

Torex...Powerfully Small!

IEC 62368-1 Certification
Load Switch with Ideal Diode function
XC8110 / XC8111 Series Product Overview

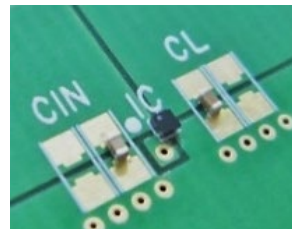
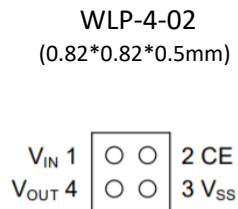
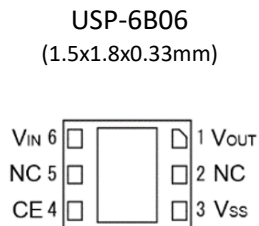
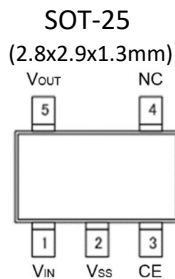
July 2023
TOREX Semiconductor
Rev. 2.0

Ideal Diode Function / No Input Current under Reverse bias / Small Solution / IEC 62368-1 Certified

■ Features

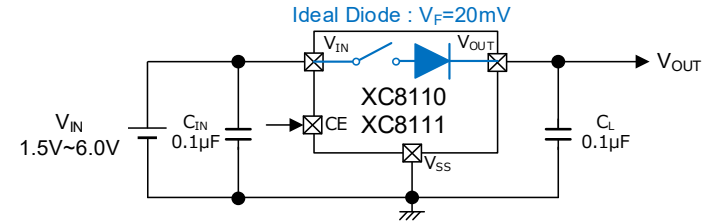
Input Voltage	: 1.5V ~ 6.0V
Output Current	: XC8110 / 500mA ($V_{IN} > 1.7V$) : XC8111 / 1A ($V_{IN} > 2.0V$)
Stand-by Current	: 0.65 μ A
Supply Current	: 3.6 μ A (at Forward bias) 0.0 μ A (at Reverse bias)
Reverse Bias Current	: 0.8 μ A
Forward Voltage	: 20mV
Current Limit	: XC8110 / 850mA : XC8111 / 1700mA
Short Current	: 50mA
Function	: Ideal diode function
Protection	: Inrush Current Protection : Current limit : Thermal Shutdown
Standard	: IEC 62368-1:2018 Certified
Packages	: WLP-4-02, SOT-25, USP-6B06
Operating Ambient Temp.	: -40 $^{\circ}$ C ~ 105 $^{\circ}$ C

■ Packages

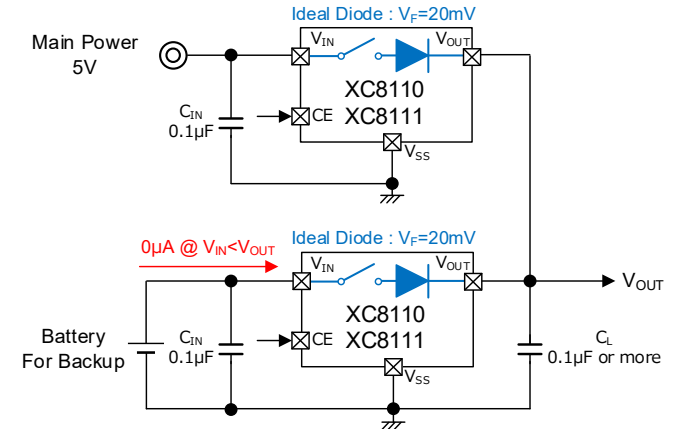


■ Typical Application Circuit

Diode / substitute for load switch



OR circuit: backup circuit, etc.



■ Ideal Diode function

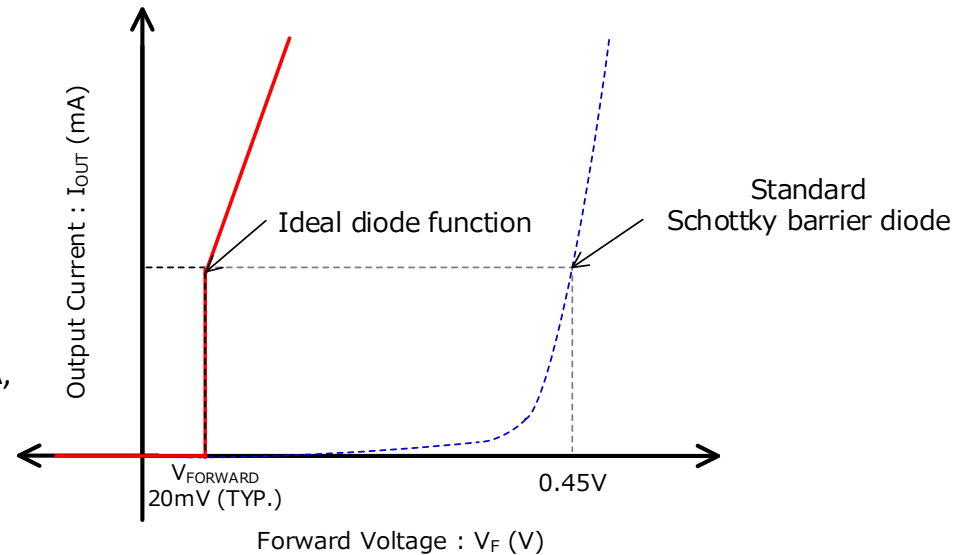
V_F and leakage current are much smaller than SBD.

- V_F of SBD is around 0.3~0.4V. When an SBD is inserted in series with a battery, the battery life is shortened due to V_F losses. With ideal diodes, V_F losses can be reduced and battery life can be prolonged.
- Good to avoid heat issue as well.

Lower leakage current from V_{OUT} to V_{IN}

- SBDs have a leakage current of several μA to several hundred μA , which have a negative impact on battery life. Whereas the ideal diode have almost no leakage current.

IV curve of Ideal diode



■ Reverse current function

There are types of reverse current prevention. XC8110/XC8111 has a True Reverse Current Prevention function.

✓ True Reverse Current Prevention:

Normally V_{OUT} is maintained at " $V_{IN}-20mV$ ". If V_{OUT} becomes higher than this, the reverse current prevention is activated. This function provides complete reverse current prevention like a diode.

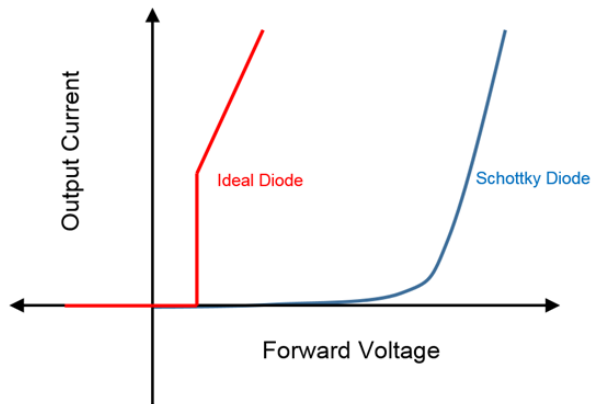
✓ Reverse current prevention: usual load SWs

This function prevents reverse current when the voltage on the input side becomes lower, but since reverse current is prevented after it has flowed, complete reverse current prevention is not possible.

* When CE = "L", reverse current prevention is possible without reverse current flow.

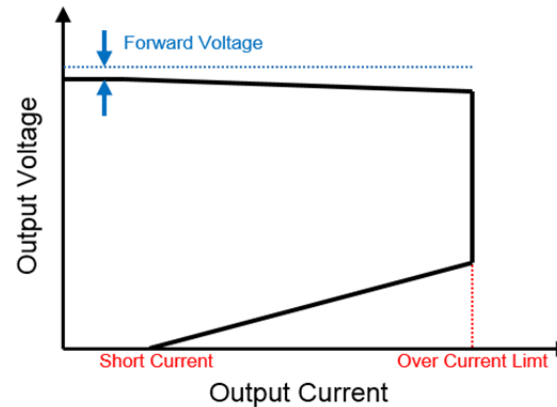
- Equipped with protective functions which are not found in diodes.

IV Characteristic



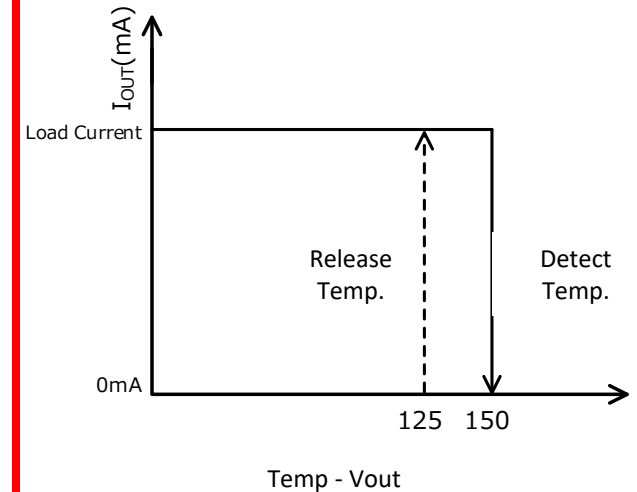
$\frac{1}{20}$ Almost no VF
Compared to SBD

Current Limit



Current limit with foldback
⇒ Pseudo Fuse that can be used repeatedly

Thermal Protection



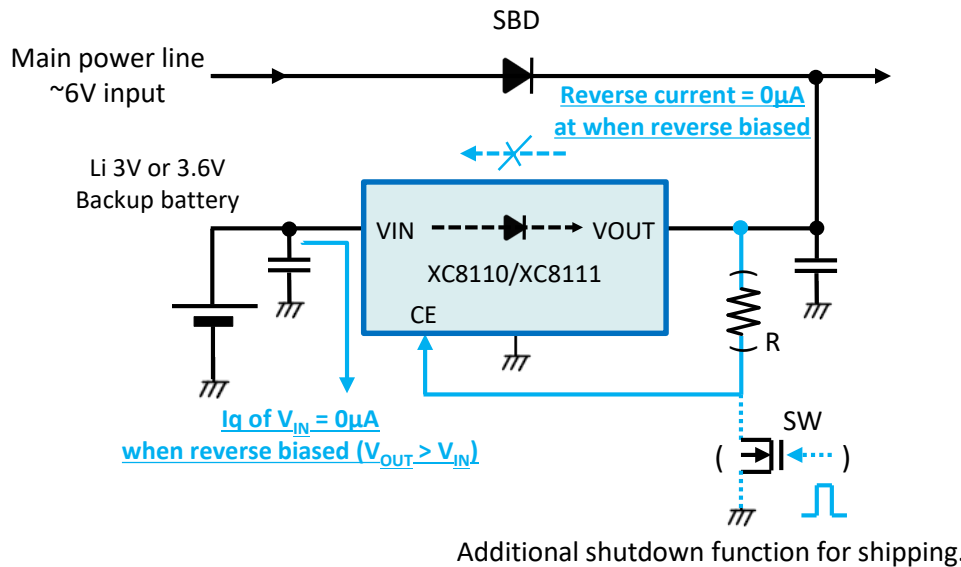
Thermal shutdown
(Automatic recovery)

- Equipped with protection functions such as current limit function. Significantly improved safety.

IEC 62368-1:2018 certified, enabling simplification of stand-alone failure testing of the post-stage components.

■ OR Connection / Backup circuit

- There is no voltage drop such as V_F of SBD.
- I_q of V_{IN} is $0.0\mu A$ when reverse biased, so suitable for a backup circuit.
- Easy automatic switching of power supply path without control



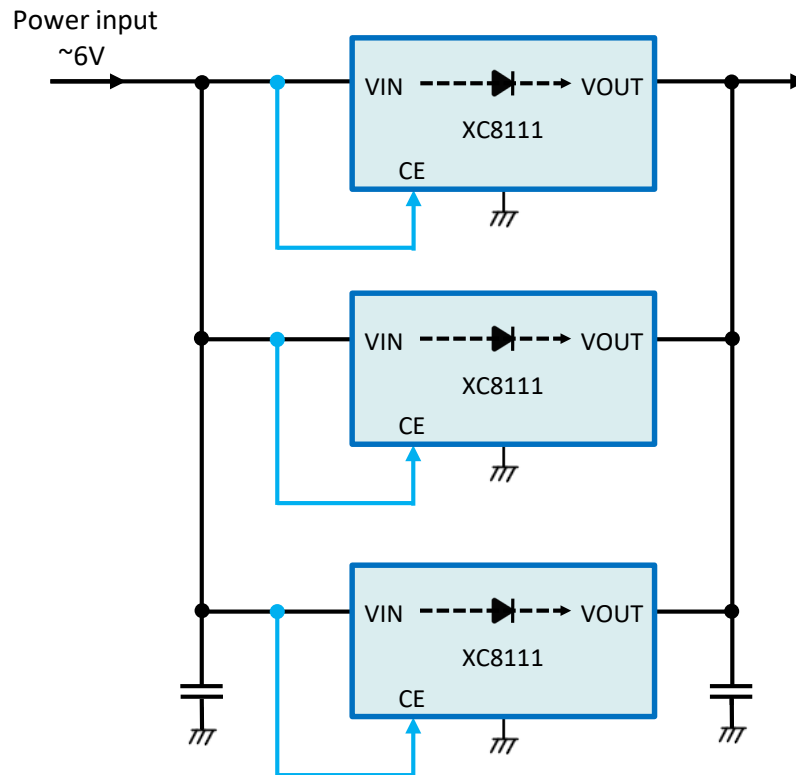
Basic use as ideal diode.

It is ideal for OR connection applications as it is equipped with true reverse current prevention.

A shutdown function at the time of shipment can also be installed by making the CE connection point on the output side.

Condition	CE	Usual case	$I_{V_{IN}}$ (I_q)	$I_{V_{OUT}}$	I_{CE}
Forward bias	"H"	Forward bias as a diode	$3.6\mu A$	$0\mu A$	$0.48\mu A$
Reverse bias		Reverse bias as a diode	$0\mu A$	$0.8\mu A$	
Forward bias	"L"	SW off as Load SW, Ship mode	$0.65\mu A$	$0\mu A$	$0\mu A$
Reverse bias		SW off as Load SW with Reverse bias	$0\mu A$	$0.8\mu A$	

■ Large current output by parallel connection



Parallel connection is available to use for large current and/or low R_{on} .

Parallel connection of the XC8111 is available for use with currents of 1 A or more.

If a current higher than 1 A or a lower R_{on} is required, the XC8111 can be connected in parallel.