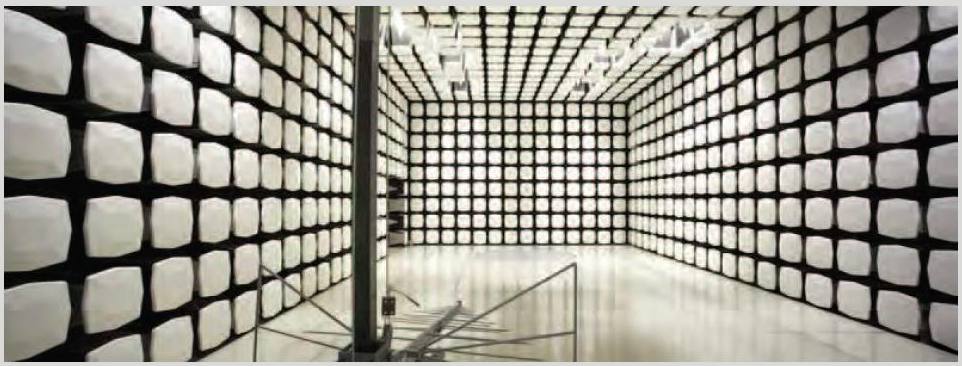
Ergotron

CareFit Pro

FCC 2.1093:2020

802.11 Radio

Report: ERGT0124.3



NVLAP Lab Code: 200630

CERTIFICATE OF EVALUATION

Last Date of Evaluation: Thursday, April 16, 2020
Ergotron
EUT: CareFit Pro

RF Exposure Evaluation

Standards

Specification	Method
FCC 2.1093:2020	FCC 447498 D01 General RF Exposure Guidance v06

Results

Method Clause	Description	Applied	Results	Comments
4.3.1	SAR Test Exclusion	Yes	Pass	

Deviations From Evaluation Standards

None

Approved By:

Donald Facteau, Process Architect

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

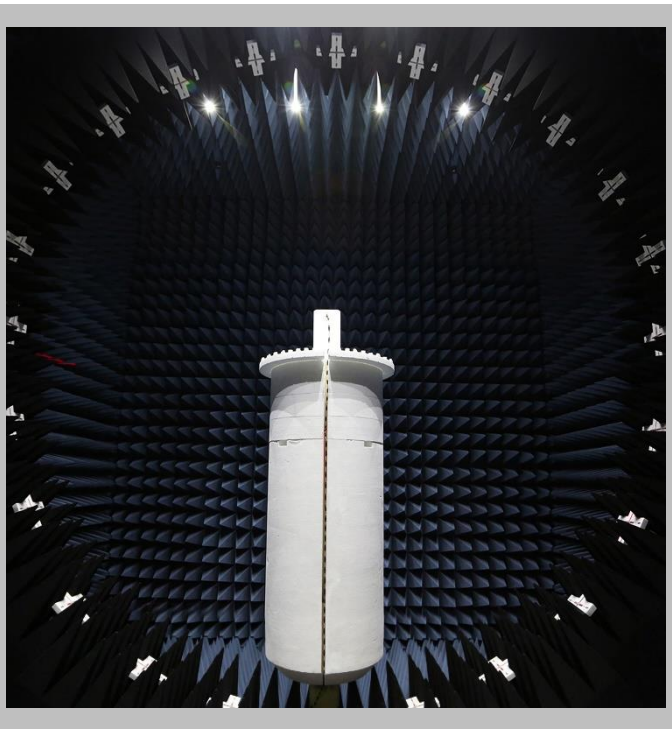
MIC – Recognized by MIC as a CAB for the acceptance of test data.

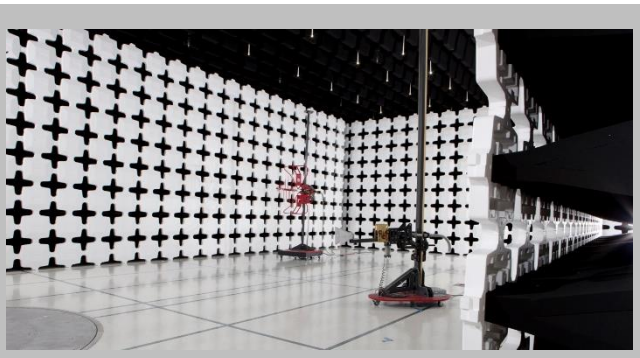
SCOPE

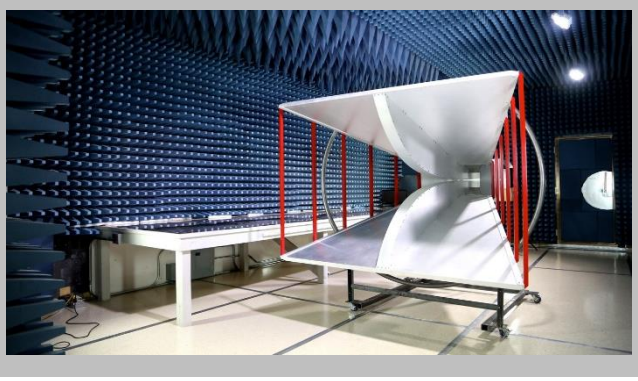
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California	Minnesota	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157







PRODUCT DESCRIPTION

Client and Equipment Under Evaluation Information

Company Name:	Ergotron
Address:	1181 Trapp Road
City, State, Zip:	SAINT PAUL, MN 55121
Evaluation Requested By:	Jay Sorlie
EUT:	CareFit Pro
Date of Evaluation:	Thursday, April 16, 2020

Information Provided by the Party Requesting the Evaluation

Functional Description of the Equipment:
The device is part of the powered Point-of-Care Medical Cart line focusing on workflow optimization and incorporating new features and expanding/improving upon beloved aspects of the previous generations. WIFI connectivity allows monitoring of status of fleet from an online portal, over the air updates, & service monitoring programs to minimize downtime and enhance service response. The 802.11 radio is certified under FCC ID: 2AVU2-C52XXXX1.

Objective:
To demonstrate compliance with FCC RF exposure requirements for 2.1093 portable devices.

RF Exposure Condition

The following RF Exposure conditions were used for the assessment documented in this report:	
Intended Use	Portable
Location on Body (if applicable)	Head/Torso
How is the Device Used	The product is meant to be a documentation cart as the primary function. Medication administration/storage is secondary, and this cart will focus on storage for 4-6 patients.
Radios Contained in the Same Host Device	802.11
Simultaneous Transmitting Radios	None
Body Worn Accessories	N/A
Environment	General Population/Uncontrolled Exposure

SAR TEST EXCLUSION

element
EXRPT.2019.10.07

OVERVIEW

Human exposure to RF emissions from portable devices (47 CFR §2.1093) used with the radiating antenna closer than 20 cm to the user requires Specific Absorption Rate (SAR) to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation.

COMPLIANCE WITH FCC 2.1093

"Portable devices that operate in the Cellular Radiotelephone Service pursuant to part 22 of this chapter; the Personal Communications Service (PCS) pursuant to part 24 of this chapter; the Satellite Communications Services pursuant to part 25 of this chapter; the Miscellaneous Wireless Communications Services pursuant to part 27 of this chapter; the Maritime Services (ship earth station devices only) pursuant to part 80 of this chapter; the Specialized Mobile Radio Service, the 4.9 GHz Band Service, and the 3650 MHz Wireless Broadband Service pursuant to part 90 of this chapter; the Wireless Medical Telemetry Service (WMTS) and the Medical Device Radiocommunication Service (MedRadio), pursuant to subparts H and I of part 95 of this chapter, respectively, unlicensed personal communication service, unlicensed NII devices and millimeter wave devices authorized under §§15.253(f), 15.255(g), 15.257(g), 15.319(i), and 15.407(f) of this chapter; and the Citizens Broadband Radio Service pursuant to part 96 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use. All other portable transmitting devices are categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use, except as specified in §§1.1307(c) and 1.1307(d) of this chapter. Applications for equipment authorization of portable transmitting devices subject to routine environmental evaluation must contain a statement confirming compliance with the limits specified in paragraph (d) of this section. Technical information showing the basis for this statement must be submitted to the Commission upon request."

The EUT will be used with a separation distance of less than 20 centimeters between the radiating antenna and the body of the user or nearby persons and must therefore be considered a portable transmitter per 47 CFR 2.1093(b).

COMPLIANCE WITH FCC KDB 447498 D01 General RF Exposure Guidance v06

"KDB 447498 D01 General RF Exposure Guidance v06" provides the procedures, requirements, and authorization policies for mobile and portable devices.

Standalone radio SAR test exclusion is covered under section 4.3.1. Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Thresholds are met as shown in the Limits section below.

Simultaneous transmission SAR test exclusion is covered under section 4.3.2. SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration.

SAR TEST EXCLUSION

element
EXRPT.2019.10.07

LIMITS

Limits for General Population /Uncontrolled Exposure: 47 CFR 1.1310 (c)

The SAR limits for general population/uncontrolled exposure are 0.08 W/kg, as averaged over the whole body, and a peak spatial-average SAR of 1.6 W/kg, averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the parts of the human body treated as extremities, such as hands, wrists, feet, ankles, and pinnae, where the peak spatial-average SAR limit is 4 W/kg, averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). Exposure may be averaged over a time period not to exceed 30 minutes to determine compliance with general population/uncontrolled SAR limits.

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the SAR test exclusion thresholds are 1-g for head and body SAR and 10-g SAR for extremity SAR.

ASSESSMENT

Dominic Del Vecchio, Electrical Engineer, for Ergotron, provided the following information about the duty cycle of the 802.11abgn radio as implemented in this application:

"Unencrypted data has overhead at the MAC and PHY layer of 802.11. At the MAC layer there is 18 bytes of overhead and an additional 16 bytes for WPA2-CCMP. The worst-case PHY header would be for Direct Sequence Spread Spectrum (DSSS) at 198 bits or 24 bytes. Therefore, 1,024 bytes ends up being 1,082 bytes transmitted at the PHY layer / WiFi module's transceiver.

Transmitting 1,024 bytes from the microcontroller to the WiFi module over UART at 11,520 bytes per second takes approximately 88.89 milliseconds: (1024 bytes)/((11,520 bytes)/s)=0.089s

Transmitting 1,082 bytes from the WiFi module's transceiver at 125,000 bytes per second takes approximately 8.2 milliseconds: (1024 bytes)/((125,000 bytes)/s)=0.0087s

Transmitting 4 bytes from the WiFi module to the microcontroller over UART at 11,520 bytes per second takes approximately 0.35 milliseconds: (4 bytes)/((11,520 bytes)/s)=0.00035s

Summing these three values and rounding down (worst case implies allowing more transmissions) gives 0.0981 seconds. Therefore, assuming zero processing time, this is the duration of a 1,024-byte transmission.

Dividing the duration it takes the WiFi module's transceiver to transmit 1,024 bytes by the entirety of the transmission duration gives a ratio of RF transmission time to total transmission time:

0.0087/0.0981=0.0887. This is the worst-case duty cycle of a data transmission.

Multiplying any duration (in seconds) by the above ratio will give the worst-case amount of time the Wi-Fi module's transceiver is transmitting. If the system state was always in a transmit mode the SAR Exception Rule can be applied: 0.0887s*360s=31.9s. This is less than the cutoff limit which is 54s (15 percent of a 6 minute duration).

Maximum Possible Duty Cycle = 8.87%"

SAR TEST EXCLUSION

element
EXRPT.2019.10.07

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [$\sqrt{f(GHz)}$] = 3.0 for 1-g SAR and = 7.5 for 10-g extremity SAR,
where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation

- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step b below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1f) is applied to determine SAR test exclusion.

The SAR Test Exclusion Threshold is summarized in the following table:

Radio	Transmit Frequency (MHz)	Measured Conducted Output Power (mW)	Duty Cycle	Minimum Separation Distance (mm)	Exclusion Threshold	Limit	Compliant
802.11: 5.8	5785	25.1	0.0887	5	1.072	3.0	Yes
802.11: 5.6	5580	21.4	0.0887	5	0.896	3.0	Yes
802.11: 5.3	5260	22.9	0.0887	5	0.932	3.0	Yes
802.11: 5.2	5220	26.9	0.0887	5	1.091	3.0	Yes
802.11: 2.4	2462	44.7	0.0887	5	1.243	3.0	Yes

The information in the table above was obtained from:

Client supplied information and Sporton International Test Reports FR8D1930A and FR8D1930B from certification filing for FCC ID: Z64-CC3235MOD. A change in ID was completed on this radio module under FCC ID: 2AVU2-C52XXXX1.