

# Nichicon SLB Series Evaluation Board User Manual

## Nichicon SLB Series Battery charging & monitoring reference circuit

### **CAUTION**

#### **ENGINEERING EVALUATION PURPOSES ONLY**

This evaluation board is made for the purpose of the product evaluation. It is strictly prohibited to use this evaluation board for any other purpose.

Torex Semiconductor does not guarantee that all samples will perform in exactly the same way and we recommend that you always consult our product data sheets for the minimum and maximum specifications.

It is also important that you evaluate all our products carefully before mass production and in case of any doubt, please contact your Torex representative.

**Nichicon SLB Series Evaluation Board***Nichicon SLB Series Battery charging & monitoring reference circuit***Battery Feature : SLB Series**

- 20C High-rate rapid charge/discharge performance
- High density input/output like an electric double layer capacitor
- Long life of more than 25,000 charge/discharge cycles
- Low temperature characteristics enabling operation even at -30°C
- Uses highly safe lithium titanium oxide (LTO)

**Battery Lineup**

|                               |              |              |              |              |              |        |
|-------------------------------|--------------|--------------|--------------|--------------|--------------|--------|
| Part Number                   | SLB03070LR35 | SLB03090LR80 | SLB04255L040 | SLB08115L140 | SLB12400L151 |        |
| Nominal Voltage               | 2.4V         | 2.4V         | 2.4V         | 2.4V         | 2.4V         |        |
| Voltage Range                 | 1.8V ~ 2.8V  | 1.8V ~ 2.8V  | 1.8V ~ 2.8V  | 1.8V ~ 2.8V  | 1.8V ~ 2.8V  |        |
| Max. charge/discharge current | 7mA          | 16mA         | 80mA         | 280mA        | 3000mA       |        |
| Nominal Capacity              | 0.35mAh      | 0.80mAh      | 4mAh         | 14mAh        | 150mAh       |        |
| ESR                           | Max. 12Ω     | Max. 8Ω      | Max. 0.6Ω    | Max. 0.24Ω   | Max. 0.06Ω   |        |
| Temperature Range             | -30°C ~ 60°C | -30°C ~ 60°C | -30°C ~ 60°C | -30°C ~ 60°C | -30°C ~ 60°C |        |
| Size                          | Diameter     | 3.0mm        | 3.3mm        | 4.0mm        | 8.0mm        | 12.5mm |
|                               | Height       | 7.0mm        | 9.0mm        | 25.5mm       | 11.5mm       | 40.0mm |

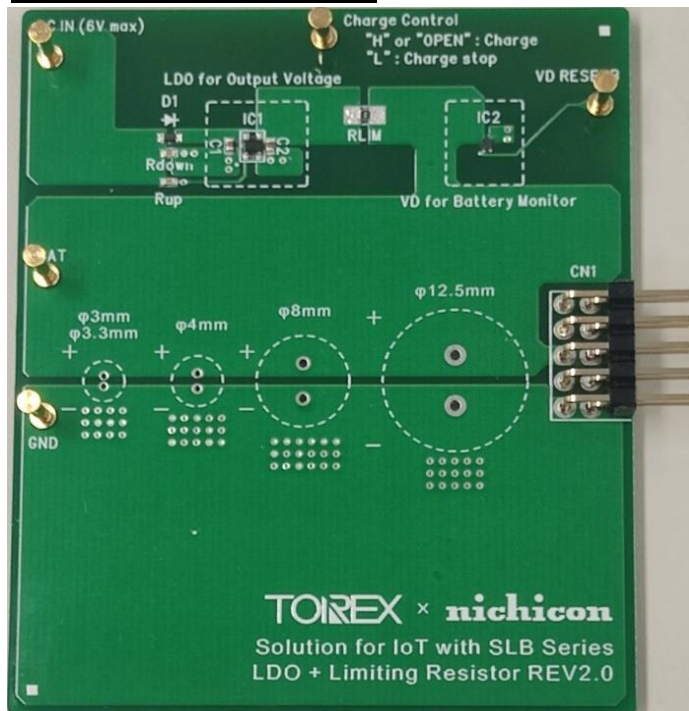
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**Contact Nichicon**English : <https://www.nichicon.co.jp/english/contact/inquiry/>日本語 : <https://www.nichicon.co.jp/contact/capacitor/>

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### Evaluation Board Picture



### Evaluation Board SPEC

Ta=25°C

|                 |                                    | CONDITION / SIGNAL | MIN.  | TYP.  | MAX.  | UNIT |
|-----------------|------------------------------------|--------------------|-------|-------|-------|------|
| Vin             | Input Voltage Range                | -                  | 2.0   | 5.0   | 6.0   | V    |
| Battery Voltage | CV Voltage<br>(Max Charge Voltage) | Ta=25°C            | -     | 2.63  | -     | V    |
|                 |                                    | Ta=-40°C ~ 85°C    | -     | 2.63  | 2.70  |      |
| Detect Voltage  | Battery Low Voltage Monitor        | RESETB="L"         | 1.786 | 1.800 | 1.814 | V    |
| Release Voltage | Battery High Voltage Monitor       | RESETB="H"         | 2.443 | 2.475 | 2.507 | V    |

## **Nichicon SLB Series Evaluation Board**

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### **XC6240 / XC6140 Feature**

#### **Charger IC for LTO Battery : XC6240 Series**

- |                        |       |                         |
|------------------------|-------|-------------------------|
| ▪ Input Voltage Range  | ..... | 1.5V ~ 6.0V             |
| ▪ Output Voltage Range | ..... | 2.63V @ Ta=25°C         |
|                        | ..... | Max 2.70V @ Ta=-40~85°C |
| ▪ Output Current       | ..... | 150mA                   |
- Designed to reduce the discharge current from the battery.
  - Low profile package with h=0.33 mm for low profile solutions.

<https://product.torexsemi.com/en/series/xc6240>

#### **Battery Monitor IC for LTO Battery : XC6140 Series**

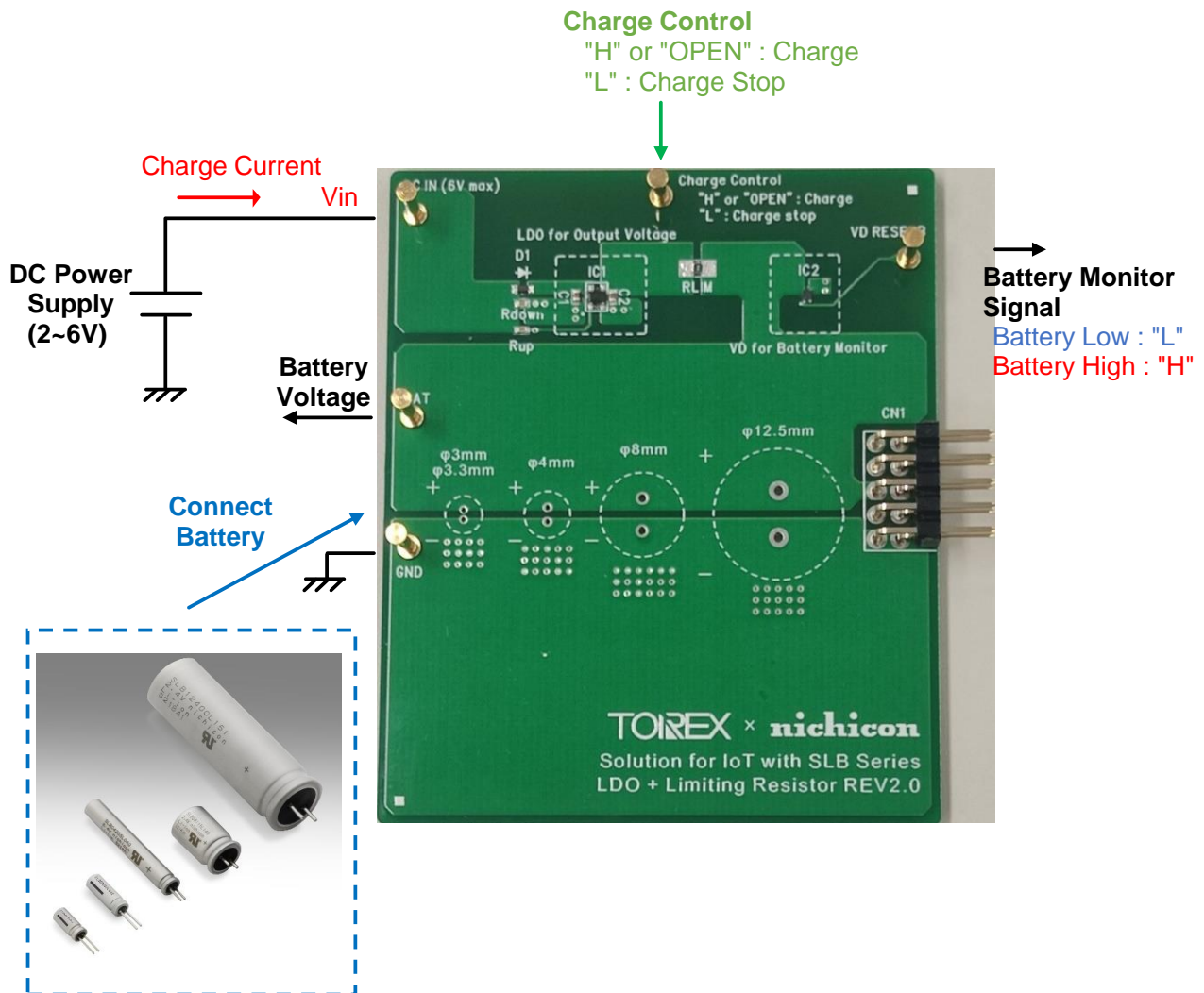
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|-----------------------|-------|-------------|
| ▪ Input Voltage Range | ..... | 1.1V ~ 6.0V |
| ▪ Detect Voltage      | ..... | 1.6V ~ 2.2V |
| ▪ Release Voltage     | ..... | 2.475V      |
- Optimum detection voltage for over-discharge protection of LTO batteries.
  - Large hysteresis width for stable signal output even with LTO batteries with high internal impedance.
  - Designed to reduce the discharge current from the battery.
  - Low profile package with h=0.33 mm for low profile solutions.

<https://product.torexsemi.com/en/series/xc6140>

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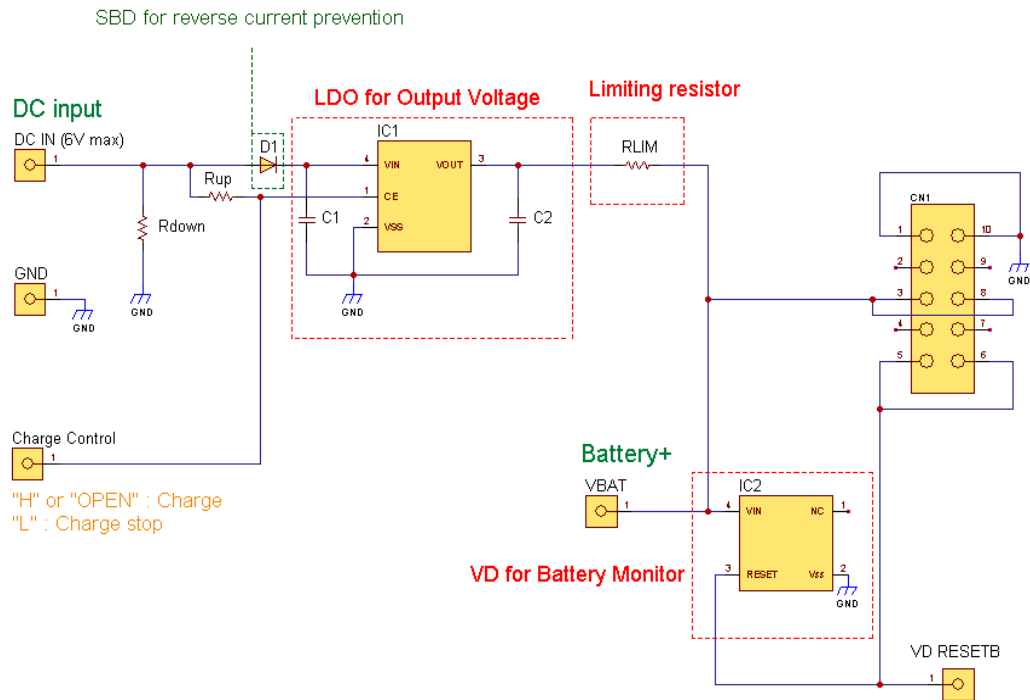
### Quick Start Procedure



## Nichicon SLB Series Evaluation Board

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### Block Diagram



### BOM

#### Required Circuit Component

| Item  | Value  | Description                        | Size [mm] | Part Number         | Manufacture |
|-------|--------|------------------------------------|-----------|---------------------|-------------|
| IC1   | -      | Battery Charger for LTO Battery    | SSOT-24   | XC6240A263NR-G      | TOREX       |
| C1    | 1uF    | Ceramic cap., 25V/1μF              | 1005      | C1005X5R1E105K050BC | TDK         |
| C2    | 1uF    | Ceramic cap., 25V/1μF              | 1005      | C1005X5R1E105K050BC | TDK         |
| IC2   | -      | Battery Monitor IC for LTO Battery | USPQ-4B05 | XC6140C18A9R-G      | TOREX       |
| D1    | -      | Schottky Barrier Diode, 40V/200mA  | SOD-523   | XBS024S15R-G        | TOREX       |
| Rup   | 100kΩ  | Resistor                           | 1005      | 100kΩ               | -           |
| Rdown | 100kΩ  | Resistor                           | 1005      | 100kΩ               | -           |
| RLIM  | Jumper | Resistor                           | 2012      | 0Ω                  | -           |

#### Battery

| Item    | Value | Description | Size [mm] | Part Number                                   | Manufacture |
|---------|-------|-------------|-----------|---|-------------|
| Battery | -     | -           | -         | SLB Series<br>(Implement the system yourself) | Nichicon    |

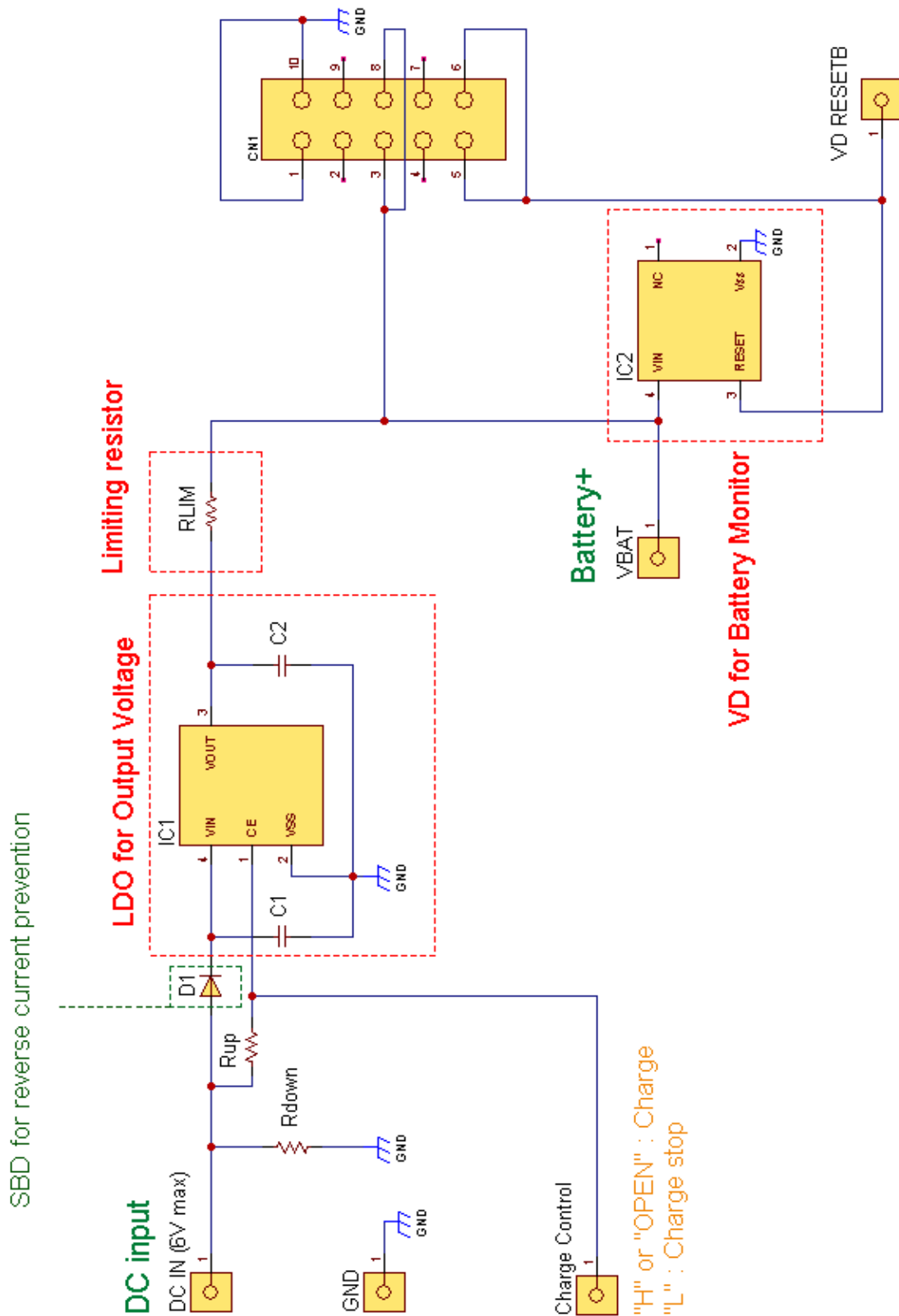
#### Connector

| Item | Value | Description          | Size [mm] | Part Number | Manufacture      |
|------|-------|----------------------|-----------|-------------|------------------|
| CN1  | -     | Pin Header, Dual 2x5 | -         | 61301021021 | Würth Elektronik |

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## Schematic



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## PCB Layout

