DESCRIPTION

MP150 is a primary side regulator providing accurate constant voltage (CV) regulation without the Opto-coupler, support Buck, Buck-Boost and Flyback topologies. 500V MOSFET is integrated in the regulator, so very simple structure and low cost can be achieved. These features help to make it a competitive candidate for off-line low power applications, such as home appliance and standby power.

MP150 is a green mode operation regulator. With the load decreasing, the peak current and the switching frequency will both decreasing with the load. As a result, it still offers excellent efficiency performance at light load, thus better average efficiency is achieved.

MP150 features various protections like Thermal Shutdown (TSD), VCC under Voltage Lockout (UVLO), Over Load Protection (OLP), Short Circuit Protection (SCP), Open Loop Protection.

MP150 is available in the TSOT23-5 package.

FEATURES

- Primary side constant voltage (CV) control, supporting Buck, Buck-Boost and Flyback topologies
- Integrated 500V/30Ω MOSFET
- < 150mW No-load power consumption
- Up to 2W output power
- Maximum DCM output current lower than 120mA, maximum CCM output current lower than 200mA
- Frequency Foldback
- Maximum frequency limitation
- Peak Current Compression
- Internal High Voltage Current Source

APPLICATIONS

- Home Appliance, white goods and consumer electronics
- Industrial Controls
- Standby Power

All MPS parts are lead-free and adhere to the RoHS directive. For MPS green status, please visit MPS website under Quality Assurance. “MPS” and “The Future of Analog IC Technology” are Registered Trademarks of Monolithic Power Systems, Inc.

EV150-J-00A EVALUATION BOARD

<table>
<thead>
<tr>
<th>Board Number</th>
<th>MPS IC Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>EV150-J-00A</td>
<td>MP150GJ</td>
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</tbody>
</table>

(L x W x H) 1.7cm x 1.7cm x 1.7cm
## EV150-J-00A BILL OF MATERIALS

<table>
<thead>
<tr>
<th>Qty</th>
<th>Ref</th>
<th>Value</th>
<th>Description</th>
<th>Package</th>
<th>Manufacture</th>
<th>Part Number</th>
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<tbody>
<tr>
<td>1</td>
<td>C1</td>
<td>220nF</td>
<td>Ceramic Capacitor, 16V; X7R, 0603</td>
<td>0603</td>
<td>muRata</td>
<td>GRM188R71C224KA01</td>
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<td>1</td>
<td>C2</td>
<td>2.2uF</td>
<td>Ceramic Capacitor, 10V; X7R, 0603</td>
<td>0603</td>
<td>muRata</td>
<td>GRM188R71A225KE15D</td>
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<tr>
<td>2</td>
<td>C3, C4</td>
<td>3.3uF/400V</td>
<td>Capacitor, 400V</td>
<td>DIP</td>
<td>Rubycon</td>
<td>400LLE3.3MEFC8X11.5</td>
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<td>C5</td>
<td>100uF</td>
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<td>1210</td>
<td>muRata</td>
<td>GRM32ER60J107ME20L</td>
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<tr>
<td>1</td>
<td>C7</td>
<td>470pF</td>
<td>Ceramic Capacitor, 50V; X7R, 0603</td>
<td>0603</td>
<td>TDK</td>
<td>C1608X7R1H471K</td>
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<td>3</td>
<td>D1, D2, D4</td>
<td>SRGC10MH</td>
<td>Diode; 1000V; 1A</td>
<td>1206</td>
<td>Maxmegas</td>
<td>SRGC10MH</td>
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<tr>
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<td>D3</td>
<td>WUGC10JH</td>
<td>Diode, 600V, 1A</td>
<td>SMA</td>
<td>Zowie</td>
<td>WUGC10JH</td>
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<tr>
<td>1</td>
<td>L1</td>
<td>2.2mH</td>
<td>Inductor, 2.2mH,</td>
<td>DIP</td>
<td>Any</td>
<td>Any</td>
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<tr>
<td>1</td>
<td>L2</td>
<td>1mH</td>
<td>Inductor, 1mH, 2.5, 420mA</td>
<td>DIP</td>
<td>Wurth</td>
<td>744743102</td>
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<td>1</td>
<td>R1</td>
<td>5.49K</td>
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<td>Yageo</td>
<td>RC0603FR-075K49L</td>
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<tr>
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<td>R2</td>
<td>4.99K</td>
<td>Film Resistor, 1%;</td>
<td>0603</td>
<td>Yageo</td>
<td>RC0603FR-074K99L</td>
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<tr>
<td>1</td>
<td>R3</td>
<td>1K</td>
<td>Resistor, 1%</td>
<td>0603</td>
<td>Yageo</td>
<td>RC0603FR-071KL</td>
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<tr>
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<td>39</td>
<td>Fuse Resistor; 5%, 1W</td>
<td>DIP</td>
<td>Yageo</td>
<td>FKN1WSJT-52-39R</td>
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<tr>
<td>1</td>
<td>U1</td>
<td>MP150GJ</td>
<td>Buck regulator</td>
<td>TSOT23-5</td>
<td>MPS</td>
<td>MP150GJ</td>
</tr>
</tbody>
</table>
EVB TEST RESULTS
Performance waveforms are tested on the evaluation board.
VIN = 85~265VAC, VOUT = 5V, IOUT = 200mA, TA = 25ºC, unless otherwise noted.

Efficiency

No Load Consumption

Normal Operation
VIN = 115VAC, Full Load

Normal Operation
VIN = 230VAC, Full Load

Output Ripple
VIN = 115VAC, No Load

Output Ripple
VIN = 230VAC, No Load

Output Ripple
VIN = 230VAC, Full Load
EVB TEST RESULTS (continued)

Performance waveforms are tested on the evaluation board. 
\[ V_{IN} = 85\text{-}265\text{VAC}, \ V_{OUT} = 5\text{V}, \ I_{OUT} = 200\text{mA}, \ T_A = 25^\circ\text{C}, \] unless otherwise noted.

**Soft Start**  
\[ V_{IN} = 85\text{VAC} \]

**Soft Start**  
\[ V_{IN} = 265\text{VAC} \]

**Turn-on Delay**  
\[ V_{IN} = 115\text{VAC}, \ \text{No Load} \]

**Turn-on Delay**  
\[ V_{IN} = 230\text{VAC}, \ \text{No Load} \]

**Turn-on Delay**  
\[ V_{IN} = 230\text{VAC}, \ \text{Full Load} \]

**Load Transient**  
\[ V_{IN} = 115\text{VAC}, \ 25\% \text{ Load to 50\% Load} \]

**Load Transient**  
\[ V_{IN} = 115\text{VAC}, \ 50\% \text{ Load to 75\% Load} \]

**Load Transient**  
\[ V_{IN} = 230\text{VAC}, \ 25\% \text{ Load to 50\% Load} \]
EVB TEST RESULTS (continued)

Performance waveforms are tested on the evaluation board. 

\( V_{IN} = 85\text{--}265\text{VAC}, \ V_{OUT} = 5\text{V}, \ I_{OUT} = 200\text{mA}, \ T_A = 25\text{ºC}, \) unless otherwise noted.

**Load Transient**

\( V_{IN} = 230\text{VAC}, \ 50\% \text{ Load to 75\% Load} \)

\( V_{RIPPLE} \ 50\text{mV/div.} \)

10ms/div.

**OLP Protection**

\( V_{IN} = 230\text{VAC} \)

\( V_{DS} \ 100\text{V/div.} \)

100ms/div.

**SCP Protection**

\( V_{IN} = 230\text{VAC} \)

\( V_{DS} \ 100\text{V/div.} \)

100ms/div.

**Thermal Down**

\( V_{DS} \ 100\text{V/div.} \)

100ms/div.

**Open Loop**

**Full Load**

\( V_{DS} \ 100\text{V/div.} \)

100ms/div.

**No Load**

\( V_{DS} \ 100\text{V/div.} \)

100ms/div.

**Conducted EMI**

Two-Wire Input, \( V_{IN} = 230\text{VAC} \)

**L Line**

0 10 20 30 40 50 60 70 80 90 100 110 120

150kHz 30MHz

EN55022A

EN55022Q

**N Line**

0 10 20 30 40 50 60 70 80 90 100 110 120

150kHz 30MHz

EN55022A

EN55022Q
SURGE PERFORMANCE

With the input capacitors C3 (3.3μF) and C4 (3.3μF), the board can pass 500V surge test. Table 1 shows the capacitance required under normal condition for different surge voltage.

Table 1: Recommended Capacitor Values

<table>
<thead>
<tr>
<th>Surge Voltage</th>
<th>500V</th>
<th>1000V</th>
<th>2000V</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>1μF</td>
<td>10μF</td>
<td>22μF</td>
</tr>
<tr>
<td>C2</td>
<td>1μF</td>
<td>4.7μF</td>
<td>10μF</td>
</tr>
</tbody>
</table>
PRINTED CIRCUIT BOARD LAYOUT

Figure 1 — Top Silk Layer

Figure 2 — Bottom Layer
QUICK START GUIDE

1. Preset Power Supply to $85\leq V_{IN} \leq 265V$.
2. Turn Power Supply off.
3. Connect the Line and Neutral terminals of the power supply output to L and N port.
4. Connect the positive terminal of the load to “+” port, and connect the negative terminal of the load to “-” port.
5. Turn Power Supply on after making connections.