

Torex...Powerfully Small!

Standard Step-up DC/DC Controller

XC9103/XC9104/XC9105

Series

XC9106/XC9107

Series

XC9120/XC9121/XC9122

Series

July 2025

TOREX Semiconductor Ltd.

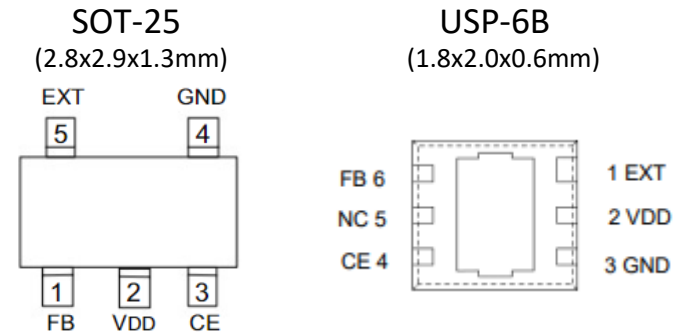
Rev. 1.1

Standard Step-up Controller

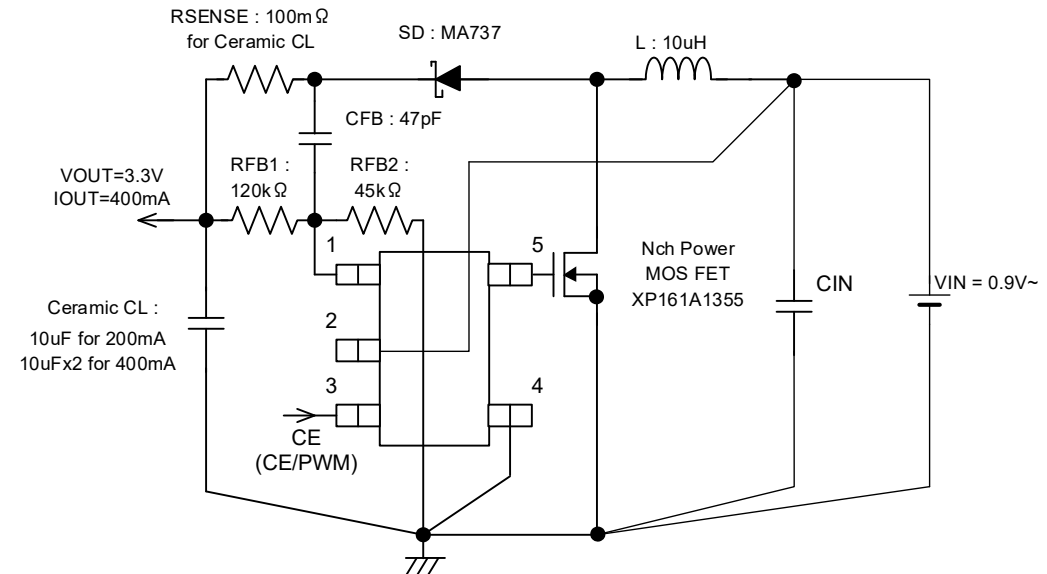
Features

V_{DD} pin Voltage	: 1.8V ~ 10.0V (Absolute Max.: :12.0V)
Output Voltage Range	: 1.5V ~ 30.0V (Adj. by Resistor) * Supports 30V or higher during light loads
FB Voltage	: 0.9V ($\pm 2.0\%$)
Oscillation Frequency	: 100kHz, 180kHz, 300kHz, 500kHz
Output Current	: more than 400mA ($V_{IN}=1.8V$, $V_{OUT}=3.3V$)
Controls	: PWM (XC9103) PWM/PFM (XC9104) PWM or PWM/PFM (XC9105)
Efficiency	: 85%
Output Capacitor	: Ceramic Capacitor compatible
Package	: SOT-25, USP-6B
Operating Ambient Temp.	: -40°C ~ 85°C

Package



Typical Application Circuit

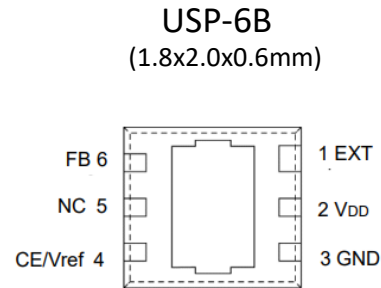
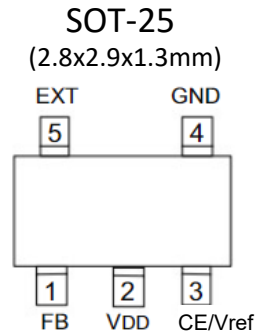


Standard Step-up Controller / Vref External input

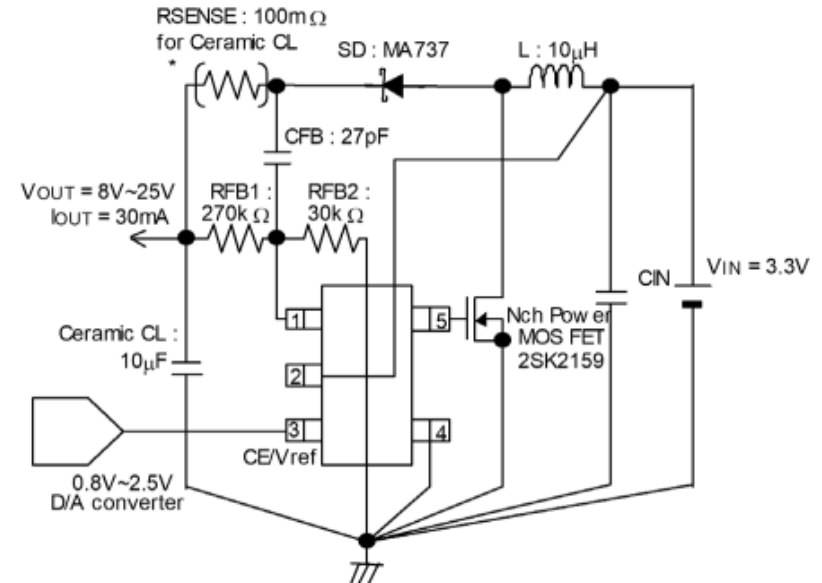
■ Features

V_{DD} pin Voltage	: 1.8V ~ 10.0V (Absolute Max.: 12.0V)
Output Voltage Range	: 1.5V ~ 30.0V (Adj. by Resistor) * Supports 30V or higher during light loads
FB Voltage	: External input 0.8V ~ 2.5V ($\pm 2.0\%$)
Oscillation Frequency	: 100kHz, 300kHz
Output Current	: 30mA or more ($V_{IN}=3.3V$, $V_{OUT}=20V$)
Controls	: PWM (XC9106) PWM/PFM (XC9107)
Efficiency	: 85%
Output Capacitor	: Ceramic Capacitor compatible
Package	: SOT-25, USP-6B
Operating Ambient Temp.	: -40°C ~ 85°C

■ Package



■ Typical Application Circuit



High step-up ratio compatible (MAX DUTY 93%)

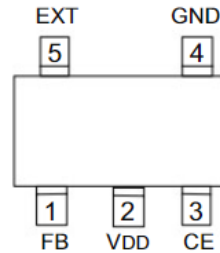
Features

V_{DD} pin Voltage	: 1.8V ~ 6.0V (Absolute Max.: 12.0V)
Output Voltage Range	: 1.5V ~ 30.0V (Adj. by Resistor) * Supports 30V or higher during light loads
FB Voltage	: 0.9V ($\pm 2.0\%$)
Oscillation Frequency	: 100kHz
Output Current	: 80mA or more ($V_{IN}=3.6V$, $V_{OUT}=15V$)
Controls	: PWM (XC9120) PWM/PFM (XC9121) PWM or PWM/PFM (XC9122)
Efficiency	: 85% ($V_{IN}=3.6V$, $V_{OUT}=15V$, $I_{OUT}=10mA$)
Output Capacitor	: Ceramic Capacitor compatible
Max Duty	: 93% (High step-up ratio compatible)
Package	: SOT-25, USP-6C
Operating Ambient Temp.	: $-40^{\circ}C \sim 85^{\circ}C$

Package

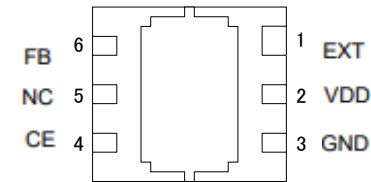
SOT-25

(2.8x2.9x1.3mm)

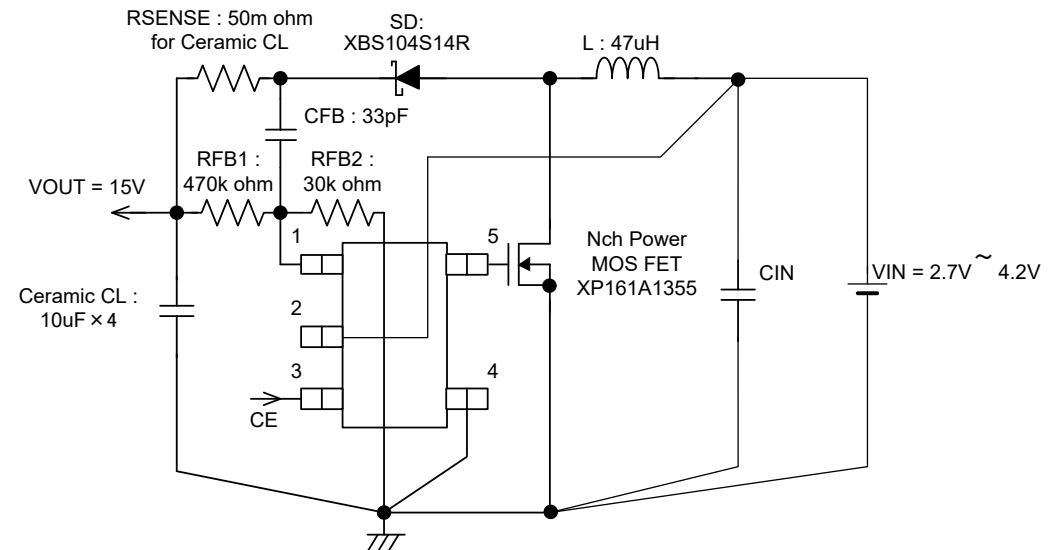


USP-6C

(1.8x2.0x0.6mm)



Typical Application Circuit



■ Overview

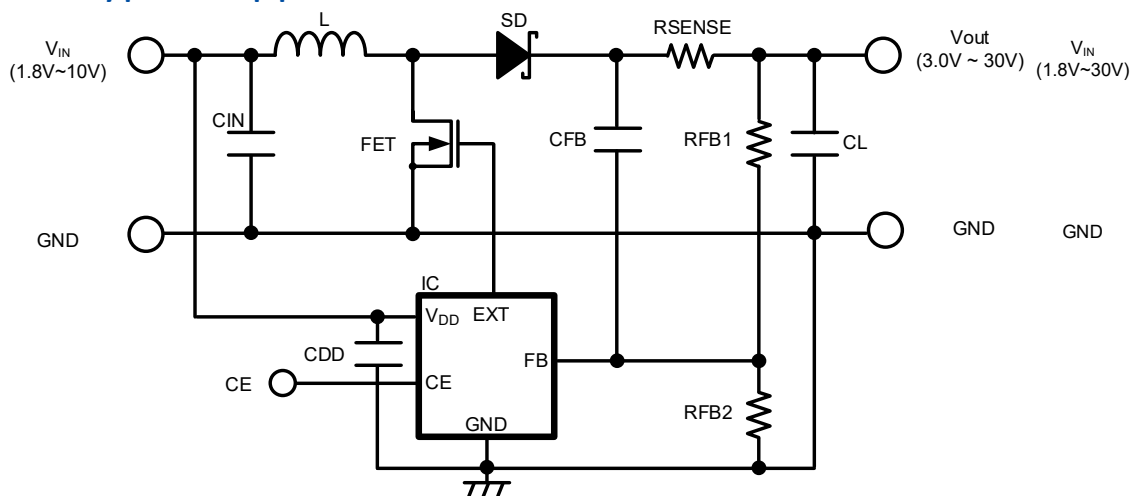
Standard circuit for XC9103/04/05, XC9120/21/22.

A boost circuit can be configured from an input voltage of 1.8V to 10V.

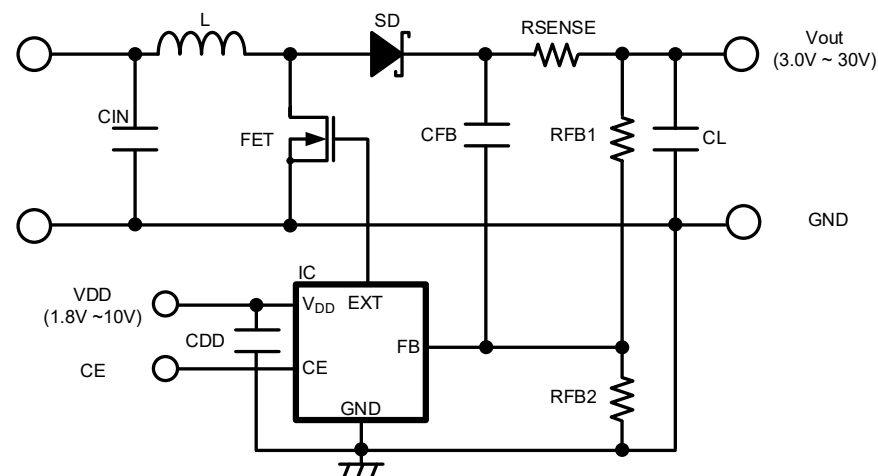
● Applications

- For various step-up power supplies (5V/9V/12V/15V/24V etc.)
 - MCU / SoC
 - Actuators / Solenoid Valves / DC Fans
 - Power Supply for Amplifiers
 - Motor Drivers
 - LED etc.

■ Typical Application Circuit



VIN 10V or less (VDD=VIN Connection)



VIN 10V or more (VDD externally applied)

■ Example specifications

Input Voltage : 1.8V ~ 30.0V

V_{DD} Voltage : 1.8V ~ 10.0V

Output Voltage : 3.0V ~ 30.0V

Output Current : 100mA ~ 3A

* Depends on power supply spec

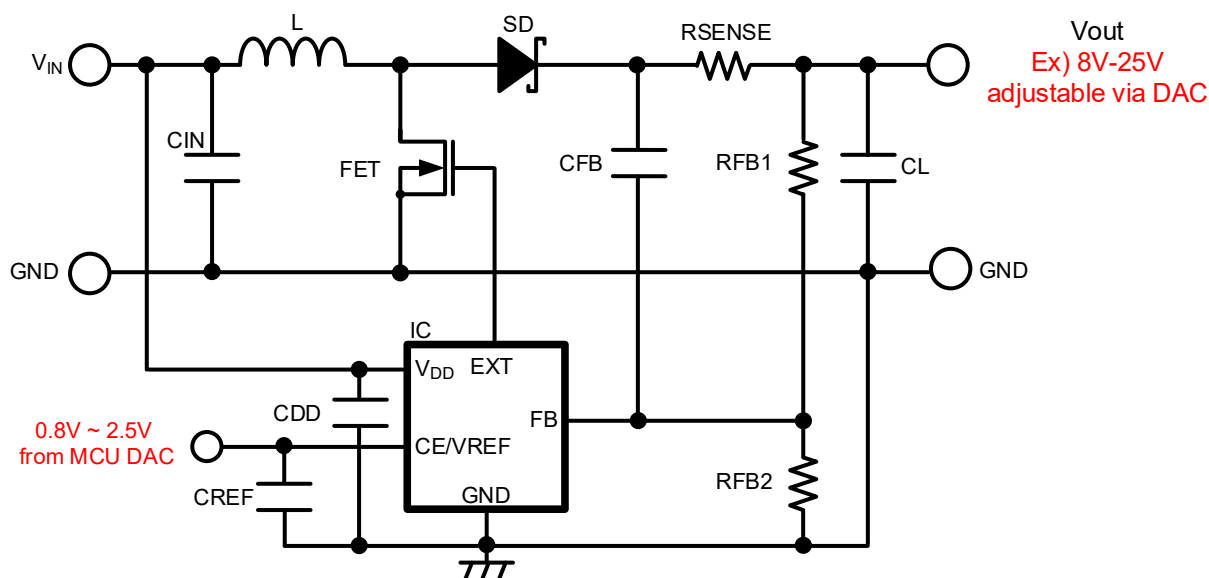
Overview

Variable output voltage circuit using XC9106/XC9107.
By applying voltage to the CE/VREF pin from the MCU's DAC, etc., the output voltage can be adjusted.

Applications

- Output voltage variable circuit
 - Actuators / Solenoid Valves / DC Fans
 - LED etc.

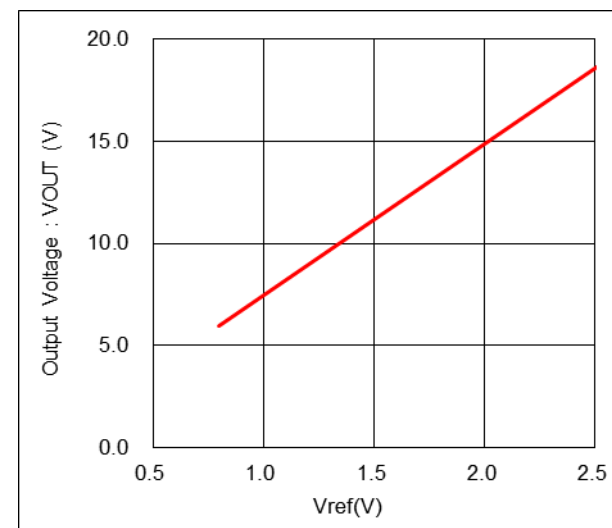
Typical Application Circuit



Example specifications

Input Voltage	: 1.8V ~ 30.0V
V _{DD} Voltage	: 1.8V ~ 10.0V
Output Voltage	: 3.0V ~ 30.0V
FB Voltage	: External input 0.8V ~ 2.5V (CE/VREF pin)
Output Current	: 100mA ~ 3A * Depends on power supply spec
Features	: Output voltage is CE/VREF adjustable.

Characteristic examples



XC9106 : 6V ~ 18.75V Output variable

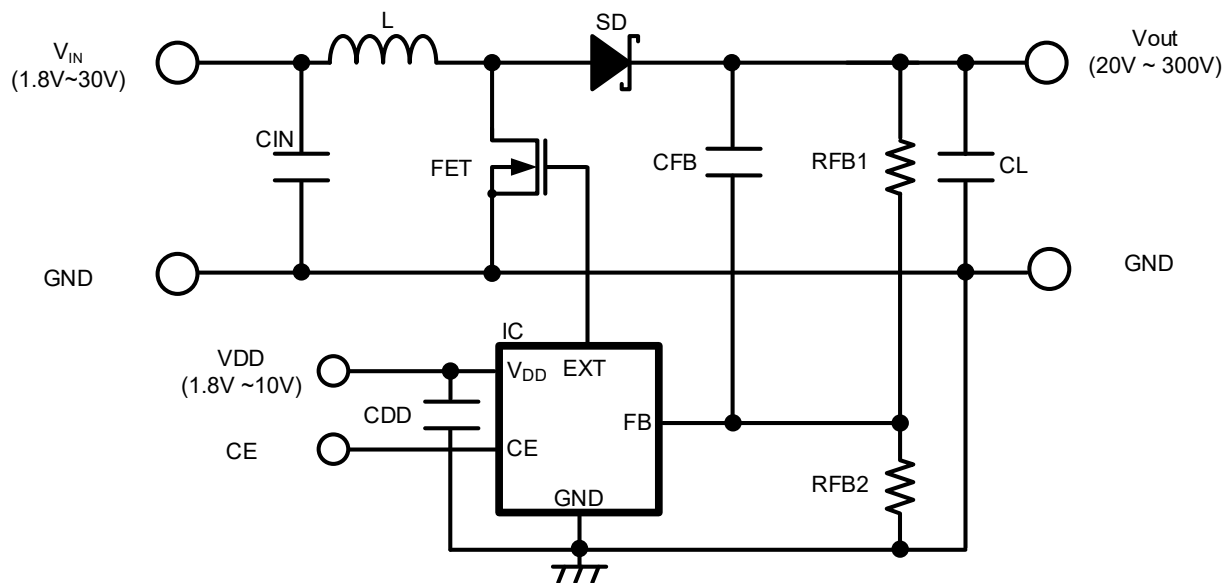
Overview

Circuit capable of outputting high voltage of 20V to 300V.
(Output power: 1W to 2W or less)
Low-cost creation of 48V / 80V to 100V / 100V to 300V, etc.
from Li-ion or 5V input.

Applications

- Phantom Power Supply for Condenser Microphones
- Beauty Devices (EMS devices)
- Power Supply for Sensors / Piezo / MEMS Bias etc.

Typical Application Circuit



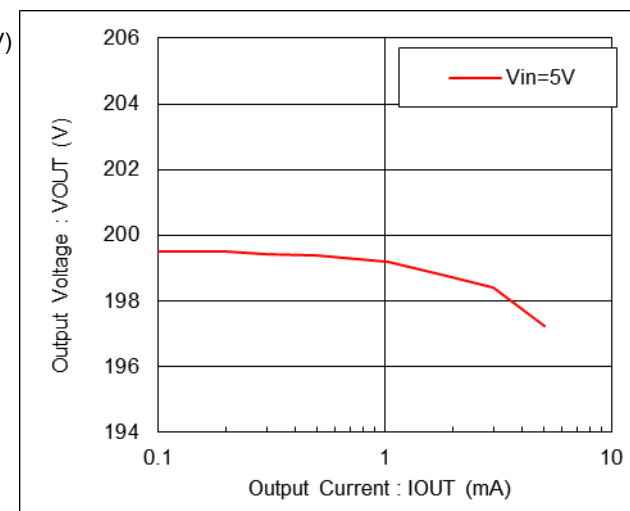
Example specifications

Input Voltage	: 1.8V ~ 30.0V
V _{DD} Voltage	: 1.8V ~ 10.0V
Output Voltage	: 20.0V ~ 300.0V
Output Current	: 1mA ~ 100mA

* Depends on power supply spec

Features : High voltage output can be adjusted using external components.

Characteristic examples



XC9103 : Vin=5V, Vout=200V

■ Overview

SEPIC circuit using XC9103/04/05.

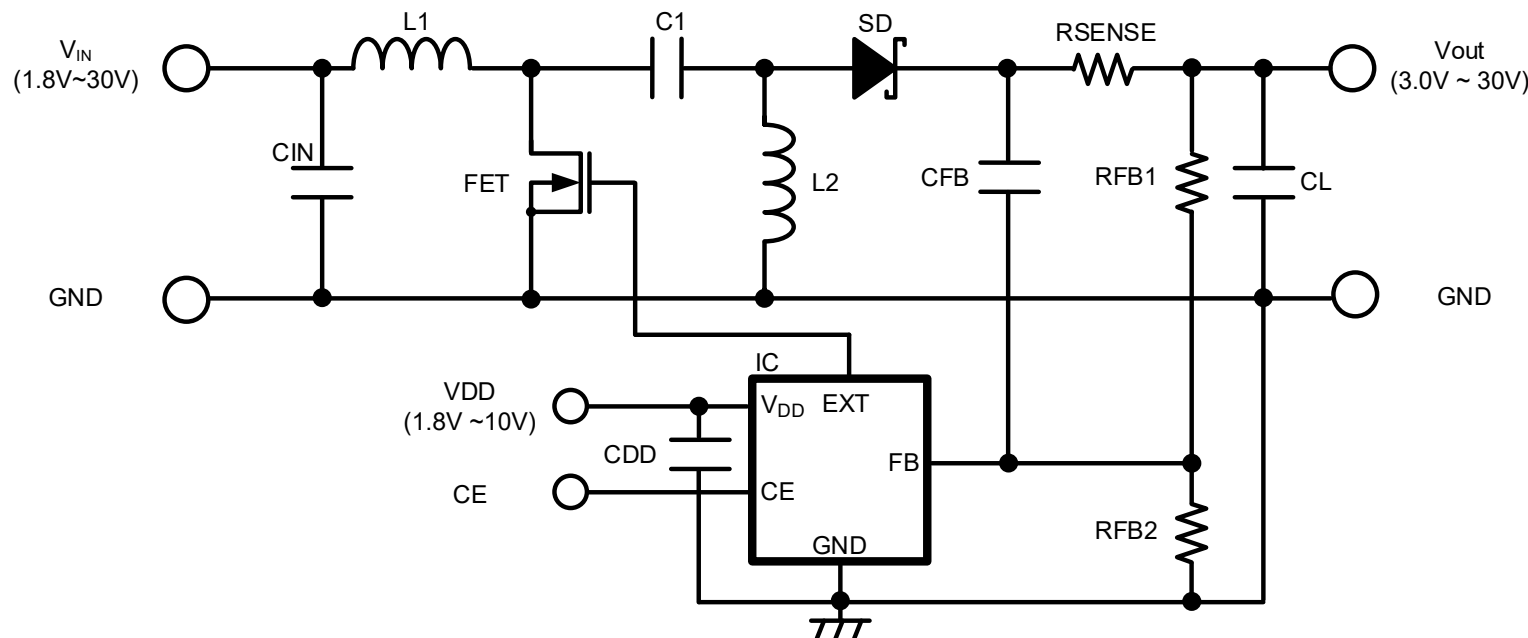
By using SEPIC, a buck-boost power supply can be configured.

Since there is no DC path between input and output, overcurrent can be suppressed even if the output is short-circuited.

● Applications

- Buck-Boost Power Supply
 - Unstable 12V -> Stable 12V
 - etc.

■ Typical Application Circuit



■ Example specifications

Input Voltage	: 1.8V ~ 30.0V
V_{DD} Voltage	: 1.8V ~ 10.0V
Output Voltage	: 3.0V ~ 30.0V
Output Current	: 100mA ~ 3A
	* Depends on power supply spec
Features	: Buck-boost power supply.
	There is no DC path
	between input and output.

■ Overview

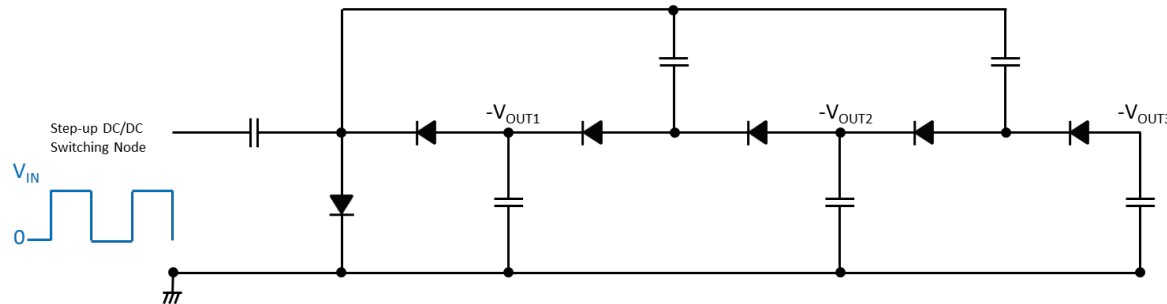
Circuit that adds a diode charge pump to XC9103/04/05, XC9106/07, and XC9120/21/22.

With a light load, it is possible to generate n times or $-n$ times the voltage of the step-up DC/DC.

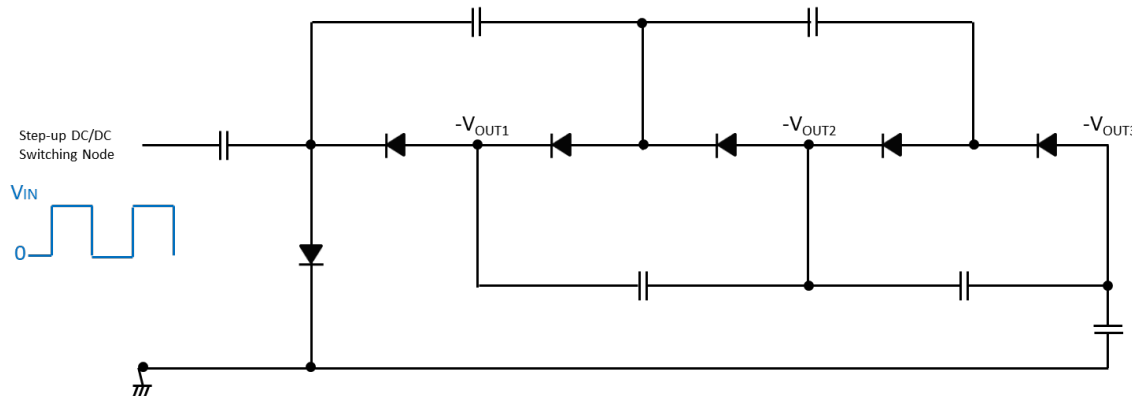
■ Example specifications

Output Voltage	: $V_{out} \times 2, 3, 4 \dots$: $V_{out} \times -1, -2, -3 \dots$
Output Current	: $0.1\text{mA} \sim \text{Several } 10\text{mA}$ * Depends on power supply spec
Features	: Voltage output of $\pm n$ times is possible.

● Circuit Example 1 : Step-up Diode Charge-pump

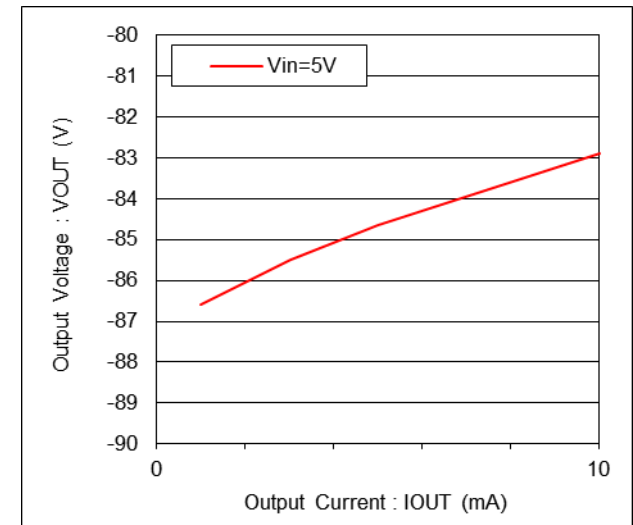


● Circuit Example 2 : Inverting Diode Charge-pump



■ Characteristic examples

(Inverting Diode Charge-pump)



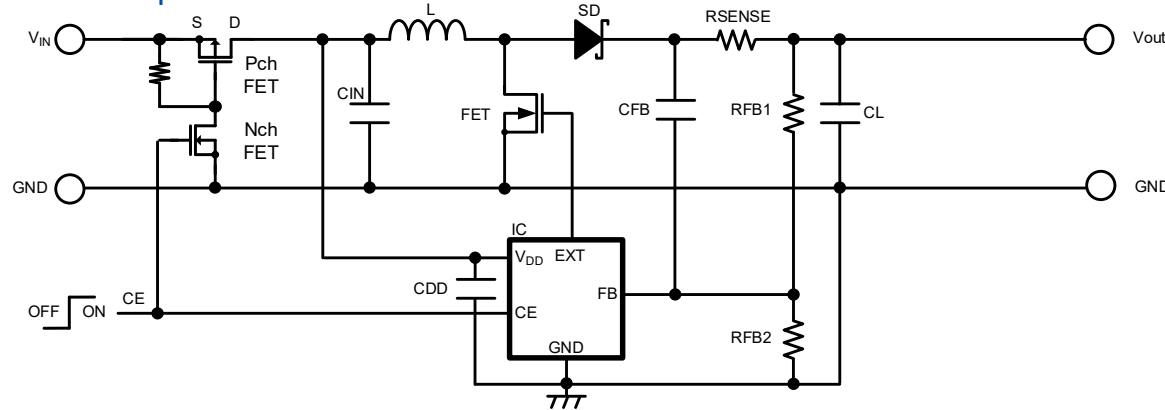
XC9103 : $V_{in}=5\text{V}$, $V_{out}=85\text{V}$
-> Inverting Diode Charge Pump -85V/10mA

■ Overview

Circuit that adds a load disconnect function to XC9103/04/05, XC9106/07, and XC9120/21/22.

When CE is 'L', the input and output sides are disconnected to protect against abnormal conditions such as output short circuits.

● Load Disconnect Circuit 1 : Input Line Disconnection



● Load Disconnect Circuit 2 : Output Line Disconnection

