

NGK INSULATORS "EnerCera" ET Series Evaluation Board User Manual

NGK INSULATORS "EnerCera" ET 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.

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Battery Feature : "EnerCera" ET Series

- Constant voltage charging by LDO is possible.
No need for dedicated expensive CC/CV charger ICs.
- Reliable and safe with long life and resistance to repeated charge/discharge.
- Resistant to over-discharge. Simple voltage detector is sufficient.
- Stable voltage of 2.1~2.4V.
Easy energy extraction compared to Supercap (EDLC).
- 105°C high-temperature operation, reflow-compatible, thin and hot-laminate-compatible products are also available.

**Battery Lineup**

Model Number	Coin			Pouch	
	ET2016C-R [Under Development]	ET2016C-H [Under Development]	ET1210C-H	ET271704P-H	ET382704P-H [Under Development]
Dimensions (Without terminals)	φ20mm	φ20mm	φ12.5mm	27mm×17mm	38mm×27mm
Typical Thickness (With terminals)	2.05mm	2.05mm	1.3mm	0.45mm	0.45mm
Nominal Capacity (Charging Voltage: 2.7V)	25mAh	20mAh	4mAh	5mAh	20mAh
Nominal Voltage	2.3V				
Charging Condition	Constant Voltage(CV) Charging (No current control required)				
(Ref.) Peak Discharge Current*1	60mA	45mA	20mA	100mA	300mA
Operation Temp.	-40°C~60°C		-20°C~105°C		-40°C~70°C
Features	Reflow soldering unapplicable	Reflow soldering applicable*2		Fast Charging*3	

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

* 2 Recommended conditions Max.240°C x 1 time. Please contact NGK (enercera-sales@ngk.co.jp) for details.

* 3 Can be charged from 0% to 80% capacity in 14 min.

The terminals (both +/-) of the pouch (E271704P-H) are aluminium and 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

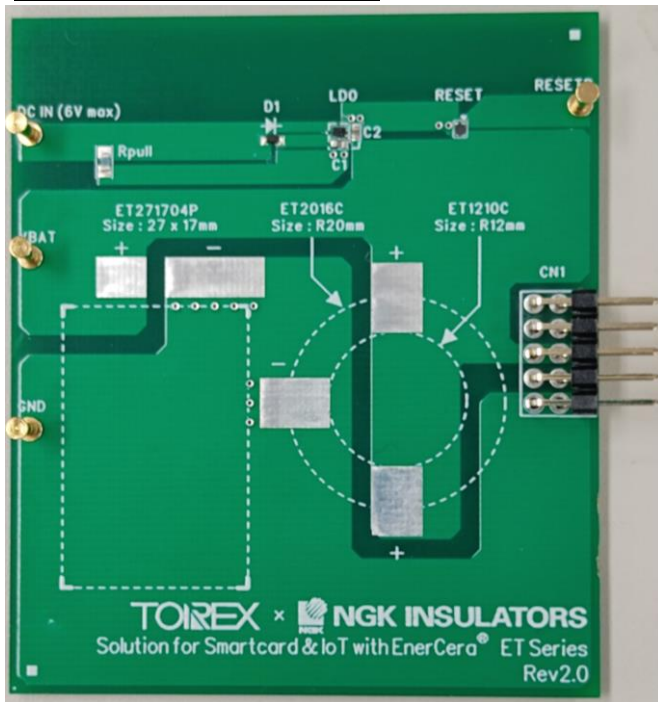
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Evaluation Board Picture



Evaluation Board SPEC

Ta=25°C

		CONDITION / SIGNAL	MIN.	TYP.	MAX.	UNIT
Vin	Input Voltage Range	-	2.0	5.0	6.0	V
Battery Voltage	CV Voltage (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"	1.984	2.000	2.016	V
Release Voltage	Battery High Voltage Monitor	RESETB="H"	2.443	2.475	2.507	V

NGK INSULATORS "EnerCera" ET Series Evaluation Board*NGK INSULATORS "EnerCera" ET Series Battery charging & monitoring reference circuit***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.

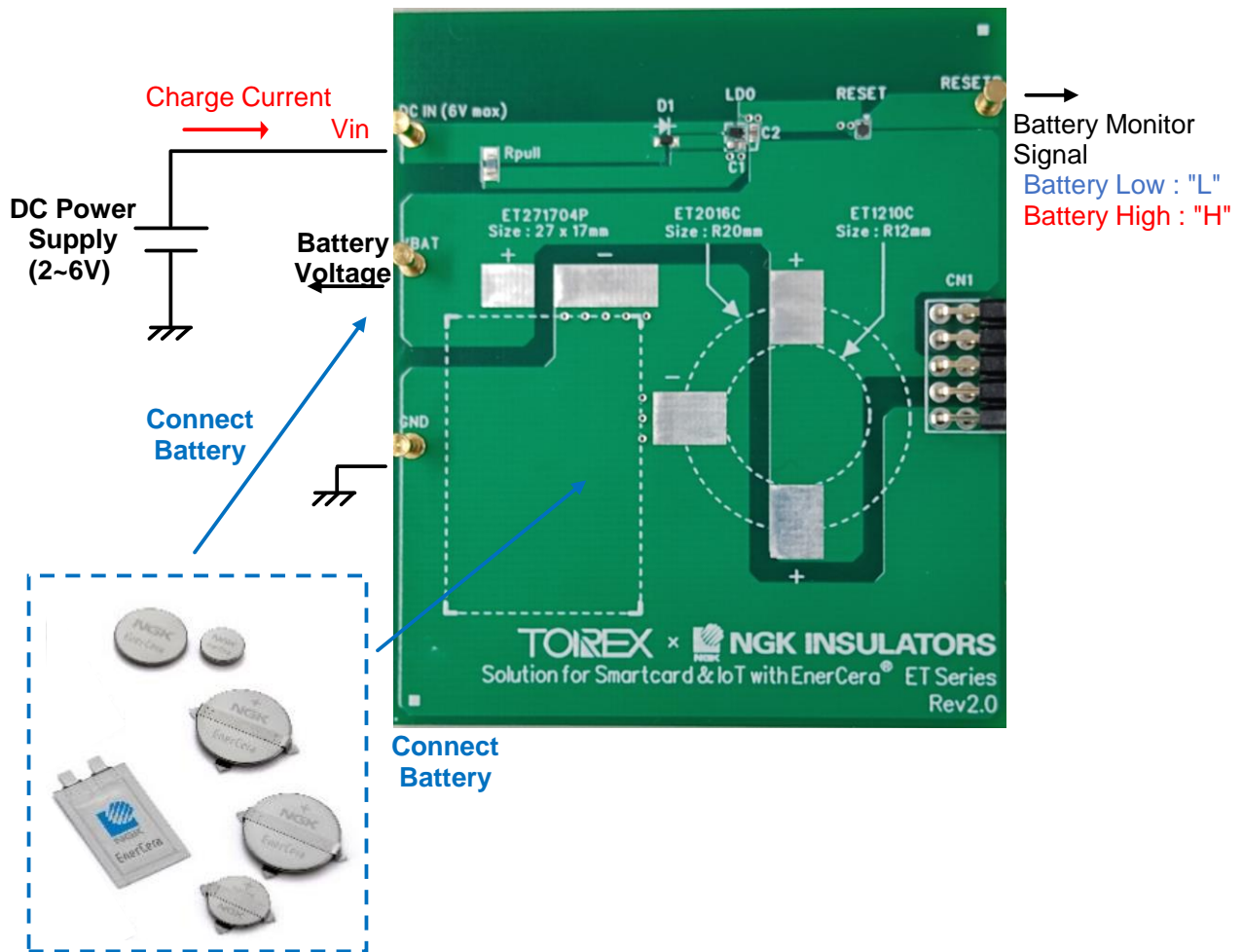
Battery Monitor IC for LTO Battery : XC6140 Series

- | | | |
|-----------------------|-------|-------------|
| ▪ 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.

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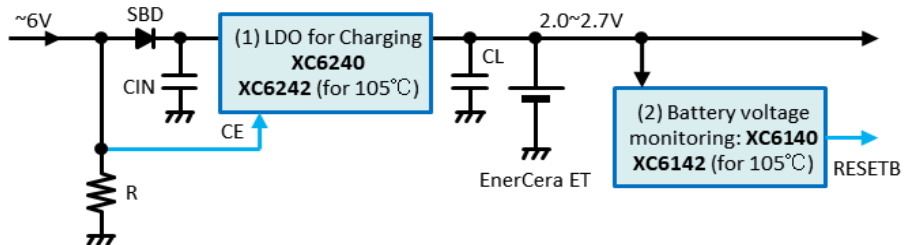
Quick Start Procedure



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Block Diagram



BOM

Required Circuit Component

Item	Value	Description	Size [mm]	Part Number	Manufacture
LDO	-	Battery Charger for LTO Battery	USPN-4	XC6240A2637R-G	TOREX
C1	1 μ F	Ceramic cap., 25V/1 μ F	1005	CGB2A1X5R1E105K	TDK
C2	1 μ F	Ceramic cap., 25V/1 μ F	1005	CGB2A1X5R1E105K	TDK
RESET	-	Battery Monitor IC for LTO Battery	USPQ-4B05	XC6140C20A9R-G	TOREX
D1	-	Schottky Barrier Diode, 40V/200mA	SOD-523	XBS024S15R-G	TOREX
Rpull	100k Ω	-	1608	-	-

Battery

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

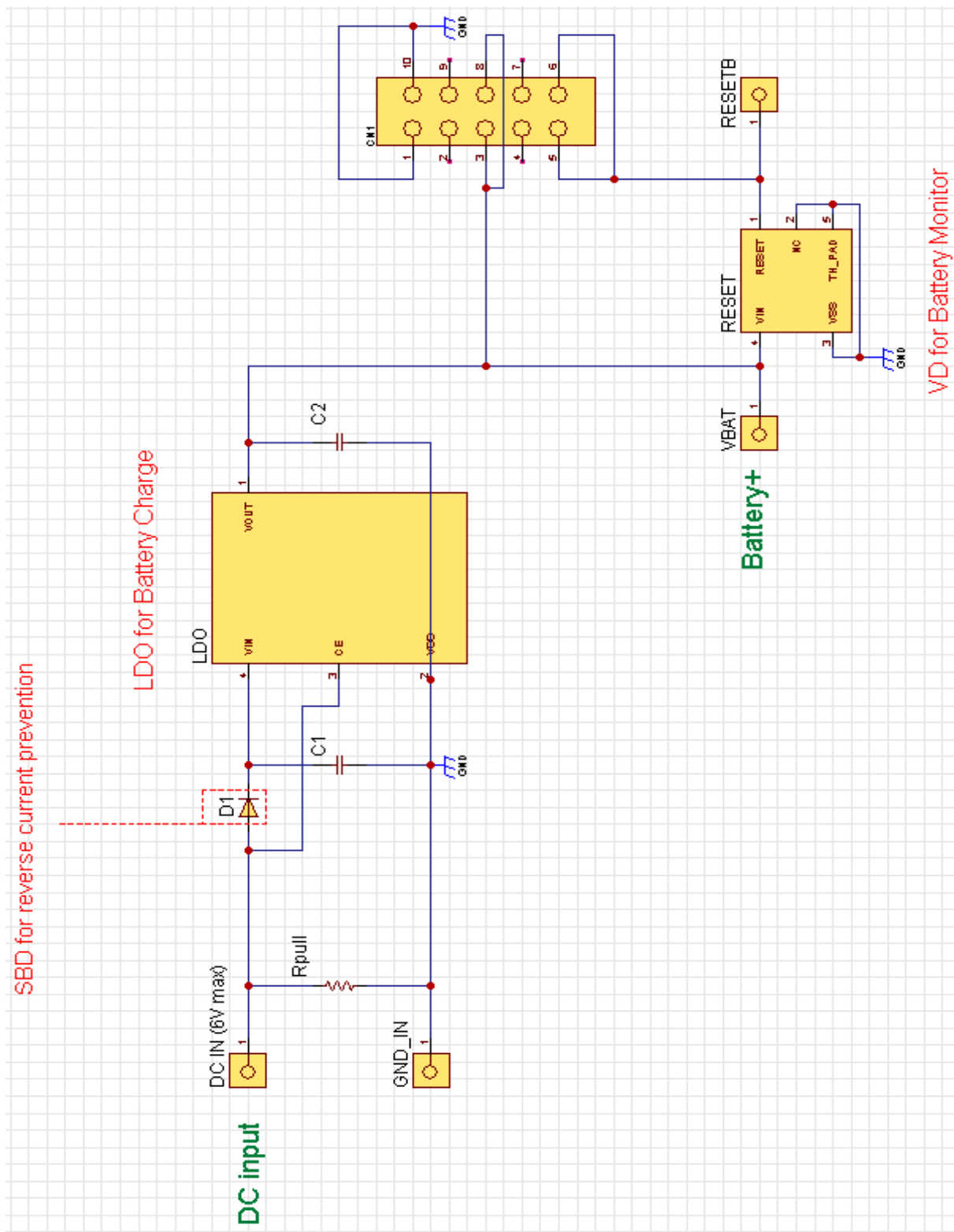
Connector

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

