



Simple, 3 W, Non-isolated Bias Supply

ON Semiconductor

Device	Application	Input Voltage	Output Power	Topology	I/O Isolation
NCP1055	Non-isolated Logic Bias Supply	90 to 300 Vac 100 to 450 Vdc	3 W Nominal	Buck	None

Other Specification

	Output
Output Voltage	12 to 15 Vdc
Ripple	Less than 2%
Nominal Current	50 to 200 mA
Max Current	250 mA
Min Current	Zero

PFC (Yes/No)	No
Minimum Efficiency	65%
Inrush Limiting / Fuse	Yes
Operating Temp. Range	0 to +50°C
Cooling Method / Supply Orientation	Convection – no specific orientation
Signal Level Control	None

Circuit Description

This circuit is a very simple buck regulator configured for a non-input isolated, 3 W bias power supply for appliances, industrial electronic equipment or the primary circuitry of a larger power supply. This specific example is a 15 Vdc at 75 mA with a 125 mA output resistively lowered to 12 Vdc for a small, optional dc cooling fan. If desired, the fan output can be eliminated and the full 200 mA with a 250 mA surge can be provided by the 15 Vdc output. By choosing the correct zener voltage for Z1, most voltages from 5 V to over 28 V can be configured.

The key to the simple circuitry is the use of ON Semiconductor's NCP1055 monolithic controller with an internal 700 V MOSFET. The controller works as a gated oscillator which shuts off when the sense input level on pin 2 exceeds about 4.7 volts. The output voltage is sensed using a "bootstrap" circuit composed of R1, D3, and C4 which allows accurate sensing despite having the ground reference at a switching node (cathode of D4). By using the gated oscillator approach instead of

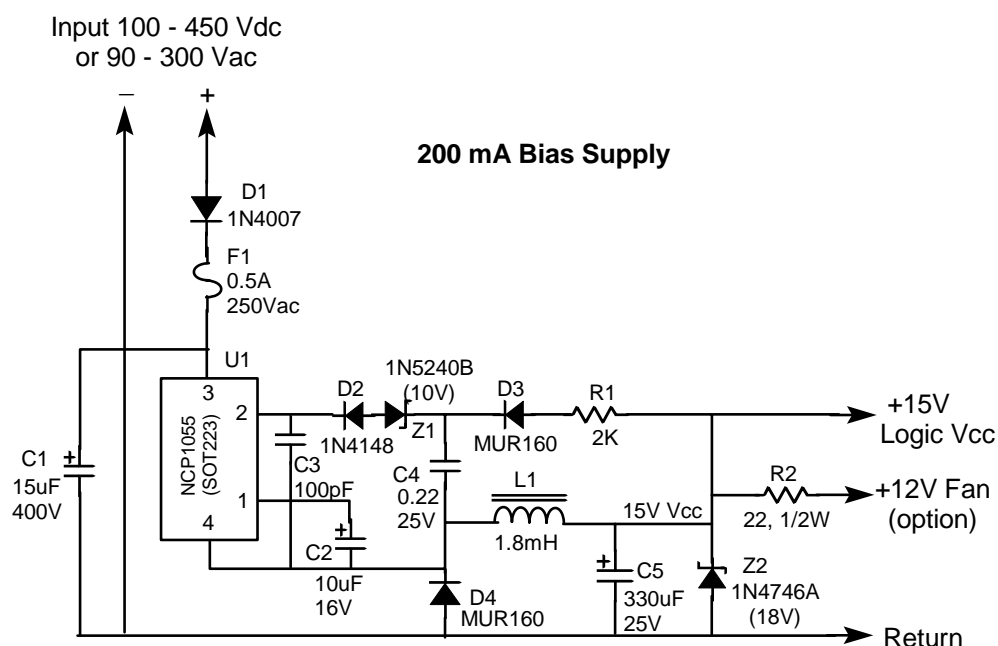
conventional, analog PWM control, maximum simplicity is achieved without stability or control loop issues. The amplitude of the output ripple can be controlled by the inductance value of L1 and the inherent ESR of output capacitor C5. For voltages less than 9 Vdc it may be necessary to slightly increase both the inductance and capacitance values of these components.

Key Features

- Ultra-simple circuit with excellent output regulation
- Inherent over current/over temperature protection in NCP1055
- Off-the-shelf components
- Configurable for most output voltages greater than 5 Vdc

DN06053/D

Schematic



Notes:

1. L1 is Coilcraft RFB1010-182L or equivalent (1.8 mH, 400 mA).
2. Vout set by Z1 zener voltage = Vz1 + 5.2 volts (approximately).
3. D1 unnecessary if input is dc.
4. R2 limits voltage for optional equipment fan to 12 Vdc.
5. Z2 is for output OV protection.
6. Crossed lines on schematic are not connected.

Bibliography and References

- Data sheet [NCP1055](#): Monolithic High Voltage Gated Oscillator Power Switching Regulator
- Application note [AND8098](#): Low-Cost 100 mA High-Voltage Buck and Buck-Boost Using NCP1052

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