Unicorn tDCS Core-2

Glossary

Wording	Explanation
Unicorn tDCS Core-2 Stimulator	The tDCS stimulator (device) including battery and basestation connector.
Unicorn tDCS Core-2 Basestation	The stimulator basestation and electrode connector.

Unicorn tDCS Core-2 Electrodes	The tDCS electrodes.

Safety Notice

In order to use this product safely and fully understand all its functions, read this manual before using the product. Follow the instructions for use for the used PC and the connected devices for allowed environmental conditions. The used PC must not go to sleep, hibernate, turn off, or turn on the screensaver during a measurement.

Warning:
Conductible parts of all Unicorn tDCS Core-2 Electrodes must not have contact with the earth or other conductible parts.

Warning:
Avoid electrostatic discharge impulses when handling the device or touching the Unicorn tDCS Core-2 Electrodes.

Warning:
Electrostatic discharge (ESD) events can harm electronic components inside your Unicorn tDCS Core-2. Under certain conditions, electric charge may build up on your body or an object, such as a peripheral, and then discharge into another object, such as your Unicorn tDCS Core-2. To prevent ESD damage, you should discharge static electricity from your body before you interact with any of your devices. You can protect against ESD and discharge static electricity from your body by touching a metal grounded object.

Warning:
Pay attention to the precautions regarding electromagnetic compatibility.

Warning:
The operation of the device can be compromised within shielded rooms. In case of problems, relocate the receiving device or consult technical support.

Warning:
The operator must be familiar with the operation of the device and must operate the device according to the instructions for use.

Warning:
The device and its accessories must not be exposed to increased mechanical stress.

Warning:
Each time you use the device, you must first check the device and its accessories for possible damage to connectors, sockets and cables. Check the Unicorn BCI Core-8 electrode cable connections with special care and ensure that the electrode cables have no breaks or cracks. Any cables, connectors, accessories, or other parts of the equipment must be replaced immediately if damaged or not working correctly.

Warning:
The Unicorn tDCS Core-2 is not protected against electrical defibrillation - before defibrillation, the Unicorn tDCS Core-2 Electrodes must be removed from the subject!

Warning:
Only use accessories identified for use with this device.

Warning:
The device is powered internally via a lithium-polymer accumulator. The accumulator must only be replaced by the manufacturer.

Note:
The Unicorn tDCS Core-2 uses special lightweight, thin and highly flexible cables for the Unicorn tDCS Core-2 Electrodes to provide high comfort and easy cap mounting. These cables are sensitive and need to be treated with special care. Following some basic guidelines will prolong the lifetime of Unicorn tDCS Core-2 Electrodes:

- Never pull on Unicorn tDCS Core-2 Electrodes cables.
- Avoid knots in cables.
- Do not soak cables and Unicorn tDCS Core-2 Electrodes for more than 30 minutes.
- Avoid exposure to direct sunlight or chemical agents.
- Make sure that no gel remains on Unicorn tDCS Core-2 Electrodes or cables after cleaning.
- Protect the stimulation unit from contamination with gel, water or disinfectant.
- Always make sure that Unicorn tDCS Core-2 Electrodes and cables are completely dry before storing.
- Don’t cut, kink or pinch electrode cables; light bending is safe.

Note:
Unicorn tDCS Core-2 Electrode and cable lifetime depends on proper usage, careful treatment and cleaning, and appropriate storage. The manufacturer will provide warranty replacement only if there is no visible physical damage to the parts, such as: damaged, broken or pinched cables; or damaged housings or connectors.

Warning:

- Do not use any detergent other than detergents mentioned in this manual!
- Do not perform automated reprocessing in Washer Disinfectors (WD) or Endoscope Washer Disinfectors (EWD)!
- Do not machine-wash!
- Do not use a laundry dryer or other hot air devices!
- Do not put into an ultrasonic bath!
- Do not autoclave Unicorn tDCS Core-2 Cap or Unicorn tDCS Core-2 Electrodes!

Note:
The manufacturer is responsible for the safety, performance and reliability of the Unicorn tDCS Core-2 as supplied to the customer at the time of delivery. This responsibility expires if the Unicorn BCI Core-8 is changed. Please note the following:

- Changes to the Unicorn tDCS Core-2 must be performed by the manufacturer only, and service and repair must be performed by corresponding qualified personnel only.
- The Unicorn tDCS Core-2 must be used according to the instructions for use.

Note:
The Unicorn tDCS Core-2 and its components have been tested and comply with the electromagnetic compliance limits for the Directive 2014/53/EU (radio equipment directive, RED). See the chapter on Electromagnetic compatibility. The equipment, if not installed and used in accordance with the instructions, may cause interference with other devices in the vicinity. If this equipment does interfere with other devices,

which can be determined by turning the equipment off and on, try to correct the interference through one or more of the following measures:

- Reorient or relocate the receiving device.
- Increase the separation between the equipment.
- Consult Unicorn technical support.

Warning:
The Unicorn tDCS Core-2 must not be used in dangerous conditions such as wet rooms or explosive environments. The relative humidity must be between 25 % and 80 %.

Warning:
The Unicorn tDCS Core-2 must not be used in combination with any other high-frequency device. Using high stimulation currents with the Unicorn tDCS Core-2 can cause itching or burning sensations under the Unicorn tDCS Core-2 Electrodes.

Warning:
The Unicorn tDCS Core-2 must not be used in humans with pace-makers.

Note:
The Unicorn tDCS Core-2 uses the 2.4 GHz band for wireless transmission. Ensure that enough transmission bandwidth is available in your environment, since other devices might also use the same band (e.g. WiFi or other Bluetooth devices).

Introduction

The Unicorn tDCS Core-2 is a consumer grade tDCS stimulator. It allows the user to

Highlights

- tDCS stimulation without cable connection via radio signal
- Bluetooth 5
- stimulation output up to 2 mA @ 30 V compliance voltage to support skin impedances up to 15 kOhm
- up to 3.5 hours stimulation time (@ 2 mA)

Intended use

The Unicorn tDCS Core-2 is intended for use in non-medical environment for non-medical applications. The Unicorn tDCS Core-2 is used by developers, artists, makers and gamers in the user’s environment.

Conditions of use

Operation and storage

Temperature: +5 to +40 °C
Relative humidity: 25 to 80 %, non-condensing
Atmospheric pressure: 700 to 1060 hPa
Altitude: 2000m or less

Hardware

The Unicorn tDCS Core-2 system consists of the Unicorn tDCS Core-2 Amplifier, Unicorn tDCS Core-2 Basestation, and Unicorn tDCS Core-2 Electrodes.

Unicorn tDCS Core-2 Stimulator

The Unicorn tDCS Core-2 Stimulator is the stimulation control unit. It provides a stimulation current of up to 2 mA and is controlled with a smartphone app via Bluetooth 5.

Symbols

Symbol	Description
	Do not dispose with domestic waste. Dispose of it via the separate collection system for electrical and electronic equipment.
	Avoid electrostatic discharge
	Follow instructions for use
	Manufacturer g.tec medical engineering GmbH https://www.gtec.at Sierningstrasse 14 4521 Schiedlberg, Austria
SN UT-2024.00.02	Serial number in the format: UT-YearOfProduction.Month.Number
FCC ID: 2AA9B05	Contains FCC ID: 2AA9B05
IC: 12208A-05	Contains IC: 12208A-05

Unicorn tDCS Core-2 Basestation

The Unicorn tDCS Core-2 Basestation is connecting the Unicorn tDCS Core-2 Stimulator to the Unicorn tDCS Core-2 Electrodes. It is also used to turn the device on and off.

The Unicorn tDCS Core-2 features 2 electrodes (anode and cathode) for tDCS stimulation.

Name	Description
+	Stimulation Anode
-	Stimulatin Cathode

Unicorn tDCS Core-2 Electrodes

The Unicorn tDCS Core-2 Electrodes are made of a conductive rubber for best stimulation behaviour with DC polarization effects.

Unicorn tDCS Core-2 Cap

The Unicorn tDCS Core-2 Cap is a fabric cap, offering pre-defined holes according to the standardized 10-20 positioning system to hold the Unicorn tDCS Core-2 Electrodes.

Unicorn tDCS Core-2 Mounting Clip

The Unicorn tDCS Core-2 Mounting Clip is the counterpart of the Unicorn tDCS Core-2 basestation to mount the basestation to the cap. The mounting clip consists of 2 pieces, the magnetic part which is placed inside the cap and the orientation part which is placed outside. At your desired stimulation location, penetrate the cap fabric with the 6 clueing stubs of the orientation part. Add some glue next to the stub holes of the magnetic part and glue together the parts by applying a gentle pressure until the glue dried.

Device handling

Status LED

The Status LED represents the device status. The following table shows available device states.

LED Status	Description
Continously on USB attached	The device is charging.
Continously off USB attached	The device is fully charged.

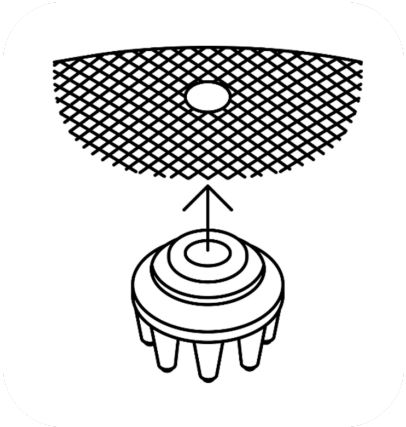
Fading	Device is discoverable via bluetooth.
Short blinks	Device is connecting to a device.
Continously on USB detached	Device is ready for stimulation.
Fast blinking	Device is in stimulation mode.

Assembling / Disassembling

The following section describes how to assemble or disassemble the Unicorn.

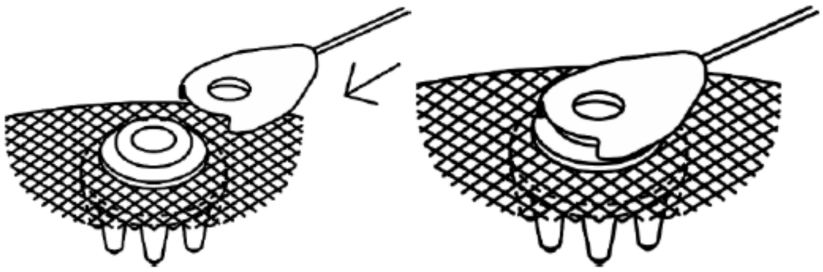
Insert / Remove Unicorn tDCS Core-2 Electrodes

The g.GAMMAcap2 features holes according to the standardized 10-20 positioning system. The first groove of the electrode is used to attach the electrode connector clip. The second groove is provided to insert and hold the electrode within the cap. Stretch one of the predefined electrode holes of the cap and insert the electrode until the second groove of the electrode is surrounded by fabric.



Connect / Disconnect Unicorn tDCS Core-2 Electrodes

To connect or disconnect the clip connector to/from the Unicorn tDCS Core-2 Electrode, just slide the clip connector on or off. Make sure that the clip surrounds the first groove of the electrode and that the holes of the electrode and electrode clip overlap.



Turn the device on and off

You have to dock the Unicorn tDCS Core-2 Stimulator on the Unicorn tDCS Core-2 Basestation to turn the device on. The magnetic connector should hold the device on the Unicorn tDCS Core-2 Basestation. The satus LED should turn on and show the current device state.

You have to remove the Unicorn tDCS Core-2 Stimulator from the Unicorn tDCS Core-2 Basestation to turn the device off.

Note:
Charge the device if the status LED doesn't start fading when placed on the Unicorn tDCS Core-2 Basestation.

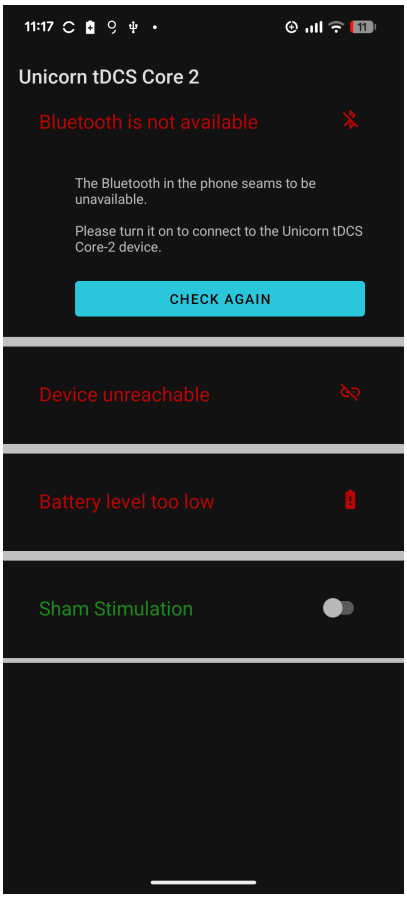
Transportation

Remove the Unicorn tDCS Core-2 Stimlator from the Unicorn tDCS Core-2 Basestation to turn the device off. Put the device onto the Unicorn tDCS Core-2 Basestation so you can see the USB connector and the gold pins. The magnetic connector should hold the device on the Unicorn tDCS Core-2 Basestation.

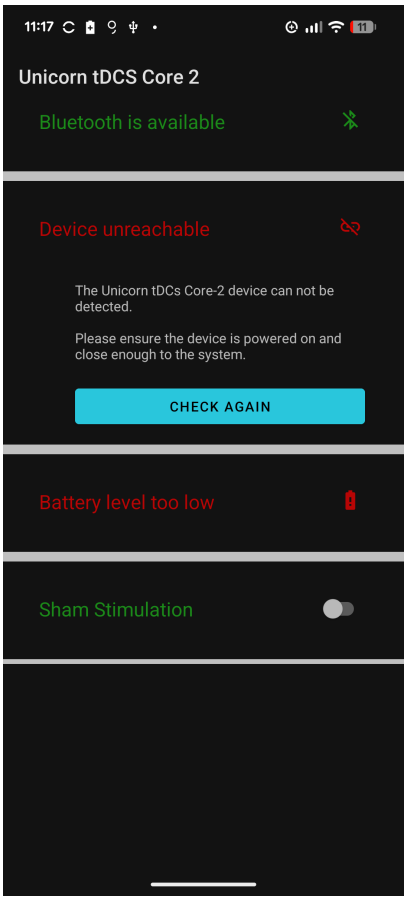
Unicorn tDCS Core-2 App

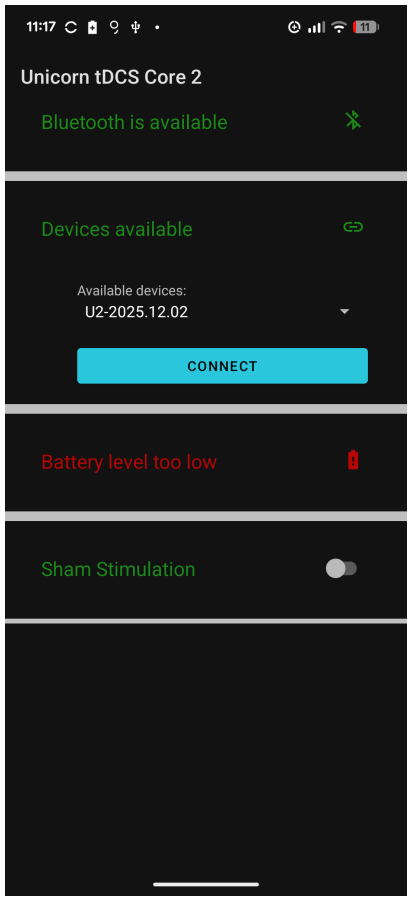
The Unicorn tDCS Core-2 device is controlled by an Smartphone App which is available for Android phones. Scan the QR Code below to install the App via Google Play Store.

Make sure to enable Bluetooth and Location (GPS) in your smartphone settings before starting the App. If Bluetooth is not properly detected, you will get a notification within the App (see screenshot below).

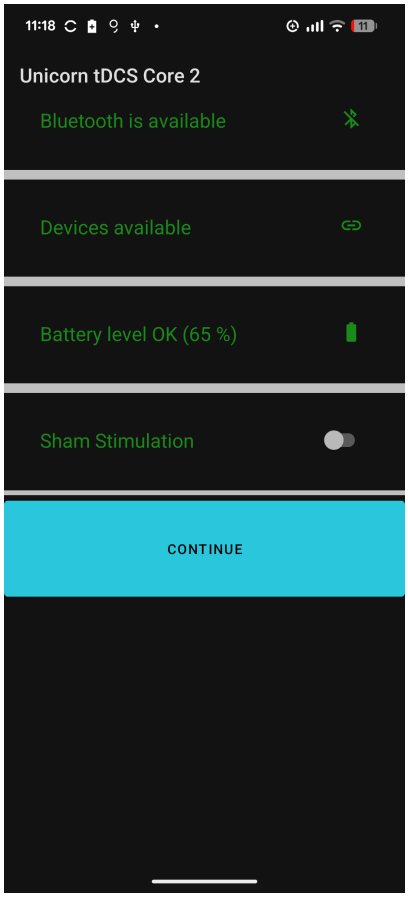


As soon as the Bluetooth is enabled and could be detected by the App, the error notification disappears and the App is searching for Unicorn tDCS Core-2 devices. Place the Unicorn tDCS Core-2 device onto the basestation as described in section Device handling and after some moments the device serial number should be added to the list **Available devices** list.



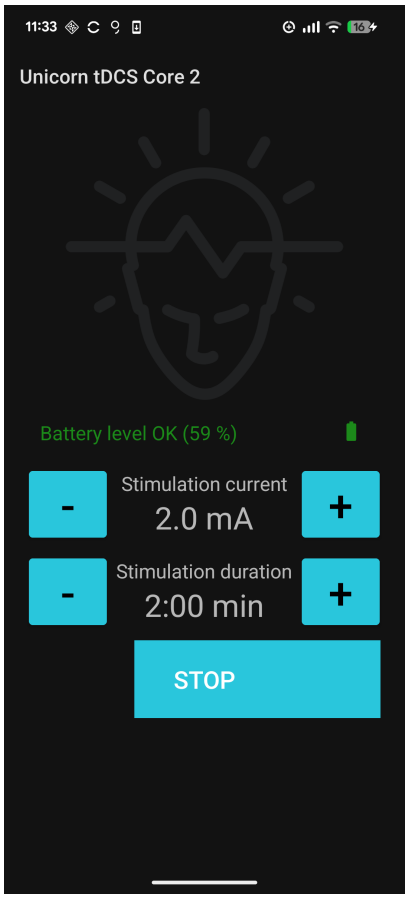


Click **Connect** to select the device and establish a connection to the Unicorn tDCS Core-2 device. Once the app is connected to the device, the device battery level is checked and updated in the battery level field. Only if the battery level is sufficient for stimulation, the **CONTINUE** button appears. Specify if you want the Unicorn tDCS Core-2 device into the **Sham Stimulation** mode, which will only fake the stimulation by ramping up and immediately ramping down at the begin and end of the stimulation. See Sham Stimulation Details for details.



Clicking the **CONTINUE** button will get you to the stimulation view. Use the **+** and **-** buttons to specify the stimulation current in steps of 0.1 mA and the stimulation duration in steps of 15 seconds. To increase / double the step-size long-press the **+** button of the stimulation duration group. Long-press the **-** button of the stimulation duration group to decrease / half the step size. A pop-up window will show you the current step size. The minimum step size is 15 seconds.

Click the **START** button to start the stimulation. The stimulation button will turn into a progress bar, which will decrease in size as the stimualation is ongoing to visualize the remaining stimulation duration. The stimulation duration consists of 3 parts. At the start and end of the stimulation, the stimulation current is ramping up with a rate of 1 mA / minute. The time spend for ramping up and down is not included in the configured stimulation duration setting. As a result, the Unicorn tDCS Core-2 device will stimulation with the configured stimulation current for the configured stimulation duration. See Stimulation Details for a detailed visualization.



Charging the device

Lift the Unicorn BCI Core-8 Amplifier from the Unicorn BCI Core-8 Basestation in order to be able to access the USB connector. Insert the Unicorn USB Charging Cable to charge the device. The status LED will be turned on continously until the device is fully charged. The Status LED will be turned off if the device is fully charged.

Note:
The Unicorn BCI Core-8 has a built-in Lithium-Polymer accumulator. The accumulator may be partly discharged when the system is delivered.

Note:
As long as the USB port of the Unicorn Brain Interface is connected to a working USB port of a PC, Notebook or appropriate wall adapter, the Unicorn Brain Interface can’t be turned on.

Note:
Charging an empty Unicorn battery will take about 3 hours.

Warning:
Do not over-discharge the Unicorn BCI Core-8 battery. Over-discharging can damage the Unicorn BCI Core-8 battery or reduce the performance and life-time.

Warning:
The Unicorn BCI Core-8 cell/battery would be at an over-discharged state by its self-discharge characteristics if the cell is not used for long time. Over long storage periods, batteries should be cycled every 90 days.

Warning:
Store in a 50 % charged state. Do not store at fully charged state (4.2V) for a long period of time.

Warning:
Expected Unicorn tDCS Core-2 battery life cycle: The capacity after 500 cycles is expected to be equal to or more than 80 % of the rated capacity.

Warning:
Operating Temperature

- Charging: 0 °C to 45 °C
- Discharging: -20 °C to 60 °C

Warning:
Storage Temperature

- 1 year at -20 °C to 30 °C

Warning:
Electrical Specifications for charging

- Voltage nominal input: 5 V DC
- Voltage input min/max: 3.75 V - 6 V
- Power input: 5 W

Technical Specifications

General

Model	Unicorn tDCS Core-2
Type	Direct current stimulator
LiPo Battery	LP702020, 230 mAh (IEC 62133 & RoHS-Compliant)
Rated power consumption	134 mW
Rated DC voltage	3.7 V
Manufacturer	g.tec medical engineering GmbH Sierningstrasse 14 4521 Schiedlberg, Austria

Warning:
Do not short circuit the battery.
Do not expose cells or batteries to heat or fire.

RF module

Operating Frequency range	2.360 GHz to 2.500 GHz
Transmit power Max	+4 dBm
Receiver sensitivity	-96 dBm
Compliance	Bluetooth 5

Marking	CE, FCC, IC, MIC, RCM, ANATEL, EAC, IFETEL, SRRC, KCC
FCC ID	2AA9B05
IC	12208A-05
MIC	210-108944
ANATEL	00857-21-05903
IFTEL	RCPRIBM18-1491
SRRC	2018DJ7255
KCC	R-C-Rgd-BMD-350

The Unicorn tDCS Core-2 complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this Unicorn tDCS Core-2 may not cause harmful interference, and (2) this Unicorn tDCS Core-2 must accept any interference received, including interference that may cause undesired operation.

FCC RF Radiation Exposure statement

This Unicorn tDCS Core-2 complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this Unicorn tDCS Core-2 may not cause interference, and (2) this Unicorn tDCS Core-2 must accept any interference, including interference that may cause undesired operation of the Unicorn tDCS Core-2.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be chosen so that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Note:
The Unicorn tDCS Core-2 uses the 2.4 GHz band for wireless transmission. Ensure that enough transmission bandwidth is available in your environment, since other devices might also use the same band (e.g. WiFi or other Bluetooth devices). Use wireless screening tools to ensure the availability of the necessary transmission channel.

Transportation and storage conditions

The Unicorn tDCS Core-2 can be stored at temperatures between –20° to +45° Celsius. The relative humidity must be between 25 % and 80 %. If there is any condensed water, wait until it disappears before use (wait at least 1 h in a heated room).

Location details

Do not use the Unicorn tDCS Core-2 near a heating system or directly in the sun. During operation, the outside temperature should be between +5° Celsius and +35° Celsius and the air pressure between 700 and 1060 hPa.

Waste disposal details

Bring the Unicorn tDCS Core-2 to a recycling center or sent it back to the manufacturer.

Warranty

Warranty in the EU is 6 month and 30 days in other countries for the Unicorn tDCS Core-2. The Unicorn tDCS Core-2 Electrodes and the Unicorn Gel are consumables. Only use parts from g.tec to operate the Unicorn tDCS Core-2. Warranty is invalidated if anyone except a g.tec employee opens or disassembles any components of the Unicorn tDCS Core-2. Warranty only applies for properly used devices. Please note that any damage resulting from improper treatment of the system will not be covered by the warranty. This may include broken, kinked or damaged wires and cables, damaged isolators and enclosures

Electromagnetic compatibility (EMC)

The EMC declaration is available on request.

Declaration of Conformity

The declaration of conformity is available on request.

Instructions for use - Unicorn tDCS Core-2
Version Number 1.24.00

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4521 Schiedlberg, Austria
https://www.gtec.at | support@gtec.at