

Torex...Powerfully Small!

**Wireless power transfer compatible, Multi-function
Ultra-compact charger IC for Li-ion batteries
XC6810 Series Product Overview**

October 2025
TOREX Semiconductor
Rev. 1.1

For Small Li-ion / Shutdown for shipping / V_{IN} Two-wire communication / Charging & Battery Monitor

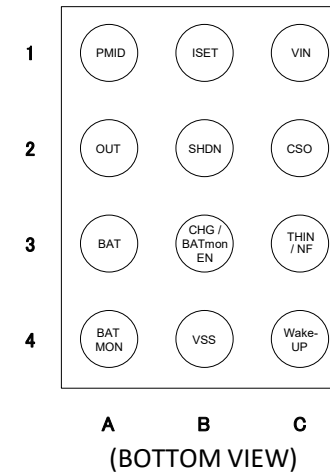
■ Features

Input Voltage (Chargeable) : 3.5V ~ 28.0V (Absolute Max. : 30V)
 Charge Voltage : 3.80V ~ 4.40V (0.05V increments)
 Charge Current : 1mA ~ 25mA (Set by an external resistor)
 BAT Sink Current : 10nA (TYP. at Shutdown)
 Functions : Shutdown, Wake-up
 Battery Voltage Monitor or Low Notification
 Current path with Input Current limit (110mA)
 OUT line switch interlocked with UVLO (option)
 Battery temperature monitor
 Charge Enable Control

Protections : Battery Over Discharge Protection
 Output Short Protection
 Thermal Control
 Reverse Current Prevention
 Safety Timer of Charging, UVLO

Package : WLP-12-01
 Operating Ambient Temp. : -40°C ~ 85°C

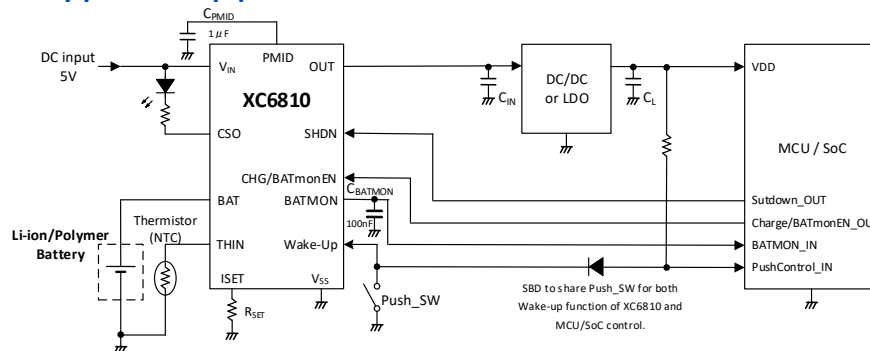
■ Package



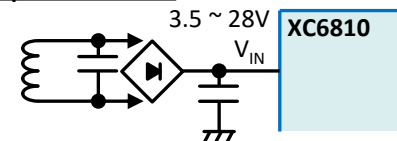
WLP-12-01
 (1.17 x 1.57 x 0.33mm)

TOREX Longevity
 Program (TLP)

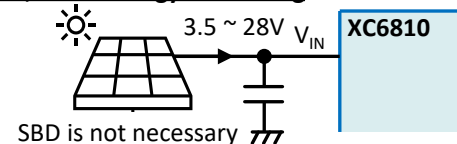
■ Typical Application Circuit



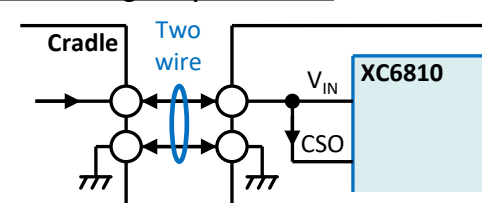
Wireless power transfer



Solar, other Energy Harvesting

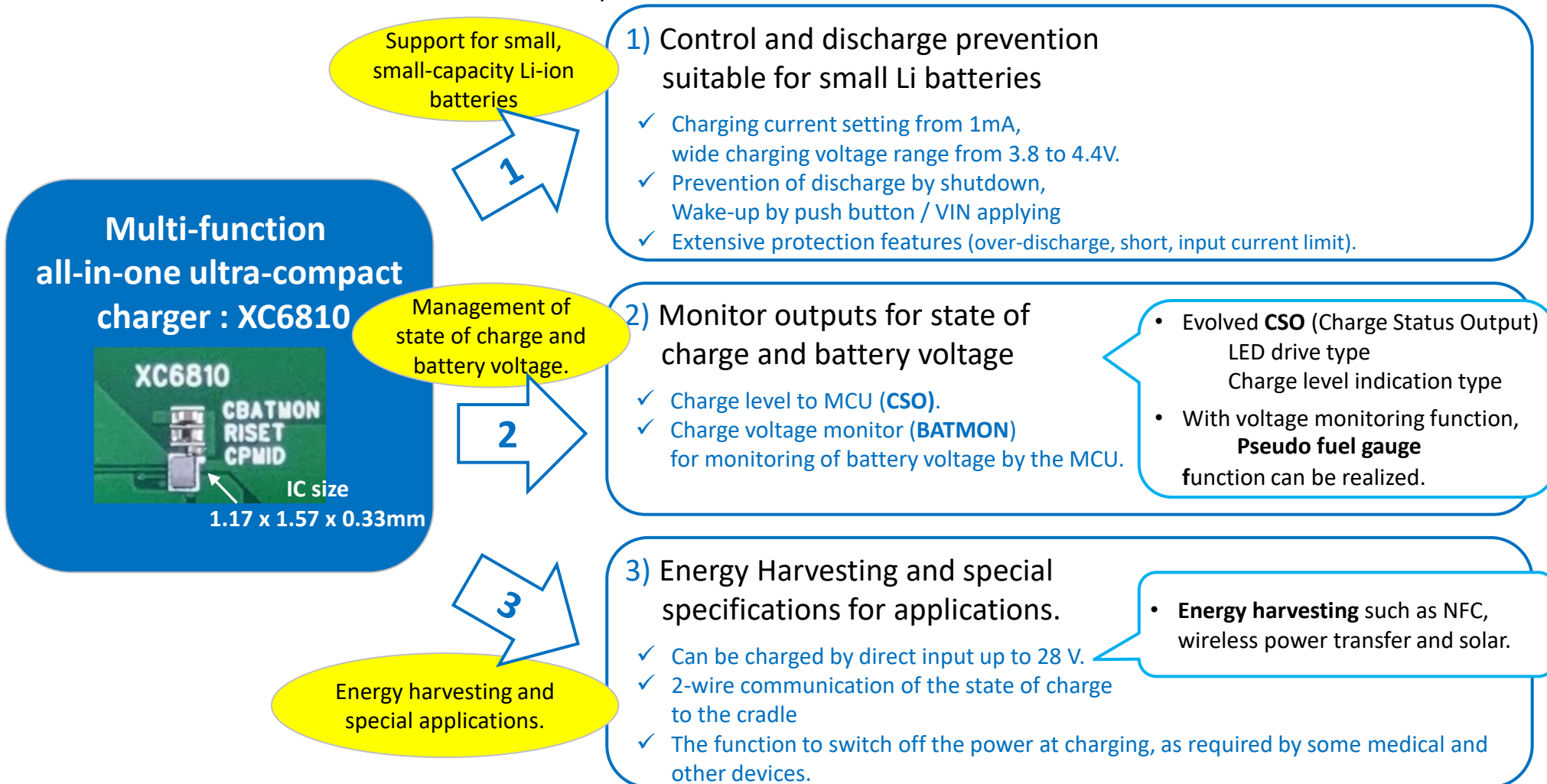


State of charge output to cradle



All-in-one charger XC6810 for ultra-compact, low-consumption devices.

- Ultra-compact charger with optimal charge/discharge management and various functions for small Li-ion batteries in wearable, hearable and IoT devices.



By controlling this charging IC and MCU, various inputs such as energy harvesting can be supported and power supply control including battery charging/discharging can be easily constructed.

XC6810 : Features and Target Applications

All-in-one multi-function charger IC for small-capacity Li-ion/polymer batteries that provides the functions required by small devices/modules in an ultra-small package.

■ Features

1) Charge Controls / Protections

- ✓ Charge controls and Current Path suitable for small capacity Li-ion/Polymer batteries
- ✓ Shutdown function to suppress battery discharge after shipment
- ✓ Extensive protection functions

2) Condition monitor

- ✓ Charge status and battery voltage monitoring

3) Support for various applications and power supplies

- ✓ V_{IN} 2-wire communication with cradle
- ✓ Supports wireless power transfer and other energy harvesting
- ✓ Options suitable for some medical and other wearables / hearables



WLP-12-01 (1.17 x 1.57 x 0.33 mm)
Ultra-small package and a few external components provide a space-saving, low-profile solution.

■ Target Applications

● Wearables / Hearables

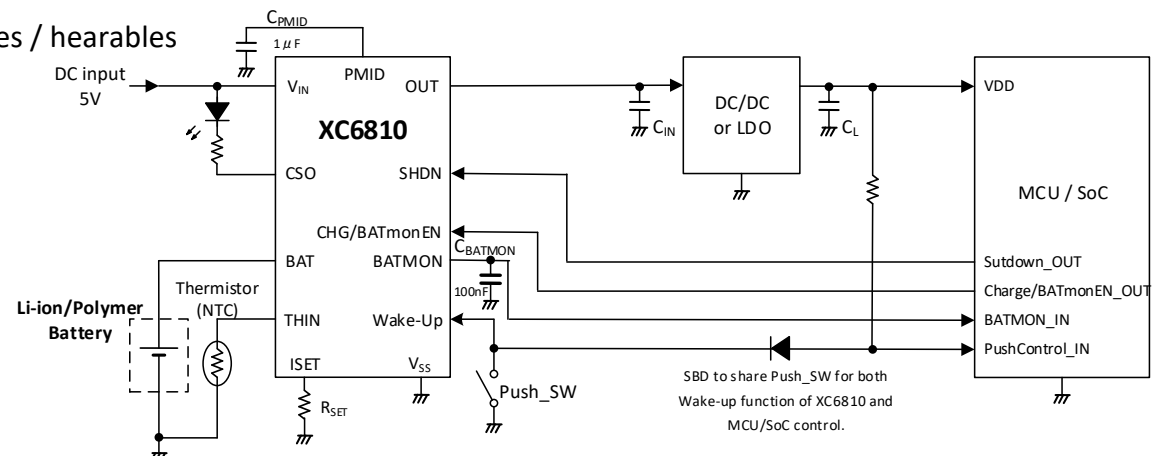
- ✓ Wearables, Tracker devices
- ✓ Hearing aids, Wireless earphones, Headsets
- ✓ Medical / Nursing care wearables / monitors

● IoT sensors/monitors

- ✓ Sensors / Monitors for Home / Office / FA

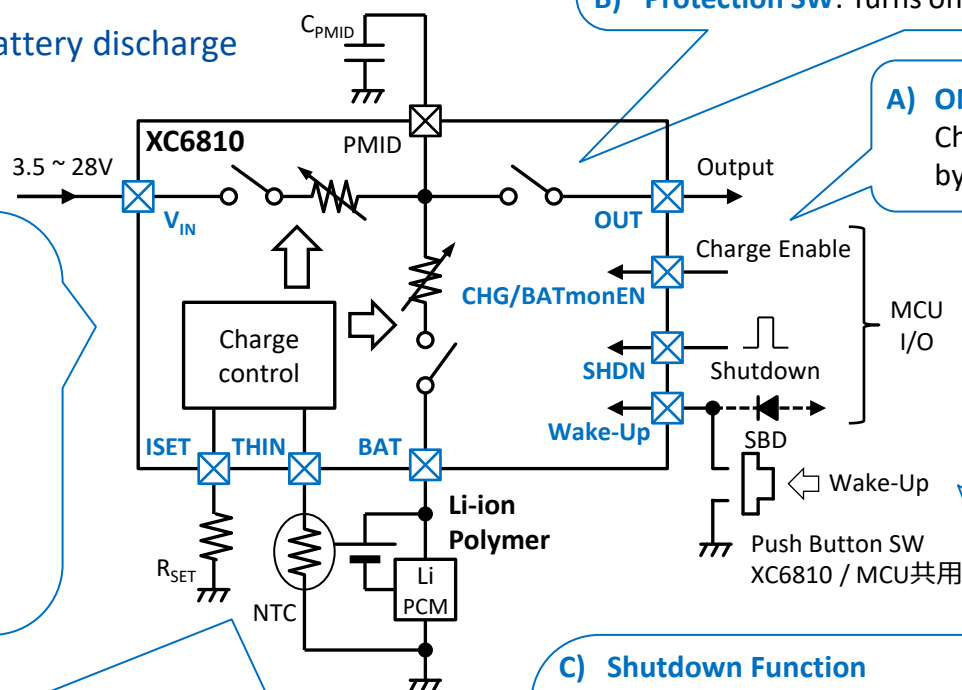
● Wireless and other energy harvesting devices

● Smart cards



■ Charge Control / Protection

- A) Charge control and functions suitable for small-capacity Li-ion/Polymer
- B) Extensive protection features
- C) Shutdown function to prevent Li battery discharge



B) Protection functions

V_{IN} pin: UVLO, Current limit of 110 mA, Reverse current prevention.

Battery over discharge protection.

OUT pin short protection.

Simplified protection for Li battery together with over-discharge.

Current limit during overheating of IC.

A) Charge control CC/CV (Constant Voltage / Constant Current) control

Charge Voltage

CV (V_{CV}) = 3.8 ~ 4.4V, selectable in 0.05V increments. Wide range of charge voltage and low voltage such like 4.1V settings for long life and all-solid-state batteries.

Charge Current

CC (ICHG) = 1~25mA can be set by R_{SET} . For Li-ion/Polymer batteries up to ~50mAh.

Temperature Control Monitored and controlled by NTC on **THIN** pin.

A) Current Path

Supply current from the **V_{IN}** pin to **OUT** pin, separated from the charge current to **BAT** pin.

B) Protection SW: Turns off when **OUT** pin is shorted.

A) ON/OFF control of charging

Charging ON/OFF is controlled by the **CHG/BATmonEN** pin.

C) Shutdown Function

Shutdown (Ship)

Shutdown by pulse to **SHDN** pin.

Prevention of discharge after shipment is essential for small Li batteries.

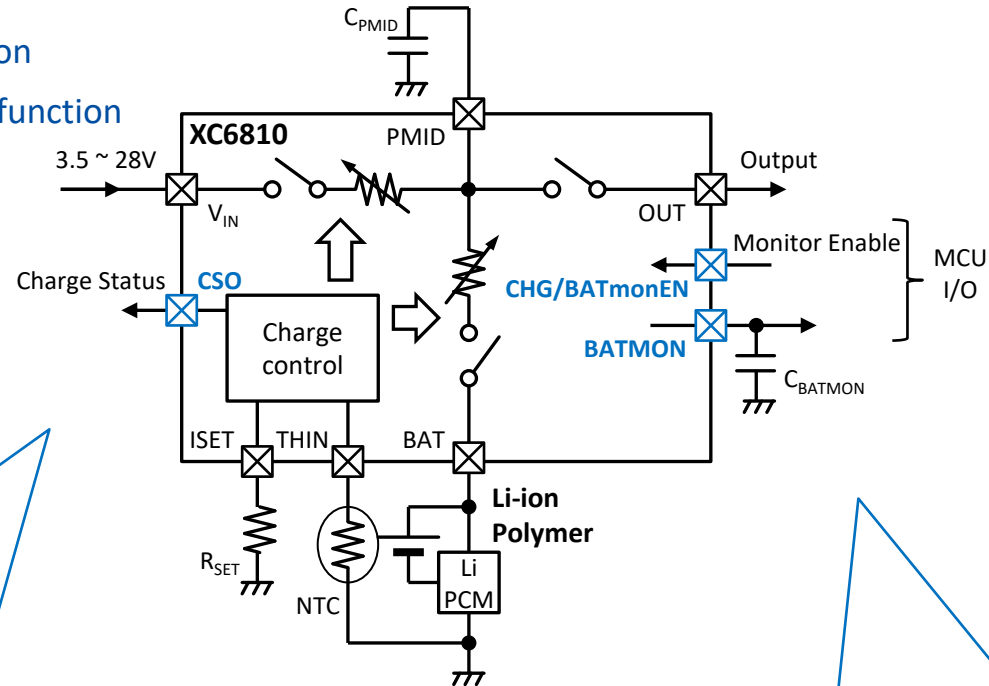
Also used as main power supply SW.

Wake-up

Startup by a "L" pulse to the **Wake-Up** pin or by applying a voltage to the **V_{IN}** pin.

State Monitor

- A) Charge status output function
- B) Battery voltage monitoring function



A) CSO : Charge Status Output : Two types

Battery LED Indicator

Charging (ON) / Stopped (OFF, including charge completion) / Error (Flashing at 8Hz).
Drives LED or outputs to MCU with pull-up resistor.

Battery Status Indicator

1mA constant current sink to GND.

Charge level (Sinks in 32, 16, 8kHz pulses for each state of < 60%, < 90%, 90% ≤)

Charge completion (4kHz) / **Stopped** (OFF) / **Error** (1kHz)

Outputs to MCU with pull-up resistor,
or Modulates V_{IN} for two-wire communication to the cradle.

B) BATMON : Battery Monitor Output : Two types

Battery Voltage Monitor

At "H" for **CHG/BATmonEN**,

Battery voltage (V_{BAT}) x 0.2

is output.

Provide suitable voltage for A/D of MCU.

Consumption during monitoring is only 0.55μA.

Low Voltage Notification (Option)

Outputs "L" when battery voltage is 3.0V or lower.

XC6810 : Extensive features (3)

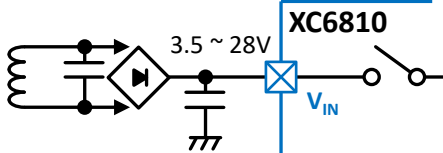
- Support for various applications and power supplies

- A) Charge status output to cradle
- B) Supports wireless power transfer and other energy harvesting
- C) Output OFF type when V_{IN} is supplied (Option)

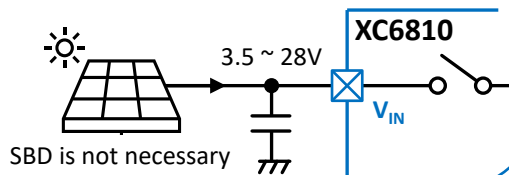
B) Wireless power transfer, Energy harvesting

Supports a wide range of supply/charge input voltage up to 28V.

Wireless power transfer



Solar and other energy harvesting



A) Charge status output/communication to cradle

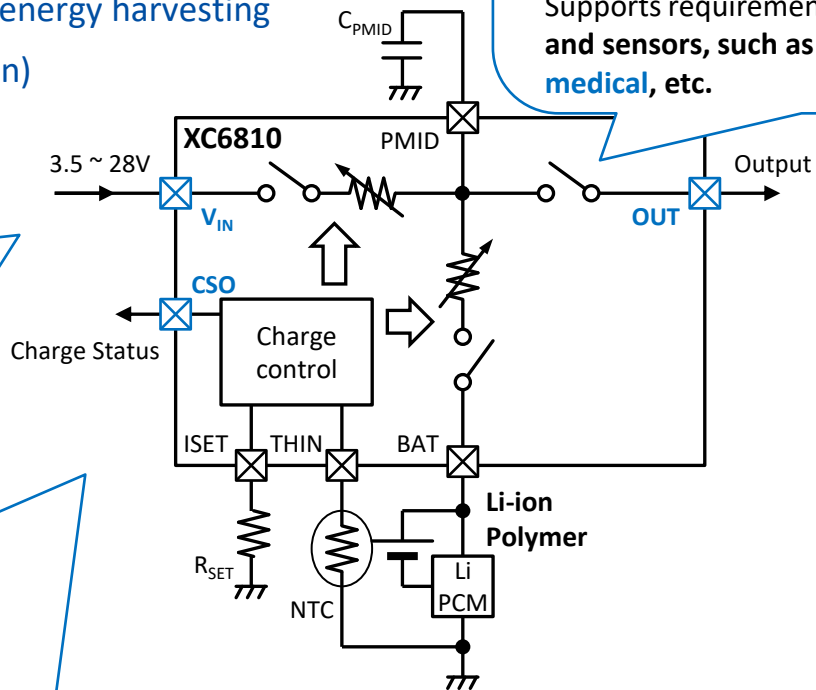
Use **CSO: Battery Status Indicator** type.

Two-wire communication via V_{IN} ; modulates with 1mA pulses.

Charge level (Sinks in 32, 16, 8kHz pulses for each state of < 60%, < 90%, 90% ≤)

Charge completion (4kHz) / Stopped (OFF) / Error (1kHz)

By detecting changes in current, the cradle can display the charge status on LED and control ON/OFF of power feeding.



C) Output OFF type when VIN is supplied (Option)

OUT line switch interlocked with UVLO

A, B, E, F types

When **V_{IN}** is connected, output (**OUT**) is turned off with this SW to stop device operation.
To reset devices as well.

Supports requirements of wearables, hearables and sensors, such as some hearing aids and medical, etc.

