### Design Note – DN06008/D

**+/- 18 V, Dual Output Power Supply**

<table>
<thead>
<tr>
<th>Device</th>
<th>Application</th>
<th>Input Voltage</th>
<th>Output Power</th>
<th>Topology</th>
<th>I/O Isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCP1308</td>
<td>Audio Amp Power Supply +/-18V</td>
<td>90 to 270 Vac</td>
<td>45 W, 90 W peak</td>
<td>Quasi Resonant Flyback</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### Circuit Description

A low cost 45 watt nominal, 90 watt peak, dual +/- 18 volt output power supply is presented here for powering audio amplifiers or similar applications. Because the sum of the outputs are sensed, good voltage regulation and tracking is provided despite the extremely simple zener and optocoupler voltage feedback circuit. The off-line power converter is implemented utilizing ON’s NCP1218 quasi-resonant (QR) flyback controller. This topology provides very high conversion efficiency and low noise generation because of the QR, zero voltage switching properties and the fact that the flyback switching operation is achieved in the discontinuous inductor current, critical conduction mode. The input circuit features common and differential mode conducted EMI filtering using off-the-shelf components. An auxiliary Vcc winding on the flyback transformer also provides for very low input standby power (less than 1 W) under no load conditions.

### Key Features

- Dual, tracking +/- 18 volt outputs.
- Very low cost, simple off-line power supply circuit.
- Quasi-resonant, critical conduction mode flyback topology for maximum efficiency.
- Input conducted EMI filter.
- Low output ripple (< 100 mV)
- NTC thermistor inrush limiting
- Very low EMI noise generation
- Inherent over-current and over-voltage protection

#### Other Specifications

<table>
<thead>
<tr>
<th>Output Voltage</th>
<th>Output 1</th>
<th>Output 2</th>
<th>Output 3</th>
<th>Output 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nominal Current</strong></td>
<td>1.25 A</td>
<td>1.25 A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Max Current</strong></td>
<td>2.5 A</td>
<td>2.5 A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Min Current</strong></td>
<td>zero</td>
<td>zero</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

- **PFC (Yes/No)**: No
- **Minimum Efficiency**: 75%
- **Input Connector / Fuse**: 2 A fuse
- **Operating Temp. Range**: 0 to +50°C
- **Cooling Method/Supply Orientation**: Convection

**Others**: Tracking dual outputs
NOTES:

1. Crossed lines on schematic are NOT connected.
2. Q1 is Infineon SP8N80C3 (8 amp, 800 volt)
3. U2 is Vishay H11A817A or equivalent optocoupler.
4. TH1 is NTC thermistor for inrush limiting.
5. L1 is Coilcraft BU15-7521R0BL EMI inductor.
6. L2 & L3 are Coilcraft PCV-0-472-05L (4.5uH, 5A)
7. Q1 will need a small heatsink.
8. BD1 can be 4 - 1N4005 rectifiers (ON Semi).
9. D1, D2, D3, D4, U1 are ON Semiconductor components
10. Output caps are radial lead, low impedance types (UCC LXV series or similar).
11. See drawing for T1 details. Suggested proto vendor is Mesa Power Systems, Escondido, CA (800-515-8514)

90 Watt Peak, Dual Output Quasi-Resonant Power Supply
ON Semiconductor Design Center
Part Description: Quasi-resonant flyback transformer, 100W pk, 2 output

Schematic ID: T1

Core Type: ETD29 (Ferroxcube 3C90 material or equivalent)

Core Gap: Gap for 400 uH +/- 5%

Inductance: 380 to 420 uH nominal across primary (pins 13 to 1)

Bobbin Type: ETD 13 pin horizontal pc mount (Ferroxcube PC1-29H)

<table>
<thead>
<tr>
<th>Winding # / type</th>
<th>Turns / Material / Gauge / Insulation Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aux winding (11 - 3)</td>
<td>7 turns of #24HN spiral wound evenly over primary. Self-leads to pins. Insulate for 1 kV to next winding.</td>
</tr>
<tr>
<td>Primary (13 - 1)</td>
<td>63 turns of #30HN over one layer; cuff ends with tape; Self-leads to pins; insulate for 3 kV to next layer.</td>
</tr>
<tr>
<td>+/- 18V secondary (9 - 4, 7 - 6)</td>
<td>10 turns bifilar (2 strands) of #26HN with 1 strand a different color, flat wound over 1 layer with 0.20&quot; end margins. Self-leads to pins with similar colors to same pin (see drawing below).</td>
</tr>
</tbody>
</table>

Hipot: 2.7 kV primary/aux to all secondaries. Vacuum varnish.

**Schematic**

**Lead Breakout / Pinout**

Bottom (pin side) view

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