

Torex...Powerfully Small!

Highly functionality
1.4A Step-up DC/DC Converters
XC9147 / XC9148 Series Product Overview

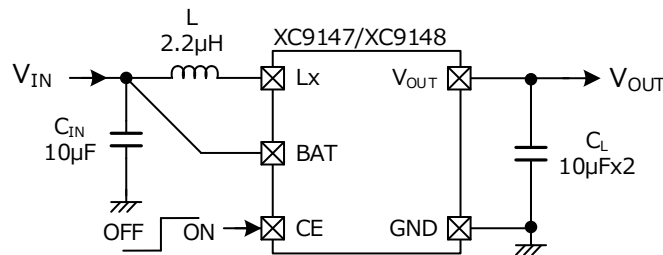
October 2025
TOREX Semiconductor
Rev. 1.1

Large output current with 3MHz tiny size, Load Disconnection / Bypass / OR connection Selectable

Features

Input Voltage Range	: 0.65V ~ 6.0V (Absolute Max. : 7.0V)
Operation start voltage	: 0.9V
Fixed Output Voltage	: 1.8V ~ 5.5V (Accuracy: $\pm 2.0\%$)
Output Current	: 750mA @ $V_{OUT}=5.0V$, $V_{BAT}=3.3V$ 500mA @ $V_{OUT}=3.3V$, $V_{BAT}=1.8V$
Supply Current	: 19 μ A (1.2MHz)
Oscillation Frequency	: 1.2MHz, 3.0MHz
Control Mode Selection	: F-PWM (XC9147), PWM/PFM (XC9148)
Type	: Load Disconnection (A/D/G/J types) Bypass Mode (XC9148B/E/H/K types) OR connection (XC9148 C/F/M/L types) C_L Discharge (A/D/G/J types)
Function	: ON/OFF, Soft-start UVLO (G/H/M/J/K/L types)
Protection	: Current limit, Thermal shutdown Integral latch & Short protection (D/E/F/J/K/L types)
Packages	: USP-6C, SOT-89-5
Operating Ambient Temp.	: -40°C ~ 105°C

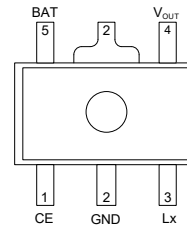
Typical Application Circuit



Packages

SOT-89-5
(4.5x4.6x1.6mm)

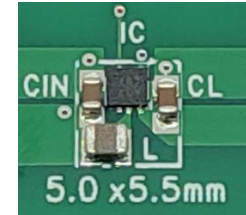
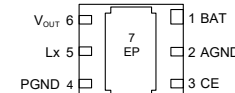
TOREX Longevity
Program (TLP)



USP-6C

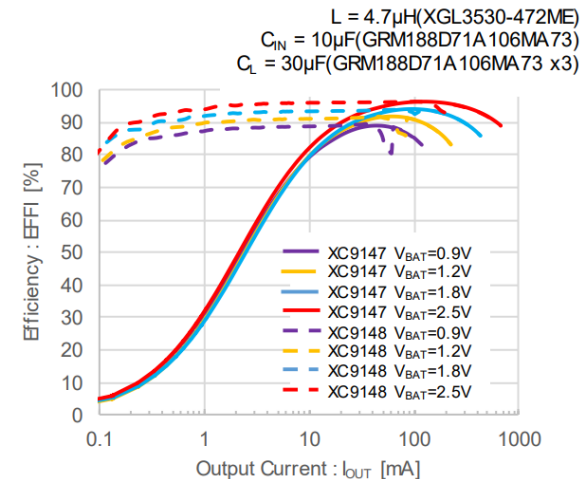
(1.8x2.0x0.6mm)

TOREX Longevity
Program (TLP)



TYPICAL CHARACTERISTICS: EFFICIENCY

$V_{OUT(T)}=3.3V$, $f_{osc}=1.2MHz$



- Step-up DC/DC to achieve low power consumption of MCUs and high performance of IoT devices.

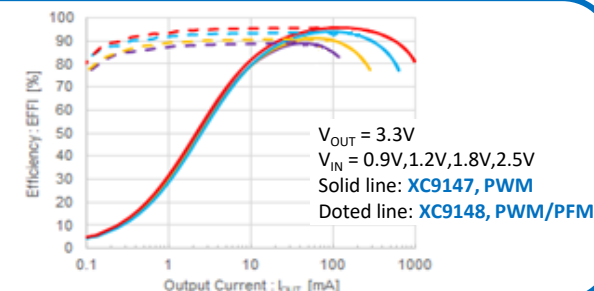
XC9147 / XC9148

Significant improvements

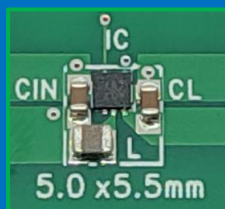
①

- To achieve **higher performance** in IoT devices.

- ✓ 1.5 times higher output current than conventional model.
- ✓ Wider operating temperature range.
- ✓ Enhanced various protection circuits.



New generation
Step-up DC/DC
XC9147 : PWM
XC9148 : PWM/PFM



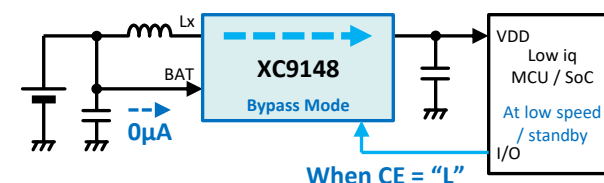
Support for low consumption MCUs

②

- For lower power consumption of MCUs and SoCs

"Bypass type"

- ✓ Significantly reduced total power consumption.
- ✓ Achieving long battery life.



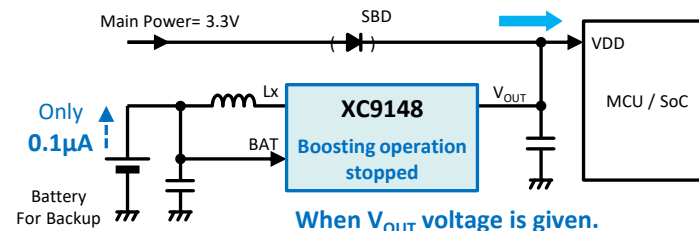
XC9148

③

- For Backup Power Supply in various devices.

VOUT "OR" type

- ✓ Almost 0 μA in standby mode.
- ✓ Long battery life for backup batteries.

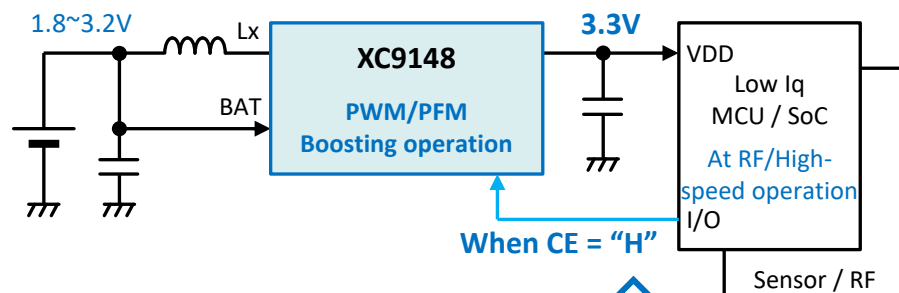


The two types, "Bypass" and "VOUT OR", contribute to long battery life, as well as high performance.

② Bypass mode control by MCU/SoC for low power consumption

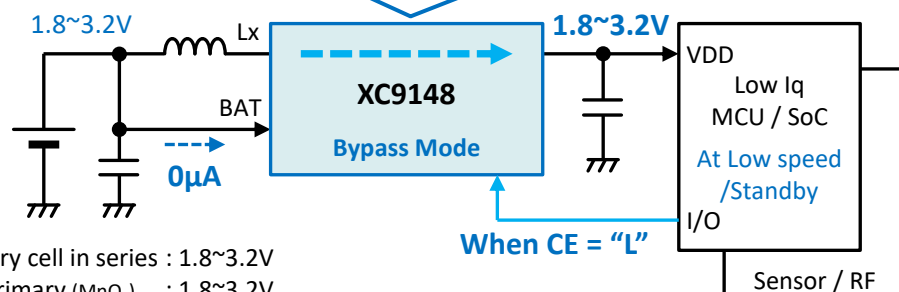
■ XC9148 Bypass type operation

a. CE = "H" : Step-up operation



b. CE = "L" : Bypass Mode

Supplying through battery voltage.



2-dry cell in series : 1.8~3.2V
Li Primary (MnO₂) : 1.8~3.2V
(SOCl₂) : 2.4~3.6V

■ Power requirements for low power MCU/SoC

a. RF/High-speed operation : Stable voltage, e.g. 3.3 V

b. Low speed/Standby :

Acceptable at low voltages, e.g. 1.8~2.4 V

This period is major for IoT equipment

Boosting the voltage only during the "a." period ensures low consumption by supplying battery energy without waste.

■ Features of XC9148 Bypass type

a. Boosting : High efficiency with PWM/PFM operation.

b. Bypass mode : Supplying through battery voltage.

XC9148 bypass mode with no voltage loss and no current consumption, 0 μ A.

→ Approximately twice the battery life

in a typical IoT device.

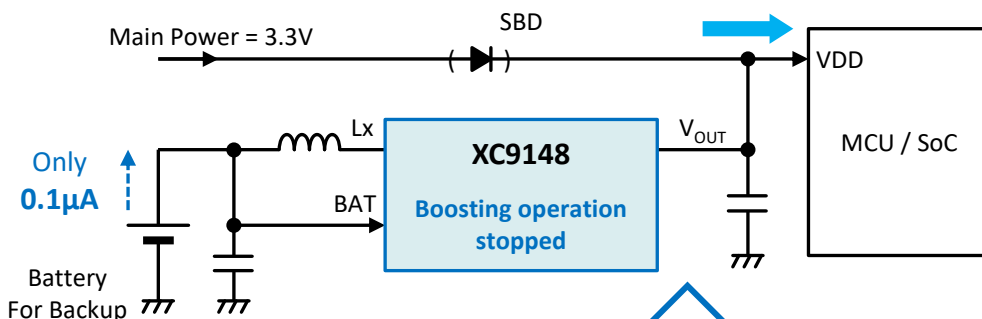
※ Sleep 5 μ A $\Leftrightarrow$ Active 5mA/Duty0.1% $\Leftrightarrow$ RF100mA/Duty 0.01%

Switch between "Bypass mode" and "Boost operation" by controlling the CE pin from the MCU.

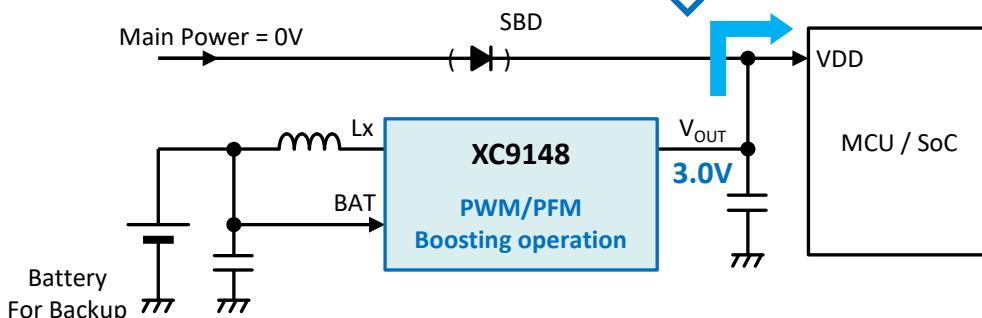
③ Backup circuit with Primary battery / Rechargeable battery / Super Cap (EDLC)

■ XC9148 VOUT “OR” type operation

a. Mains power supplied / Backup on standby



b. When supplied from Backup



■ Requests for backup circuits

- a. No power should be consumed from the backup source when mains power is supplied
 - b. Starts boosting immediately when the mains power supply drops.
- Backup sources are,
- Li Primary Batteries
 - LTO Batteries, High reliability Rechargeable batteries (Semi-solid-state/All-solid-state batteries)
 - Super Cap (EDLC)

■ Features of XC9148 VOUT "OR" type

- a. Current consumption from the backup battery when the backup is on standby is **only 0.1 μA**.
- b. When the output voltage falls below a set value, boost operation is immediately activated, and power is supplied from a backup source. No external control is required.

When the mains power falls, **boost operation starts automatically**.

The voltage supplied from the backup source to the MCU can be supplied without any drop in voltage.

Select from the line-up below according to your purpose.

IC	Type	Purpose	Input to Output (at CE=L)	Latch	C _L Discharge	UVLO	Reference page for usage examples
XC9147 / XC9148	A	Load Disconnection	Disconnect		✓		• Power is supplied only during the post-stage operation.
	D			✓	✓		
	G				✓	✓	
	J			✓	✓	✓	
XC9148	B	Bypass	Bypass				• Supporting low I _q MCU • Reduction of power consumption at receiving of RF communication
	E			✓			
	H					✓	
	K			✓		✓	
	C	VOUT "OR"	Disconnect				• Backup power supply
	F			✓			
	M					✓	
	L			✓		✓	

Options

● Current Limit / Short Protection

- ✓ Current Limit : Monitors and limits the current of the Nch FETs at Lx pin. Combined type with current limit and latch-stop also available.
- ✓ Short Protection: Types with latch-stop function also stop and latch when the short-circuit protection threshold voltage is reached in an overcurrent condition.

● C_L Discharge

- ✓ The Nch FET connected between the V_{OUT} and GND enables high-speed discharge from the CL capacitor when shutting down (CE= "L").
- ✓ Prevents malfunctions of the subsequent system due to the remaining voltage in the CL capacitor during shutdown.

● UVLO

- ✓ Function for 2-cell dry cell batteries and primary lithium batteries to reduce the risk of battery liquid leakage by stopping the IC operation when the battery voltage drops. (UVLO release/detection = 1.6 V/1.45 V).