



## Data Sheet



# Continuous Core Body Temperature Monitoring

## General Description

CORE is the only accurate, non-invasive, wearable, continuous core body temperature monitoring solution available today. CORE’s underlying technology is based on a new thermal energy transfer sensor developed by greenTEG that enables a solution that is accurate, independent of the activity, and external environmental factors. Truly a breakthrough technology in accurately measuring Core Body Temperature!

CORE is a compact wireless device that can be worn on the chest with a strap or adhesive patch. CORE has accompanying Android and iOS phone Applications that can be used to display live data and can alert the user with a configurable Alarm. CORE communicate wirelessly using standards-based Bluetooth Low Energy (BLE) and ANT+ communication profiles. Using standards-based communication allows CORE to work with many third-party Apps and devices.

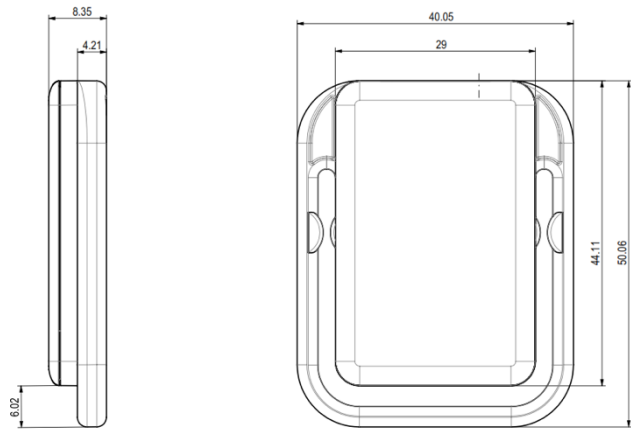


Figure 1: Dimensions of CORE [mm]

### Features

- ◇ High Accuracy
  - $\pm 0.1^{\circ}\text{C}$  Skin
  - $\pm 0.26^{\circ}\text{C}$  Body
- ◇ Compact Design
  - 50 x 40 x 8.35 mm
  - 12 grams
- ◇ Easy to use
  - Patch or Strap application
  - Long Battery life >6d
  - Waterproof IPX7
  - Disinfect with alcohol
- ◇ Connectivity
  - iOS / Android / WatchOS / Garmin ConnectIQ / WearOS
  - BLE & ANT+ Standard profiles

### Use Cases

- ◇ Health and Wellness
- ◇ Worker Safety
- ◇ Sleep (circadian cycle) Monitoring
- ◇ Sports Performance for Athletes
- ◇ Research Applications
- ◇ Elevated body temperature monitoring
- ◇ Early Detection of Thermoregulatory Diseases

### Clinically Validated Solution

The accuracy of the core body temperature solution from greenTEG has been validated through numerous independent clinical and case studies.

The algorithm has been tested on many candidates over the past several years with varying ages, weights, BMI, and under different activities including sports, sleeping and daily life. For the reference temperatures to validate accuracy, ingestible thermometer pills have been used with a duration of 24h to 72h.

The accuracy based on the conditions mentioned above is shown in Figure 2. It leads to a mean absolute deviation of 0.26 °C and a 95% limit of agreement of  $\pm 0.67$  °C and a correlation coefficient of 0.86. A comparative study between thermometers done over 201 patients concluded that the best non-invasive medical grade thermometer had a limit of agreement between -0.7 and 0.5 °C. but only when measured by a professional, at low activity and room temperature<sup>1</sup>. Figure 3 shows the measured temperature profile of a subject with an elevated body temperature is displayed. One can see that the predicted core body temperature follows the reference temperature closely.

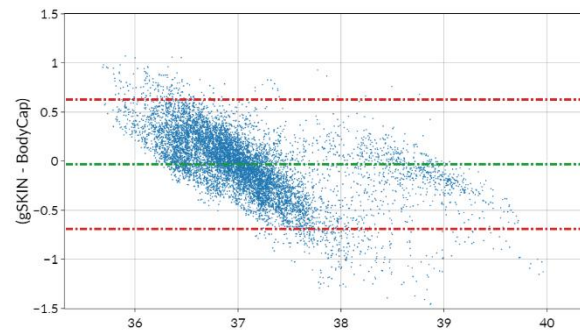


Figure 2: Bland-Altman plot showing the confidence interval for different core body temperature measurements of the CORE compared to the reference (ingestible temperature pill from BodyCap)

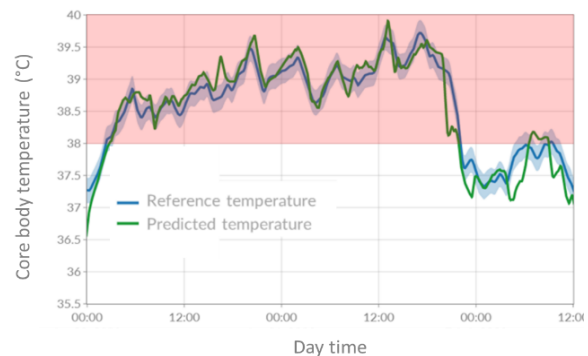


Figure 3: Core body temperature of a subject before and during a time of elevated body temperature. The blue curve representing the reference temperature measured with an ingestible temperature pill and the green curve is core body temperature measured with the CORE device.

### greenTEG AG @ A GLANCE

greenTEG is focused on delivering the highest quality thermal sensing solutions. Founded as a spin-off from ETH Zürich, greenTEG’s expertise in thermal sensing solutions has been developed for more than 10 years through partnerships with our international customer base. greenTEG develops, manufactures and markets thermal sensor solutions for a growing customer base active in photonics, building physics, MedTech, automotive, processing industry, and R&D. CORE ventures is affiliated with greenTEG AG.

<sup>1</sup>J.Rubia-Rubia - Measurement of body temperature in adult patients: Comparative study of accuracy, reliability and validity of different devices - 2011

<b>Product Name</b>	<b>CORE</b>
Article Number	A-166251
CORE	Rechargeable <i>patch</i> device for continuous monitoring of Core Body Temperature
In the box	<b>CORE</b> Body Temperature Patch Set of medical-grade adhesive tapes USB charging cable Quick Start guide, warranty and manual
Connectivity	CORE accompanying Smart Phone Apps available iOS and Android Smartwatch Apps also available on Apple WatchOS, Garmin ConnectIQ with Android WearOS available soon Also compatible with many existing third-party apps and devices
Automatically updateable to the latest technology	Over the air firmware updates enable CORE to automatically update to the latest and most accurate solutions available without having to upgrade hardware
<b>Technical Data</b>	
CORE outer casing	Made of durable skin-compatible polymer. Fully sealed with no moving parts
Compact Size	50mm x 40mm x 8.5mm Lightweight at only 12 grams
Power supply	Rechargeable lithium-polymer battery via magnetic USB cable
Battery life	Constant transmit time > 6 day Standby mode > 5 weeks
Internal memory	Record up to 84 hours of high-resolution data
Communication Protocol	Standard BLE Health Thermometer profile Standard ANT+ Thermometer profile
Data output streams	Core Body Temperature, skin temperature, data quality, battery level, heart rate, time stamp; additional information can be exposed upon request (ie. accelerometer, firmware version)
Sampling rate	1 HZ
Skin temperature accuracy	$\pm 0.05^{\circ}\text{C}$ (typical) or $\pm 0.13^{\circ}\text{C}$ (max) from $20^{\circ}\text{C}$ to $42^{\circ}\text{C}$
Core Body Temperature accuracy measured at chest	$\pm 0.33^{\circ}\text{C}$ ( $1\sigma$ ) ; $\pm 0.26^{\circ}\text{C}$ (MAD)
Calibration	Factory calibrated – no recalibration necessary
Water Rating	IPX7 (waterproof up to 5ft)
Product features	<ul style="list-style-type: none"> <li>- Smartphone application (Android/iOS/WatchOS/Wear OS/Garmin)</li> <li>- Live display of current core body and skin temperature (via app)</li> </ul>

Version: V.1.9.1\_Zürich, May 2020

## Disclaimer

**Warning: The CORE is not a medical device.**

It is not intended to diagnose, treat, cure, or prevent any disease or health condition. It does not have FDA or Medical CE approval. CORE should be used by healthy adults in a safe environment and is only meant to inform you about your overall wellbeing. No medical advice can be concluded from the measured temperature data, and it cannot replace the services of health care professionals. Deviations from the normal body temperature range should be investigated by a health care professional and no conclusion regarding your health can be drawn from a core temperature that is within the healthy range. Never disregard professional medical advice or delay in seeking it because of the temperature measurements by CORE. The use-case scenarios that are shown on any printed or digital material from CORE or greenTEG are only used to inform the public about our research topics. It does not prove the current application of the CORE in these fields. If the CORE causes any redness or skin irritation, remove the product immediately. greenTEG is not responsible for any decisions, and potential subsequent incidents, you or someone that takes care of you might make, based on the measured core body temperature by CORE.