

# LS0502SCD33 Evaluation Board

## Quick Reference Guide

### About this document

This Evaluation Board (EVB) quick reference guide describes an advanced linear charger to 2 cells super capacitor storage load. It contains the EVB specification, PCB layout, schematic, bill of materials (BOM), and LEDs indication function.

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## 1. Introduction

The LS0502SCD33 protection IC provides a complete solution designed for systems with backup storage capacitors or the capacitor bank. This integrated system implements essential features such as input overvoltage and overcurrent protection circuits, a reverse blocking switch, and a super capacitor charging control circuit. Additionally, it includes a built-in cell balance mechanism that ensures protection and optimal performance for dual-cell super capacitor systems. With these capabilities, the LS0502SCD33 offers a reliable and efficient solution for managing energy storage and safeguarding the system components.

The LS0502SCD33 is an advanced linear charger. It provides a constant current to charge the super capacitors. It also offers the following functions, programmable super capacitor charging current, programmable input current, programmable input overcurrent, protection automatic cell balancing and automatic main/backup switchover.

LED indicators are used to display the operational mode of the IC.

## 2. LS0502SCD33 Evaluation Board (EVB)

This section covers LS0502SCD33 load switch evaluation board, PCB layout, schematic and BOM.

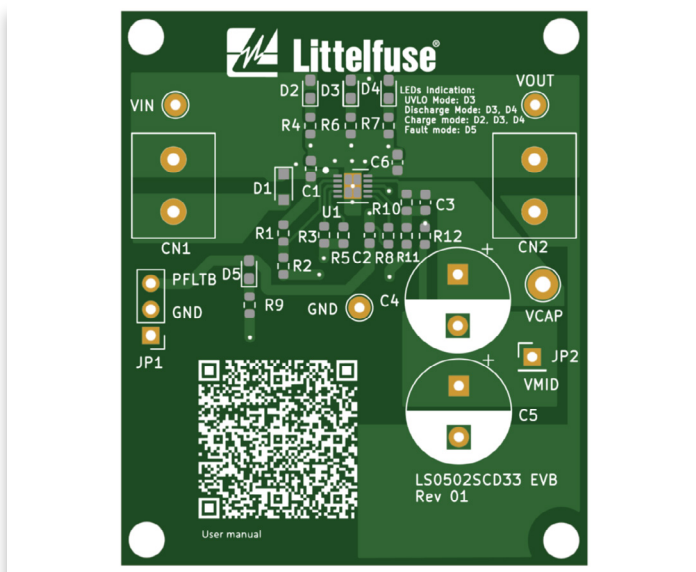
**Figure 1.** LS0502SCD33 evaluation board



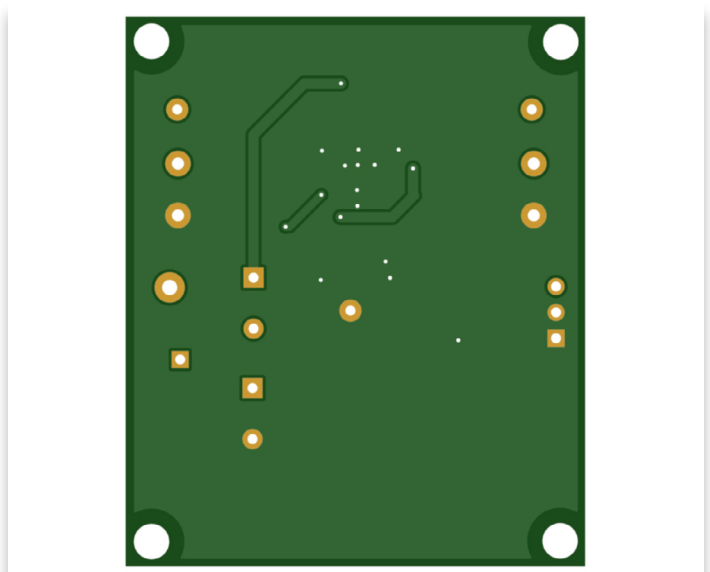
### 2.1 PCB layout

The top-side of the board is shown in Figure 2, and the bottom side in Figure 3.

**Figure 2.** Top-side copper and component



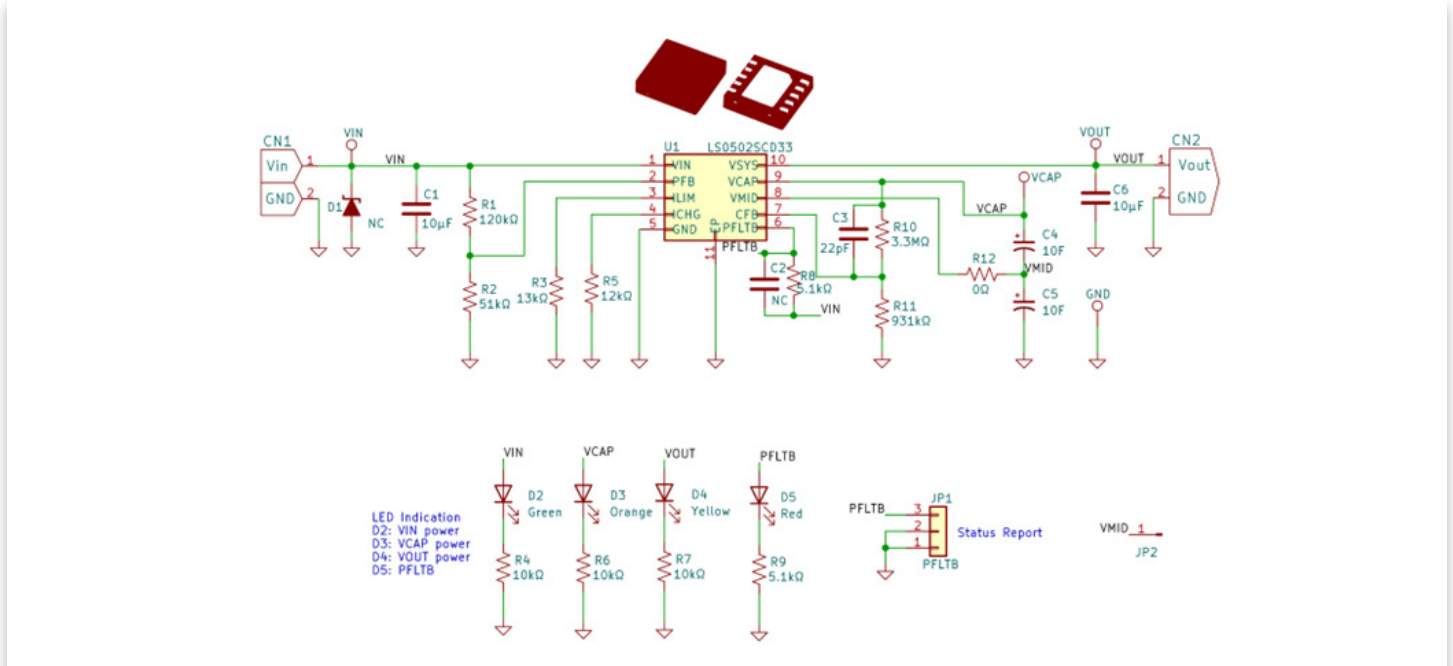
**Figure 3.** Bottom-side copper



## 2.2 Schematic

Figure 4 provides the EVB schematic. The jumpers are highlighted. See Figure 5 for the jumper locations on the board.

Figure 4. Schematic



## 2.3 BOM

Table 1 provides the EVB bill of materials (BOM).

Table 1. BOM

Item	Qty	Reference Designator	Description	Part number	Manufacturer	Package Size
1	1	R1	RES 120K OHM 1% 1/10W 0603	RC0603FR-13120KL	YAGEO	0603
2	1	R2	RES 51K OHM 1% 1/10W 0603	RC0603FR-0751KL	YAGEO	0603
3	1	R3	RES 13K OHM 1% 1/10W 0603	RC0603FR-0713KL	YAGEO	0603
4	3	R4, R4, R7	RES SMD 10K OHM 1% 1/10W 0603	AT0603FRE0710KL	YAGEO	0603
5	1	R5	RES 12K OHM 1% 1/10W 0603	RC0603FR-105K1L	YAGEO	0603
6	2	R8, R9	RES 51K OHM 1% 1/10W 0603	AT0603FRE0710KL	YAGEO	0603
7	1	R10	RES 3.3M OHM 1% 1/10W 0603	RC0603FR-073M3L	YAGEO	0603
8	1	R11	RES 931K OHM 1% 1/10W 0603	RC0603FR-07931KL	YAGEO	0603
9	1	R12	RES 0 OHM JUMPER 1/10W 0603	RC0603FR-070RL	YAGEO	0603
10	2	C1, C6	CAP CER 10UF 10V X5R 0603	CC0603MRX5R6BB106	YAGEO	0603
11	1	C3	CAP CER 22PF 50V C0G/NPO 0603	CC0603JPNPO9BN220	YAGEO	0603
12	2	C4, C5	Super CAP 3V 10F	WEC3R0106QA	PAC ELECTRONICS	P10x25
13	1	D2	LED GREEN CLEAR SMD	LTST-C191KGKT	LITEON	0603
14	1	D3	LED ORANGE CLEAR SMD	LTST-C191KFKT	LITEON	0603
15	1	D4	LED YELLOW CLEAR SMD	LTST-C191KSKT	LITEON	0603
16	1	D5	LED RED CLEAR SMD	LTST-C191KRKT	LITEON	0603
17	1	U1	SUPER CAPACITOR PROTECTION IC	LS0502SCD33	LITTELFUSE	DFN3x3_10L
18	4	Vin, Vout, Vcap, GND	PCB TEST POINT	4697	CENTENARY MATERIAL	HOLE $\phi 0.8 \sim \phi 1.0$
19	2	CN1, CN2	TERMINAL BLOCK, PLUGGABLE, 2P 5.08	AMB310-508M2	TUN-HWA MATERIAL	2Px 5.08mm

### 3. Function Setting

The current Limit, charging current setting, input voltage sensing and stop charging voltage, as defined in Table 2.

**Table 2.** EVB function list

Functions	Value
Current Limit (A)	2.3
Charging Current (A)	0.275
Input Low Voltage Sensing (V)	4.02
Stop Charging Voltage (V)	5.03

- Use the following equation to calculate the current limit value

$$ILIMIT = 30A * k\Omega / RLIMIT$$

- Use the following equation to calculate the charging current value

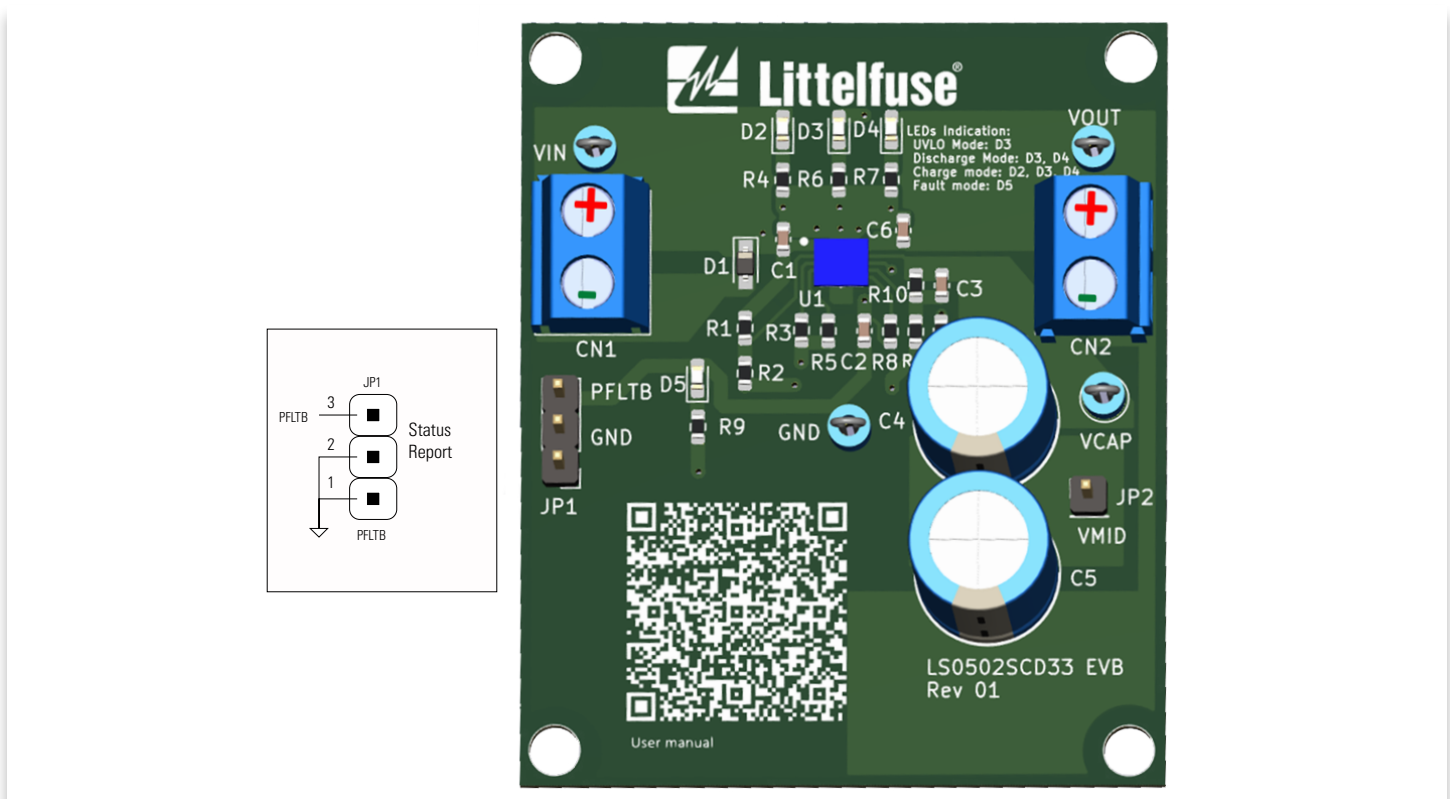
$$ICHG = 3.3A * k\Omega / RCHG$$

- Use the resistors and the voltage divider to set input low voltage value and the reference voltage is 1.2 V.
- Use the resistors and the voltage divider to set stop charging voltage value and the reference voltage is 1.1 V.

### 4. Connectors, Jumpers and LEDs Indication

To configure the EVB for operation, reference Table 3. This table lists a summary of the EVB's connectors, jumpers and LEDs. The location of the connectors and jumpers are shown in Figure 5.

**Figure 5.** EVB connector and jumpers



**Table 3. Connectors and Jumper**

Connector	Description
CN1 for Vin	DC positive pin (Vin+) and Ground (GND) pin
CN2 for Vout	DC positive pin (Vout+) and Ground (GND) pin

Jumper Options	Description
JP1	Input power failure indicator
JP2	Two capacitors middle point voltage

**Table 4. EVB LED summary list**

LED	Description
D2	Vin powerpin
D3	Vcap power
D4	Vout power
D5	off when the PFB drop below 1.2 V or (Vin-Vout) exceed 360 mV

**Note:** EVB LEDs indication are as shown in Table 4.