Reference Design RD-350

5W Power Supply Adapter Design Using FAN302HL, mWSaver™ Technology PWM Controller for Low Standby Power

<table>
<thead>
<tr>
<th>Featured Device</th>
<th>Application</th>
<th>Input Voltage Range</th>
<th>Output Voltage (Rated Current)</th>
<th>Rated Output Power</th>
<th>Topology</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAN302HL</td>
<td>Cell Phone Charger</td>
<td>90~264V&lt;sub&gt;AC&lt;/sub&gt;</td>
<td>5V (1A)</td>
<td>5W</td>
<td>Primary-Side Regulated Flyback</td>
</tr>
</tbody>
</table>

Featured Fairchild Product: FAN302HL

- Ultra-Low Standby Power: Under 10mW at 230V<sub>AC</sub>
- Constant-Current (CC) Control without Secondary-Feedback Circuitry
- Fixed PWM Frequency at 85kHz with Frequency Hopping to Reduce EMI
- High-Voltage Startup
- Low Burst Mode Operating Current (350μA Maximum) and Operating Current (3.5mA Typical)
- Protection Functions (V<sub>S</sub> OVP, V<sub>DD</sub> OVP, V<sub>DD</sub> UVLO and Over-Temperature Protection)
- Available in SOIC-8 Package

1. Schematic

![FAN302HL 5W Application Schematic](image)

Figure 1. FAN302HL 5W Application Schematic
2. Transformer

2.1. Transformer Schematic Diagram

```
Primary side                                      Secondary side
PIN5                                            FLY+
W1 0.1\phi X 1 93T
PIN4                                            Tube
PIN1                                            FLY-
W3 0.18\phi X 1 11T
PIN2
```

2.2. Winding Specification

<table>
<thead>
<tr>
<th>Pin (S → F)</th>
<th>Wire</th>
<th>Turns</th>
<th>Isolation Tape</th>
<th>Winding Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1</td>
<td>4 → 5</td>
<td>2UEW 0.1\phi</td>
<td>26</td>
<td>0</td>
</tr>
<tr>
<td>W1</td>
<td>4 → 5</td>
<td>2UEW 0.1\phi</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>W1</td>
<td>4 → 5</td>
<td>2UEW 0.1\phi</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>W1</td>
<td>4 → 5</td>
<td>2UEW 0.1\phi</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>W2</td>
<td>Fly+ → Fly-</td>
<td>TEX-E 0.45\phi</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>W3</td>
<td>1 → 2</td>
<td>2UEW 0.18\phi</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>W3</td>
<td>Core Rounding Tape</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W4</td>
<td>2 → -</td>
<td>2UEW 0.18\phi</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>W4</td>
<td>Core Rounding Tape</td>
<td></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- W1 is four winds, each wind of turns referred to above as turns. Need to add one insulating tape between the one and two layers.
- W2 is wound two layers and used triple-insulated wire, end of positive fly line is 3cm, the end of negative fly line is 2.5cm.
- W3 is spare winding in one layer.
- W4 is wound in the core of the outermost layer and sparse winding.

Core: EI12.5
Bobbin: EI12.5

2.3. Electrical Characteristics

<table>
<thead>
<tr>
<th>Pin</th>
<th>Spec.</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary-Side Inductance</td>
<td>4 – 5 700µH ±7%</td>
<td>100kHz, 1V</td>
</tr>
<tr>
<td>Primary-Side Leakage Inductance</td>
<td>4 – 5 200µH max.</td>
<td>Short one of the secondary windings</td>
</tr>
</tbody>
</table>
3. Typical Performance

Efficiency

- 115V/60Hz (74.79% Avg.)
- 230V/50Hz (73.78% Avg.)
- 68.17% Energy Star V2.0 (Nov. 2008)

Load
25% 50% 75% 100%

Efficiency
66.00% 68.00% 70.00% 72.00% 74.00% 76.00% 78.00%

Output Voltage (V)
0 200 400 600 800 1000 1200 1400 1600

Output Current (mA)

Standby Power (mW)

VAC (V)

Related Resources

FAN302HL — PWM Controller-CC from Primary side and CV from Secondary Side

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