Portable Cell Phone Charger

By Miguel Contreras
Design Overview

Function:
Serves as a portable charging device.

Specifications
- Uses Boost Converter/Boost Regulator
- 5V output @ 500 mA output
- Uses any AA battery (pref. Lithium)
<table>
<thead>
<tr>
<th>Item #</th>
<th>Quantity</th>
<th>Reference</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>IC1</td>
<td>Converter</td>
<td>5V boost converter LT1302CN85</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>IC1'</td>
<td>8-pin socket</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>C4</td>
<td>Capacitor</td>
<td>Power supply capacitor 220uF/6.3V+</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>C3</td>
<td>Capacitor</td>
<td>Power supply capacitor 220uF/6.3V+</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>C1</td>
<td>Capacitor</td>
<td>Bypass capacitor (0.1uF)</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>C2</td>
<td>Capacitor</td>
<td>Bypass capacitor (0.1uF)</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>R5</td>
<td>Resistor</td>
<td>1/8W 5% 3.3K Resistor</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>R2</td>
<td>Resistor</td>
<td>1/8W 1% 75K Resistor</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>R4</td>
<td>Resistor</td>
<td>1/8W 1% 75K Resistor</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>R1</td>
<td>Resistor</td>
<td>1/8W 1% 49.9K Resistor</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>R3</td>
<td>Resistor</td>
<td>1/8W 1% 49.9K Resistor</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>D1</td>
<td>Diode</td>
<td>IN5818 Schottky Diode</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>L1</td>
<td>Inductor</td>
<td>10uH power inductor</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>X1</td>
<td>USB</td>
<td>USB type A female jack</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td></td>
<td></td>
<td>2 x AA battery holder</td>
</tr>
</tbody>
</table>
Boost Converter

Boost Converter (step-up converter) must:
- 8-DIP package
- Exerts 500 mA @ 5V
- 3V minimum input voltage (for two 1.5V AA batteries)

What does it do?
- Output DC voltage greater than its input
- Principle:
  - Tendency of an inductor to resist changes in current
  - Inductor acts like a load to absorb energy
  - When being discharged it acts like an energy source

IC: LT1302CN8-5
Schematic
Printed Circuit Board

Width: 1.49 Inches
Height: 1.25 Inches
Manufactured Board: Unpopulated

- All components are through-hole
- Components spread out for ease of assembly
Manufactured Board: Populated
Chassis Design

Length: 3.75 inches
Width: 1.38 inches
Height: 0.70 inches
Material: Acrylic Plastic
Some Numbers...

- iPhone (all types): 3/4 full recharge
- iPod touch: 26 hours more (1.5 full recharges)
- iPod touch video: 3 hours more video (1 full recharge)
- iPod nano: 4 full recharges
- iPod shuffle: 60 hours more (5 full recharges)

- Higher quality batteries give you a longer boost time!
Conclusions

- Diptrace is a versatile program to design schematic and PCB layout
- Double sided PCB
- Small enough to design portable chassis
- Total size, including battery pack: 2.50 in by 1.25 in
- Works for: Apple, HTC, LG, Motorola, Samsung, Sony Ericsson, and MP3 players
- Efficiency 85% with 2 AA batteries
- Circuit Worked!
Recommendations

- Place components closer together
  - Serves for a more portable/compact device
- Use different chassis material
  - Easier to work with
For more information...

- Visit:
  http://www.ladyada.net/make/mintyboost/index.html
Questions?