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

RF EXPOSURE EVALUATION
Maximum Permissible Exposure (MPE)

Applicant Name:
Centum research & technology S.L.
Fontes das Abelleiras s/n Edificio Citexvi
Vigo, Spain 36310

Date of Testing:
06/26/2024
Test Report Issue Date:
11/22/2024
Test Site/Location:
Element lab., Columbia, MD, USA
Test Report Serial No.:
1M2402290014-05.2A93U

FCC ID:	**2A93U-58450**
APPLICANT:	**Centum research & technology S.L.**

EUT Type:	Geolocation System
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part:	FCC Part 1 (§1.1310) and Part 2 (§2.1091)
Test Procedure(s):	KDB 447498 D01 v06

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 FCC KDB 447498 D01. 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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1.0 RF EXPOSURE EVALUATION – MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 Introduction

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC Rules.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits For Occupational / Control Exposures (f = frequency)				
30-300	61.4	0.163	1.0	6
300-1500	…	…	f/300	6
1500-100,000	…	…	5.0	6
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
30-300	27.5	0.073	0.2	30
300-1500	…	…	f/1500	30
1500-100,000	…	…	1.0	30

Table 1-1. Limits for Maximum Permissible Exposure (MPE)

1.2 EUT Description

The EUT is a device containing an RF transmitter whose antenna is mounted to the underside of a helicopter. Due to its installation and usage, a distance greater than 20cm will be maintained between the antenna of the device and any nearby user. Also, the antenna will be connected to the radio transmitter via a cable of fixed length, as declared by the manufacturer. The loss of that cable is included in the MPE analysis to assess compliance.

1.3 Procedure

The procedure used to determine the RF power density was based upon a calculation for determining compliance with the MPE requirements. The power generated by each transmitter used in this product was initially measured by a power meter or spectrum analyzer and the powers were recorded. Through use of the Friis transmission formula and knowledge of the maximum antenna gain to be used, the power density level is calculated at a distance of 20cm.

Friis Transmission Formula

Friis transmission formula: $P_d = (P_{out}*G) / (4\pi r^2)$

Where,

P_d = Power Density (mW/cm^2) $\pi = 3.1416$
P_{out} = output power to antenna (mW) r = distance between observation point and center of the radiator (cm)
G = gain of antenna in linear scale

Calculated MPE

The power density limit for General Population/Uncontrolled Exposure at each frequency is determined based on the information in Table 1-1.

Frequency Range (MHz)	Band Designation	Maximum Conducted Power (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Adjusted Antenna Gain (dBi)	EIRP (dBm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
869 - 894	LTE B26/5	35.00	5.00	6.02	-1.02	33.98	0.497	0.579
1850 - 1995	LTE B25/2	34.00	6.00	9.90	-3.90	30.10	0.204	1.000
729 - 746	LTE B12	16.00	5.00	6.02	-1.02	14.98	0.006	0.486
746 - 756	LTE B13	35.00	5.00	6.02	-1.02	33.98	0.497	0.499
2110 - 2180	LTE B66/4	31.00	6.00	9.90	-3.90	27.10	0.102	1.000
869 - 894	GSM850	35.00	5.00	6.02	-1.02	33.98	0.497	0.579
1850 - 1990	GSM1900	34.00	6.00	9.90	-3.90	30.10	0.204	1.000
729 - 746	UMTS B12	10.00	5.00	6.02	-1.02	8.98	0.002	0.486
746 - 756	UMTS B13	34.00	5.00	6.02	-1.02	32.98	0.395	0.497
869 - 894	UMTS 850	34.50	5.00	6.02	-1.02	33.48	0.443	0.579
2110 - 2155	UMTS 1700	32.00	6.00	9.90	-3.90	28.10	0.128	1.000
1850 - 1990	UMTS 1900	35.00	6.00	9.90	-3.90	31.10	0.256	1.000

Table 1-2. Calculated MPE Data for Cellular Band at 20cm Distance

Note(s):

1. The maximum conducted power shown in the table above accounts for the target power plus additional manufacturing tolerances.
2. The Adjusted Antenna Gain is the effective antenna gain when considering the loss of the cable that will be used in the installation of this transmitter.

2.0 CONCLUSION

The device meets the mobile RF exposure limit at a 20cm separation distance as specified in §2.1091 of the FCC Rules and Regulations. An appropriate RF exposure compliance statement will be placed in the user's manual.