



# Universal Input, +/- 12 V Output 8 Watt PSU

ON Semiconductor

Device	Application	Input Voltage	Output Power	Topology	I/O Isolation
NCP1014	Power Supply	90 – 275 Vac	8 Watts nominal	DCM Flyback	Yes – 3kV

## Other Specifications

	Output 1	Output 2	Output 3	Output 4
<b>Output Voltage</b>	+12 Vdc	-12 Vdc	N/A	N/A
<b>Ripple</b>	100 mV pk	100 mV pk	N/A	N/A
<b>Nominal Current</b>	500 mA	100 mA	N/A	N/A
<b>Max Current</b>	650 mA	250 mA	N/A	N/A
<b>Min Current</b>	450 mA	50 mA	N/A	N/A

<b>PFC (Yes/No)</b>	No
<b>Minimum Efficiency</b>	75% at full load
<b>Inrush Limiting / Fuse</b>	Yes – both included
<b>Operating Temp. Range</b>	0 to +60°C
<b>Cooling Method/Supply Orientation</b>	Convection

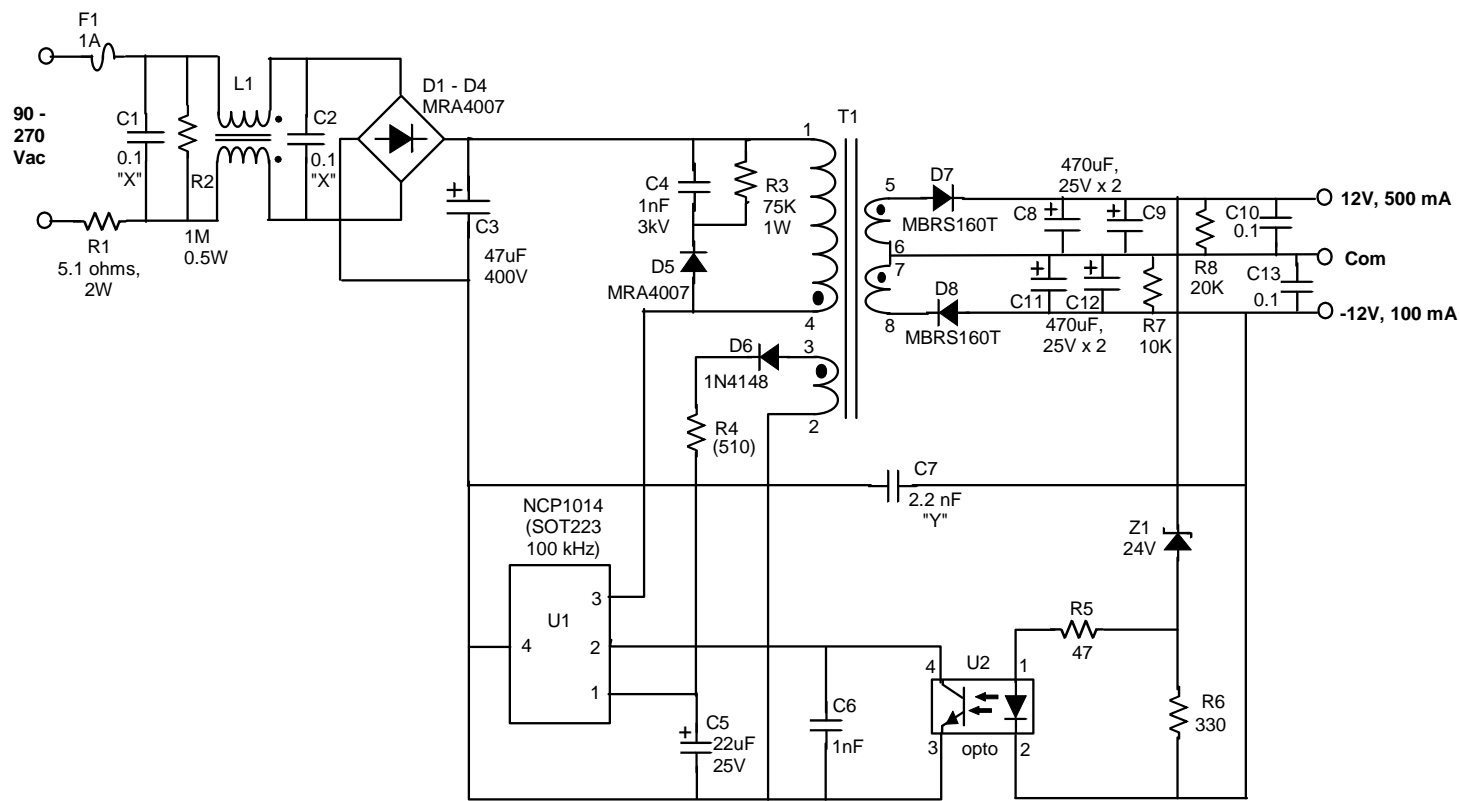
## Circuit Description

This 8 watt, dual output (+/- 12 volts), off-line power supply is designed around a flyback converter topology utilizing ON Semiconductor's NCP1014 monolithic controller with integrated high voltage Mosfet. The flyback converter is operated in discontinuous conduction mode (DCM) for minimal EMI generation and to enhance simplicity and compactness in the flyback transformer design (T1). An auxiliary winding on the transformer powers the control circuit after turn on which maximizes overall conversion efficiency. The outputs are regulated by sensing the summed voltage of both the -12 and +12 volt outputs. This assures very good regulation on both channels. A very simple yet effective zener (Z1) and optocoupler (U2) feedback scheme is used for maximum simplicity and low cost. The flyback transformer is designed utilizing an industry standard EF16 ferrite core with straightforward winding techniques. Details of critical components and other circuit layout information are located in the "Notes" block on the schematic below.

## Key Features

- Common and differential mode EMI input filter for low conducted emissions.
- Inherent over-current and over-voltage protection on both outputs.
- Schottky output rectifiers for high efficiency.
- Summed output voltage sensing for tight regulation on both outputs.
- Output surge capability to over 10 watts.
- Input current inrush limiting (R1)
- Universal AC input

Schematic



Notes:

1. Crossed lines on schematic are not connected.
2. U2 is Vishay H11A817A optocoupler or equivalent.
3. L1 is Coilcraft BU16-4530R5BL or similar CM EMI inductor.
4. Z1 sets output level:  $V_{out} = (V_z + 0.85V)/2$
5. U1 pin 4 tab should be soldered to clad for heatsinking.
6. R4 may need adjustment for startup/OVP optimization.
7. See magnetics design for T1 details.

**Triple Output, 8 Watt, Off-line Power Supply based on NCP1014 Controller**  
 ON Semiconductor Design Group

# DN06034/D

## MAGNETICS DESIGN DATA SHEET

Project / Customer: Schneider - NCP1014 dual output supply (+/- 12V)

Part Description: 8 watt, 100 kHz flyback transformer; +/- 12V output, universal input

Schematic ID: T1

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

Core Gap: Gap for 1.4 to 1.6 mH

Inductance: L = 1.5 mH +/- 5% nominal

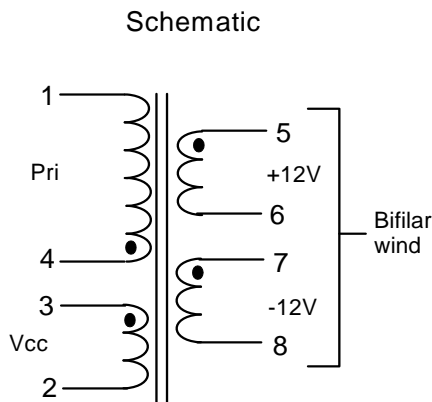
Bobbin Type: 8 pin horizontal mount for EF16

Windings (in order):

Winding # / type	Turns / Material / Gauge / Insulation Data
Vcc/Aux (3 - 2)	8 turns of #35HN spiral wound over 1 layer. Self-leads to pins. Insulate with tape for 1 kV to next winding.
Primary (4 - 1)	100 turns of #35HN over 2 layers, 50 TPL. Insulate with tape for 3 kV to next winding. Self-leads to pins.
+12/-12V Secondary (5 - 6, 7 - 8)	8 turns wound biflar of two different colors of #26HN flat wound over 1 layer with winding ends cuffed with tape. Self-leads to pins per diagram below. Insulate with final layer of tape.

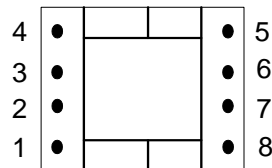
Vacuum varnish assembly.

Hipot: 3 kV from boost/primary to secondaries for 1 minute.



Lead Breakout / Pinout

(Bottom View - facing pins)



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