CN3165 Li-Ion Battery Charger Module

DEVLAB FACTOR

Mfr. Part #: UE0089

Product Reference Manual (V1.0)

Description

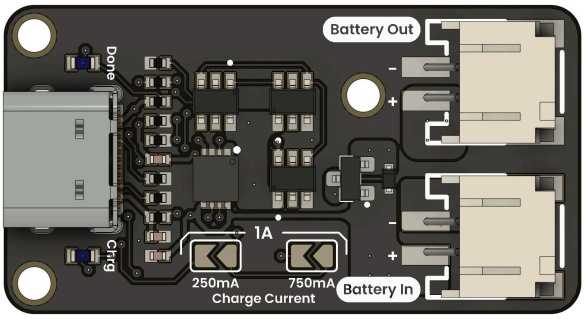
This compact printed circuit board is designed to serve as a single-cell Li-Ion battery charger and power-out module. Its USB-C interface provides 5 V from any compliant source, powering an on-board charger IC that supports charging currents of 250 mA, 750 mA, or 1 A*. Two JST 2.0 mm are available:

- **Battery In**: for charging the battery safely.
- **Battery Out**: for delivering battery voltage to a load even while the battery is charging.

Note: The charging current will depend on the battery charge percentage.

Key Features

- The USB-C port accepts a 5 V supply from PCs, charger bricks, or power banks.
- The CN3165 IC manages the charging process safely with automatic preconditioning, constant current, and constant voltage phases.
- CHRG and DONE LEDs indicate the charging status clearly.
- Battery Out terminals remain powered even during the charging cycle, enabling uninterrupted device usage.



DevLab format compatibility.

Simplicity and compatibility are the core principles of the **DevLab form factor**. This standard defines a **compact and communication-optimized board layout**, ensuring straightforward connections and interoperability among DevLab modules.

By adhering to this format, the UNIT Capacitive Touch Sensor guarantees **efficient prototyping**, **ease of integration**, and **unified accessibility** across a wide ecosystem of devices and development platforms.

Hardware Features

- Input Voltage: 5 V (USB-C)
- Charging Current Options: 250 mA, 750 mA, 1 A (configurable via pads)
- Battery Chemistry: Single-cell Li-Ion (3.7V - 4.2V)
- Charge Termination: Voltage threshold and current taper
- Status Indicators: CHRG (charging), DONE (charge complete)
- Short Circuit and polarity Protection
- Overcharge and overdischarge protection
- Overcurrent protection

Applications

- Battery charger for single-cell Li-Ion batteries
- Power supply for low-power devices
- Educational prototyping with power delivery requirements
- Portable sensors and microcontroller systems
- USB-powered battery packs

CONTENTS

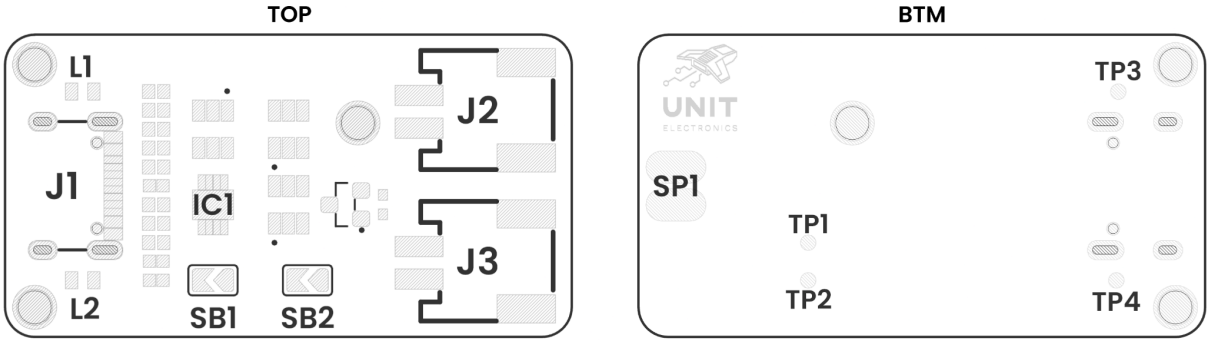
1 Ratings

1.1 Recommended Operating Conditions

Symbol / Rail	Description	Min	Typ	Max	Unit
V_IN	USB-C input voltage	4.75	5.0	5.25	V
I_CHG	Configurable charging current (set by resistor)	0.25	0.75	1.0	A
V_BATT	Battery voltage during charge	—	4.2	—	V
V_OCP	Overcharge Protection Voltage	4.25	4.3	4.35	V
V_OCR	Overcharge Release Voltage	4.05	4.10	4.15	V
I_BATT	Battery discharge current (to load)	—	3.5	5	A
V_OUT	Output voltage from “Battery Out” terminals	2.3	V_BATT	4.2	V
V_ODR	Overdischarge Release Voltage	2.9	3.0	3.10	V
I_USB	USB input current draw during charging	—	0.75	1.2	A
T_TERM	Charge termination threshold current	—	0.1 × I_CHG	—	A
LED CHRG	Charging status indicator (active LOW during charge)	—	—	—	—
LED DONE	Charge complete indicator (active HIGH when full)	—	—	—	—

2 Functional Overview

2.1 Board Topology



Views of Board Topology

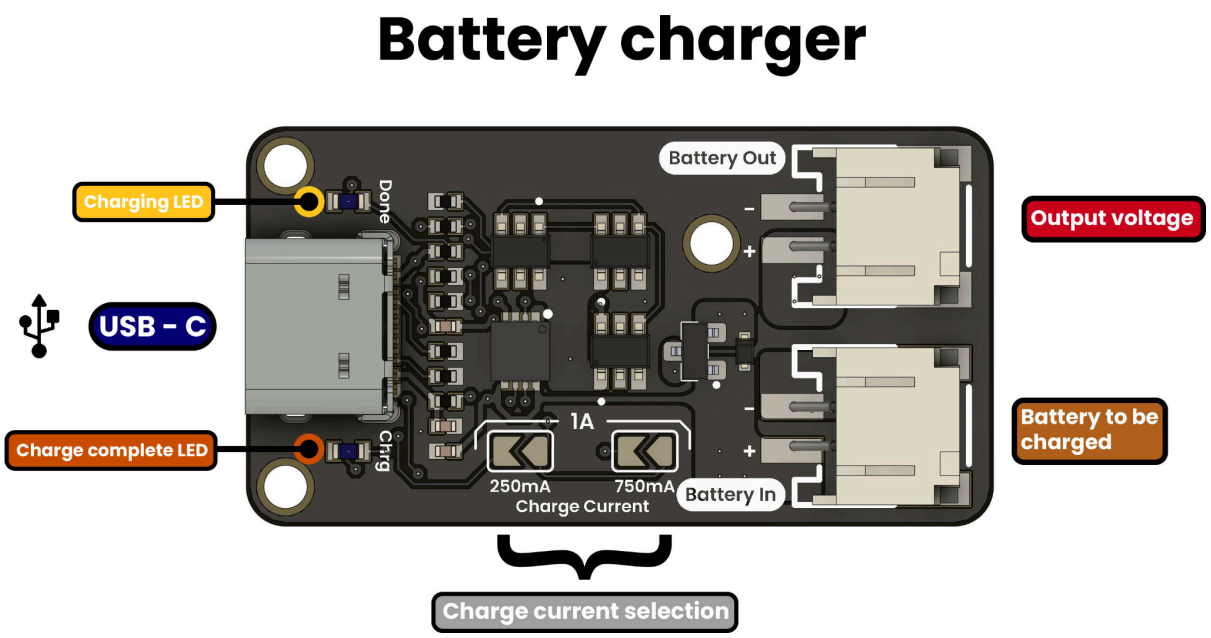
Views of Topology

Table 2.1 - Components Overview

Ref.	Description
IC1	CN3165 Battery Charger IC
L1	Charging LED
L2	Charge Done LED
J1	USB Type-C Connector
J2	JST PH2.0 Connector for Battery Voltage Output
J3	JST PH2.0 Connector for Battery Input
SB1	200 mA Charging Current Solder Bridge
SB2	700 mA Charging Current Solder Bridge
SP1	Solder Pads for Battery Output
TP1	Battery V- Test Point
TP2	Battery V+ Test Point
TP3	Charging LED Test Point
TP4	Charge Done LED Test Point

3 Connectors & Pinouts

3.1 General Pinout



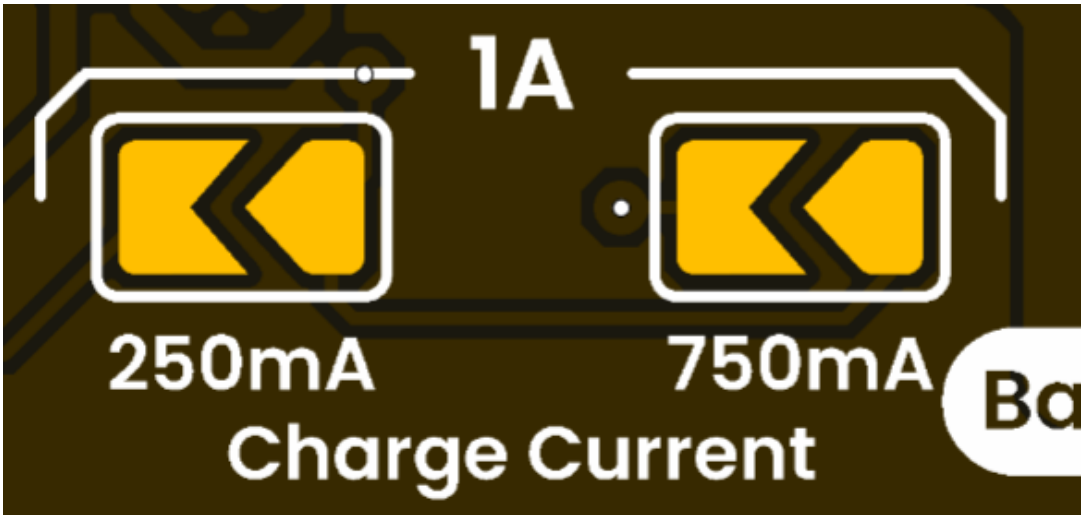
General Pinout

3.1 Pinout General Description

Component	PCB Label	Description
USB-C Connector	USB IN	5 V power input from USB-C source
Connector	Battery IN	JST Connector for connecting the Li-ion cell
Connector	Battery Out	JST Connector for outputting battery voltage
CHRG LED	CHRG	Indicator LED: on during the charging phase
DONE LED	DONE	Indicator LED: on when the charging cycle completes

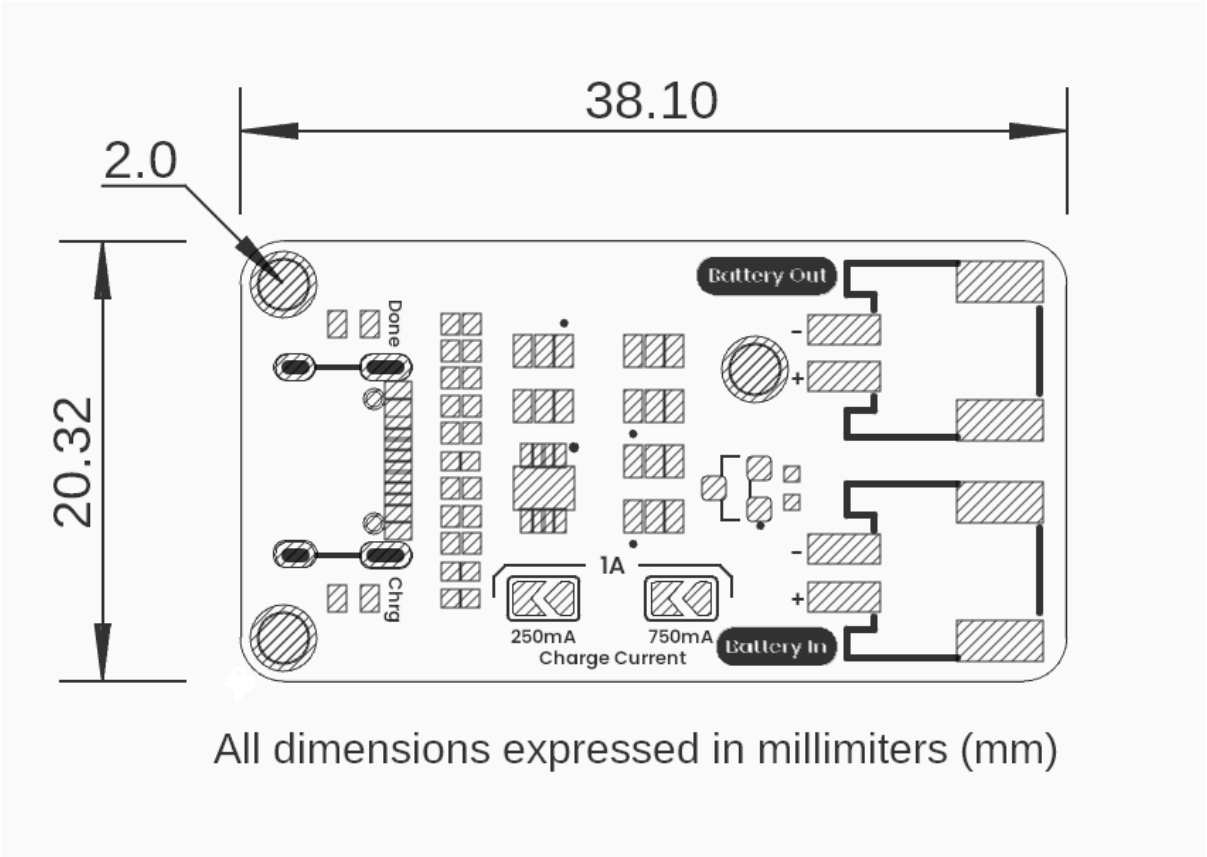
4 Current Charge Configuration

Select charging current using the designated solder bridges shown below:



- Solder only 250 mA solder bridge to charge battery at 250 mA.
- Solder only 750 mA solder bridge to charge battery at 750 mA.
- Solder both bridges to charge battery at 1A.

5 Mechanical Information



Mechanical dimensions in millimeters

6 Company Information

Company name	UNIT Electronics
Company website	https://uelectronics.com/
Company Address	Salvador 19, Cuauhtémoc, 06000 Mexico City, CDMX

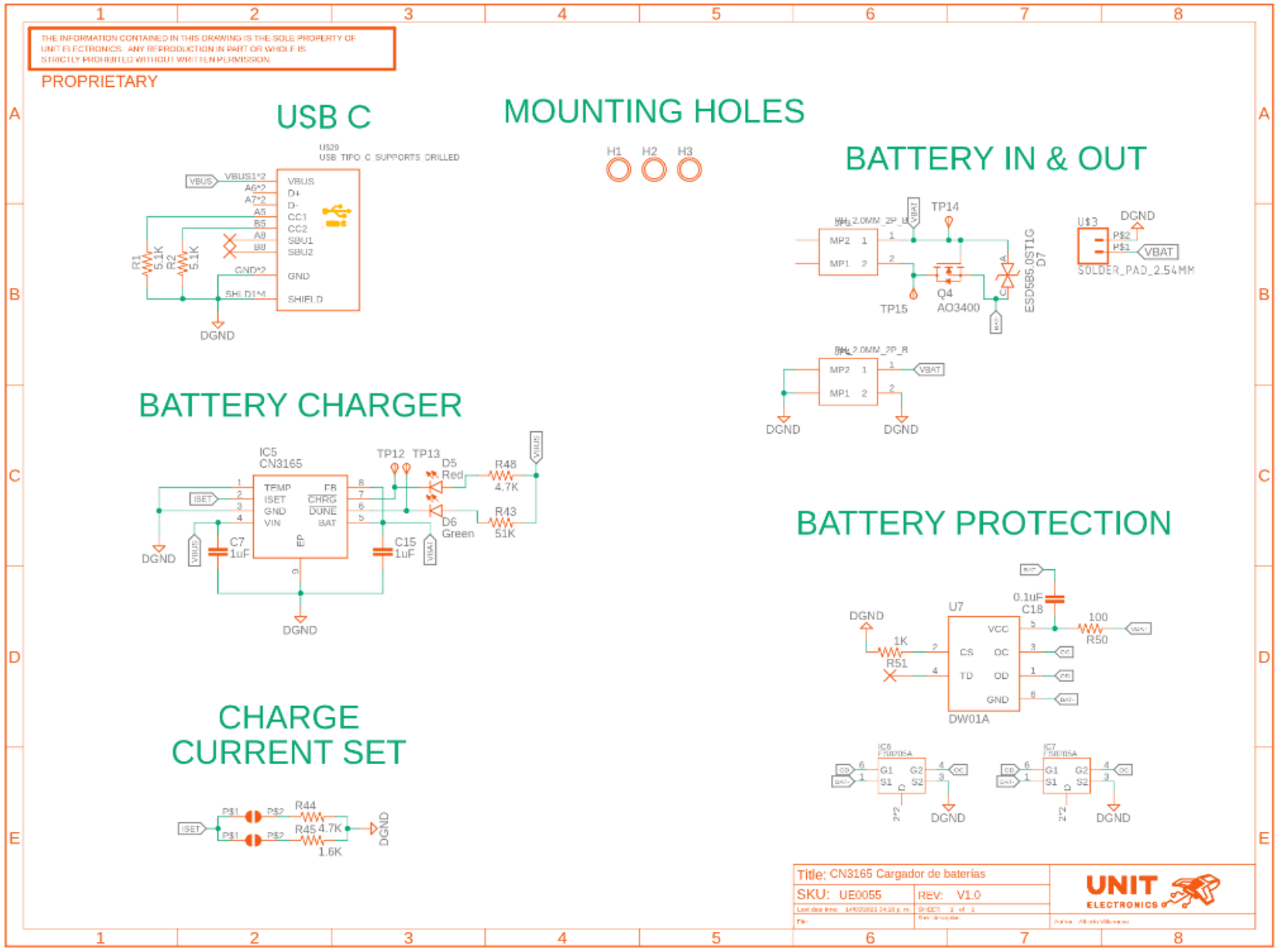
7 Reference Documentation

Ref	Link
Documentation	https://github.com/UNIT-Electronics-MX/unit_devlab_cn3165_li_ion_battery_charger_module
Thonny IDE	https://thonny.org/
Arduino IDE	https://www.arduino.cc/en/software
Visual Studio Code	https://code.visualstudio.com/download
Wiki	https://wiki.uelectronics.com/wiki/devlab-cn3165-li-ion-battery-charger-module

8 Appendix

8.1 Schematic

(https://github.com/UNIT-Electronics-MX/unit_devlab_cn3165_li_ion_battery_charger_module/blob/main/hardware/unit_sch_v_0_0_1_ue0089_cn3165_battery_charger.pdf)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PROPRIETARY
USB C
MOUNTING HOLES
H1 H2 H3
BATTERY IN & OUT
TP14
TP15
Q4
AO3400
ESD5B5.0ST1G
D7
U$3
SOLDER_PAD_2.54MM
DGND
VBAT
BATTERY CHARGER
IC5
CN3165
TP12 TP13
D5
Red
D6
Green
R48
4.7K
R43
51K
C7
1uF
C15
1uF
BATTERY PROTECTION
U7
DW01A
0.1uF
C18
100
R50
1K
R51
CHARGE
CURRENT SET
R44
R45 4.7K
1.6K
Title: CN3165 Cargador de baterías
SKU: UE0055
REV: V1.0
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