



ON Semiconductor

1 W, Dual Output, Off-line Converter

Device	Application	Input Voltage	Output Power	Topology	I/O Isolation
NCP1012	Auxiliary off-line power supply for appliances	85 to 270 Vac	1 W	Buck/Flyback	None

Other Specifications				
	Output 1	Output 2	Output 3	Output 4
Output Voltage	- 5 V	- 12 V	N/A	N/A
Ripple	100 mV	200 mV	N/A	N/A
Nominal Current	100 mA	50 mA	N/A	N/A
Max Current	100 mA	50 mA	N/A	N/A
Min Current	10 mA	0 mA	N/A	N/A

PFC (Yes/No)	Passive due to low input C
Minimum Efficiency	70%
Operating Temp Range	0 to +55 °C
Cooling Method/Supply Orientation	Convection

Circuit Description

This design is intended for low power applications where 5 V and/or 12 V may be necessary for control circuits in appliances or similar devices in which mains isolation is not required and low cost and simplicity are mandatory. The topology is an off-line buck converter configured for a 5 volt negative output with an additional negative 12 volt output derived from a secondary flyback winding on the buck choke. The schematic notes detail how this circuit can be converted for positive outputs if desired.

The input section uses half-wave rectification for simplicity and allows the output common to be referenced to the mains neutral line. An input EMI filter is provided for conducted emissions compliance. Good output cross regulation is achieved on the 12 V output with the use of stacked windings in the buck choke. Regulation feedback is achieved with a simple zener diode and optocoupler circuit that also provides the required offset floating for the NCP1012 controller.

Key Features

- Extremely simple and cost effective low power supply to provide non-isolated, low voltage outputs.
- Good cross regulation due to stacked windings in the buck choke.
- Low cost monolithic NCP1012 integrated controller with self-biased Vcc used for buck converter.
- EMI filter on AC input for agency compliance.
- Output polarities easily reversible without component changes.
- Over current protection.
- 2 watt capability if NCP1014 is used for U1.

