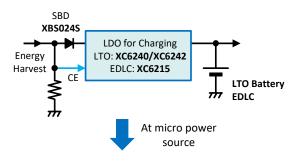# Solutions for Energy Harvesting

■ **Examples of charging from Energy Harvesting to LTO battery or Supercap (EDLC)**

● Challenges : Supporting various Energy Harvesting : Wireless power transfer (WPT), NFC, solar panels, piezo, etc.
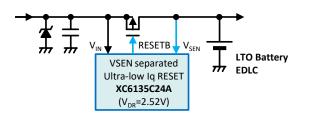Charge LTO battery or Supercap (EDLC) from unstable/micropower sources

Example of 3V~6V input + LTO battery / EDLC

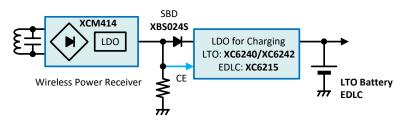Supported by LTO charging reference circuit

SBD
XBS024S

Energy Harvest

CE

LDO for Charging
LTO: **XC6240/XC6242**
EDLC: **XC6215**

LTO Battery EDLC

At micro power source

Example of 3V~6V Rectenna and other micro power (a few µW) + LTO battery / EDLC

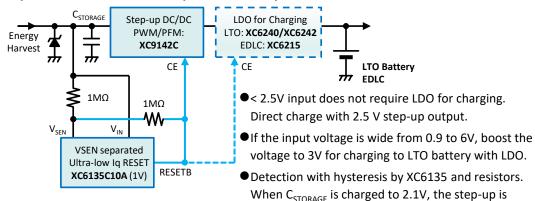ON-OFF control of Pch FET with Ultra-low Iq Voltage Detector

V_{IN} RESETB V_{SEN}

VSEN separated
Ultra-low Iq RESET
XC6135C24A
(V_{DR}=2.52V)

LTO Battery EDLC

Example of Wireless power transfer + LTO battery / EDLC

Charging with wireless power receiving IC + LDO

XCM414
LDO

SBD
XBS024S

LDO for Charging
LTO: **XC6240/XC6242**
EDLC: **XC6215**

Wireless Power Receiver

CE

LTO Battery EDLC

Example of 0.9V~2.7V / 0.9V~6V input + LTO battery

$C_{STORAGE}$

Energy Harvest

Step-up DC/DC
PWM/PFM:
XC9142C

LDO for Charging
LTO: **XC6240/XC6242**
EDLC: **XC6215**

CE

CE

LTO Battery EDLC

1MΩ

1MΩ

V_{SEN}

V_{IN}

VSEN separated
Ultra-low Iq RESET
XC6135C10A (1V)

RESETB

● < 2.5V input does not require LDO for charging. Direct charge with 2.5 V step-up output.

● If the input voltage is wide from 0.9 to 6V, boost the voltage to 3V for charging to LTO battery with LDO.

● Detection with hysteresis by XC6135 and resistors. When $C_{STORAGE}$ is charged to 2.1V, the step-up is started to charge, and stopped when it drops to 1V.

For Supercap (EDLC), select the appropriate charge/detect voltages.

● **Depending on the voltage characteristics and power of Energy Harvesting, the optimal charging circuit and control voltage varies.**
TOREX offers optimal power supply configurations to match the characteristics of your energy harvesting.
Please contact : **https://product.torexsemi.com/en/contact-us/technical-inquiry**