

ELEMENT WASHINGTON DC LLC

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

PART 22 & 90 MEASUREMENT REPORT

Applicant Name:

Centum Research & Technology S.L Fonte das Abelleiras S/N Edificio Citexvi 36310 Vigo (Spain)

Date of Testing:

08/14 - 08/27/2024 **Test Report Issue Date:** 1/16/2025 **Test Site/Location:** Element lab., Columbia, MD, USA **Test Report Serial No.:** 1M2407310061-04.2A93U

FCC ID:

2A93U-55041-402

APPLICANT:

Centum Research & Technology S.L

Application Type: Model: EUT Type: FCC Classification: FCC Rule Part: Test Procedure(s): Class II Permissive Change: Original Grant Date:

Class II Permissive Change Lifeseeker Mini S10 Geolocation System PCS Licensed Transmitter (PCB) §22(H), §90(S) ANSI C63.26-2015 Adding additional 2G/3G bands and modes of operation 03/02/2023

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

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

RJ Ortanez Executive Vice President



| FCC ID: 2A93U-55041-402 | MEASUREMENT REPORT | | Approved by: Technical Manager |
|-------------------------|-----------------------|--------------------|-----------------------------------|
| Test Report S/N: | Test Dates: EUT Type: | | Dogo 1 of 20 |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 1 of 29 |
| © 2025 ELEMENT | • | | V11.1 08/28/2023 |



TABLE OF CONTENTS

| 1.0 | INTR | ODUCTION | 4 |
|-----|------|--|----|
| | 1.1 | Scope | 4 |
| | 1.2 | Element Test Location | 4 |
| | 1.3 | Test Facility / Accreditations | 4 |
| 2.0 | PRO | DUCT INFORMATION | 5 |
| | 2.1 | Equipment Description | 5 |
| | 2.2 | Device Capabilities | 5 |
| | 2.3 | Test Configuration | 5 |
| | 2.4 | Software and Firmware | 5 |
| | 2.5 | EMI Suppression Device(s)/Modifications | 5 |
| 3.0 | DESC | CRIPTION OF TESTS | 6 |
| | 3.1 | Evaluation Procedure | 6 |
| | 3.2 | Radiated Spurious Emissions | 6 |
| 4.0 | MEAS | SUREMENT UNCERTAINTY | 7 |
| 5.0 | TEST | EQUIPMENT CALIBRATION DATA | 8 |
| 6.0 | SAM | PLE CALCULATIONS | 9 |
| 7.0 | TEST | RESULTS | 10 |
| | 7.1 | Summary | 10 |
| | 7.2 | Transmitter Conducted Output Power/ Effective Radiated Power | 11 |
| | 7.3 | Occupied Bandwidth | 14 |
| | 7.4 | Spurious and Harmonic Emissions at Antenna Terminal | 16 |
| | 7.5 | Band Edge Emissions at Antenna Terminal | 20 |
| | 7.6 | Radiated Spurious Emissions Measurements | 22 |
| | 7.7 | Frequency Stability / Temperature Variation | 27 |
| 8.0 | CON | CLUSION | 29 |

| FCC ID: 2A93U-55041-402 | MEASUREMENT REPORT | | Approved by: Technical Manager | |
|-------------------------|--------------------|-----------------------|-----------------------------------|--|
| Test Report S/N: | Test Dates: | Test Dates: EUT Type: | | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 2 of 29 | |
| © 2025 ELEMENT | | | V11.1 08/28/2023 | |



MEASUREMENT REPORT FCC Part 22 & 90

| Mode | Bandwidth | Modulation | Tx Frequency Range [MHz] | Measurement | Max. Power [W] | Max. Power [dBm] | Emission Designator |
|--------------|-----------|------------|-----------------------------|-------------|-------------------|---------------------|------------------------|
| UMTS Band 26 | 5 MHz | QPSK | 861.4 - 891.6 | Conducted | 0.121 | 20.82 | 4M33G7D |
| EUT Overview | | | | | | | |

| FCC ID: 2A93U-55041-402 | | Approved by: Technical Manager | |
|-------------------------|--------------------|-----------------------------------|------------------|
| Test Report S/N: | Test Dates: | EUT Type: | Page 3 of 29 |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Fage 3 01 29 |
| © 2025 ELEMENT | | | V11.1 08/28/2023 |



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 and the Innovation, Science and Economic Development Canada.

1.2 Element Test Location

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

1.3 Test Facility / Accreditations

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

- Element Washington DC LLC is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- Element Washington DC LLC TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- Element Washington DC LLC facility is a registered (2451B) test laboratory with the site description on file with ISED.
- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreement.

| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | |
|-------------------------|--------------------|-----------------------|------------------|
| Test Report S/N: | Test Dates: | Test Dates: EUT Type: | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 4 of 29 |
| © 2025 ELEMENT | • | · | V11.1 08/28/2023 |

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Centum Geolocation System FCC ID: 2A93U-55041-402**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 90 and 22H.

Test Device Serial No.: 213014

2.2 Device Capabilities

This device was tested for the following capabilities:

UMTS Bands: 2, 4/10, 5/26, 12, 13 and GSM Bands: 850 and 1900

2.3 Test Configuration

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

RF was generated by a test tool provided by the manufacturer.

2.4 Software and Firmware

Testing was performed on device(s) using software/firmware version 2.1 installed on the EUT.

2.5 EMI Suppression Device(s)/Modifications

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

| FCC ID: 2A93U-55041-402 | MEASUREMENT REPORT | | Approved by: Technical Manager |
|-------------------------|--------------------|-----------------------|-----------------------------------|
| Test Report S/N: | Test Dates: | Test Dates: EUT Type: | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 5 of 29 |
| © 2025 ELEMENT | - | | V11.1 08/28/2023 |



3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

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

Deviation from Measurement Procedure......None

3.2 Radiated Spurious Emissions

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

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

For radiated spurious emissions measurements, the field strength conversion method is used per the formulas in Section 5.2.7 of ANSI C63.26-2015. Field Strength (EIRP) is calculated using the following formulas:

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

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

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

| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | |
|-------------------------|--------------------|-----------------------|------------------|
| Test Report S/N: | Test Dates: | Test Dates: EUT Type: | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 6 of 29 |
| © 2025 ELEMENT | | · | V11.1 08/28/2023 |



4.0 MEASUREMENT UNCERTAINTY

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

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

| FCC ID: 2A93U-55041-402 | MEASUREMENT REPORT | | Approved by: Technical Manager |
|-------------------------|-----------------------|--------------------|-----------------------------------|
| Test Report S/N: | Test Dates: EUT Type: | | Page 7 of 29 |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Fage / 01 29 |
| © 2025 ELEMENT | | | V11.1 08/28/2023 |



5.0 TEST EQUIPMENT CALIBRATION DATA

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

| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|-----------------------|--------|-----------------------------|-----------|--------------|-----------|---------------|
| - | AP2 | EMC Cable and Switch System | 4/2/2024 | Annual | 4/2/2025 | AP2 |
| - | ETS | EMC Cable and Switch System | 4/2/2024 | Annual | 4/2/2025 | ETS |
| - | WL25-3 | Conducted Cable Set (25GHz) | 4/2/2024 | Annual | 4/2/2025 | WL25-3 |
| - | WL40-1 | WLAN Cable Set (40GHz) | 4/2/2024 | Annual | 4/2/2025 | WL40-1 |
| Keysight Technologies | N9020A | MXA Signal Analyzer | 4/11/2024 | Annual | 4/11/2025 | MY54500644 |
| Keysight Technologies | N9030A | PXA Signal Analyzer (44GHz) | 4/9/2024 | Annual | 4/9/2025 | MY52350166 |
| Emco | 3115 | Horn Antenna (1-18GHz) | 6/7/2024 | Biennial | 6/7/2026 | 9704-5182 |
| Sunol | JB5 | Bi-Log Antenna (30M - 5GHz) | 8/30/2022 | Biennial | 8/30/2024 | A051107 |
| Rohde & Schwarz | ESU26 | EMI Test Receiver (26.5GHz) | 9/25/2023 | Annual | 9/25/2024 | 100342 |
| Keysight Technologies | N9038A | MXE EMI Receiver | 8/30/2023 | Annual | 8/30/2024 | MY51210133 |

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.

| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | |
|-------------------------|--------------------|-----------------------|------------------|
| Test Report S/N: | Test Dates: | Test Dates: EUT Type: | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 8 of 29 |
| © 2025 ELEMENT | · | · | V11.1 08/28/2023 |

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

- G = Phase Modulation
- 7 = Quantized/Digital Info
- D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

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

Spurious Radiated Emission – LTE Band

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

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm - (-24.80) = 50.3 dBc.

| FCC ID: 2A93U-55041-402 | MEASUREMENT REPORT | | Approved by: Technical Manager |
|-------------------------|-----------------------|--------------------|-----------------------------------|
| Test Report S/N: | Test Dates: EUT Type: | | Dage 0 of 20 |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 9 of 29 |
| © 2025 ELEMENT | <u>.</u> | | V11.1 08/28/2023 |



7.0 TEST RESULTS

7.1 Summary

| Company Name: | Centum Research & Technology S.L |
|---------------------|----------------------------------|
| FCC ID: | <u>2A93U-55041-402</u> |
| FCC Classification: | PCS Licensed Transmitter (PCB) |
| Mode(s): | <u>UMTS</u> |

| Test Condition | Test Description | FCC Part Section(s) | Test Limit | Test Result | Reference |
|-------------------|--|----------------------|--|-------------|----------------------|
| | Transmitter Conducted Output Power | 2.1046(a), 90.635(b) | < 100 Watts | PASS | Section 7.2 |
| | Effective Radiated Power (UMTS Band 26) | 22.913(a)(2) | < 7 Watts max. ERP for operation crossing over into the 869 - 894MHz band under Part 22 | PASS | Section 7.2 |
| CONDUCTED | Occupied Bandwidth | 2.1049(h) | N/A | PASS | Section 7.3 |
| CONDI | Conducted Band Edge / Spurious Emissions (UMTS Band 26) | 2.1051, 90.691(a) | > 43 + 10 log10(P[Watts]) for all out-of-band emissions except emissions beyond 37.5kHz from the block edge > 50 + 10 log10(P[Watts]) at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge | PASS | Sections 7.4, 7.5 |
| | Frequency Stability | 2.1055, 90.213 | < 2.5 ppm Fundamental emissions stay within authorized frequency block | PASS | Section 7.7 |
| RADIATED | Radiated Spurious Emissions (UMTS Band 26) | 2.1053, 90.691(a) | > 43 + 10 log10(P[Watts]) for all out-of-band emissions except emissions beyond 37.5kHz from the block edge > 50 + 10 log10(P[Watts]) at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge | PASS | Section 7.6 |

Table 7-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in Section 7.0 were taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is EMC Software Tool v1.2.2.

| FCC ID: 2A93U-55041-402 | MEASUREMENT REPORT | | MEASUREMENT REPORT | | Approved by: Technical Manager |
|-------------------------|--------------------|-----------------------|--------------------|--|-----------------------------------|
| Test Report S/N: | Test Dates: | Test Dates: EUT Type: | | | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 10 of 29 | | |
| © 2025 ELEMENT | - | | V11.1 08/28/2023 | | |



7.2 Transmitter Conducted Output Power/ Effective Radiated Power

Test Overview

All 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.

Test Procedure Used

ANSI C63.26-2015 - Section 5.2

Test Settings

- 1. Power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
- 2. Span = 2 3 times the OBW
- 3. RBW = 1 5% of the expected OBW
- 4. VBW \geq 3 x RBW
- 5. No. of sweep points > 2 x span / RBW
- 6. Sweep time = auto-couple
- 7. Detector = RMS
- 8. Trigger is set to "free run" for signals with continuous operation.
- 9. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
- 10. Trace mode = trace averaging (RMS) over 100 sweeps
- 11. The trace was allowed to stabilize.

Test Setup

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



Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None.

| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | |
|-------------------------|--------------------|-----------------------|------------------|
| Test Report S/N: | Test Dates: | Test Dates: EUT Type: | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 11 of 29 |
| © 2025 ELEMENT | • | | V11.1 08/28/2023 |



| Channel | Frequency [MHz] | Conducted Power [dBm] | Ant Gain [dBi] | ERP [dBm] | ERP [Watts] | ERP Limit [dBm] | Margin [dB] |
|---------|--------------------|--------------------------|-------------------|-----------|-------------|--------------------|-------------|
| 5762 | 861.4 | 20.82 | 0.82 | 19.49 | 0.089 | 38.45 | -18.96 |
| 5913 | 891.6 | 20.81 | 0.82 | 19.48 | 0.089 | 38.45 | -18.98 |

Table 7-2. Conducted Power Output Data (UMTS Band 26)

| Keysight Spectrum Analyzer - Channel Power | | | | | | | - • × |
|--|-------|---|---------------------------------------|--|----------------------|-------------|------------------------------|
| | Trig: | SENSE:INT er Freq: 861.400000 M Free Run Av n: 36 dB | ALIGN AUTO //Hz gjHold: 100/100 | 12:00:44 Pl Radio Std: Radio Dev | | Trace | /Detector |
| 10 dB/div Ref 30.00 dBm | | | | | | | |
| 20.0 | | | ~~_ | | | С | lear Write |
| -10.0 -20.0 -30.0 | | | | | | | Average |
| -40.0 | | | | | | | Max Hold |
| Center 861.400 MHz Res BW 120 kHz | | /BW 1.2 MHz | | | 2.50 MHz 1.067 ms | | Min Hold |
| Channel Power | | Power Sp | ectral Dens | ity | | | |
| 20.82 dBm / | 5 MHz | -46 | .17 dBm | /Hz | | <u>Auto</u> | Detector Average ► Man |
| | | | | | | | |
| MSG | | | STATUS | 6 | | | |

Plot 7-1. Occupied Bandwidth Plot (UMTS Band 26 - 5MHz)

| FCC ID: 2A93U-55041-402 | MEASUREMENT REPORT | | Approved by: Technical Manager |
|-------------------------|--------------------|-----------------------|-----------------------------------|
| Test Report S/N: | Test Dates: | Test Dates: EUT Type: | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 12 of 29 |
| © 2025 ELEMENT | | | V11.1 08/28/2023 |

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



| Keysight Spectrum Analyzer - Channel Power | | | |
|--|---|--|-----------------|
| LXI RL RF 50 Ω DC CORREC | SENSE:INT ALI Center Freg: 891.600000 MHz | IGN AUTO 12:02:01 PM Aug 23, 2024 Radio Std: None | Trace/Detector |
| | Trig: Free Run Avg Hold: 10 | 00/100 | |
| #IFGain:Low | #Atten: 36 dB | Radio Device: BTS | |
| | | | |
| 10 dB/div Ref 30.00 dBm | | | |
| 20.0 | | | |
| 10.0 | | | Clear Write |
| 0.00 | | | |
| -10.0 | | | |
| -20.0 | | | Average |
| | | | Average |
| -30.0 | | munimum | |
| -40.0 | | | |
| -50.0 | | | Max Hold |
| -60.0 | | | |
| Center 891.600 MHz | | Span 12.50 MHz | |
| Res BW 120 kHz | VBW 1.2 MHz | Sweep 1.067 ms | |
| | | | Minitiona |
| Channel Power | Power Spectral | Density | |
| | | | Detector |
| 20.81 dBm / 5 мнz | -46.18 c | | Average► |
| | | | <u>Auto</u> Man |
| | | | |
| | | | |
| | | | |
| | | | |
| MSG | | STATUS | |

Plot 7-2. Occupied Bandwidth Plot (UMTS Band 26 - 5MHz)

| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | |
|-------------------------|--------------------|-----------------------|------------------|
| Test Report S/N: | Test Dates: | Test Dates: EUT Type: | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 13 of 29 |
| © 2025 ELEMENT | | • | V11.1 08/28/2023 |



7.3 Occupied Bandwidth

Test Overview

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

Test Procedure Used

ANSI C63.26-2015 - Section 5.4.4

Test Settings

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

Test Setup

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



Figure 7-2. Test Instrument & Measurement Setup

Test Notes

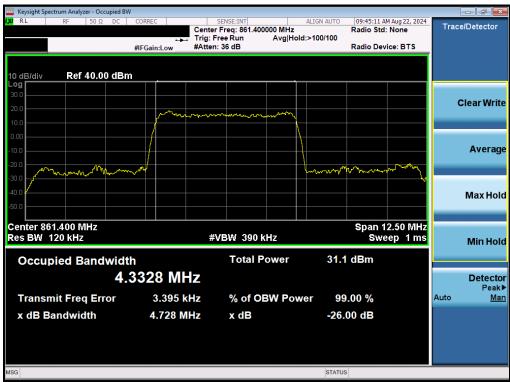
None

| FCC ID: 2A93U-55041-402 | MEASUREMENT REPORT | | Approved by: Technical Manager |
|-------------------------|-----------------------|--------------------|-----------------------------------|
| Test Report S/N: | Test Dates: EUT Type: | | Dage 14 of 20 |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 14 of 29 |
| © 2025 ELEMENT | - | · | V11.1 08/28/2023 |

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



UMTS Band 26



Plot 7-3. Occupied Bandwidth Plot (UMTS Band 26 - 5MHz)

| FCC ID: 2A93U-55041-402 | MEASUREMENT REPORT | | MEASUREMENT REPORT | | Approved by: Technical Manager |
|-------------------------|--------------------|-----------------------|--------------------|--|-----------------------------------|
| Test Report S/N: | Test Dates: | Test Dates: EUT Type: | | | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 15 of 29 | | |
| © 2025 ELEMENT | | | V11.1 08/28/2023 | | |



7.4 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at 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 minimum permissible attenuation level of any spurious emission is $43 + 10 \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

ANSI C63.26-2015 – Section 5.7.4

Test Settings

- 1. Start frequency was set to 30MHz and stop frequency was set to 10GHz (separated into at least two plots per channel)
- 2. RBW ≥ 100kHz
- 3. VBW \geq 3 x RBW
- 4. Detector = RMS
- 5. Trace mode = max hold
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

Test Setup

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



Figure 7-3. Test Instrument & Measurement Setup

Test Notes

Per Part 22H and 90, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

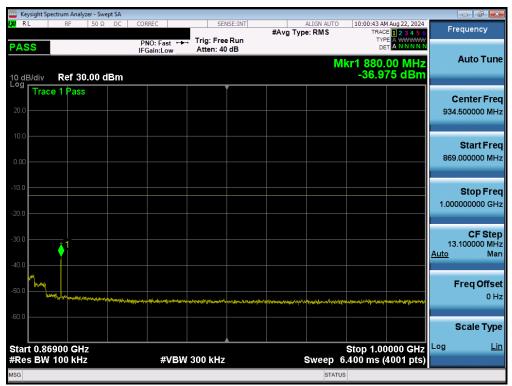
| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | | | |
|-------------------------|--------------------|----------------------|------------------|--|--|
| Test Report S/N: | Test Dates: | est Dates: EUT Type: | | | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 16 of 29 | | |
| © 2025 ELEMENT | • | · | V11.1 08/28/2023 | | |



UMTS Band 26

| | pectrum Analyz | | | | | | | | | | | _ | |
|------------------|--|----------------------------|--------------------------|--|-------------------------|-----------------------------|---------|-----------------------------|------------|-----------------|---|-------------|----------------------------|
| LXI RL | RF | 50 Ω | DC | CORREC | | SEI | ISE:INT | #Avg Typ | ALIGN AUTO | TRA | M Aug 22, 2024 | Fi | requency |
| PASS | | | | PNO: Fa | ast ↔→ .ow | Trig: Free Atten: 30 | | | | TY D | | | |
| 10 dB/div Log | Ref 20 | .00 dE | 3m | | | | | | Μ | kr1 858 -32. | .96 MHz 93 dBm | | Auto Tune |
| Tra | ce 1 Pass | | | | | | | | | | | (| Center Freq |
| 10.0 | | | | | | | | | | | | 444 | 4.500000 MHz |
| 0.00 | | | | | | | | | | | | | |
| | | | | | | | | | | | | 30 | Start Freq 0.000000 MHz |
| -10.0 | | | | | | | | | | | | 50 | 5.000000 WH2 |
| -20.0 | | | | | | | | | | | | | Stop Freq |
| -30.0 | | | | | | | | | | | 1, | 859 | 9.000000 MHz |
| -30.0 | | | | | | | | | | | → | | |
| -40.0 | | | | | | | | | | | | 82 | CF Step 2.900000 MHz |
| -50.0 | | | | | | | | | | | | <u>Auto</u> | Man |
| | | | | | | | | | | | | | Freq Offset |
| -60.0 | وي المراجع الم | and to be supported by the | | | | والمراجع والمراجع | | den til men med her med her | | | a ha an | | 0 Hz |
| -70.0 | | | and a state of the state | and a second | and set the left of the | ana felo de la casa de defe | | | | | | | |
| | | | | | | | | | | | | | Scale Type |
| Start 30. | | | | | 0.00144 | 200 1411- | | | | Stop 8 | 59.0 MHz | Log | <u>Lin</u> |
| #Res BV | V 100 kHz | | | # | ABM | 300 kHz | | S | weep 40 | | 20001 pts) | | |
| | | | _ | | | | | | 0 | | | | |

Plot 7-4. Conducted Spurious Plot – Low Channel (UMTS Band 26 - 5MHz)



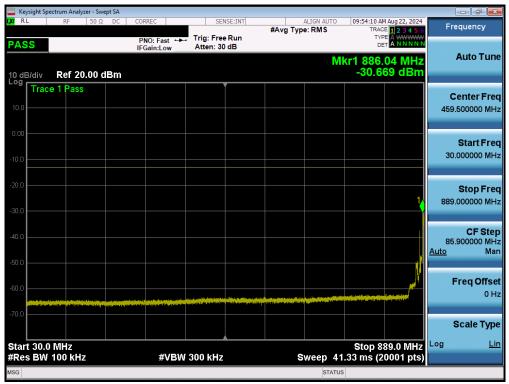
Plot 7-5. Conducted Spurious Plot – Low Channel (UMTS Band 26 - 5MHz)

| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | | | |
|-------------------------|--------------------|--------------------|------------------|--|--|
| Test Report S/N: | Test Dates: | EUT Type: | Dage 17 of 20 | | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 17 of 29 | | |
| © 2025 ELEMENT | · | | V11.1 08/28/2023 | | |



| | ectrum Analyz | er - Swep | ot SA | | | | | | | | | | |
|-----------------------|---------------|-----------|-------|---------------------|------|-------------------------|---------|----------|------------|-------------------------------|---------------------------|--------|-------------------|
| X/RL | RF | 50 Ω | DC | CORREC | | SEN | ISE:INT | #Avg Typ | ALIGN AUTO | TF | AM Aug 22, 2024 | Fr | equency |
| PASS | | | | PNO: Fa IFGain:L | ow | Trig: Free Atten: 40 | | | | | | | |
| 10 dB/div | Ref 30 | .00 d | Bm | | | | | | Ν | /kr1 9.7 -34. | 71 0 GHz 176 dBm | | Auto Tune |
| Log Trace | e 1 Pass | | | | | | | | | | | C | enter Fred |
| 20.0 | | | | | | | | | | | | 5.50 | 0000000 GH |
| 10.0 | | | | | | | | | | | | | |
| 0.00 | | | | | | | | | | | | 1.00 | Start Free |
| | | | | | | | | | | | | | |
| -10.0 | | | | | | | | | | | | 40.00 | Stop Fre |
| -20.0 | | | | | | | | | | | | 10.000 | J000000 GH |
| -30.0 | | | | | | | | | | | 1 | 000 | CF Ste |
| -40.0 | | | | ~~ | - | ~~~~ | | ~~~ | - | ~~~ | ~~~~~ | Auto | .000000 MH Mai |
| -40.0 | | | | | | | | | | | | | Freq Offse |
| -50.0 | | | | | | | | | | | | | 0 H |
| -60.0 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | Scale Type |
| Start 1.00 #Res BW | | | | # | ¢VB₩ | 3.0 MHz | | | weep | Stop [•] 15.60 ms | 10.000 GHz (18001 pts) | Log | Li |
| ASG | | | | | | | | | STA | | | | |

Plot 7-6. Conducted Spurious Plot – Low Channel (UMTS Band 26 - 5MHz)



Plot 7-7. Conducted Spurious Plot – High Channel (UMTS Band 26 - 5MHz)

| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | | | |
|-------------------------|--------------------|--------------------|------------------|--|--|
| Test Report S/N: | Test Dates: | ates: EUT Type: | | | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 18 of 29 | | |
| © 2025 ELEMENT | | | V11.1 08/28/2023 | | |



| | ctrum Analyze | | | | | | | | | | |
|------------------|---|---------|----------------------------------|--|---------------------------------------|----------------------------------|---|-------------------|---------------------------------------|-------------------|---------------------------|
| LXU RL | RF | 50 Ω DC | CORREC | SEI | NSE:INT | #Avg Typ | ALIGN AUTO | | Aug 22, 2024 | Fr | equency |
| PASS | | | PNO: Fast IFGain:Low | Atten: 30 | | | | TYP | | | |
| 10 dB/div Log | Ref 20. | 00 dBm | | | | | Mk | r1 899.0 -49.0 | 51 MHz 97 dBm | | Auto Tune |
| Trace | e 1 Pass | | | | | | | | | c | enter Freq |
| 10.0 | | | | | | | | | | 949 | .500000 MHz |
| 0.00 | | | | | | | | | | | |
| -10.0 | | | | | | | | | | 899 | Start Freq .000000 MHz |
| -10.0 | | | | | | | | | | | |
| -20.0 | | | | | | | | | | | Stop Freq |
| -30.0 | | | | | | | | | | 1.000 | 0000000 GHz |
| -40.0 | | | | | | | | | | | CF Step |
| 1 | | | | | | | | | | 10 <u>Auto</u> | .100000 MHz Man |
| -50.0 | | | | | | | | | | | |
| -60.0 | | | | | | | | | | 1 | Freq Offset 0 Hz |
| -70.0 | and the state of the | ******* | engenderspelaktion beinner Begel | and a second | ประวานสาราชาตุการจะ เ | had a construction of the second | and a state of the second s | harradhanathraith | ₽₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩ | | |
| | | | | | | | | | | | Scale Type |
| Start 0.89 | | | | | · · · · · · · · · · · · · · · · · · · | | | Stop 1.00 | 0000 GHz | Log | <u>Lin</u> |
| #Res BW | 100 KHz | | #V | BW 300 kHz | | | Sweep 4 | 1.800 ms (| 4001 pts) | | |
| Dem | | | | | | | STATU | 3 | | | |

Plot 7-8. Conducted Spurious Plot – High Channel (UMTS Band 26 - 5MHz)



Plot 7-9. Conducted Spurious Plot – High Channel (UMTS Band 26 - 5MHz)

| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | | | |
|-------------------------|--------------------|--------------------|------------------|--|--|
| Test Report S/N: | Test Dates: | EUT Type: | Page 19 of 29 | | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | | | |
| © 2025 ELEMENT | • | | V11.1 08/28/2023 | | |



7.5 Band Edge Emissions at Antenna Terminal

Test Overview

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

For B26 operation under Part 90.691, the minimum permissible attenuation level of any spurious emission removed from the EA licensee's frequency block by greater than 37.5 kHz is 43 + $10\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts. The minimum permissible attenuation level of any spurious emission removed from the EA licensee's frequency block by up to and including 37.5 kHz is 50 + $10\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

ANSI C63.26-2015 - Section 5.7.3

Test Settings

- 1. Span was set large enough so as to capture all out of band emissions near the band edge
- 2. RBW = 100 kHz
- 3. VBW = 300 kHz
- 4. Detector = RMS
- 5. Trace mode = trace average
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

Test Setup

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



Figure 7-4. Test Instrument & Measurement Setup

Test Notes

- 1. For channel edge emission, the signal analyzer's "ACP" measurement capability is used.
- 2. Per KDB 971168 D02 VIII)c), an RBW = 300Hz was used for measurements within 37.5kHz from the band edge. For offsets greater than 37.5kHz from the band edge, an RBW = 100kHz was used

| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | | |
|-------------------------|--------------------|--------------------|------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | Dama 20 of 20 | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 20 of 29 | |
| © 2025 ELEMENT | | • | V11.1 08/28/2023 | |



UMTS Band 26

| 🔤 Keysight Spectrum Ai | nalyzer - ACP | | | | | | | | | | | | |
|------------------------|---------------|-------------------|----------|--|--|---|--------|-------------------|--------|-----------|--------------|-------------|-------------------------|
| LXIRL RF | <u>50 Ω</u> | DC | CORREC | | | NSE:INT reg: 861.4000 | 00 MH- | ALIGN AUT | | :45:55 AM | Aug 22, 2024 | F | requency |
| | | | | | Trig: Free | | | d: 100/100 | | 10 310.1 | NOTIE | | |
| PASS | | | IFGain:L | ow 🕴 | #Atten: 3 | 6 dB | | | Rad | dio Devic | e: BTS | | |
| | | | | | | | | | | | | | |
| 10 dB/div R | ef 30.00 | l dBm | | | | | | | | | | | |
| Log | | | 11 | | | | | 1 1 | | | | | |
| 20.0 | | | | | 20.9 | dBm | | - | | | | | Center Freq |
| 10.0 | | | i | | | | | * | | | | 86 | 1.400000 MHz |
| 0.00 | | | | and the second s | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | hand the manual of the second s | | | | | | | |
| -10.0 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| -20.0 | | | - i (| | | | | | | | | | |
| -30.0 | | | | | | | | | | | RMS AVG | | |
| -40.0 | | فيستجهلون ويتريده | | | | | | The second second | | | mannet | | |
| -50.0 | | | | | | | | | | | <u>\</u> | | |
| -60.0 | | | | | | | | | | | | | |
| -00.0 | | | | | | | | | | | | | |
| Center 861.400 | MHz | | | | | | | | S | pan 12 | .50 MHz | | CE Oton |
| #Res BW 100 | kHz | | | | #VE | 300 k | Hz | | | | o 20 ms | | CF Step 1.250000 MHz |
| Total Carrier Po | ower | 20.868 | dBm/ 5.0 | 0 MHz | | ACP-I | BW | | | | | <u>Auto</u> | Man |
| | | | | | | | | wer | U | oper | | | |
| Carrier Power | | | Filter | Offset | Freq | Integ BW | dBc | dBm | dBc | dBm | Filter | | Freq Offset |
| 1 20.868 dB | m/ 5.000 | MHz | -3 dB | 0.0 |) Hz | 37.50 kHz | -61.13 | -40.27 | -61.17 | -40.30 | -3 dB | | 0 Hz |
| | | | | 37.50 | kHz | 100.0 kHz | -56.90 | -36.03 | -57.11 | -36.24 | -3 dB | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| MSG | | | | | | | | ST/ | ATUS | | | | |

Plot 7-10. Channel Edge Plot – Low Channel (UMTS Band 26 - 5MHz)



Plot 7-11. Channel Edge Plot – High Channel (UMTS Band 26 - 5MHz)

| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | | | |
|-------------------------|--------------------|--------------------|------------------|--|--|
| Test Report S/N: | Test Dates: | EUT Type: | Da 04 | | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 21 of 29 | | |
| © 2025 ELEMENT | | · | V11 1 08/28/2023 | | |



7.6 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the field strength conversion method described in ANSI C63.26-2015 with the EUT transmitting into an external antenna. Measurements on signals operating below 1GHz are performed using hybrid (biconical/log) antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26-2015 - Section 5.5.4

Test Settings

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

| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | Approved by: Technical Manager | | | | |
|---------------------------------|--------------------|--------------------|-----------------------------------|--|--|--|--|
| Test Report S/N: | Test Dates: | EUT Type: | Page 22 of 29 | | | | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | | | | | |
| 0 2025 ELEMENT V11.1 08/28/2023 | | | | | | | |

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



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

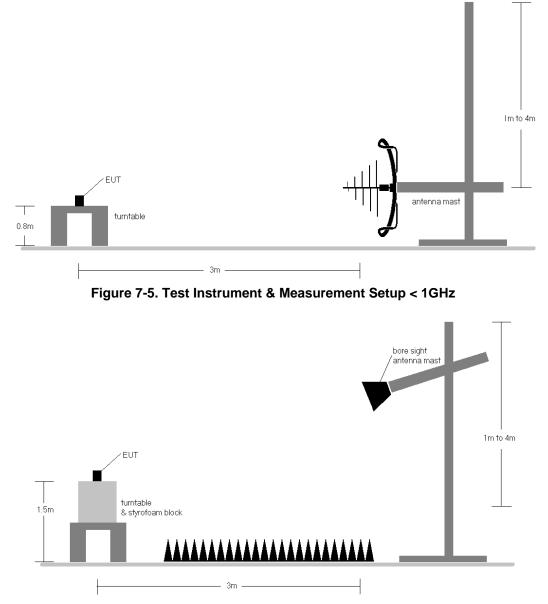


Figure 7-6. Test Instrument & Measurement Setup >1 GHz

| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | | | |
|-------------------------|--------------------|--------------------|------------------|--|--|
| Test Report S/N: | Test Dates: | EUT Type: | Dama 00 of 00 | | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 23 of 29 | | |
| © 2025 ELEMENT | · · · · · | · | V11.1 08/28/2023 | | |



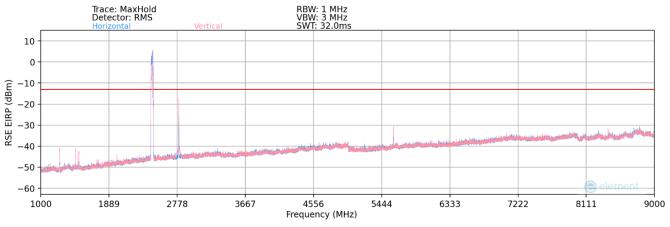
Test Notes

- 1) Field strengths are calculated using the Measurement quantity conversions in ANSI C63.26-2015 Section 5.2.7:
 - a) $E(dB\mu V/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m) b) EIRP (dBm) = E(dB\mu V/m) + 20logD 104.8; where D is the measurement distance in meters.$
- 2) This unit was tested while powered by a 12VDC power supply.
- 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) This unit has a WLAN Transmitter.

| FCC ID: 2A93U-55041-402 | | Approved by: Technical Manager | |
|-------------------------|--------------------|-----------------------------------|------------------|
| Test Report S/N: | Test Dates: | EUT Type: | Dage 24 of 20 |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 24 of 29 |
| © 2025 ELEMENT | | · | V11.1 08/28/2023 |



UMTS Band 26





| | 5 | | | | | | | |
|--------------------|---------------------------|---|--|---|--|--|---|--|
| | 861.4 | | | | | | | |
| 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] |
| V | 134 | 294 | -71.49 | 0.49 | 36.00 | -59.26 | -13.00 | -46.26 |
| V | - | - | -76.86 | 4.16 | 34.30 | -60.96 | -13.00 | -47.96 |
| V | - | - | -77.98 | 6.96 | 35.98 | -59.28 | -13.00 | -46.28 |
| V | - | - | -77.47 | 8.04 | 37.57 | -57.68 | -13.00 | -44.68 |
| | [H/V] V V V V | 861.4 Ant. Pol. [H/V] Antenna Height [cm] V 134 V - V - V - V - V - V - | 861.4 Ant. Pol. [H/V] Antenna Height [cm] Turntable Azimuth [degree] V 134 294 V - - V - - V - - V - - V - - V - - | 861.4 Ant. Pol. [H/V] Antenna Height [cm] Turntable Azimuth [degree] Analyzer Level [dBm] V 134 294 -71.49 V - - -76.86 V - - -77.98 V - - -77.47 | 861.4 Ant. Pol. [H/V] Antenna Height [cm] Turntable Azimuth [degree] Analyzer Level [dBm] AFCL [dB/m] V 134 294 -71.49 0.49 V - - -76.86 4.16 V - - -77.98 6.96 V - - -77.47 8.04 | 861.4 Ant. Pol. [H/V] Antenna Height [cm] Turntable Azimuth [degree] Analyzer Level [dBm] AFCL [dB/m] Field Strength [dBµV/m] V 134 294 -71.49 0.49 36.00 V - - -76.86 4.16 34.30 V - - -77.98 6.96 35.98 V - - -77.47 8.04 37.57 | 861.4 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] V 134 294 -71.49 0.49 36.00 -59.26 V - - -76.86 4.16 34.30 -60.96 V - - -77.98 6.96 35.98 -59.28 V - - -77.47 8.04 37.57 -57.68 | 861.4 Ant. Pol. [H/V] Antenna Height [cm] Turntable Azimuth [degree] Analyzer Level [dBm] AFCL [dB/m] Field Strength [dB/m] EIRP Spurious Emission Level [dBm] Limit [dBm] V 134 294 -71.49 0.49 36.00 -59.26 -13.00 V - - -76.86 4.16 34.30 -60.96 -13.00 V - - -77.98 6.96 35.98 -59.28 -13.00 V - - -77.47 8.04 37.57 -57.68 -13.00 |

Table 7-3. Radiated Spurious Data (UMTS Band 26 – Low Channel)

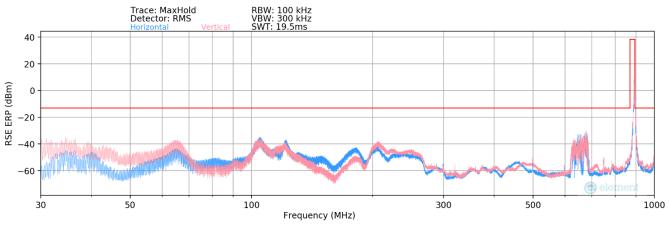
| Bandwidth (MHz): | | 5 | | | | | | | |
|------------------|--------------------|------------------------|----------------------------------|----------------------------|----------------|-------------------------------|--|----------------|----------------|
| Frequency (MHz): | | 891.6 | | | | | | | |
| 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] |
| 1783.20 | V | 220 | 81 | -62.61 | 0.29 | 44.68 | -50.58 | -13.00 | -37.58 |
| 2674.80 | V | 220 | 81 | -57.48 | 4.58 | 54.10 | -41.16 | -13.00 | -28.16 |
| 3566.40 | V | - | - | -77.82 | 6.89 | 36.07 | -59.19 | -13.00 | -46.19 |
| 4458.00 | V | - | - | -77.59 | 8.77 | 38.18 | -57.07 | -13.00 | -44.07 |
| 5349.60 | V | - | - | -79.02 | 10.95 | 38.93 | -56.33 | -13.00 | -43.33 |

Table 7-4. Radiated Spurious Data (UMTS Band 26 – High Channel)

| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | | | |
|-------------------------|--------------------|--------------------|------------------|--|--|
| Test Report S/N: | Test Dates: | EUT Type: | Dage 25 of 20 | | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 25 of 29 | | |
| © 2025 ELEMENT | | · | V11.1 08/28/2023 | | |



UMTS Band 26





| Bandwidth (MHz): Frequency (MHz): | | 5 | | | | | | | |
|--------------------------------------|--------------------|------------------------|----------------------------------|----------------------------|----------------|-------------------------------|---|----------------|----------------|
| Frequency [MHz] | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Field Strength [dBµV/m] | ERP Spurious Emission Level [dBm] | Limit [dBm] | Margin [dB] |
| 104.00 | V | 250 | 0 | -35.47 | -13.52 | 58.01 | -39.40 | -13.00 | -26.40 |
| 299.00 | V | 250 | 67 | -61.31 | -11.19 | 34.50 | -62.90 | -13.00 | -49.90 |
| 498.00 | V | 250 | 67 | -72.07 | -6.82 | 28.11 | -69.30 | -13.00 | -56.30 |
| 622.00 | V | 250 | 67 | -72.81 | -4.77 | 29.42 | -67.99 | -13.00 | -54.99 |
| 748.00 | V | 250 | 67 | -72.55 | -2.70 | 31.75 | -65.65 | -13.00 | -52.65 |

Table 7-5. Radiated Spurious Data (UMTS Band 26 - High Channel)

| FCC ID: 2A93U-55041-402 | | Approved by: Technical Manager | |
|-------------------------|--------------------|-----------------------------------|------------------|
| Test Report S/N: | Test Dates: | EUT Type: | Dage 26 of 20 |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 26 of 29 |
| © 2025 ELEMENT | • | · | V11.1 08/28/2023 |



7.7 Frequency Stability / Temperature Variation

Test Overview and Limit

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

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

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

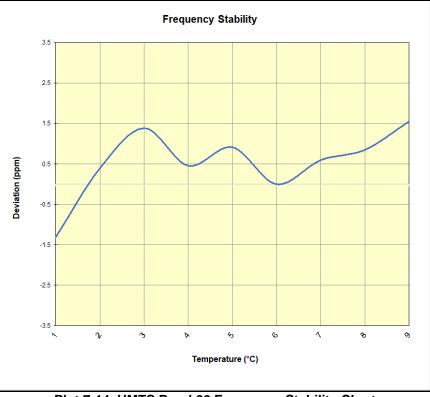
| FCC ID: 2A93U-55041-402 | | MEASUREMENT REPORT | | | |
|-------------------------|--------------------|--------------------|------------------|--|--|
| Test Report S/N: | Test Dates: | EUT Type: | Page 27 of 29 | | |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Fage 27 01 29 | | |
| © 2025 ELEMENT | | | V11.1 08/28/2023 | | |



Frequency Stability / Temperature Variation

| UMTS Band 26 | | | | | | | |
|--------------|-------------|-----------------|-------------------|--------------------|------------------|--|--|
| | Operating F | Frequency (Hz): | 861,40 | 00,000 | | | |
| | Ref. | Voltage (VDC): | 1 | 2 | | | |
| | | | | | | | |
| Voltage (%) | Power (VDC) | Temp (°C) | Frequency (Hz) | Freq. Dev. (Hz) | Deviation (%) | | |
| | | - 30 | 861,430,251 | -1,135 | -0.0001318 | | |
| | | - 20 | 861,431,724 | 338 | 0.0000392 | | |
| | | - 10 | 861,432,583 | 1,197 | 0.0001390 | | |
| | | 0 | 861,431,780 | 394 | 0.0000457 | | |
| 100 % | 12 | + 10 | 861,432,177 | 791 | 0.0000918 | | |
| | | + 20 (Ref) | 861,431,386 | 0 | 0.0000000 | | |
| | | + 30 | 861,431,901 | 515 | 0.0000598 | | |
| | | + 40 | 861,432,119 | 733 | 0.0000851 | | |
| | | + 50 | 861,432,727 | 1,341 | 0.0001557 | | |

Table 7-6. UMTS Band 26 Frequency Stability Data



Plot 7-14. UMTS Band 26 Frequency Stability Chart

| FCC ID: 2A93U-55041-402 | | Approved by: Technical Manager | |
|-------------------------|--------------------|-----------------------------------|------------------|
| Test Report S/N: | Test Dates: | EUT Type: | Dage 29 of 20 |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 28 of 29 |
| © 2025 ELEMENT | <u>.</u> | | V11.1 08/28/2023 |



8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Centum Geolocation System FCC ID: 2A93U-55041-402** complies with all the requirements of Parts 22(H) and 90 of the FCC rules.

| FCC ID: 2A93U-55041-402 | | Approved by: Technical Manager | |
|-------------------------|--------------------|-----------------------------------|------------------|
| Test Report S/N: | Test Dates: | EUT Type: | Dage 20 of 20 |
| 1M2407310061-04.2A93U | 08/14 - 08/27/2024 | Geolocation System | Page 29 of 29 |
| © 2025 ELEMENT | | • | V11.1 08/28/2023 |