ELEMENT WASHINGTON DC LLC
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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:	Class II Permissive Change
Model:	Lifeseeker Mini S10
EUT Type:	Geolocation System
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part:	§22(H), §90(S)
Test Procedure(s):	ANSI C63.26-2015
Class II Permissive Change:	Adding additional 2G/3G bands and modes of operation
Original Grant Date:	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

ACCREDITED
CERT #2041.01

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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

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.

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.

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:

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

And

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

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

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

4.0 MEASUREMENT UNCERTAINTY

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

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

5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	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.

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.

7.0 TEST RESULTS

7.1 Summary

Company Name: Centum Research & Technology S.L

FCC ID: 2A93U-55041-402

FCC Classification: PCS Licensed Transmitter (PCB)

Mode(s): UMTS

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	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
	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 7.3
	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.
4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is EMC Software Tool v1.2.2.

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 ≥ 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.

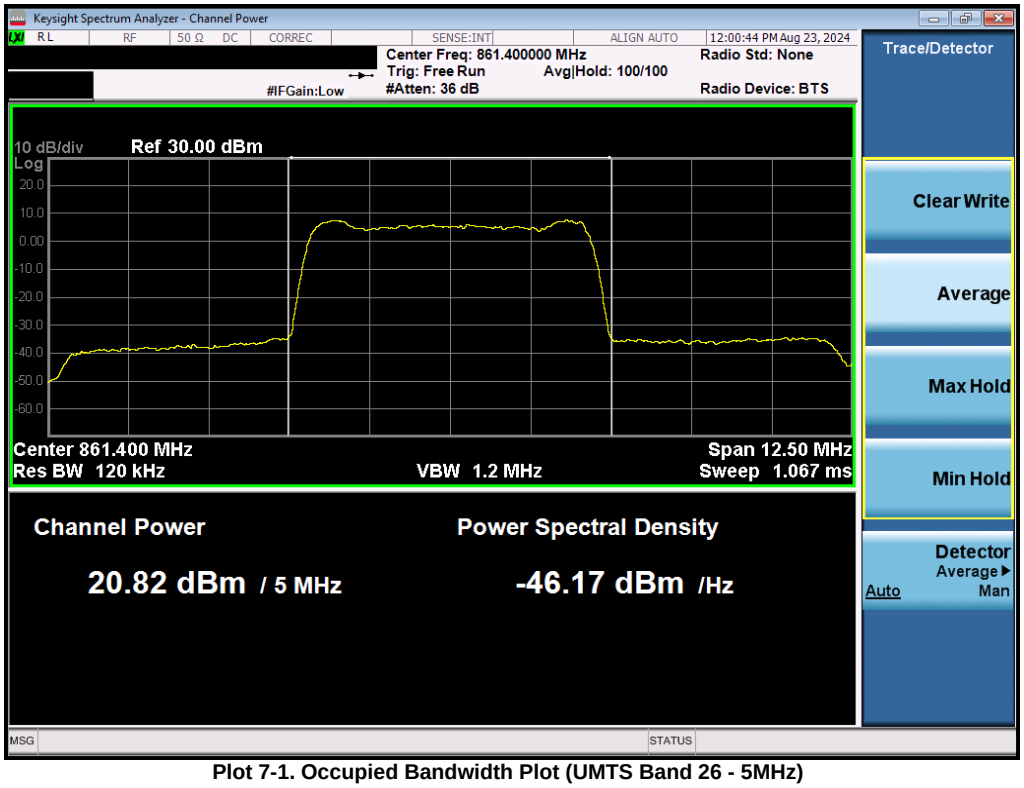
Figure 7-1. Test Instrument & Measurement Setup

Test Notes

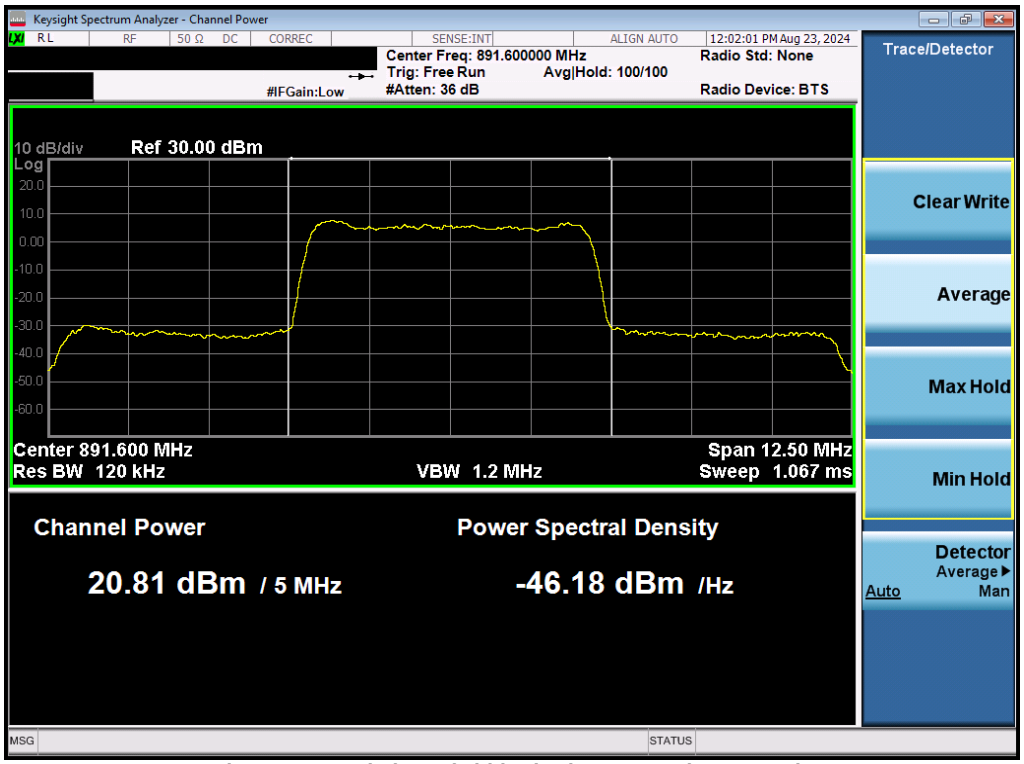
None.

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)



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



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

7.3 Occupied Bandwidth

Test Overview

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

Test Procedure Used

ANSI C63.26-2015 – Section 5.4.4

Test Settings

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

Test Setup

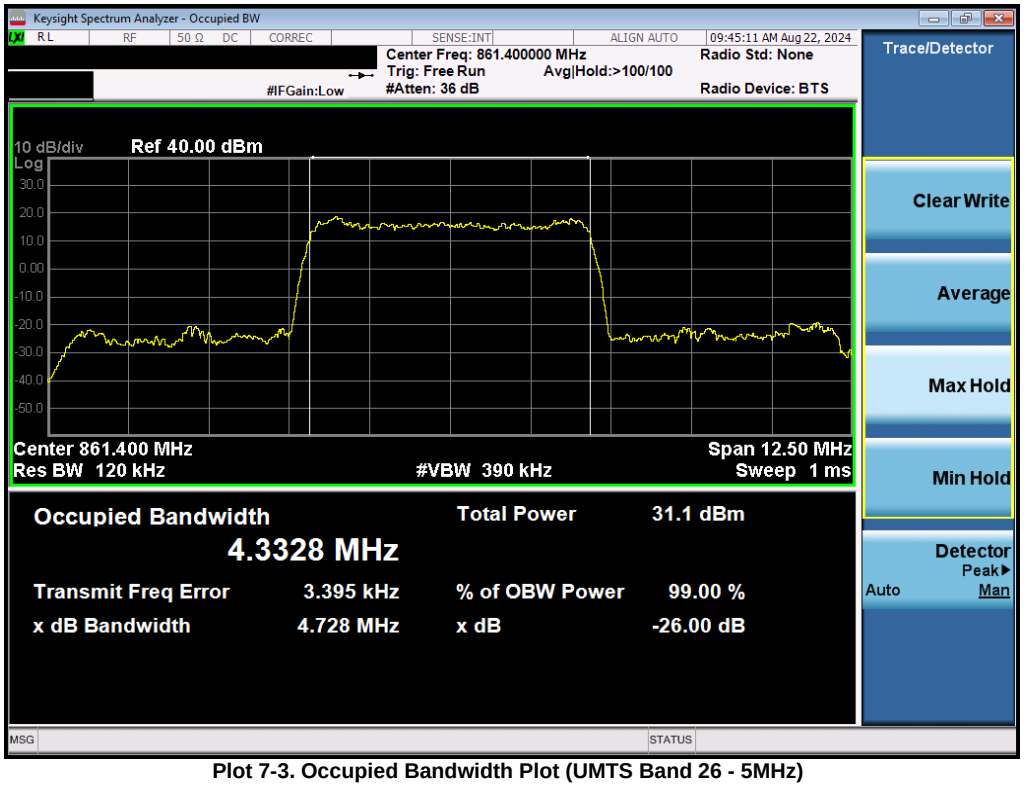
The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-2. Test Instrument & Measurement Setup

Test Notes

None

UMTS Band 26



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

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 ≥ 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

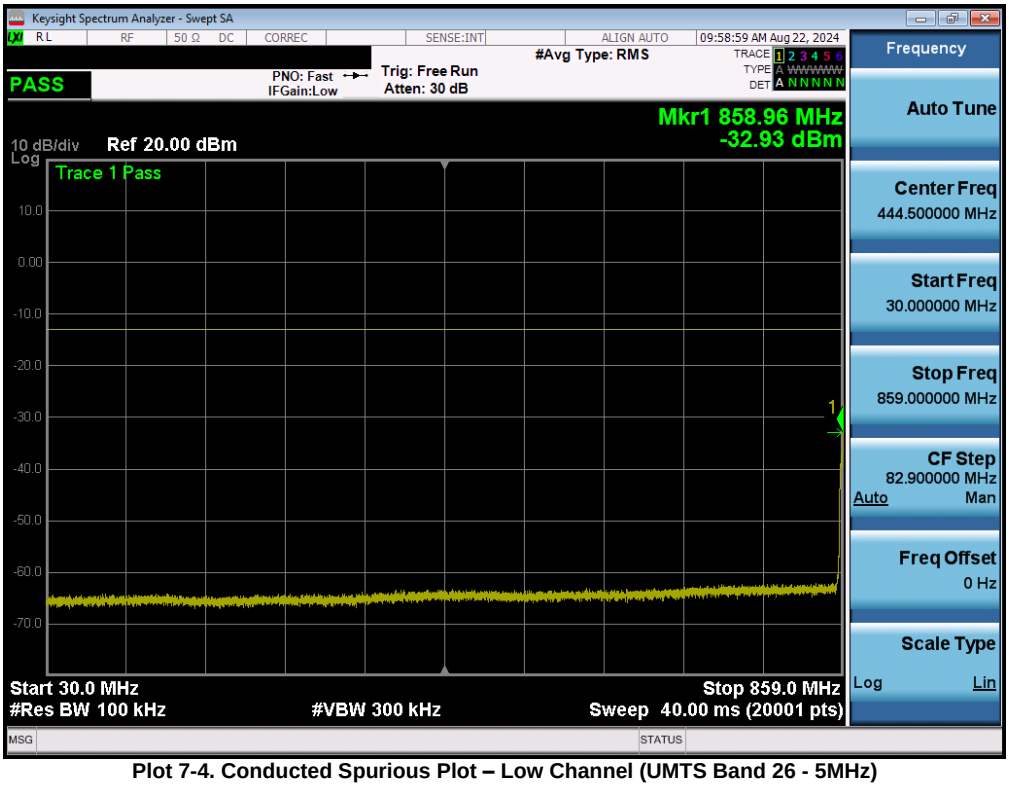
The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-3. Test Instrument & Measurement Setup

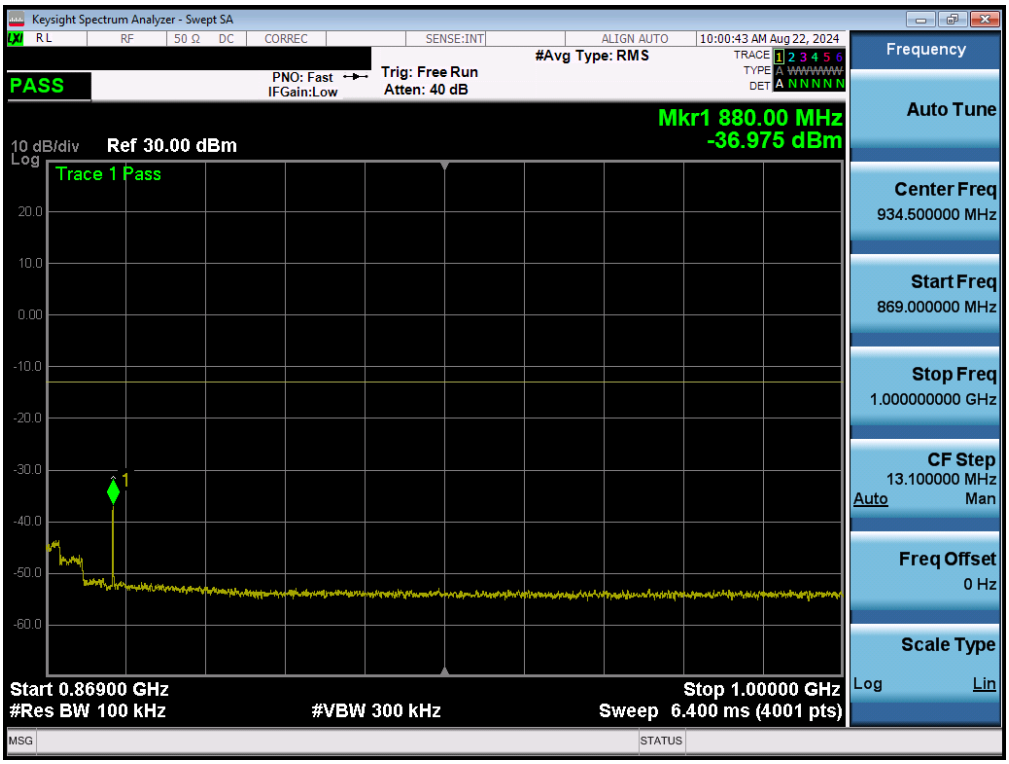
Test Notes

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.

UMTS Band 26

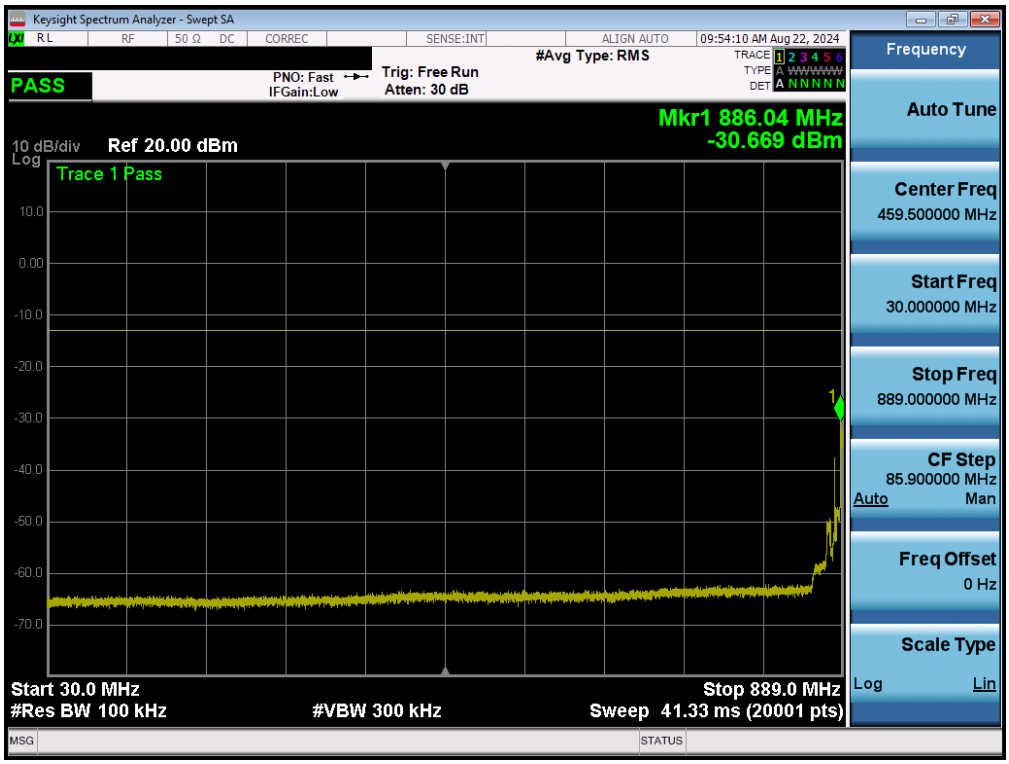


Plot 7-4. Conducted Spurious Plot – Low Channel (UMTS Band 26 - 5MHz)

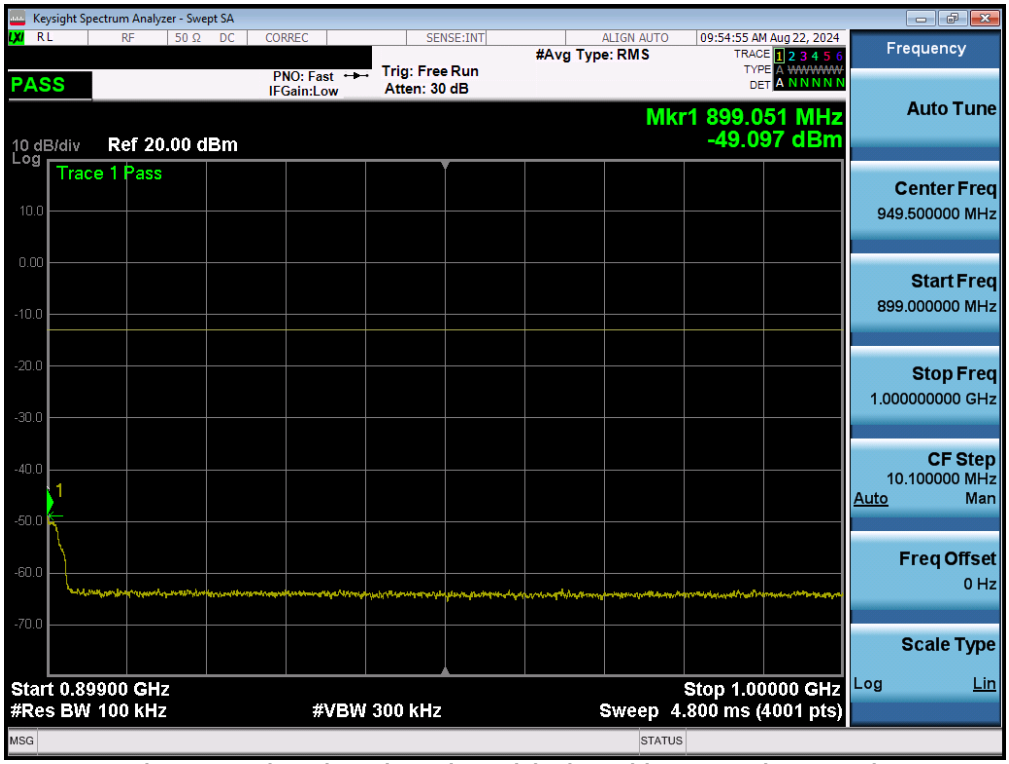


Plot 7-5. Conducted Spurious Plot – Low Channel (UMTS Band 26 - 5MHz)

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



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



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

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

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 + 10log$_{10}$(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 + 10log$_{10}$(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.

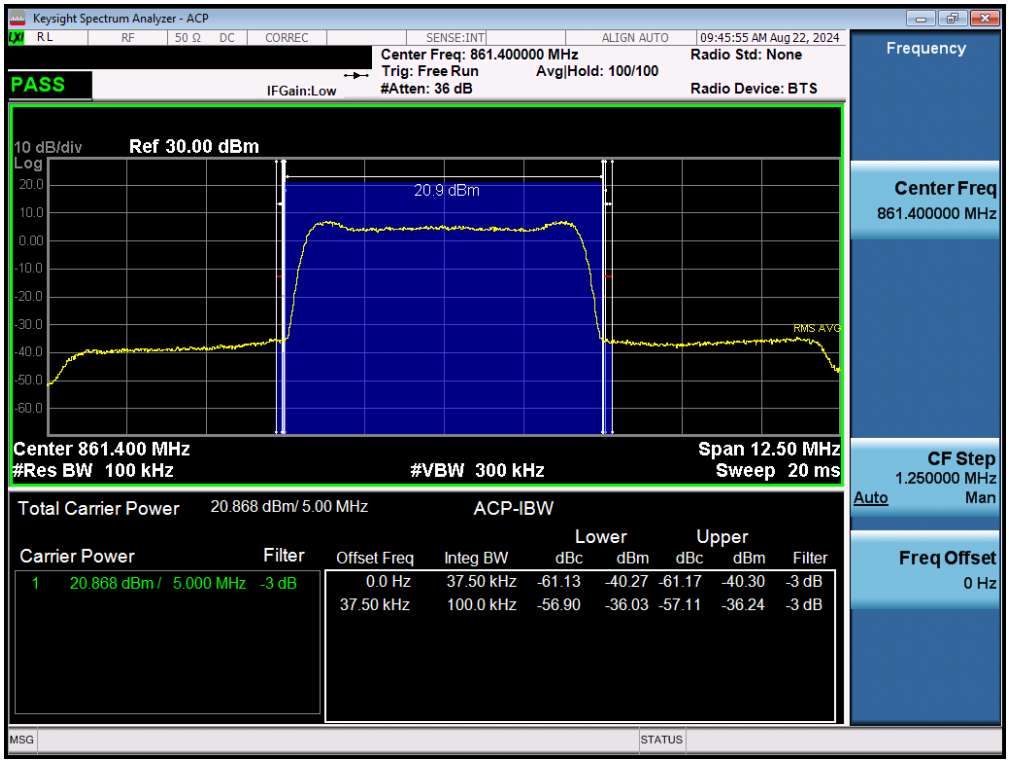
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

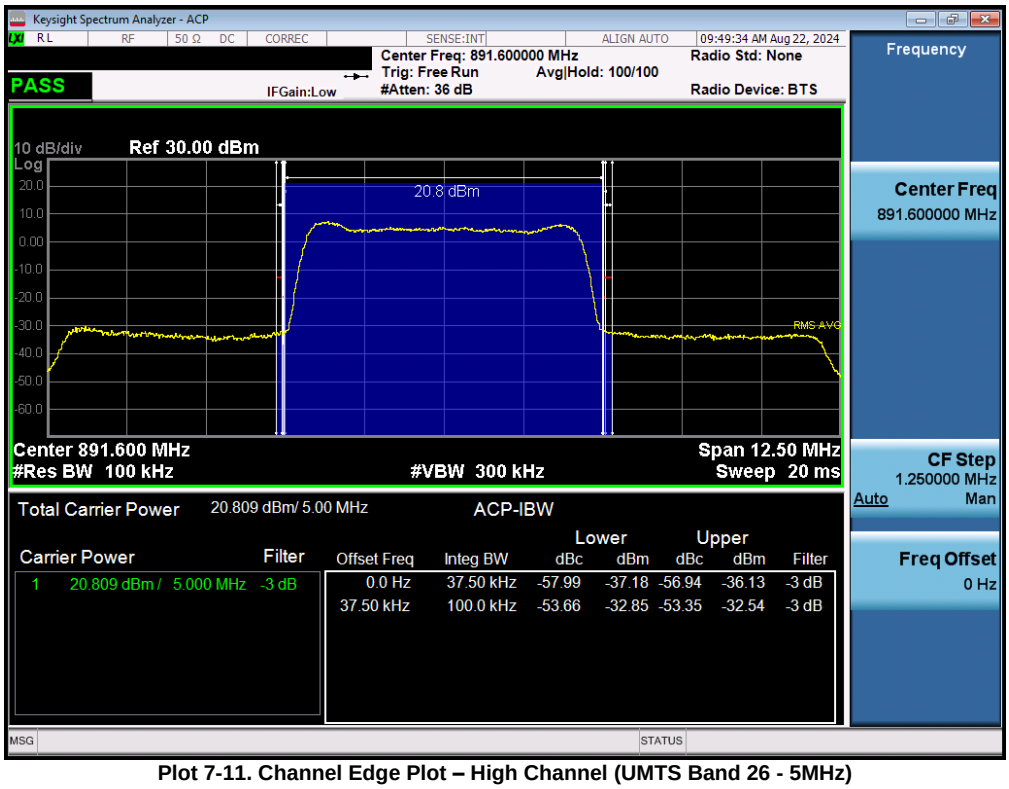
1. For channel edge emission, the signal analyzer's "ACP" measurement capability is used.

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

UMTS Band 26



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



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

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 ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

Test Setup

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

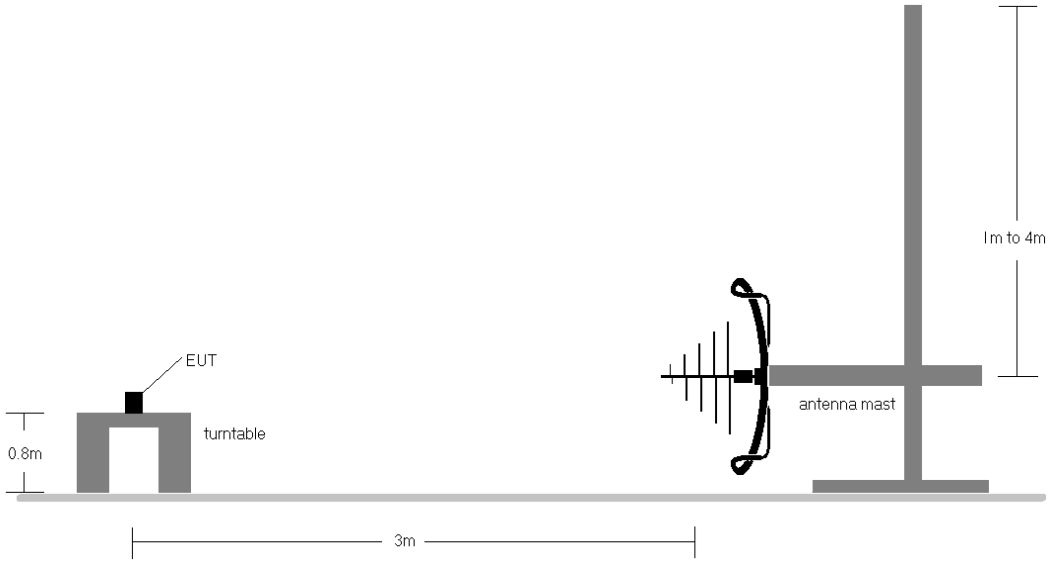


Figure 7-5. Test Instrument & Measurement Setup < 1GHz

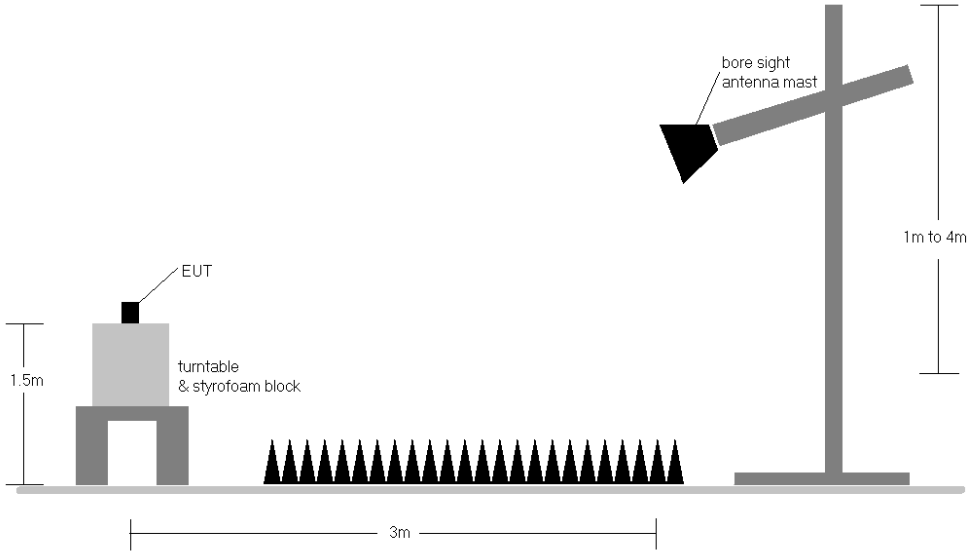


Figure 7-6. Test Instrument & Measurement Setup >1 GHz

Test Notes

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

2) This unit was tested while powered by a 12VDC power supply.

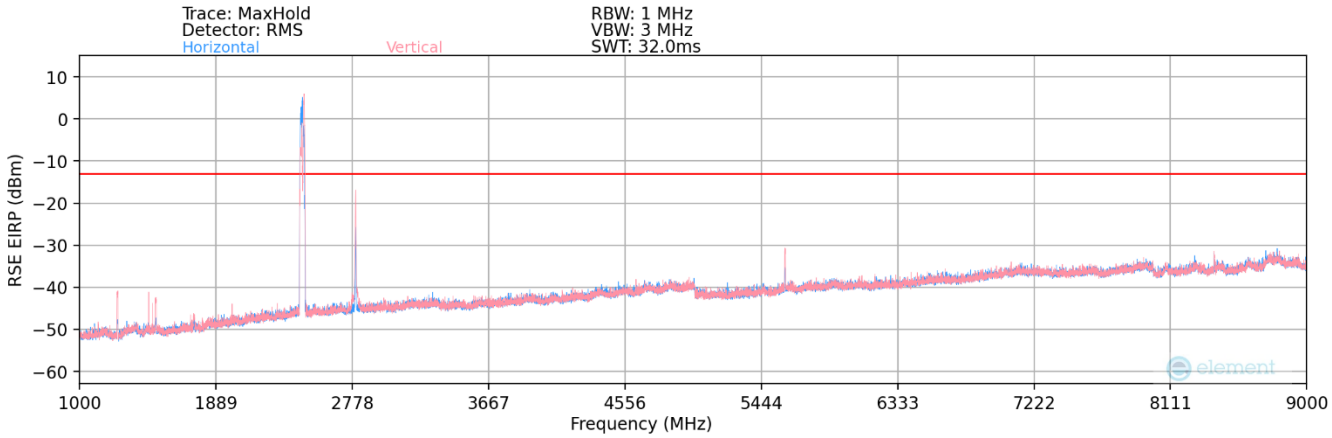
3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

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.

UMTS Band 26



Plot 7-12. Radiated Spurious Plot (UMTS Band 26) – Above 1GHz

Bandwidth (MHz):	5
Frequency (MHz):	861.4

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]
1722.80	V	134	294	-71.49	0.49	36.00	-59.26	-13.00	-46.26
2584.20	V	-	-	-76.86	4.16	34.30	-60.96	-13.00	-47.96
3445.60	V	-	-	-77.98	6.96	35.98	-59.28	-13.00	-46.28
4307.00	V	-	-	-77.47	8.04	37.57	-57.68	-13.00	-44.68

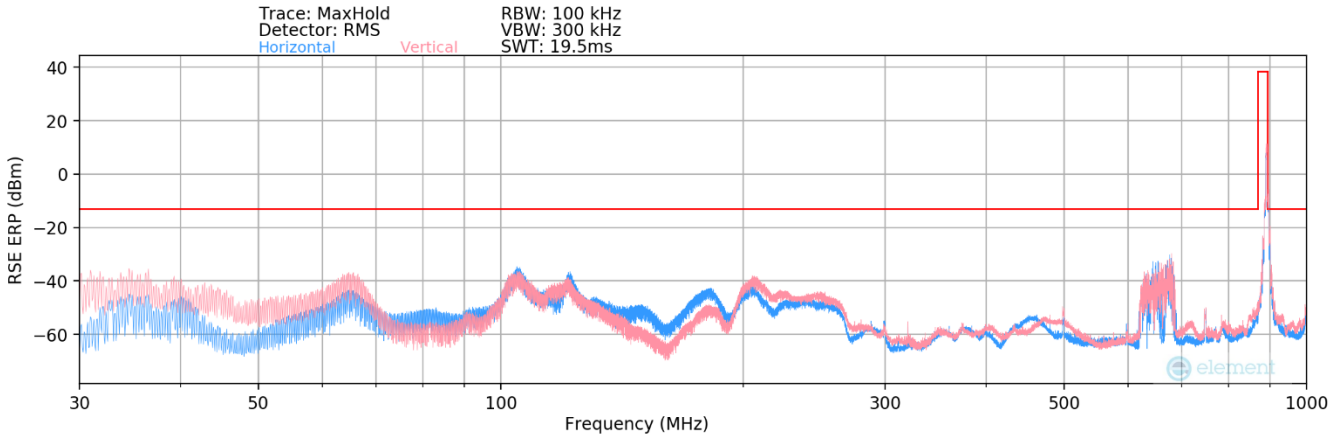
Table 7-3. Radiated Spurious Data (UMTS Band 26 – Low Channel)

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)

UMTS Band 26



Plot 7-13. Radiated Spurious Plot (UMTS Band 26) – Below 1GHz

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]	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)

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 ±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

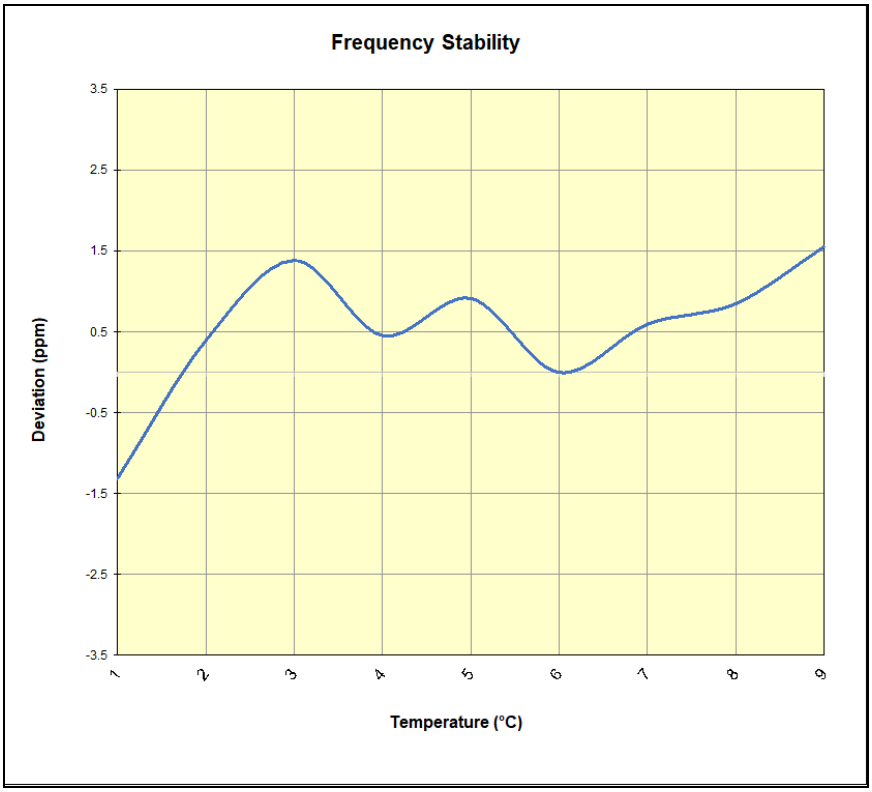
None

Frequency Stability / Temperature Variation

UMTS Band 26	
Operating Frequency (Hz):	861,400,000
Ref. Voltage (VDC):	12

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	12	- 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
		+ 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

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.