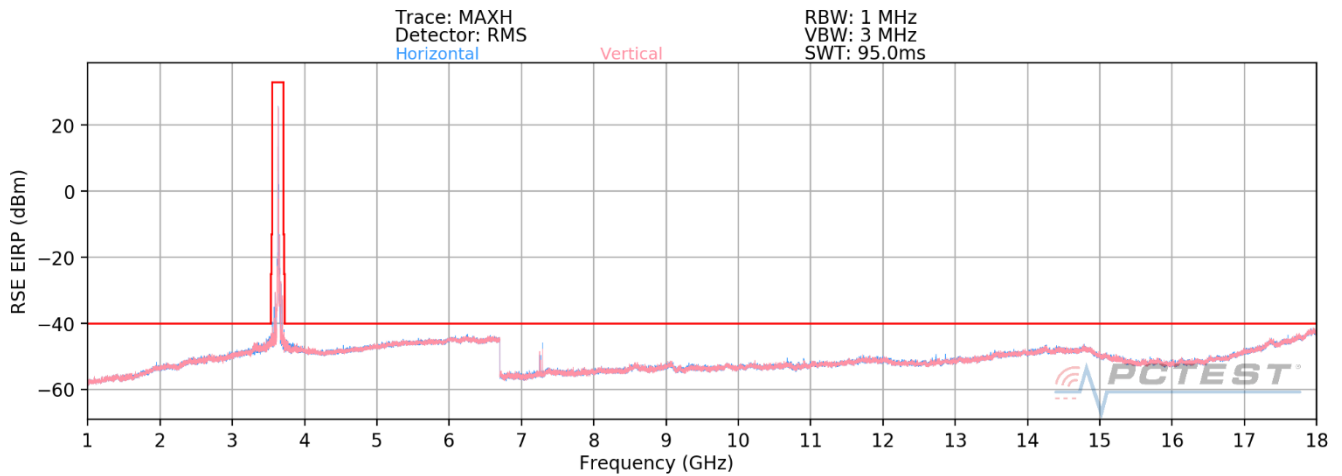
Table 7-5. Radiated Spurious Data (LTE Band 48 – High Channel)

FCC ID: V7MBHSLCTOGA		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 17 of 36

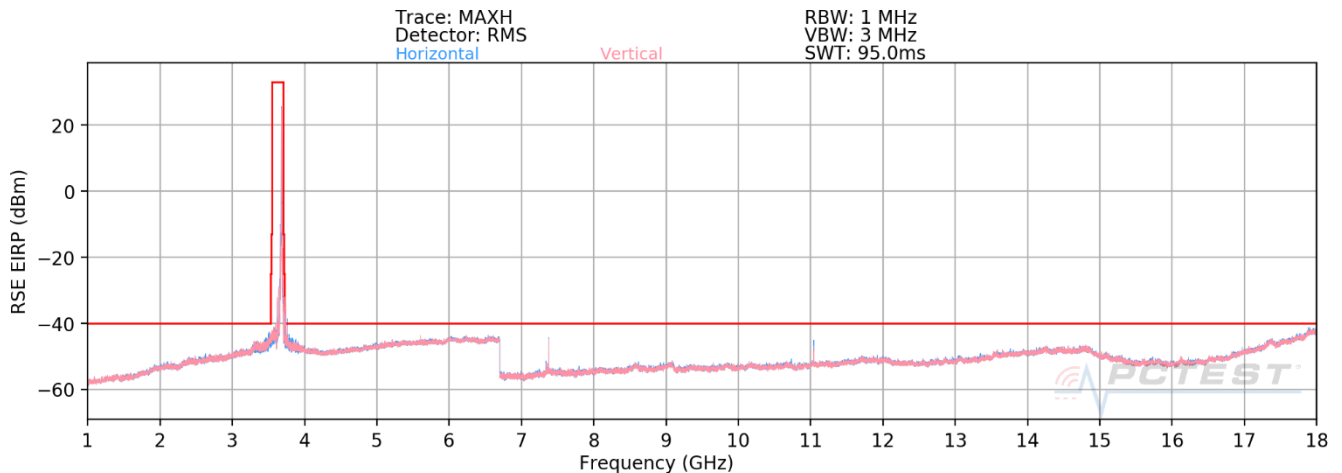
ULCA LTE Band 48



Plot 7-4. Low Channel Radiated Spurious Prescan 1- 18GHz



Plot 7-5. Mid Channel Radiated Spurious Prescan 1- 18GHz



Plot 7-6. High Channel Radiated Spurious Prescan 1- 18GHz

FCC ID: V7MBHSLCTOGA	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality 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]
7120.0	H	289	122	-61.14	8.55	54.41	-40.84	-40.00	-0.84
10680.0	H	136	249	-80.91	13.24	39.33	-55.93	-40.00	-15.93
14240.0	H	-	-	-80.10	17.36	44.26	-51.00	-40.00	-11.00
17800.0	H	-	-	-80.86	21.11	47.25	-48.01	-40.00	-8.01

Table 7-6. 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]
1321.0	H	-	-	-75.94	2.35	33.41	-61.85	-40.00	-21.85
7250.0	H	204	189	-61.60	8.71	54.11	-41.15	-40.00	-1.15
10875.0	H	140	248	-80.12	12.39	39.27	-55.99	-40.00	-15.99
14500.0	H	-	-	-80.52	17.20	43.68	-51.58	-40.00	-11.58

Table 7-7. 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]
7380.00	H	208	309	-62.97	10.30	54.33	-40.93	-40.00	-0.93
11070.00	H	400	4	-75.62	12.85	44.23	-51.03	-40.00	-11.03
14760.00	H	-	-	-81.30	17.79	43.49	-51.77	-40.00	-11.77

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

FCC ID: V7MBHSLCTOGA		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Seowon LTE Outdoor CPE FCC ID: V7MBHSLCTOGA** complies with all of the Category B Devices (CBSD) requirements of Part 96 of the FCC Rules for LTE operation only.

FCC ID: V7MBHSLCTOGA		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 20 of 36

APPENDIX A. SPOT CHECK MEASUREMENT RESULTS FOR DATA REFERENCING



a. Introduction

Per KDB 484596 D01 v01, the new original certification application of FCC ID: V7MBHSLCTOGA is referencing all conducted EMC data from FCC ID: V7MBSLC-120T42OGA for operations under Part 96 (frequency range of operations 3550-3700MHz). The applicant Seowon Intech Co. Inc. takes full responsibility that the test data as referenced represents compliance for the new FCC ID: V7MBHSLCTOGA.

All referenced test data can be found under FCC ID: V7MBSLC-120T42OGA's test report exhibit with file name "Part 96 Test Report 1" and "Part 96 Test Report 2" (Test Report number is DRTFCC1901-0023(2)).

b. Description of Component Differences

The only difference between FCC ID: V7MBSLC-120T42OGA and FCC ID: V7MBHSLCTOGA is the antenna. The new FCC ID: V7MBHSLCTOGA increases the antenna gain to 15.55dBi. All other hardware, software, and RF parameters are exactly the same between the 2 FCC ID's.

FCC ID: V7MBHSLCTOGA		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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c. Spotcheck Verification Data

c-1. Conducted Powers

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	55990	3625.0	1/50	24.87
	16-QAM	55990	3625.0	1/50	23.53
	64-QAM	55990	3625.0	1/50	22.32

Table 1. Conducted Powers for Single Carrier LTE B48



Bandwidth	Modulation	PCC			SCC			Conducted Power [dBm]
		Bandwidth [MHz]	Frequency [MHz]	RB / Offset	Bandwidth [MHz]	Frequency [MHz]	RB / Offset	
25 MHz	QPSK	20	3622.5	1 / 99	5	3634.2	1 / 0	22.46
		20	3622.5	100/0	5	3634.2	25/0	19.77
	16-QAM	20	3622.5	1 / 99	5	3634.2	1 / 0	22.19
		20	3622.5	100/0	5	3634.2	25/0	19.61
	64-QAM	20	3622.5	1 / 99	5	3634.2	1 / 0	19.06
		20	3622.5	100/0	5	3634.2	25/0	16.9

Table 2. Conducted Powers for ULCA LTE B48 (Contiguous)

Bandwidth	Modulation	PCC			SCC			PCC Conducted Power [dBm]	SCC Conducted Power [dBm]
		Bandwidth [MHz]	Frequency [MHz]	RB / Offset	Bandwidth [MHz]	Frequency [MHz]	RB / Offset		
25 MHz	QPSK	20	3560.0	1/0	5	3697.5	1/24	20.31	20.41
		20	3560.0	100/0	5	3697.5	25/0	20.04	19.94
	16-QAM	20	3560.0	1/0	5	3697.5	1/24	19.01	19.64
		20	3560.0	100/0	5	3697.5	25/0	19.69	19.59
	64-QAM	20	3560.0	1/0	5	3697.5	1/24	18.56	18.55
		20	3560.0	100/0	5	3697.5	25/0	19.34	19.13

Table 3. Conducted Powers for ULCA LTE B48 (Non-Contiguous)

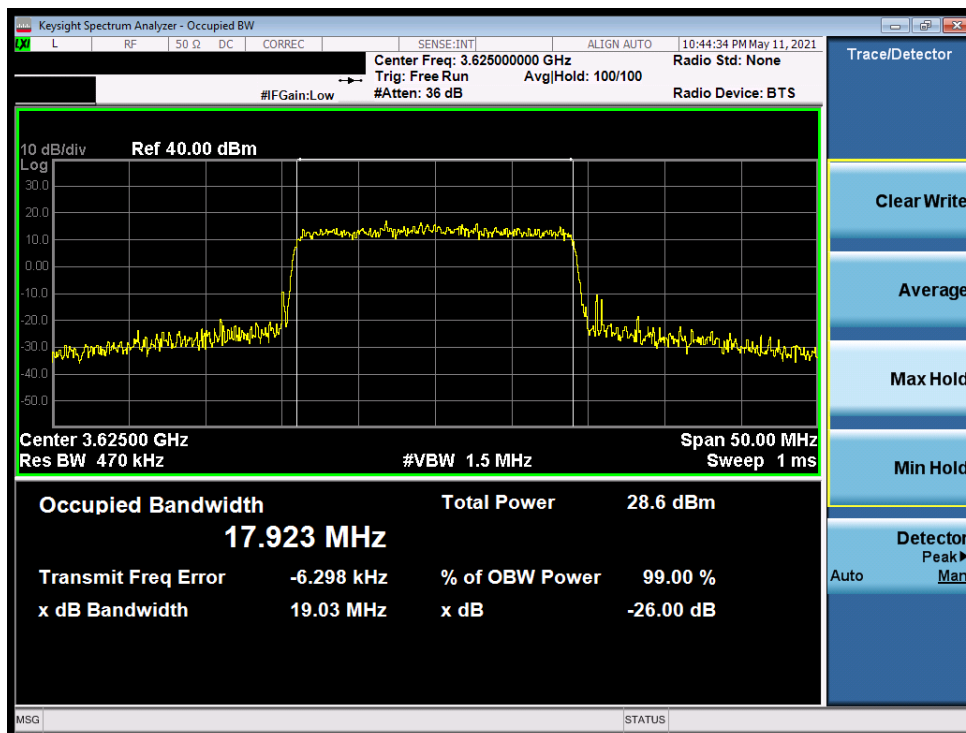
Note: The Conducted Power results shown above are measured based on worst case results from referenced FCC ID: V7MBSLC-120T42OGA and is within the expected measurement tolerances. PSD spot check measurements were also considered, however the conducted powers spot checks shown above covers the PSD since only antenna was changed.

FCC ID: V7MBHSLCTOGA	 PCTEST® Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	 SEOWON INTECH	Approved by: Quality Manager
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c-2. Occupied Bandwidth

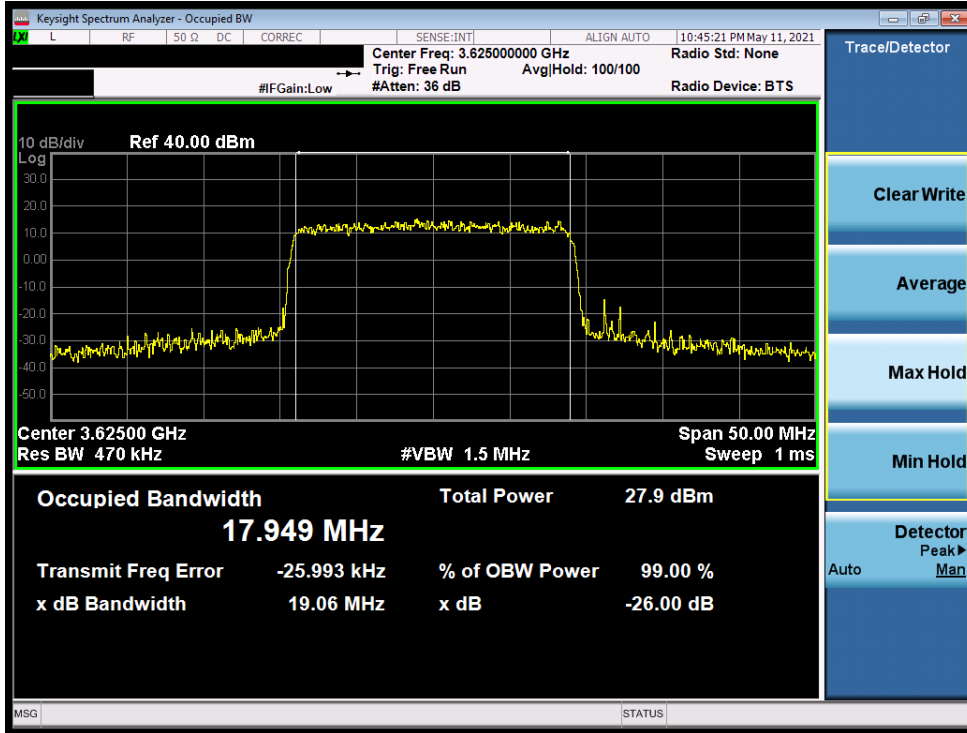


Plot 1. Occupied Bandwidth Plot (20MHz, QPSK)



Plot 2. Occupied Bandwidth Plot (20MHz, 16-QAM)

FCC ID: V7MBHSLCTOGA		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 23 of 36

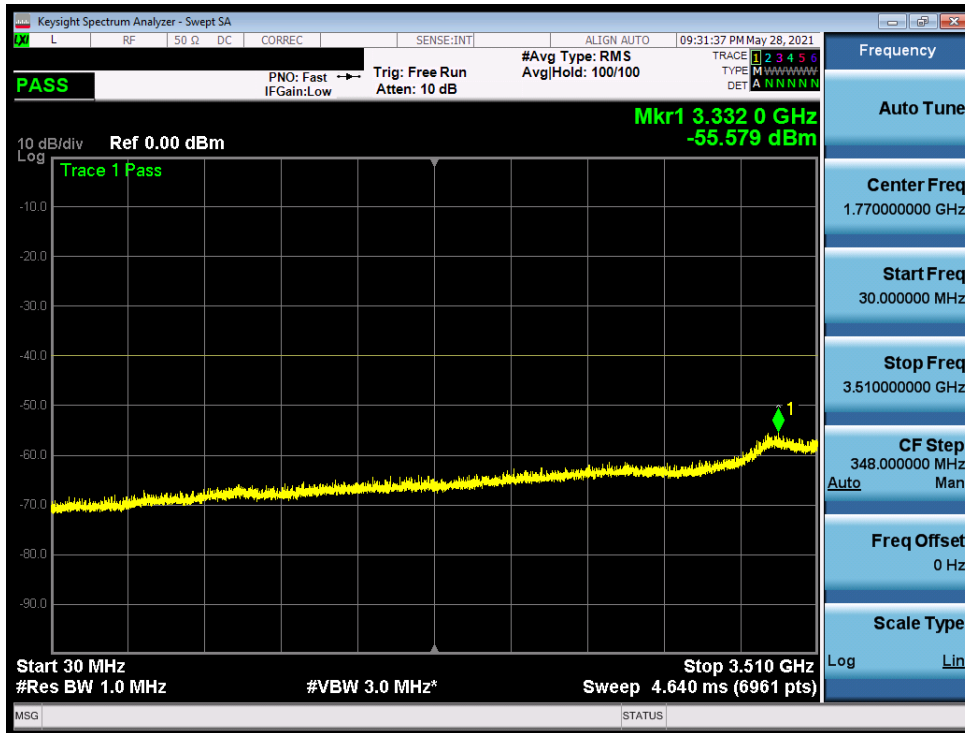


Plot 3.Occupied Bandwidth Plot (20MHz, 64-QAM)

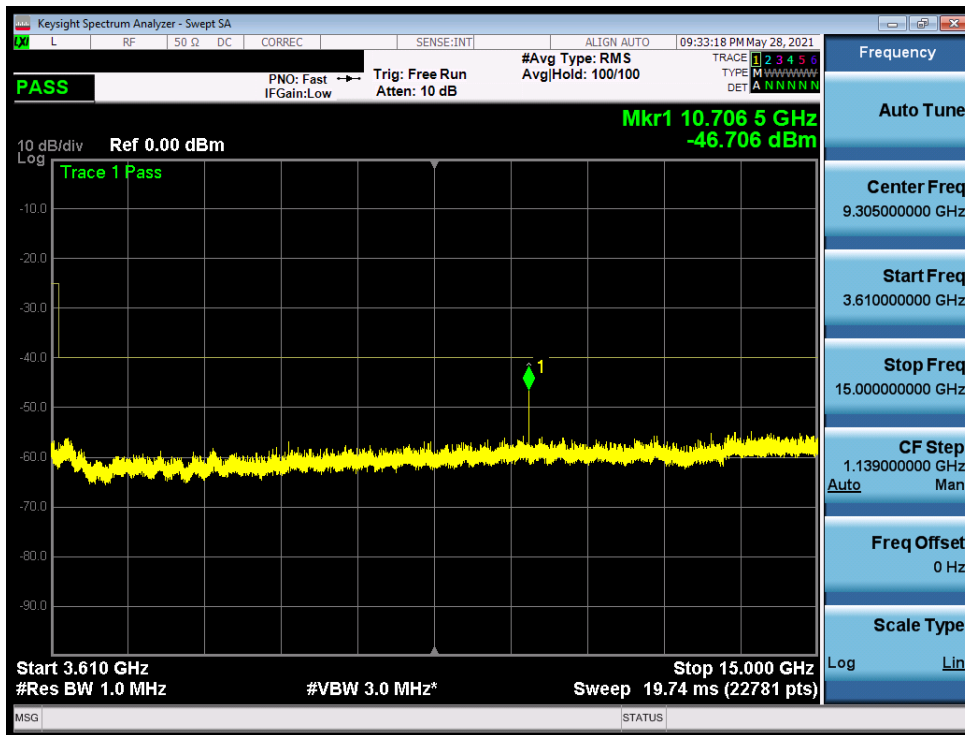
Note: The Occupied Bandwidth Plots shown above are measured based on worst case results from referenced FCC ID: V7MBSLC-120T42OGA and is within the expected measurement tolerances.

FCC ID: V7MBHSLCTOGA	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
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c-3. Spurious and Harmonic Emissions at Antenna Terminal

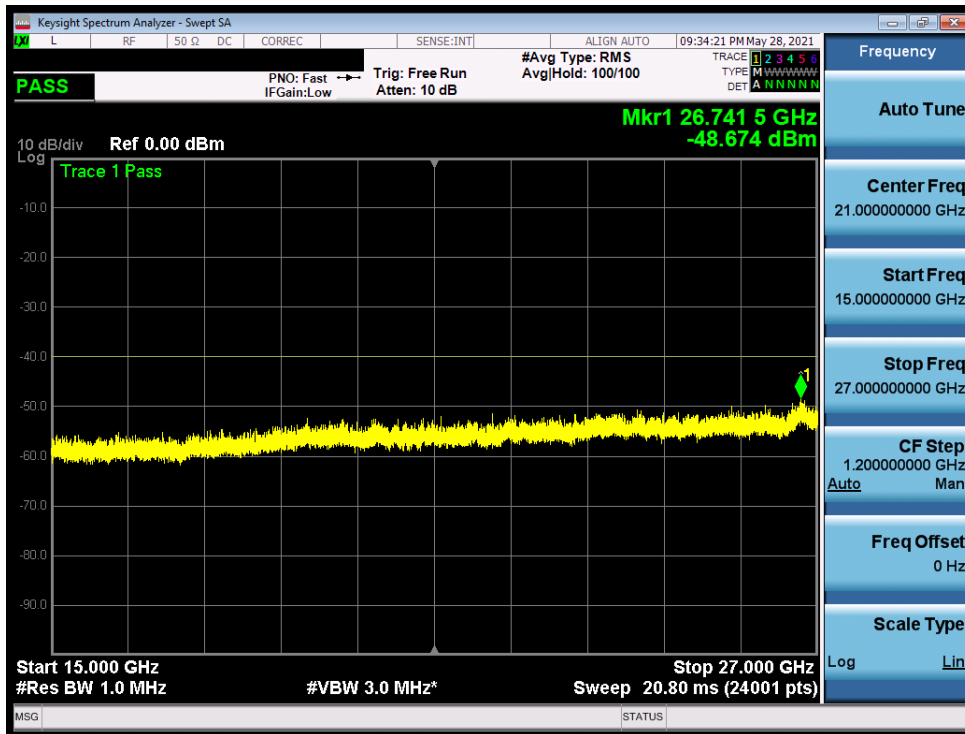


Plot 4. Conducted Spurious Emission Plot LTE B48 (QPSK, 20MHz, Low – RB Size/ Offset(1/99))

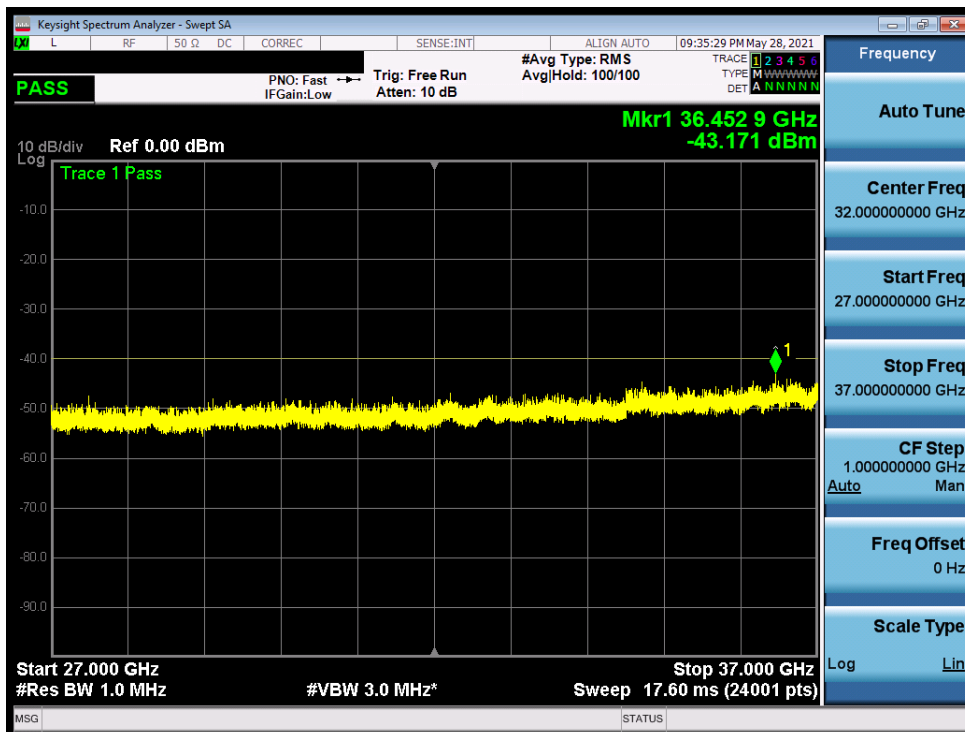


Plot 5. Conducted Spurious Emission Plot LTE B48 (QPSK, 20MHz, Low – RB Size/ Offset(1/99))



FCC ID: V7MBHSLCTOGA	 PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	 SEOWON INTECH	Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 25 of 36

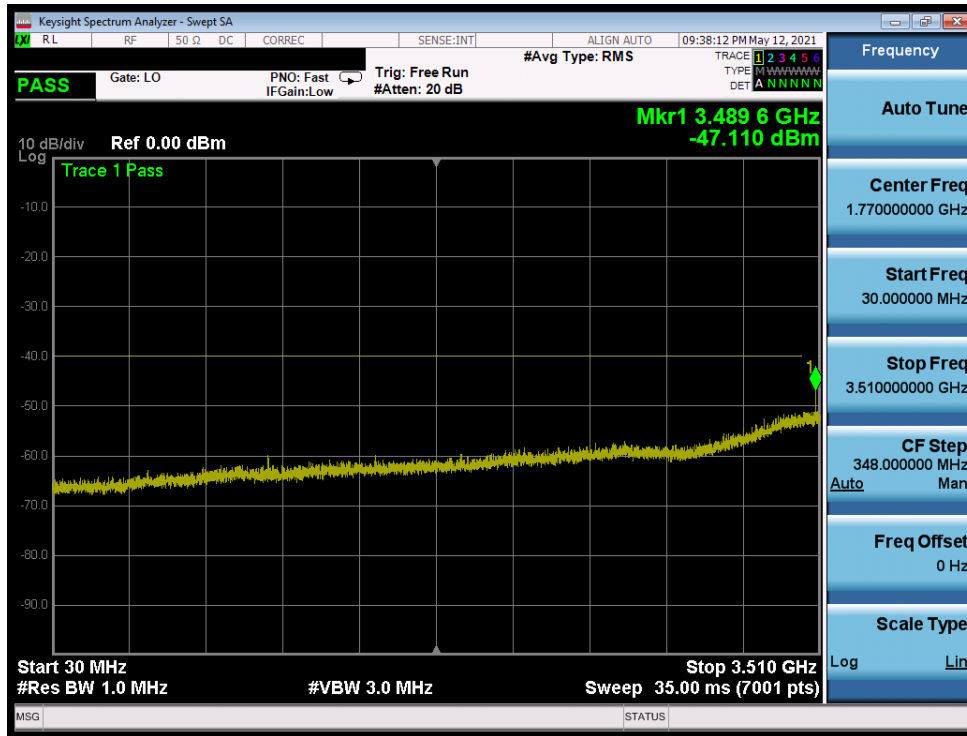


Plot 6. Conducted Spurious Emission Plot LTE B48 (QPSK, 20MHz, Low – RB Size/ Offset(1/99))

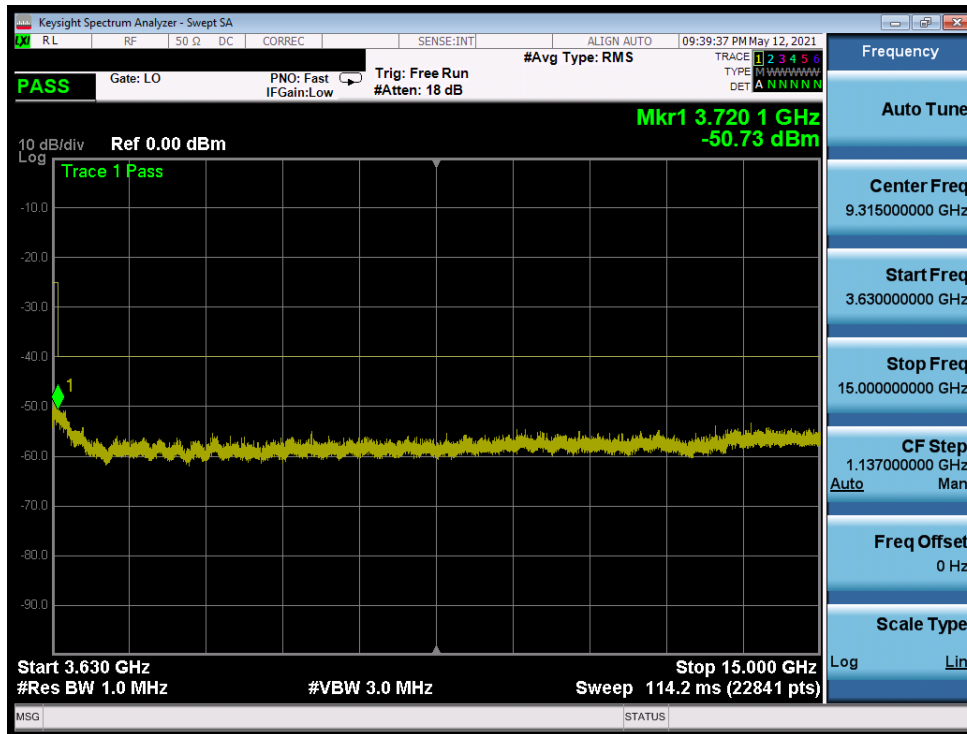


Plot 7. Conducted Spurious Emission Plot LTE B48 (QPSK, 20MHz, Low – RB Size/ Offset(1/99))

FCC ID: V7MBHSLCTOGA	 PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	 SEOWON INTECH	Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 26 of 36

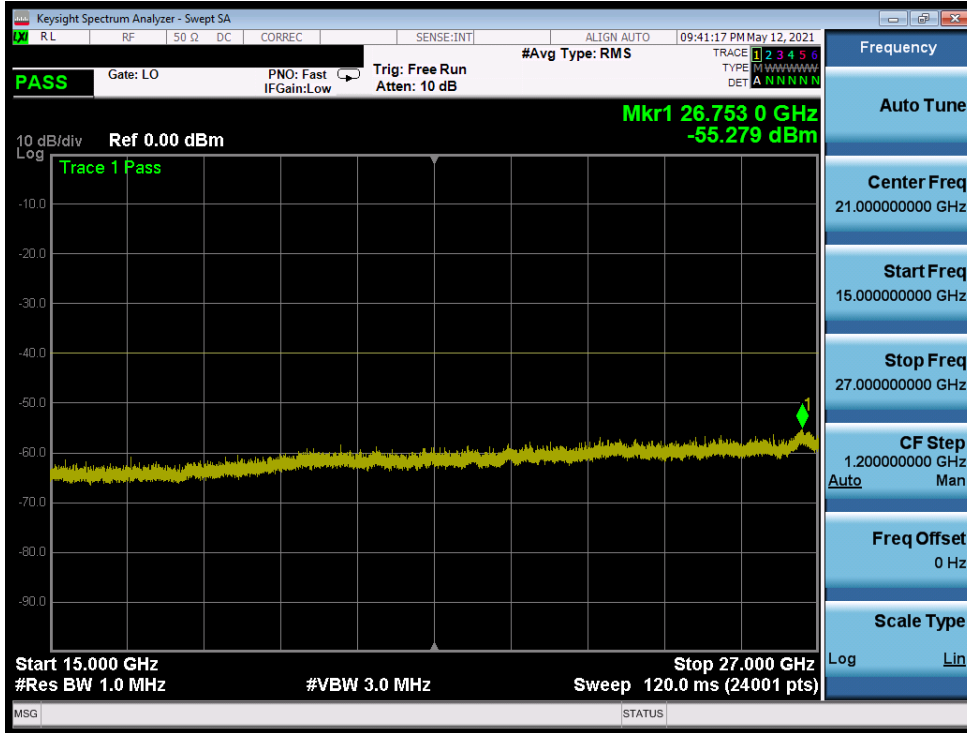


Plot 8. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, Low)

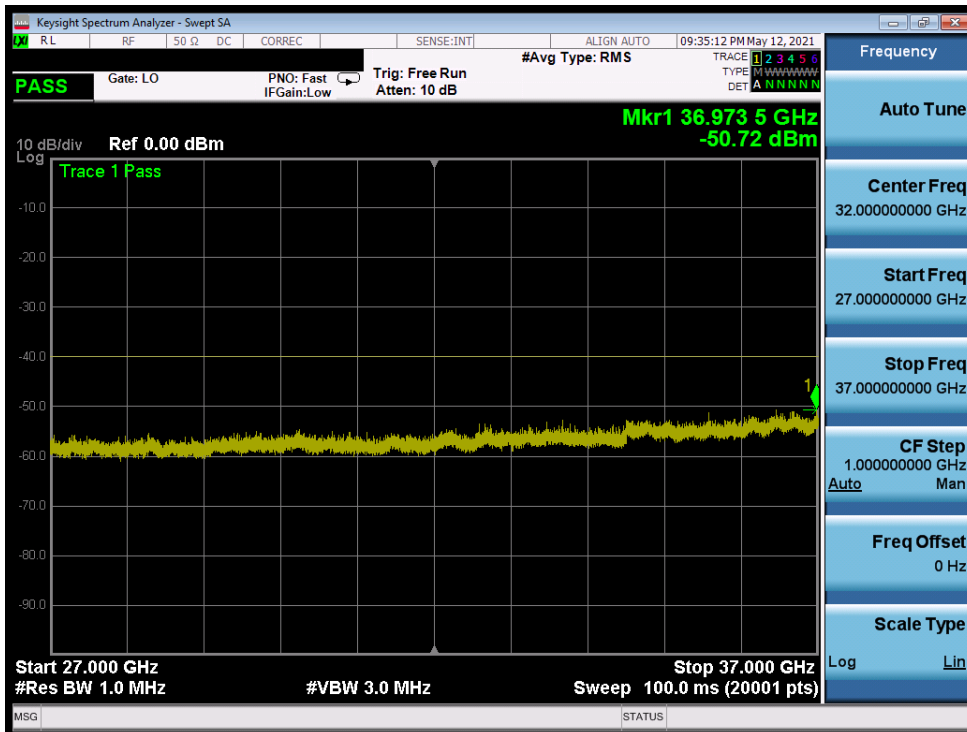


Plot 9. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, Low)

FCC ID: V7MBHSLCTOGA	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 27 of 36

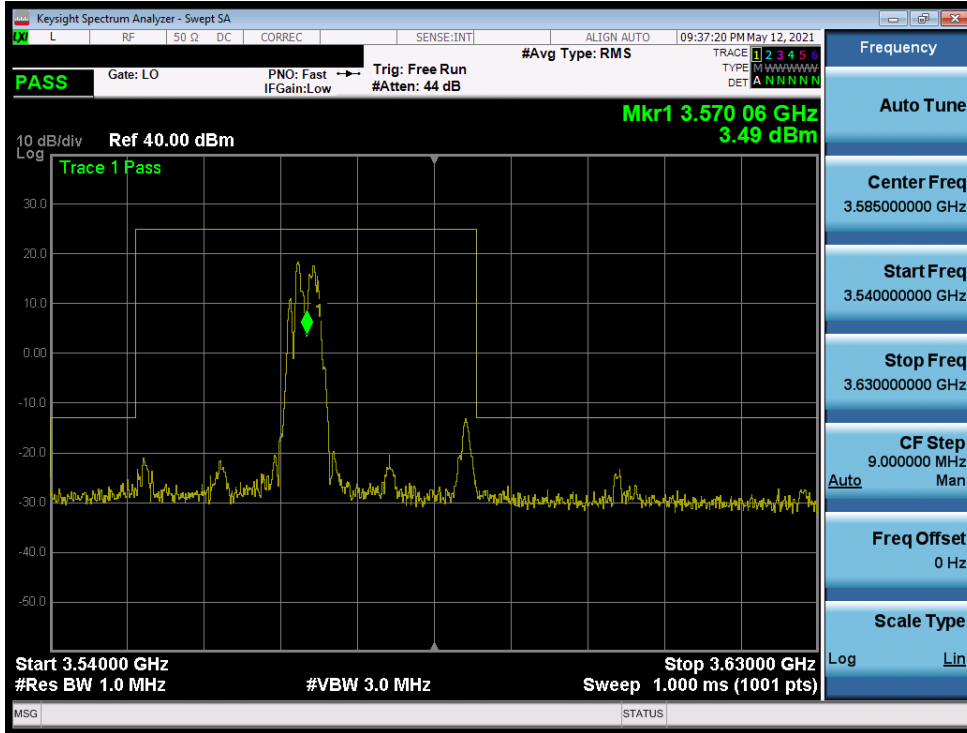


Plot 10. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, Low)



Plot 11. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, Low)

FCC ID: V7MBHSLCTOGA	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 28 of 36

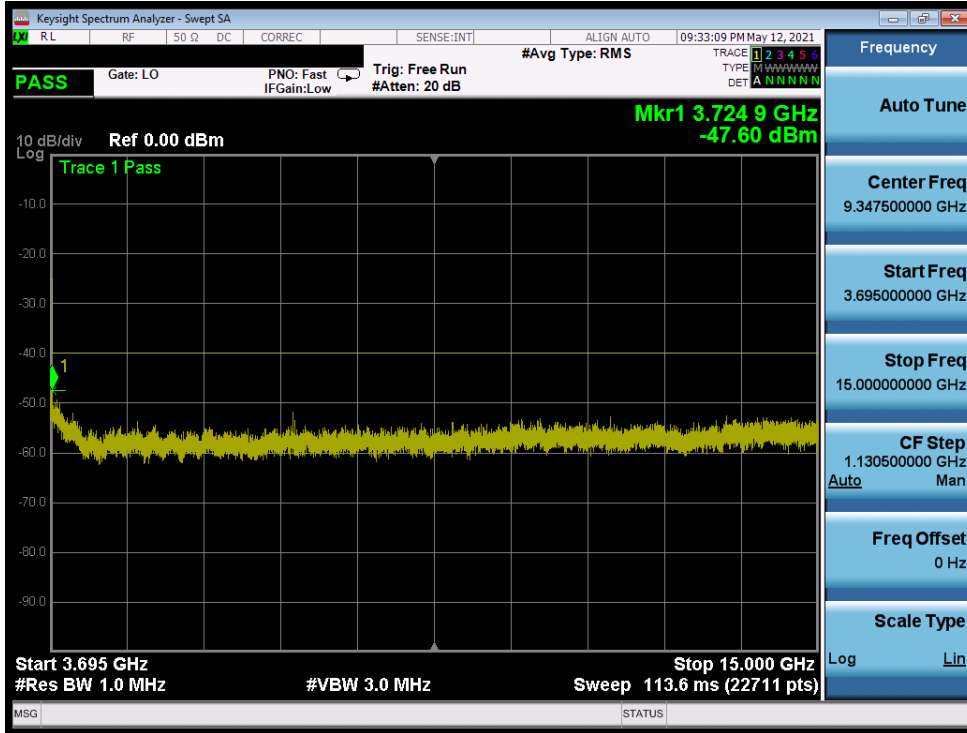


Plot 12. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, Low)

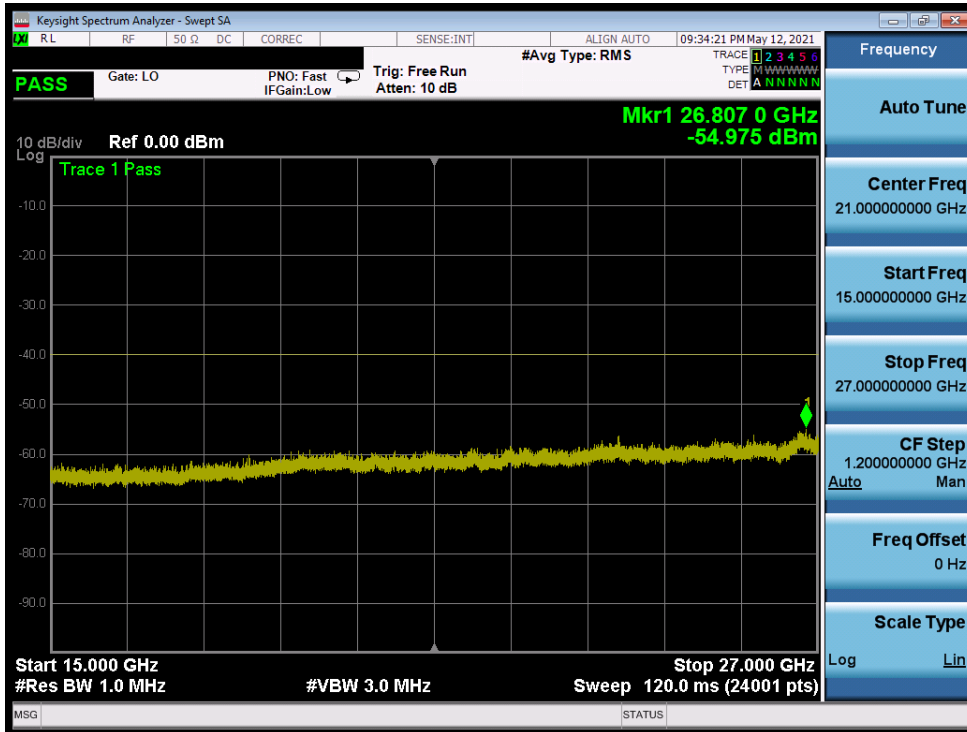


Plot 13. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, Mid)

FCC ID: V7MBHSLCTOGA	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 29 of 36

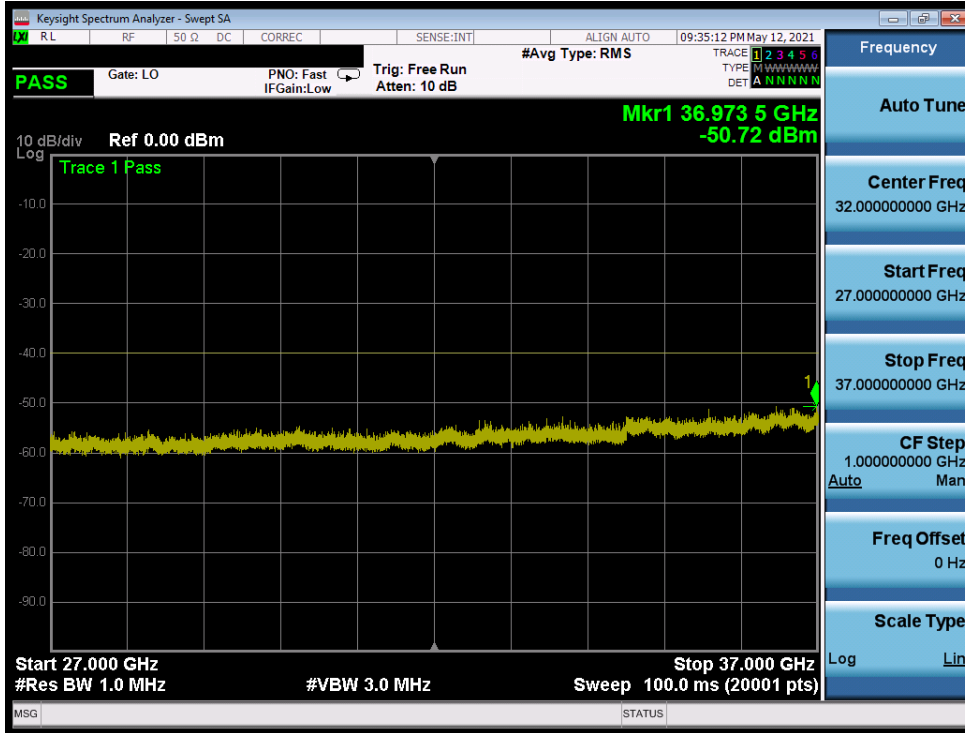


Plot 14. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, Mid)

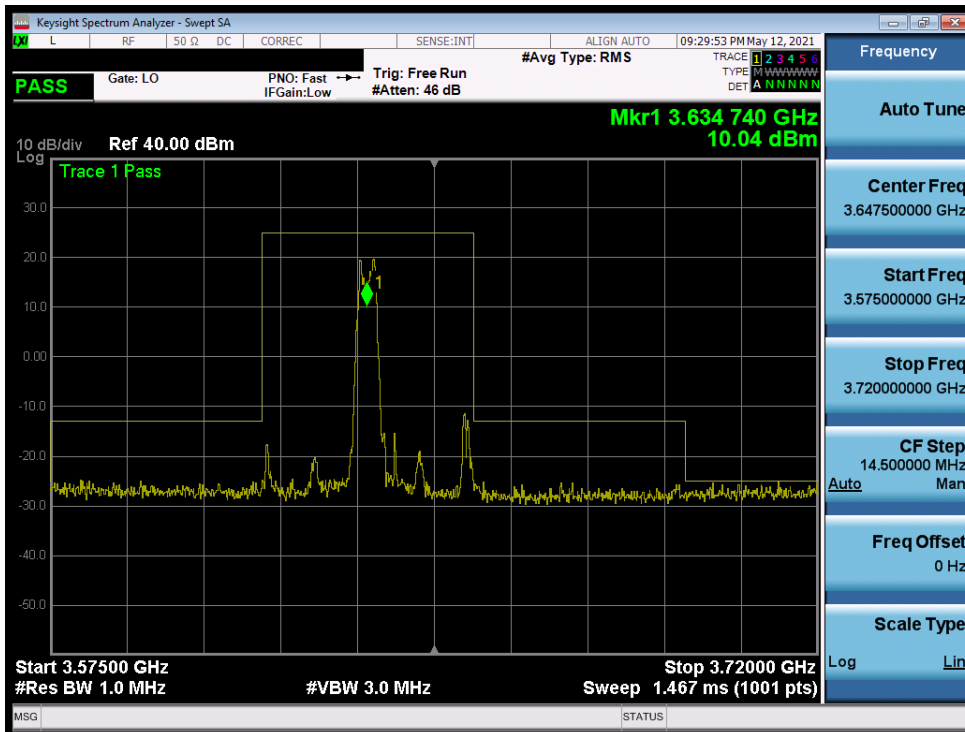


Plot 15. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, Mid)

FCC ID: V7MBHSLCTOGA	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
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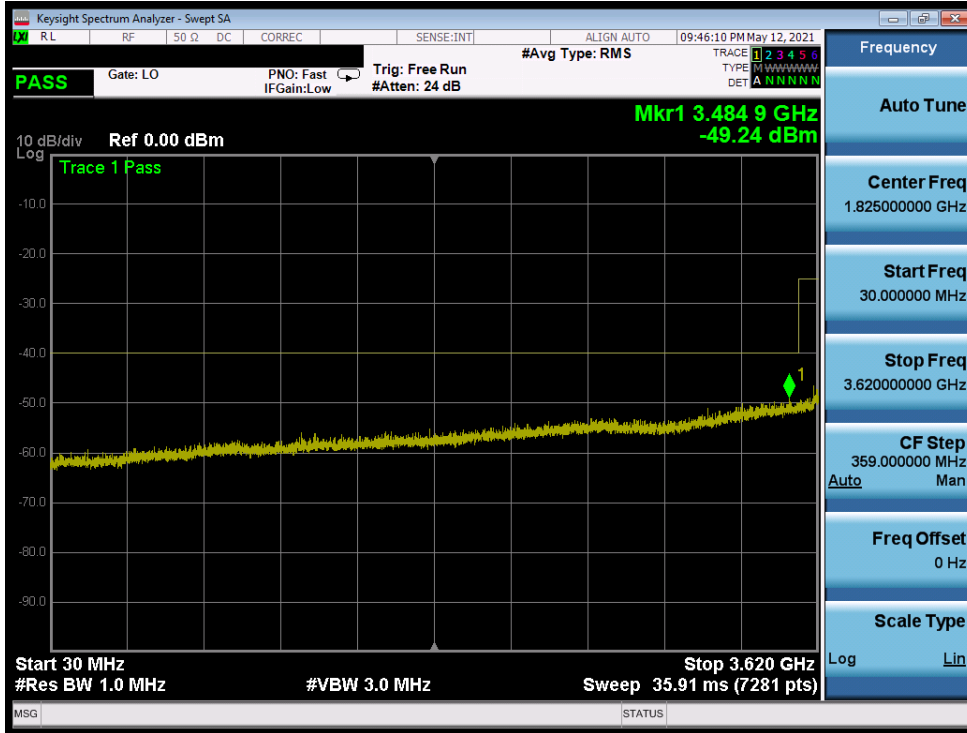


Plot 16. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, Mid)

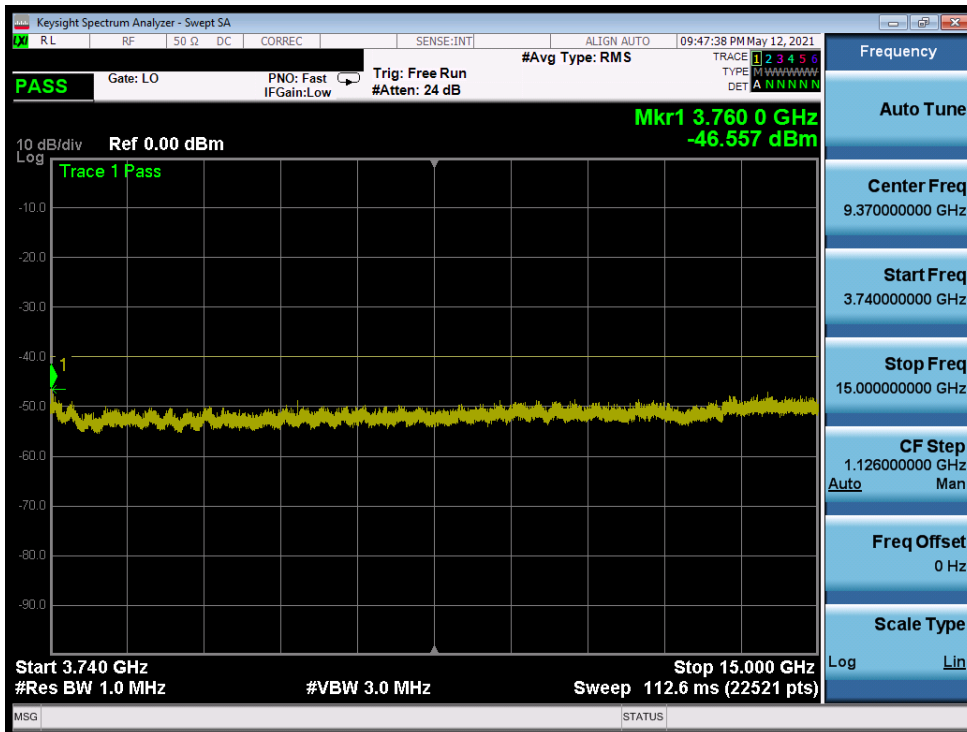


Plot 17. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, Mid)

FCC ID: V7MBHSLCTOGA	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 31 of 36

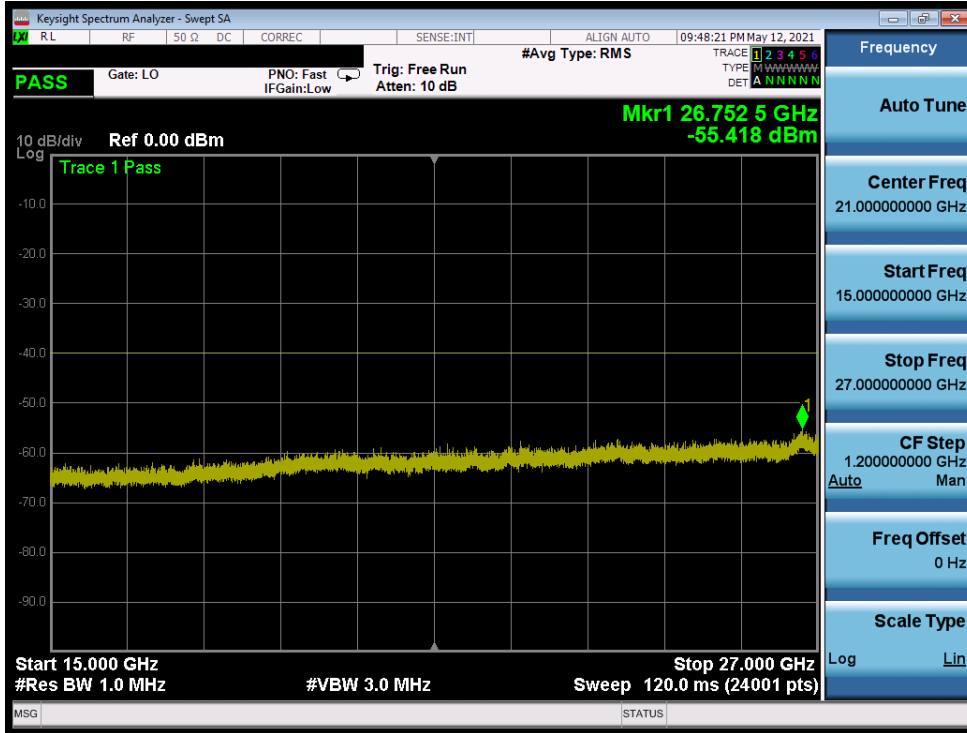


Plot 18. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, High)

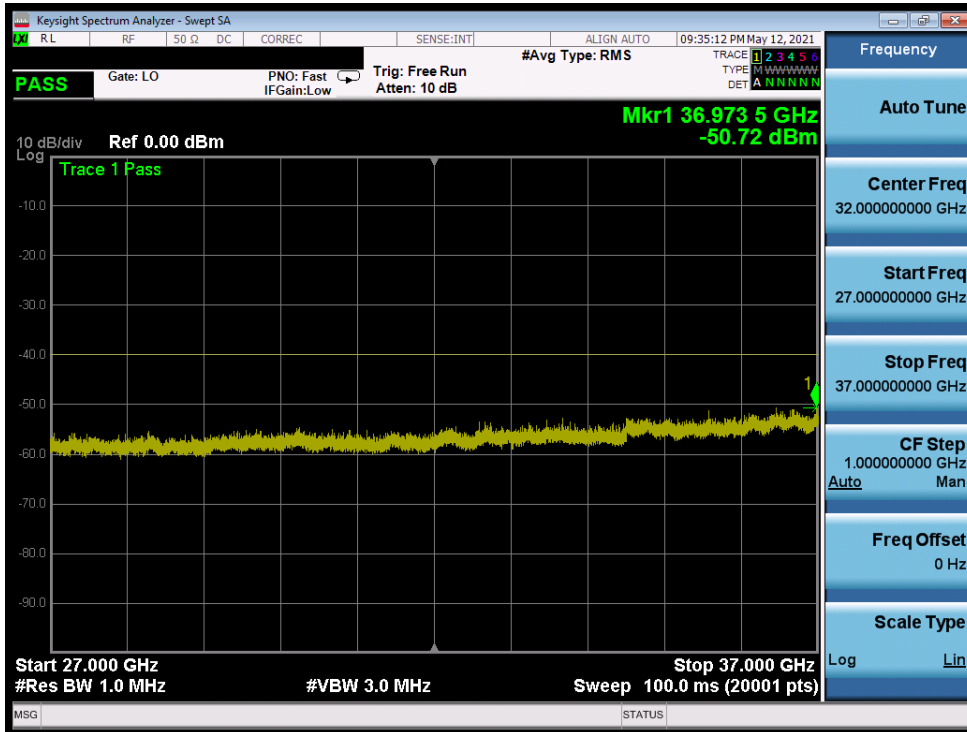


Plot 19. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, High)

FCC ID: V7MBHSLCTOGA	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 32 of 36

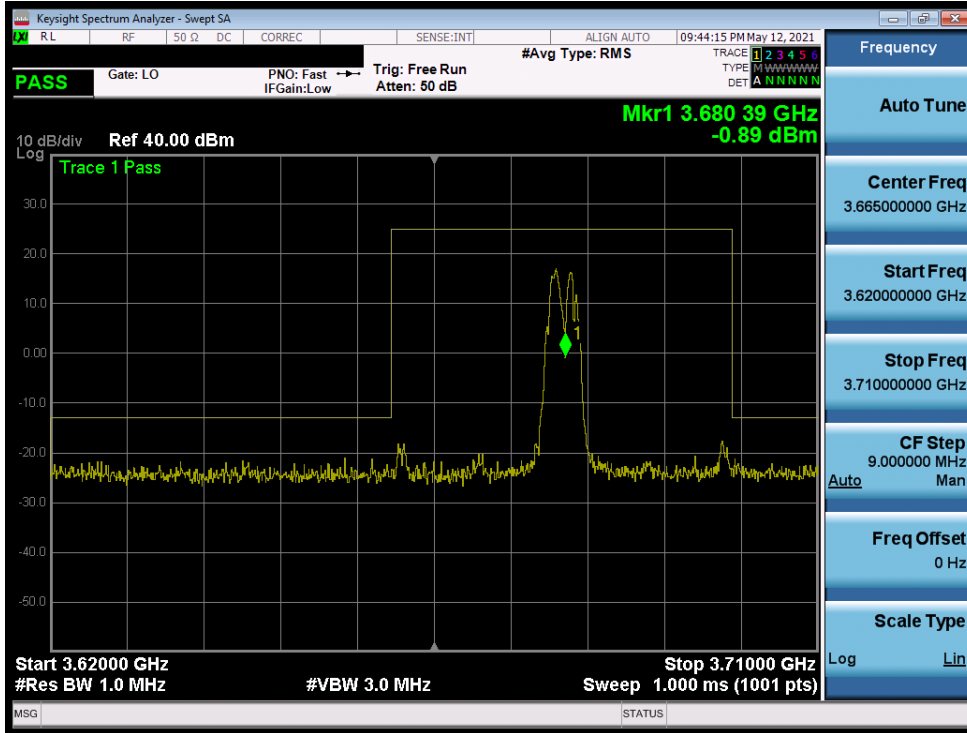


Plot 20. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, High)



Plot 21. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, High)

FCC ID: V7MBHSLCTOGA	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 33 of 36

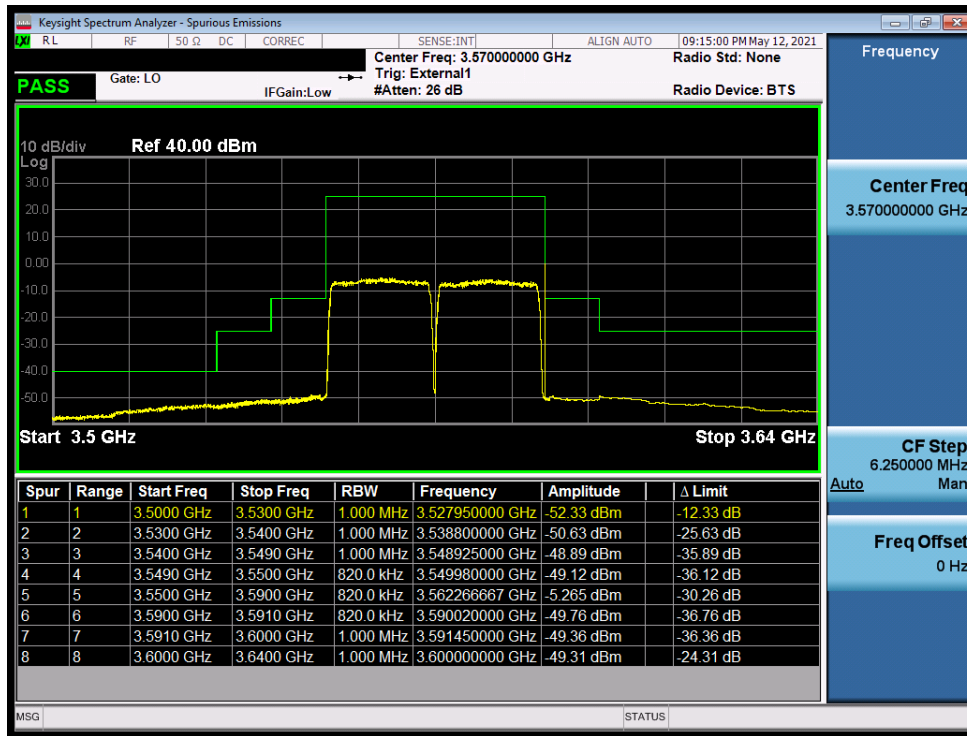


Plot 22. Conducted Spurious Emission Plot ULCA LTE B48 (20+20MHz, High)

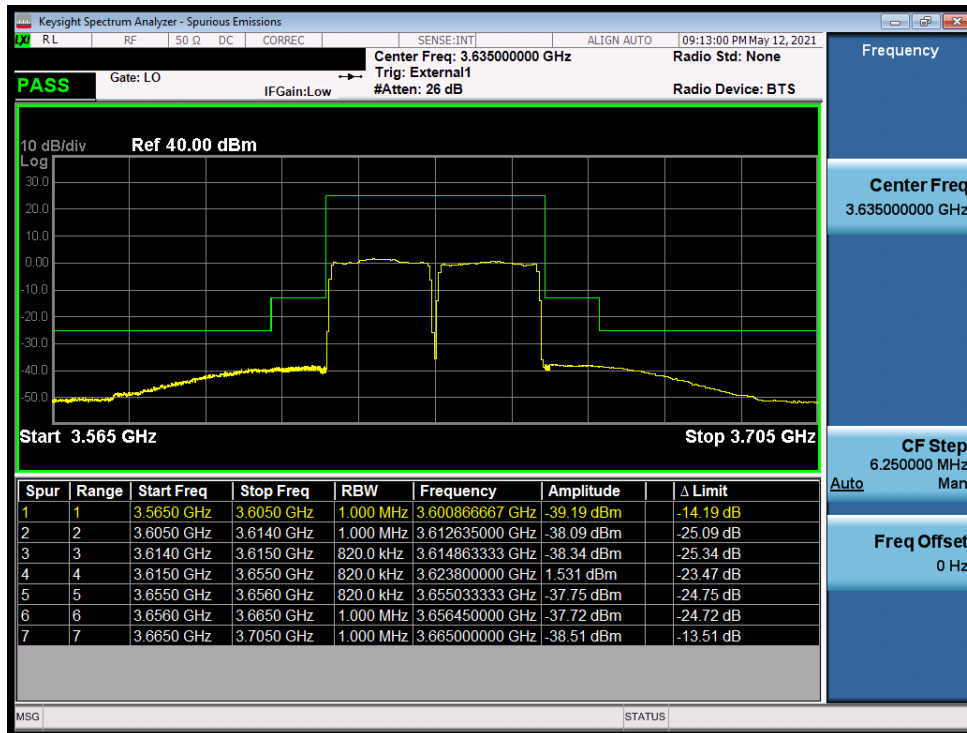
Note: The Conducted Spurious Emission Plot shown above are measured based on worst case results from referenced FCC ID: V7MBSLC-120T42OGA and is within the expected measurement tolerances.

FCC ID: V7MBHSLCTOGA	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 34 of 36

c-4. Band Edge Emissions at Antenna Terminal

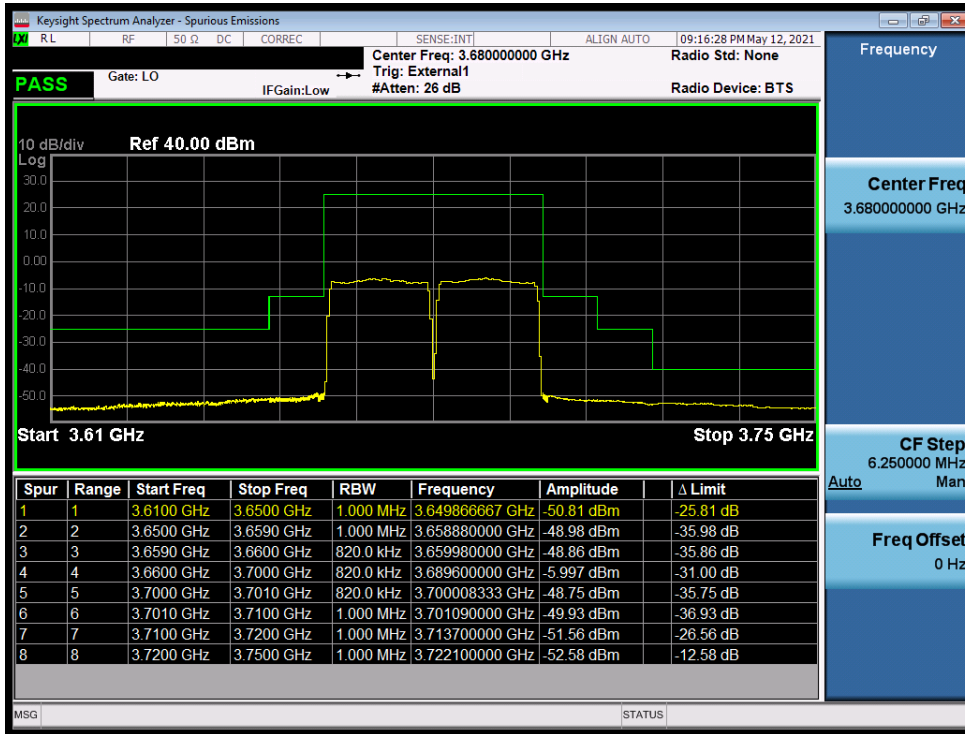


Plot 23. Conducted Band Edge Plot ULCA LTE B48 (20+20MHz, Low)





Plot 24. Conducted Band Edge Plot ULCA LTE B48 (20+20MHz, Mid)

FCC ID: V7MBHSLCTOGA	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 35 of 36



Plot 25. Conducted Band Edge Plot ULCA LTE B48 (20+20MHz, High)

Note: The Conducted Band Edge Plots shown above are measured based on worst case results from referenced FCC ID: V7MBSLC-120T42OGA and is within the expected measurement tolerances.

FCC ID: V7MBHSLCTOGA		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2105060049-01.V7M	Test Dates: 05/12- 05/28/2021	EUT Type: LTE Outdoor CPE		Page 36 of 36