

## NGK INSULATORS "EnerCera" EC Series Evaluation Board User Manual

### NGK INSULATORS "EnerCera" EC 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.

**NGK INSULATORS "EnerCera" EC Series Evaluation Board**

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**Battery Feature : "EnerCera" EC Series**

- Ultra thin (0.45mm thickness) and small configuration embedded in card devices, etc.
- Bendability conforming to ISO 14443-1 standard
- High peak discharge current (~560mA) suitable for long range wireless communication

**Battery Lineup**

Model Number		EC382704P-T	EC382704P-Hr
Dimensions (Without terminals)		38 x 27mm	
Thickness		0.45mm	
Nominal Capacity		27mAh (4.3V) / 24mAh (4.2V)	20mAh(4.2V)
Nominal Voltage		3.8V	
Charge	Charging Condition	Constant current (CC)-constant Voltage (CV) Charging	
	Charge Voltage	4.3V / 4.2V	4.2V
	Standard Charge Current	13.5mA (4.3V) / 12mA (4.2V)	10mA
Discharge	Discharge end voltage	3.0V	
	Standard Discharge Current	27mA (4.3V) / 24mA (4.2V)	10mA
	(Ref.) Peak Discharge Current <sup>**</sup>	560mA	130mA
Operation Temp.		Charge : 0 ~ 45°C (Discharge : -20 ~ 45°C)	Charge : 0 ~ 60°C (Discharge : -20 ~ 60°C)

As at July 2023.

\* 1 Voltage drop is less than 0.5V with continuous discharge for 0.1 sec(at 25°C)

Since the terminals of "EnerCera" EC series are aluminum(+) and Nickel(-), the cannot be attached to the evaluation board with common solder.

For direct soldering, refer to following EnerCera special site "MyEnerCera". Registration is required on this site.

<https://enercera.ngk-event.com/en/myenercera/>

**Contact NGK INSULATORS**

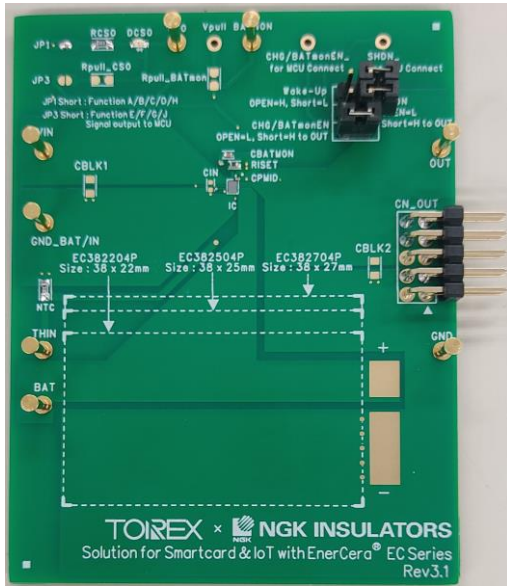
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## Evaluation Board Picture



## Evaluation Board SPEC

Ta=25°C

	CONDITON / SIGNAL	MIN.	TYP.	MAX.	UNIT
Input Voltage Range	-	3.5	5.0	28.0	V
Charge Voltage (CV)	Charge Mode, Normal Operation	4.18	4.20	4.22	V
Charge Current (CC)		-	5	-	mA

### CSO Output (Function H)

STATUS	Condition	LED (CSO Output)
Trickle Charge		ON (Low impedance)
Main Charge		ON (Low impedance)
Charge Complete		OFF (High impedance)
Charge Disable Status (Charge Enable=L, Function H)	Safety Timer Pause	OFF (High impedance)
Charge Abnormal State	Safety Timer Active	8Hz Oscillation
No Battery (THIN OPEN)	Safety Timer Pause	OFF (High impedance)
No Battery (THIN Connected)	Charge Complete⇔Recharge	ON⇔OFF
No Power	UVLO or Battery Reverse Current Protection	OFF (High impedance)
Shutdown Mode		OFF (High impedance)

### BATMON Output (Function H)

Mode	CHG/BATmonEN	Charge State	BATMON Output
Shutdown Mode	-	-	GND or High impedance
Charge Mode	"H"	Charge Enable	0.2 x V <sub>BAT</sub>
	"L"	Charge Disable (Timer pause)	GND
Battery Power Mode	"H"	Charge Disable	0.2 x V <sub>BAT</sub>
	"L"		GND

## NGK INSULATORS "EnerCera" EC Series Evaluation Board

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### XC6810 Feature

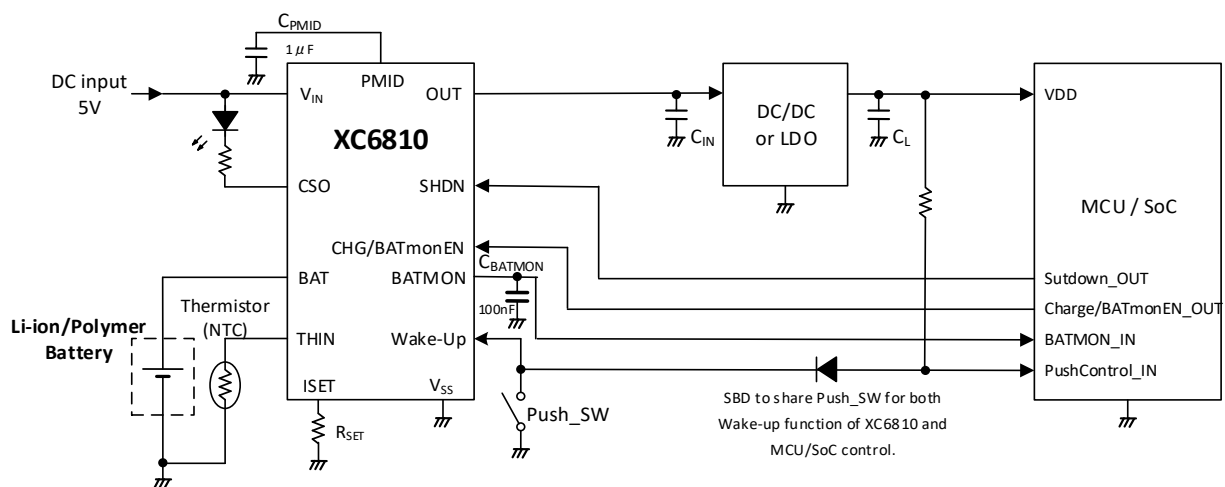
- |                       |       |                         |
|-----------------------|-------|-------------------------|
| ▪ Input Voltage Range | ..... | 3.5V ~ 28.0V            |
| ▪ Charge Voltage (CV) | ..... | 3.80V ~ 4.40V           |
| ▪ Charge Current (CC) | ..... | 1mA ~ 25mA              |
| ▪ BAT Sink Current    | ..... | 10nA (TYP. at Shutdown) |
- 
- Ultra-compact charger IC for Li-ion batteries compatible with wireless power transfer
  - Shutdown for shipping / VIN Two-wire communication / Charging & Battery Monitor

### 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



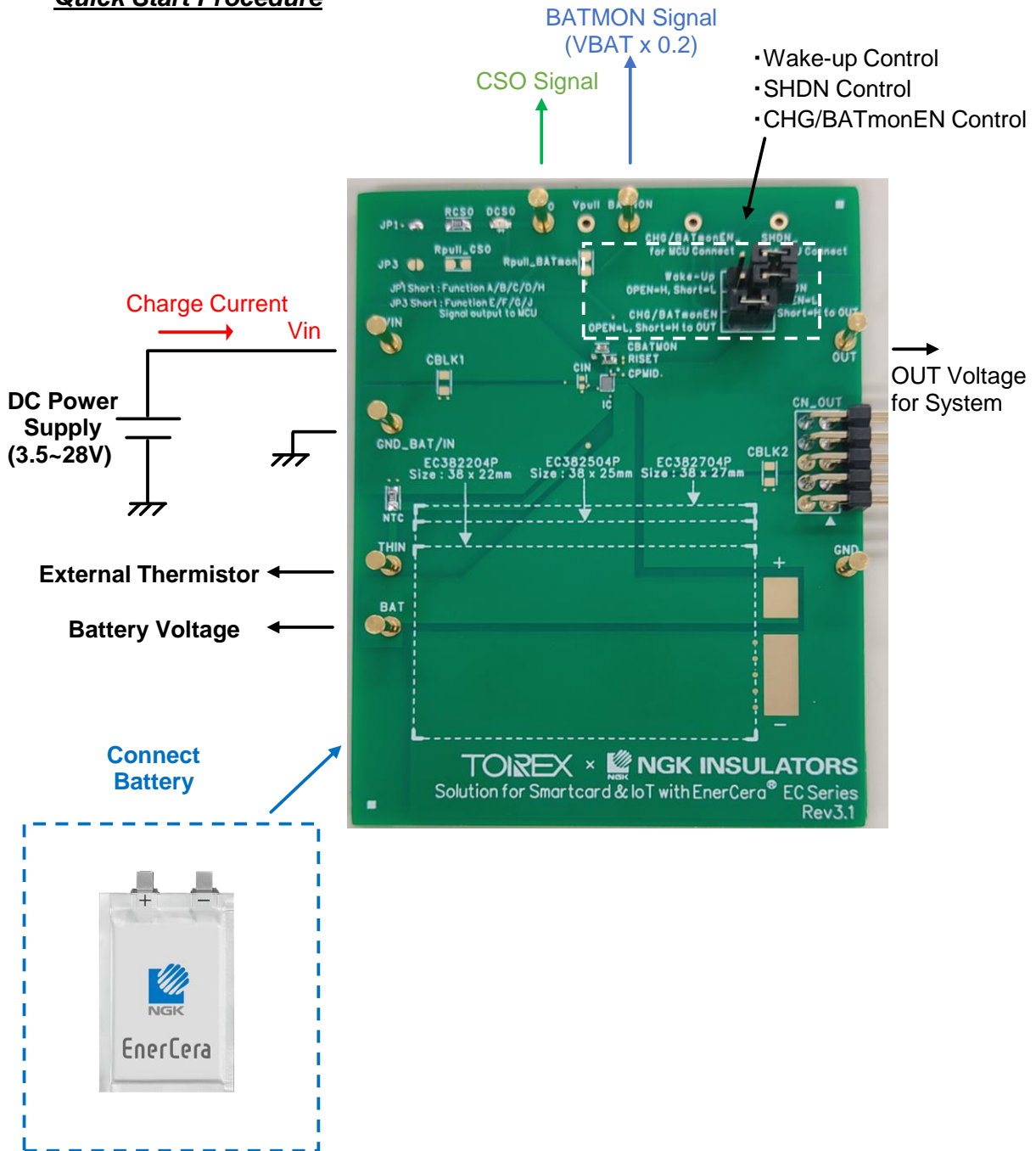
Typical Application Circuit

<https://product.torexsemi.com/en/series/xc6810>

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NGK INSULATORS "EnerCera" EC Series Battery charging & monitoring reference circuit

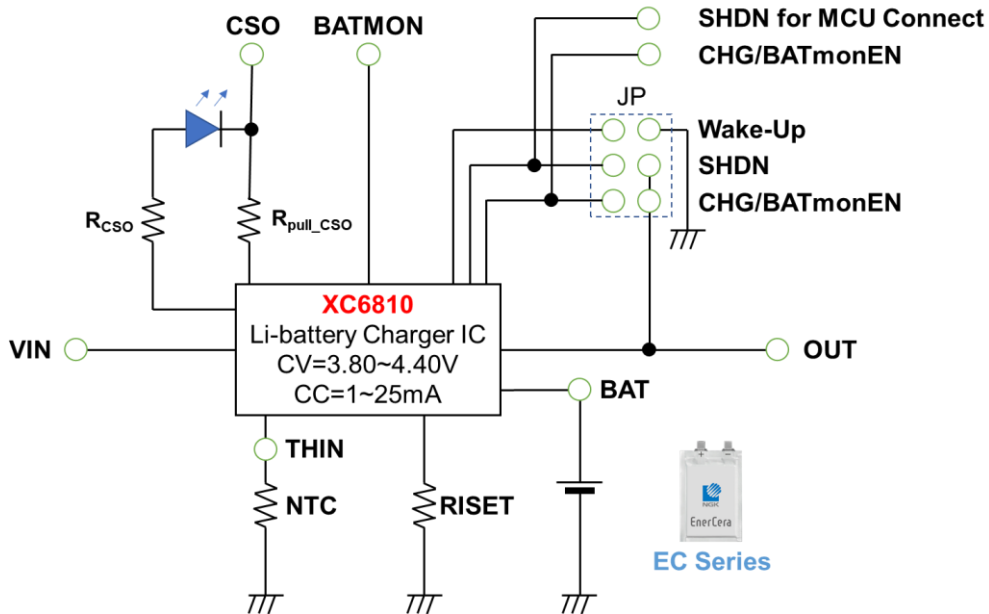
## Quick Start Procedure



# NGK INSULATORS "EnerCera" EC Series Evaluation Board

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## Block Diagram



## BOM

### Required Circuit Component

Item	Value	Description	Size [mm]	Part Number	Manufacture
IC	1	Battery Charger for LI-ion	WLP-12-01	XC6810B42H0R-G	TOREX
DCSO	1	LED, Red	1608	150 060 RS7 500 0	Würth Elektronik
CPMID	1	Ceramic cap., 6.3V/1μF	0603	GRM033R60J105MEA2	Murata
CBATMON	1	Ceramic cap., 25V/100nF	1005	GRM155R71E104KE14	Murata
Riset	1	Resistor	1005	10kΩ	-
RCSO	1	Resistor	1005	100kΩ	-
NTC	1	Resistor	1608	10kΩ	-
CIN	-	-	-	-	-
CBLK1	-	-	-	-	-
CBLK2	-	-	-	-	-
RpullBATmon	-	-	-	-	-
Rpull_CSO	-	-	-	-	-
JP1	1	Jumper	-	Short	-
JP3	-	-	-	-	-

### Battery

Item	Value	Description	Size [mm]	Part Number	Manufacture
Battery	-	-	-	"EnerCera" EC Series (Implement the system yourself)	NGK INSULATORS

### Connector

Item	Value	Description	Size [mm]	Part Number	Manufacture
Pin Header	-	Pin Header, Dual 2x5	-	613 010 210 21	Würth Elektronik
Pin Header	-	Pin Header, Dual 2x3	-	613 006 211 21	Würth Elektronik
Jumper	-	Jumper	-	609 002 134 21	Würth Elektronik



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## PCB Layout

