TOREX

Torex...Powerfully Small!

36V 600mA Synchronous
Step-down DC/DC Converter

XC9704/XC9705 Series Product Overview

Jan. 2025

TOREX Semiconductor

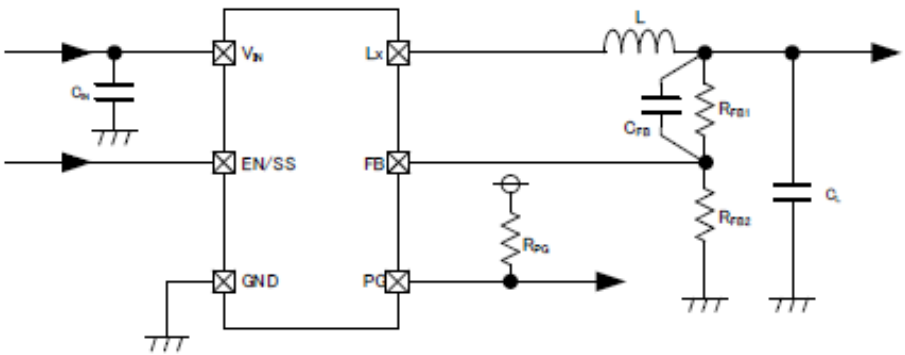
Rev. 1.1

Low Iq and high efficiency at light loads / Sequence controllable with PG function and external Soft Start

Features

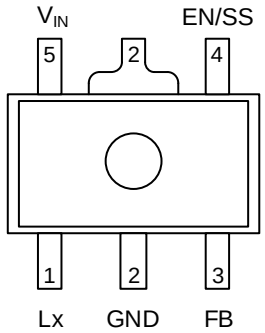
Input Voltage	: 3.0V ~ 36.0V (Absolute Max.:40.0V)
Surge Voltage	: 46.0V (Applied Time≦400ms)
Output Voltage Range	: 2.8V ~ 18.0V (XC9704)
	: 2.8V ~ 15.0V (XC9705)
FB Voltage	: 0.75V(±1.5%)
Output Current	: 600mA
Supply Current	: 11μA
Oscillation Frequency	: 1.2MHz, 2.2MHz
Efficiency	: 90% (V_{IN}=12V, V_{OUT}=5V, I_{OUT}=1mA)
Control Method	: F-PWM (XC9704)
	PWM/PFM (XC9705)
Function	: Soft-start (External Adj.), UVLO
	Power Good (USP-6C)
Protection	: Current Limit, Thermal Shutdown
Package	: SOT-89-5, USP-6C
Junction Temp	: -40℃ ~ 150℃

Typical Application Circuit

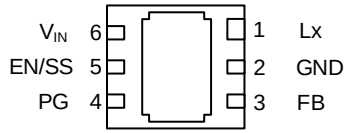


Package

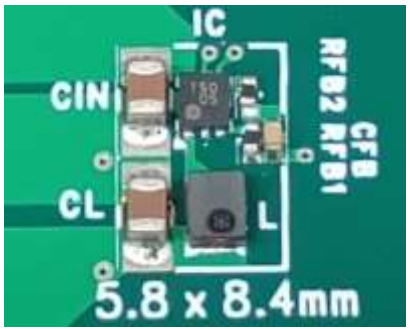
SOT-89-5
(4.5x4.6x1.6mm)



USP-6C
(1.8x2.0x0.6mm)



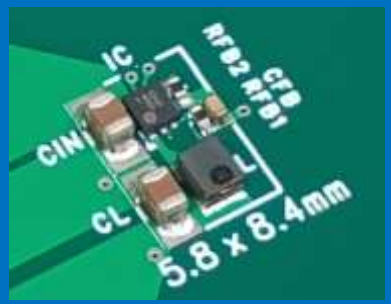
Mounting Area



XC9704/XC9705: 36V 600mA Step-down DC/DC convertor

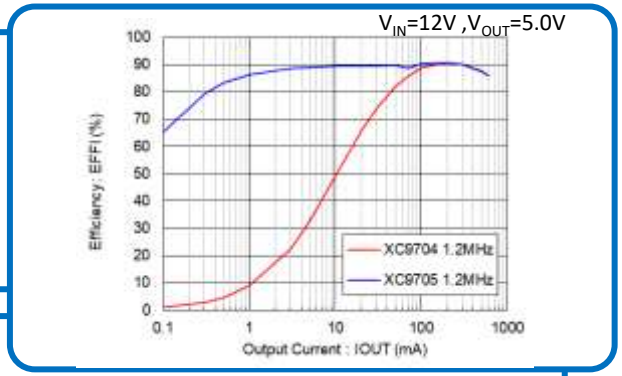
■ Space-Saving and Low Iq Step-down DC/DC for Medium and High Voltage Inputs

Compact/Low Iq
36V 600mA Step-down DC/DC
XC9704/XC9705



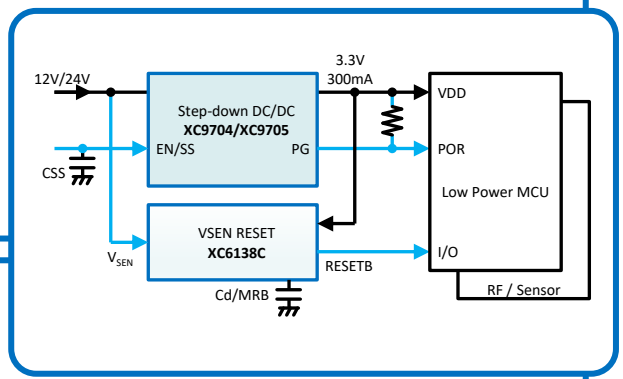
Mounting Area 48 mm²

① **Ultra-small / High efficiency at light load**
- ✓ Synchronous rectification
- ✓ Small external components can save space
- ✓ High efficiency at light load



② **Simple power source sequence control**
- ✓ Soft start can be adjusted externally to accommodate large output capacitors
- ✓ Power Good function can be used to drive the latter-stage IC after the output voltage rises.

Sequence



③ **Stable output voltage supply even when input voltage drops**
- ✓ Supplies stable output voltage even when input voltage drops as it supports 100% Max Duty.

Pch driver FET 100% Duty

Ideal for miniaturization / heat reduction due to high voltage / small size / low Iq.
Also suitable for replacing conventional high-voltage LDOs.
- ➢ Primary Step-down DC/DC for 12V/24V input
- ➢ For various sensors and security equipment in factories, buildings, and facilities, etc.

XC9704/XC9705: Stable output voltage supply even when the input voltage drops

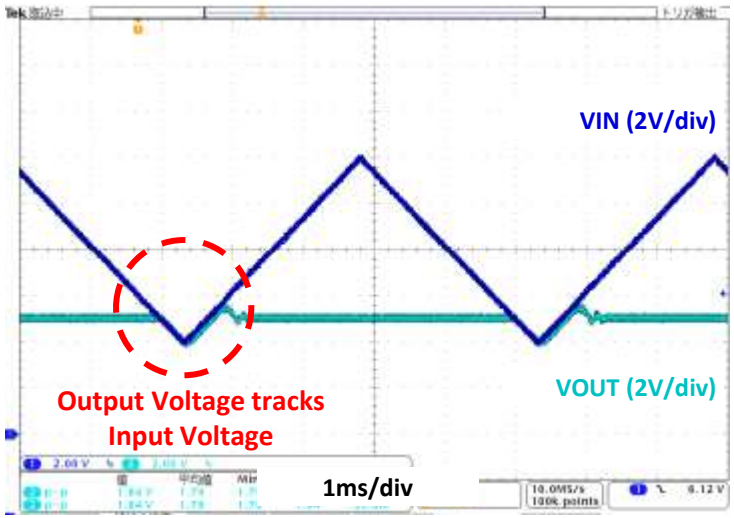
- Supports 100% duty cycle, and maintains a high output voltage even when the input voltage drops.

Features of 100% Max Duty Support

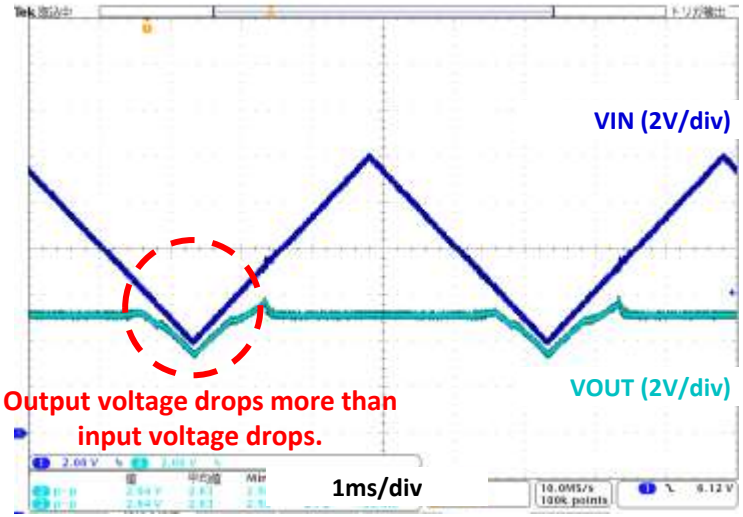
- Even if the input voltage is close to the output voltage, there is no drop in the output voltage.
- When the input voltage is lower than the set output voltage, the input voltage is passed through to the output and the output voltage is maintained as high as possible.

Even with “load fluctuations/induction in motors, etc.” and “large fluctuations in power supply due to input impedance” the output is maintained as high as possible.

Contributes to preventing system shutdown and maintaining the system due to low power supply voltage.



Max Duty 100% Supported
XC9704/XC9705

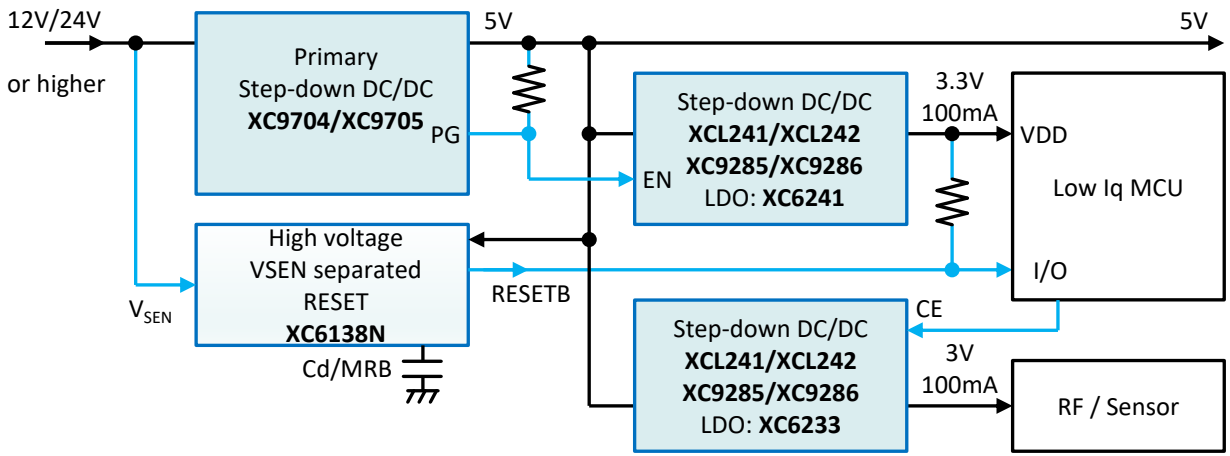


Max Duty 100% Not supported
General Step Down DC/DC

XC9704/XC9705: Application Block Diagram for Small industrial sensors

For 12V/24V or Higher lines : Various small devices / Industrial sensors / IoT

Step-down to 5V, then create 3.3V and other secondary voltages

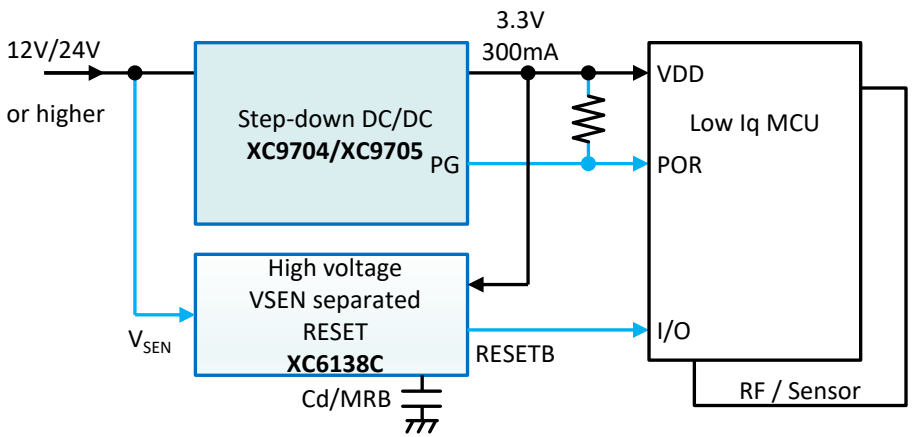


Supplies voltage to MCU/sensors, etc.

Power source sequence control with the PG pin.

Supervises 12V/24V power line with XC6138N.

Output 3.3V directly



Suitable for small sensors used in FA.

XC9704 : F-PWM	⇒ Low noise (For sensors, etc.)
XC9705 : PWM/PFM	⇒ High efficiency at light load

XC9705 Application circuit1 : Voltage inverting using step-down DC/DC

Voltage inverting using step-down DC/DC

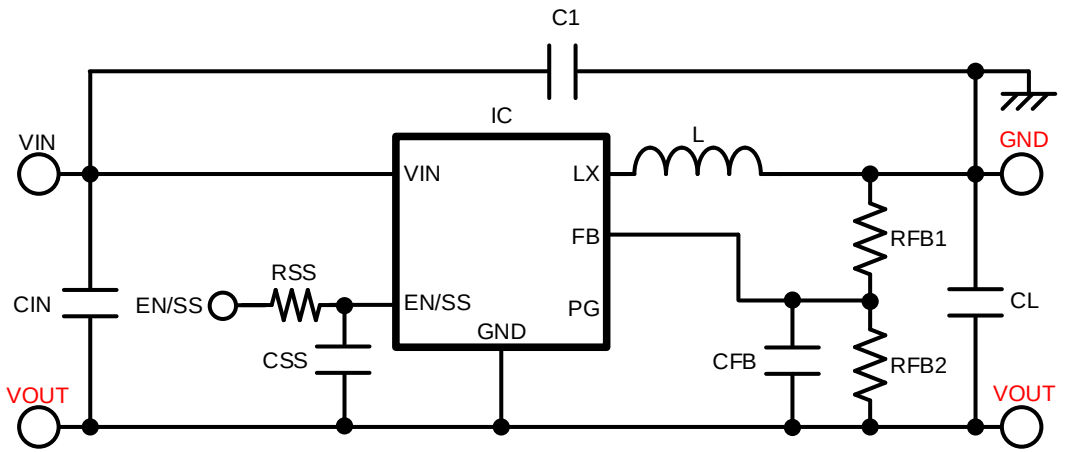
To obtain an inexpensive inverting voltage using step-down DC/DC.
To generate an inverting voltage of -2.8V~-15V from 5V/12V/24V.

- Applications
  - Various negative power supplies (OP amp/measuring amplifiers ±12V etc.)
  - Gate drive bias (floating power supply / negative power supply)

Example specifications

Input Voltage	: 3.0V ~ 36.0V + V_{OUT}
Output Voltage	: -2.8V ~ -15.0V
Output Current	: Max. 50mA ~ 200mA
Features	: Inverting voltage generation using step-down DC/DC Small size solution

Typical Application Circuit



Evaluation Board

XC9704 Application circuit2 :
Multi-channel isolated power supplies using transformers /couple inductors

Multi-channel isolated power supplies using transformers /couple inductors

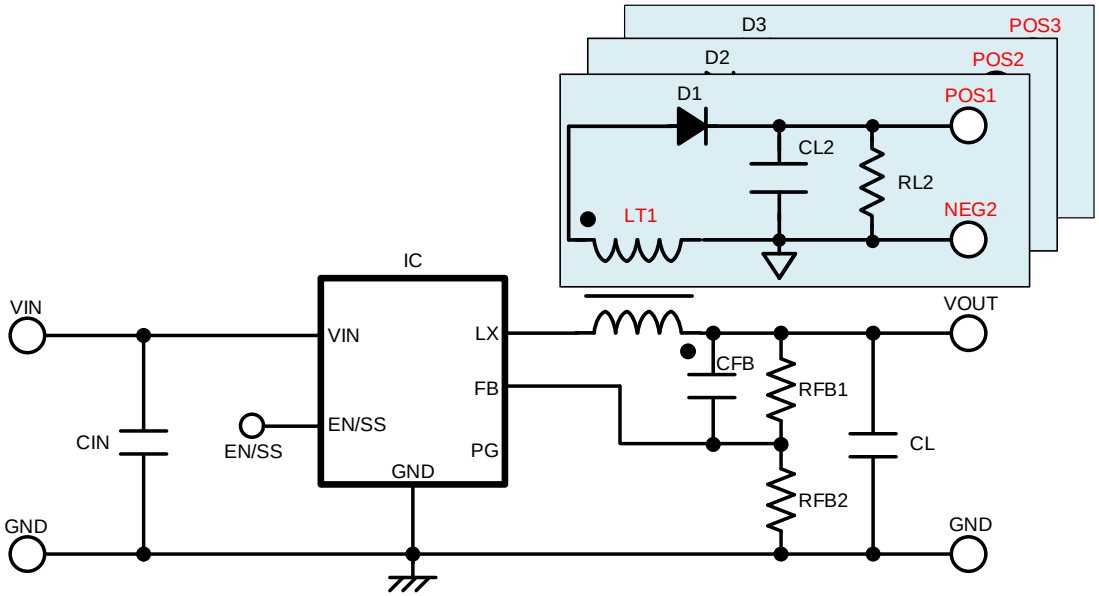
To obtain an inexpensive isolated power supplies using transformers/couple inductors.
To generate multi-channel of small power isolated power supplies
To be used for floating power supplies, inverting power supplies, etc.

- Applications
- Isolated power supply
- Various negative power supplies
  (OP amp/measuring amplifiers ±12V, ±15V, etc.)
- Gate drive bias (floating power supply / negative power supply)

Example specifications

Input Voltage	: 3.0V ~ 36.0V
Output Voltage 1	: 2.8V ~ 18.0V
Output Voltage 2~	: 5V/12V/15V etc *depending on the winding ratio
Output Current 1	: Max 300mA ~ 600mA
Output Current 2~	: Max 10mA ~ 100mA
Features	: Floating voltage available. Multi-channel are possible by transformers.

Typical Application Circuit



Evaluation Board