ON Semiconductor

Design Note – DN06013/D

3.6 W Auxiliary Power Supply for Appliance/White Goods

Device	Application	Input Voltage	Output Power	Topology	I/O Isolation
NCP1012	Auxiliary supply for Appliance / White Goods	90 to 270 Vac	3.6 W	Flyback	Yes

Other Specifications

	Output 1	Output 2	Output 3	Output 4
Output Voltage	12 Vdc	N/A	N/A	N/A
Ripple	100 mV max	N/A	N/A	N/A
Nominal Current	300 mA	N/A	N/A	N/A
Max Current	300 mA	N/A	N/A	N/A
Min Current	0 A	N/A	N/A	N/A

PFC (Yes/No)	No
Minimum Efficiency	65%
Cooling Method/Supply Orientation	Convection

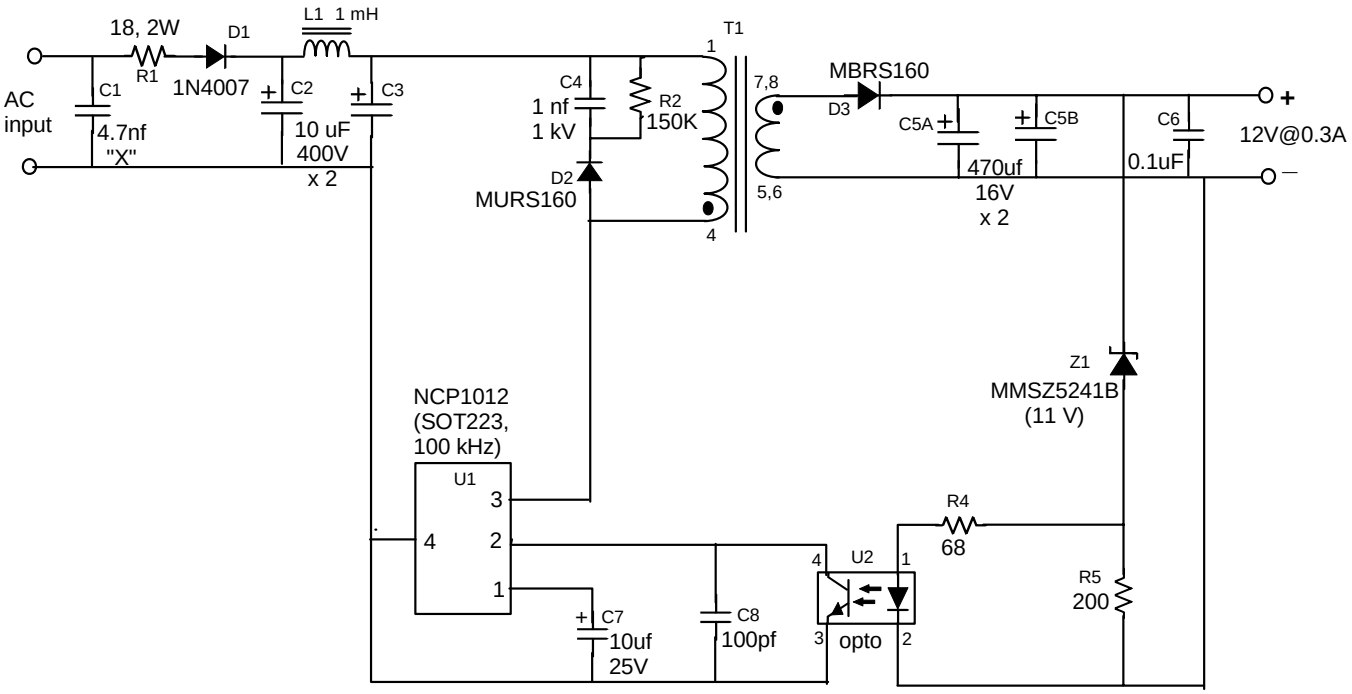
Circuit Description

The universal AC input converter circuit is a simple flyback regulator utilizing the monolithic NCP1012 controller (U1) with internal Mosfet to provide an isolated 12 volts at 300 mA output. Output voltage feedback is achieved via zener diode Z1 and optocoupler U1. Conducted EMI is attenuated by the input filter comprised of C1 and L1. A simple inrush limiter is provided by R1. R2, D2 and C4 is a voltage clipping snubber that limits the peak flyback voltage to pin 3 (Mosfet drain) of U1.

Key Features

- Simple yet effective off-line switcher with very few components.
- EMI filter for conducted EMI compliance.
- Isolated output.
- Protection from overload and open optocoupler.
- Over-temperature protection.
- No auxiliary winding required on transformer for control Vcc.

DN06013/D
Schematic



NOTES:

1. Zener D5 and resistor R6 sets the output voltage. Vout = Vz + 0.9 volts approximately.
2. Crossed lines are not connected.
3. Input is 90 - 265 Vac.
4. R1 is for inrush limiting.
5. U2 opto is Vishay SFH6156A or similar.
6. Pin 4 of U1 should be soldered to clad ground plane for good heatsinking.
7. L1 is Coilcraft RFB0807-102L inductor for conducted EMI compliance.
8. See magnetics drawing for T1 details.
9. C5B is optional for very low output ripple.

NCP1012 Off-Line Power Supply
12 Vout @ 300 mA
ON Semiconductor

DN06013/D

MAGNETICS DESIGN DATA SHEET

Project / Customer: ON Semiconductor - NCP1012 power supply - 3.6W

Part Description: 5 watt flyback transformer, 12 volts out

Schematic ID: T1

Core Type: EF16 (E16/8/5); 3C90 material or similar

Core Gap: Gap for 3.3 to 3.5 mH inductance

Inductance: 3.4 mH nominal

Bobbin Type: 8 pin horizontal mount for EF16

Windings (in order):

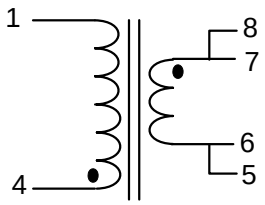
Winding # / type	Turns / Material / Gauge / Insulation Data
Primary (1 - 4)	104 turns of #35HN over 2 layers (52 TPL). Insulate for 3 kV to the next winding.
12V Secondary (5, 6 - 7, 8)	10 turns of #28HN spiral wound over one layer with 0.12" (3mm) end margins and tape cuffed ends. Triple insulated #28 can be subsituted without end margins.

Vacuum varnish assembly

NOTE: Suggested Vendor: Mesa Power Systems, Escondido, CA. 1-800-515-8514

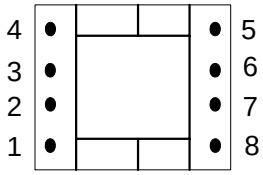
Hipot: 3 kV from boost/primary to secondary

Schematic



Lead Breakout / Pinout

(Bottom View - facing pins)



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