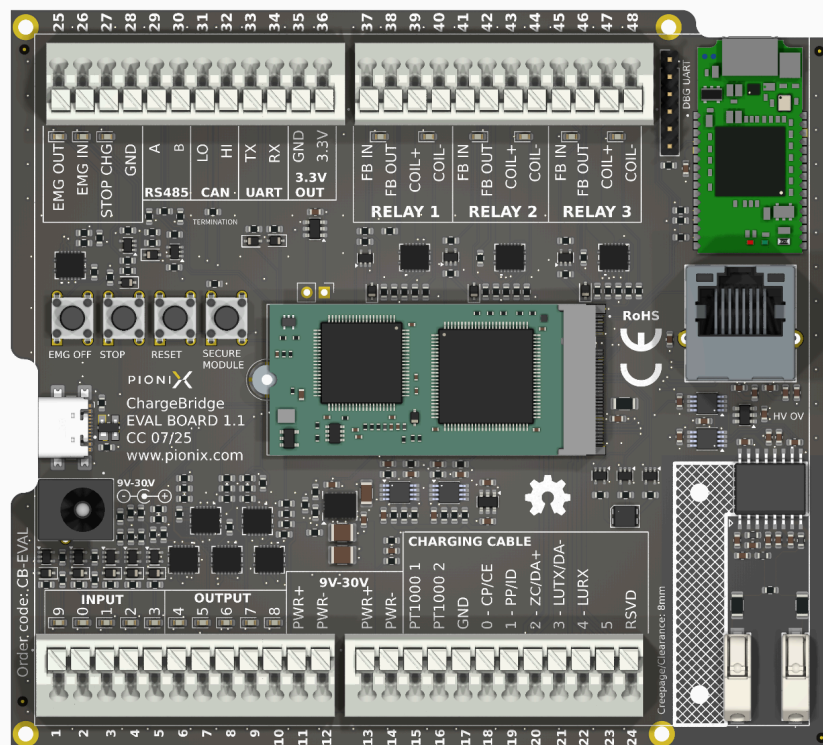


# ChargeBridge Evaluation Board Datasheet



CB-EVAL

**Preliminary specifications for prototype series v1.1**  
**June 2025**

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# Overview

This datasheet provides the technical specifications and application examples for the **ChargeBridge Evaluation Board**.

The evaluation board is compatible with all variants of the ChargeBridge module family, supporting all major charging standards and both EVSE (Electric Vehicle Supply Equipment) and EV (Electric Vehicle) configurations.

The hardware design—schematics and PCB layout—is released under an open hardware license, making it an ideal foundation for developing custom hardware solutions based on ChargeBridge modules.

**GitHub Repository:** <https://github.com/PionixPublic/cb-eval-board>

Additional application examples and reference designs will be made available as open hardware projects. For further information, please contact Pionix.

## Typical Applications

The **ChargeBridge** evaluation board is designed to support a broad range of EV charging scenarios. It enables comprehensive testing and development in both AC and DC charging configurations. Key use cases include:

### Dual-Board Evaluation Setup

By utilizing two evaluation boards—one configured as an EVSE (Electric Vehicle Supply Equipment) module and the other as an EV module—you can create a complete desktop simulation environment. In this setup, the EV module emulates an electric vehicle being charged by the EVSE module, providing a practical platform for development and testing.

### Fully Functional DC Charger (Single-Port)

Develop and test a real DC charging system using a single evaluation board. Connect actual power components such as relays, insulation monitoring devices, power meters, and AC/DC converters. When paired with **BaseCamp** software running on a laptop or Raspberry Pi, the system can charge a real electric vehicle.

### Fully Functional AC Charger (Single-Port)

Create a complete AC charging solution by integrating power components including relays, residual current devices (RCDs), and power meters. The system supports **ISO 15118 for AC charging** and is fully operational when BaseCamp is run on a laptop or Raspberry Pi, allowing for charging of actual electric vehicles.

### Multi-Port Charging via Satellite Architecture

Scale your charging setup by implementing a satellite architecture using Ethernet switches. This allows multiple charging ports—both AC and DC—to operate over a network, all managed from a single BaseCamp instance. Ideal for testing and deployment of multi-port EVSE systems.

### EV Simulator

Utilize a single evaluation board equipped with the EV **ChargeBridge** module to create a fully functional electric vehicle simulator. This setup supports advanced features such as **Plug and Charge** and **ISO 15118-20**, enabling comprehensive testing and validation of real-world EV charging stations.

## Features

The following features are available on all ChargeBridge models:

- **Wide Input Voltage Range:** VSUPPLY input supports 9–30 V
- **Charging Cable Interface:** 7-pin connector supporting all major charging standards
- **Temperature Sensing**
  - 2× PT1000 sensor inputs
  - On-board PCB temperature monitoring
- **Relay Control**
  - 3× relay drivers for VSUPPLY (with feedback inputs)
  - Up to 5A coil drive
  - PWM to reduce holding current (optional)
- **Output Over Voltage Monitoring**
  - Input for DC overvoltage monitoring (supports up to 1200V)
  - Compliant with IEC 61851-23:2023, sections 6.3.1.106.2 and 6.3.1.106.3
- **Communication Interfaces**
  - Ethernet and USB-C for host communication
  - UART (3.3 V TTL level)
  - CAN with onboard termination
  - RS485 with onboard termination
  - Debug UART pin header compatible with FTDI cables
- **User Interface & Control**
  - RGB LED for charging status indication
  - Push buttons for:
    - Stop charging
    - Emergency stop
    - Module secure
    - Reset
  - Emergency stop I/O and stop charging input (up to VSUPPLY)
- **General Purpose I/O**
  - 5× digital inputs
  - 5× digital outputs (all at VSUPPLY level)
- **Power & Measurement**
  - VSUPPLY voltage monitoring
  - Integrated shunt resistor for measuring ChargeBridge current consumption

# Specifications

## Absolute Maximum Ratings

Exceeding the Absolute Maximum Ratings can lead to permanent device damage. These ratings do not guarantee functional operation; for that, refer to the Recommended Operating Conditions. Operating the device outside the Recommended Operating Conditions but within the Absolute Maximum Ratings may compromise reliability, functionality, and performance, and could reduce the device's lifespan.

		MIN	MAX	UNIT
$V_{\text{SUPPLY}}$	Supply voltage on Pins 11/13 and Barrel connector	-0.1	36	V
$T_{\text{stg}}$	Storage Temperature	-40	TBD	°C
	- exact maximum ratings will be defined later -			

## Recommended Operating Conditions

		MIN	TYPICAL	MAX	UNIT
$V_{\text{supply}}$	Supply voltage	9	12 or 24	30	V
$V_{\text{inputHI}}$	HI Input voltage on pins 1-5,26,27,37,41,45	9	12 or 24	30	V
$V_{\text{inputLO}}$	LO Input voltage on pins 1-5,26,27,37,41,45	0	0	0.9	V
$I_{\text{GPIO}}$	Maximum output current of pins 6-10 and 25		1	2	A
$I_{\text{RELAY}}$	Maximum output current of pins 39, 43 and 47		2	5	A
$T_{\text{ambient}}$	Ambient temperature, natural convection	-40		85	°C
$V_{\text{input}}$	Voltage level on pins 35/36 (UART)	-0.1		3.45	V

## ESD Ratings

PINS	TEST CONDITIONS	VALUE	UNIT
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ETHERNET  Protection is sufficient for typical applications. For outdoor ethernet usage consider additional protection.	IEC 61000-4-2 contact discharge	±12000	V
	IEC 61000-4-2 air-gap discharge	±15000	V
	Human-body model (HBM), per AEC Q100-002	±8000	V
	Charged-device model (CDM), per AEC Q100-011	±1000	V
RS485 A/B 29/30  Protection is sufficient for typical applications. Consider additional protection / isolation when used for charger to charger connections.	IEC 61000-4-2 contact discharge	±12000	V
	IEC 61000-4-2 air-gap discharge	±15000	V
	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001(	±16000	V
	Charged-device model (CDM), per ANSI/ESDA/JEDEC JS-002	±1500	V
CAN HI/LO 31/32	Human-body model (HBM), per AEC Q100-002	±10000	V
	Charged-device model (CDM), per AEC Q100-011	±750	V
	SAE J2962-2 per ISO 10605 Powered contact discharge	±8000	V
	SAE J2962-2 per ISO 10605 Powered air discharge	±15000	V
	IEC 62228-3 per ISO 10605	±8000	V
	ISO 7637-2 Transient immunity/Pulse 1	-100	V
	ISO 7637-2 Transient immunity/Pulse 2a	75	V
	ISO 7637-2 Transient immunity/Pulse 3a	-150	V
	ISO 7637-2 Transient immunity/Pulse 3b	100	V
GPIO outputs, Relay drivers	Human body model (HBM)	±5000	V
	Charged device model (CDM)	±750	V
	Contact/Air discharge, per IEC 61000-4-2	±16000	V
	Electrical fast transient, per IEC 61000-4-4	±4000	V
	Surge protection with 42 Ω, per IEC 61000-4-5; 1.2/50 μs	±1000	V
GPIO inputs, Relay feedback, UART RX/TX, Emergency inputs 1-5, 26,27,33,34,37,41,45	Human Body Model Class 3	±16000	V

Charging standard pins 18-24	Refer to ChargeBridge datasheet		
All other pins	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001(	±2000	V
Protection needed on baseboard if signals leave the PCB	Charged-device model (CDM), per ANSI/ESDA/JEDEC JS-002	±500	V

## Pin configuration and functions

NC: Do not connect, leave floating

O: Logic level 3.3V output, maximal 5mA

I: Logic level 3.3V input

IPU: Logic level 3.3V input with internal pull up

IPD: Logic level 3.3V input with internal pull down

PWR: Supply Voltage/Ground pin

OPWR: Output pin with supply voltage level (up to 30V)

IPDPWR: Supply voltage level input, internal pull down (up to 30V)

IPUPWR: Supply voltage level input, internal pull down (up to 30V)

AO: Analog output, 2.048V level

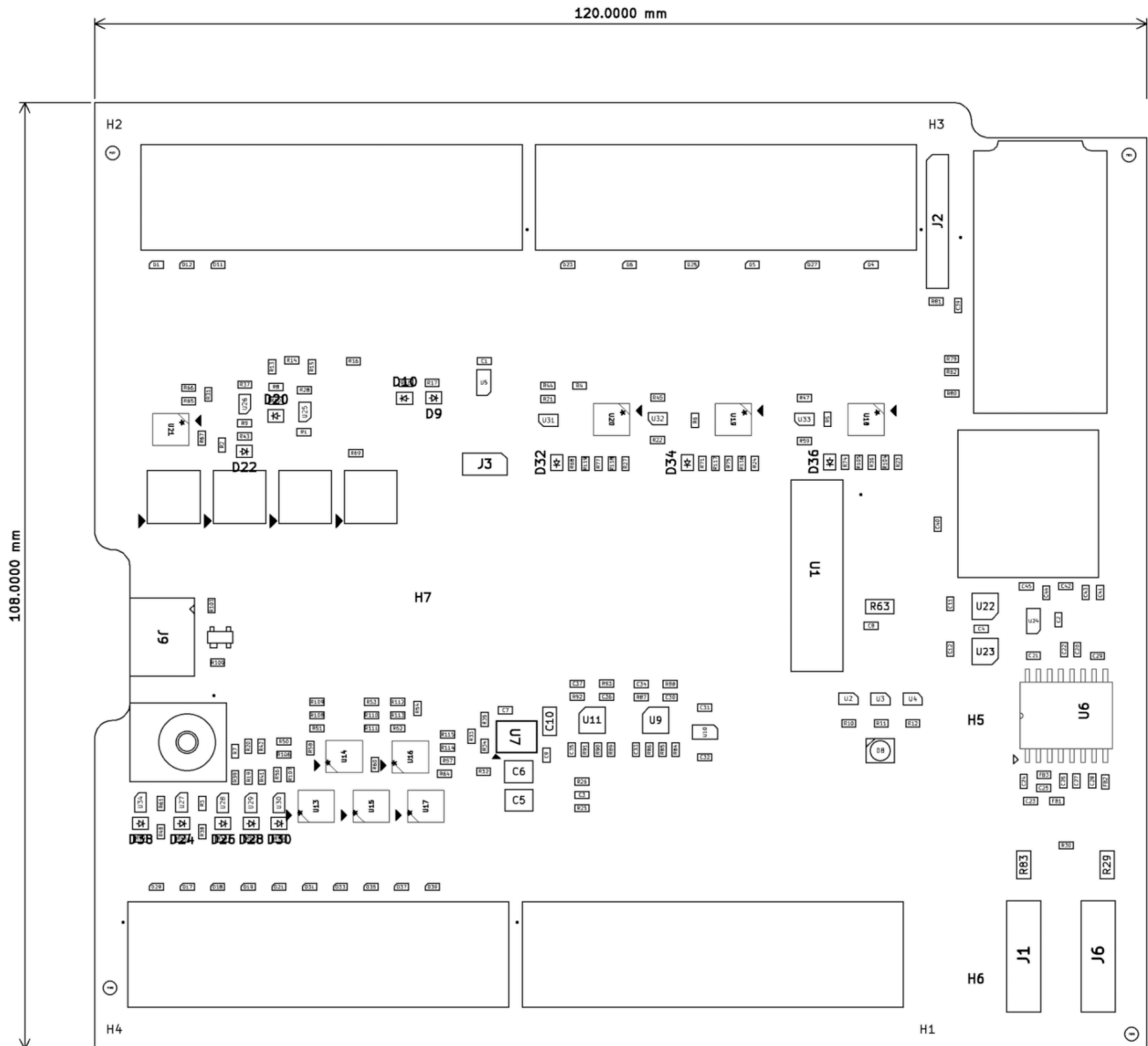
PIN	NAME	TYPE	DESCRIPTION
1 -5	GPIO INPUT	IPDPWR	User GPIO inputs
6-10	GPIO OUTPUT	OPWR	User GPIO outputs
11	PWR+	PWR	Supply voltage input or output, up to 30V
12	PWR-	PWR	Supply voltage GND
13	PWR+	PWR	Supply voltage input or output, up to 30V
14	PWR-	PWR	Supply voltage GND
15	PT1000+	AO	Analog output for PT1000_1 measurement. Connect directly to one side of the PT1000.
16	PT1000+	AO	Analog output for PT1000_2 measurement. Connect directly to one side of the PT1000.
17	GND	PWR	Use this GND to connect the other side of both PT1000.
18 - 24	CC0-5, RSVD		Charging Cable pins. Function depends on ChargeBridge module in use. Directly wired to the corresponding pins on the ChargeBridge module.

25	EMG OUT	OPWR	Emergency output. HI: Emergency active, LO: Normal operation.
26	EMG IN	IPUPWR	Emergency input. HI: Normal operation: Pulse LO: trigger emergency shutdown.
27	STOP CHRG	IPUPWR	Normal stop charging input. HI: Normal operation: Pulse LO: trigger regular session stop.
28	GND	PWR	Ground
29	RS485 A		RS485 Differential signal A. Internally terminated.
30	RS485 B		RS485 Differential signal B. Internally terminated.
31	CAN LO		CAN LO Signal. Internally terminated.
32	CAN HI		CAN HI Signal. Internally terminated.
33	UART TX	O	3.3V level UART TX
34	UART RX	I	3.3V level UART RX
35	GND	PWR	Ground
36	3.3V	PWR	Unprotected 3.3V voltage rail output. Limit external loads to <500mA.
37/41/45	RELAY FB IN	IPDPWR	Relay feedback input, accepts up to 30V. You may use RELAY FB OUT or another current source to drive auxiliary / feedback contacts of the relays.
38/32/46	RELAY FB OUT		3.3V / 10mA output to drive auxiliary contacts directly.
39/43/47	RELAY COIL+	OPWR	HI side relay drive output with supply voltage level. Max 5A short peak while switching. Keep <2A during normal operation. Optional PWM to reduce holding current.
40/44/48	RELAY COIL-	PWR	Ground. Use as a return path for Relay coil currents.



## Mechanical specifications

- Width: 120mm
- Height: 108mm
- Weight: 107g
- Can be mounted on a DIN Rail with an adapter: Phoenix Contact UM-PRO-SKT-B108-L120-7035



## Ordering Information

The Evaluation Board is available from Pionix with the following order code:

**CB-EVAL**

## Further Information

For more details, documentation, and support resources, please visit the **Pionix Customer Portal** (free registration required):

[portal.pionix.com](https://portal.pionix.com)

For direct inquiries, feel free to contact us via email:

**contact@pionix.de**

Additional company and product information is available at:

[www.pionix.com](https://www.pionix.com)