DESCRIPTION

EVM3632S-PQ-00A evaluation board is based on MPS’S MPM3632S. The MPM3632S is a synchronous rectified, step-down Mini-Module regulator with built-in power MOSFETs, inductor and two capacitors. It offers a very compact solution with only input and output capacitors to achieve a 3A continuous output current with excellent load and line regulation over a wide input supply range. The MPM3632S operates in fixed 2.2MHz switching frequency with Constant-On-Time control which provides fast load transient response.

Full protection features include output over voltage protection, over-current protection and thermal shut down.

MPM3632S eliminates design and manufacturing risks while dramatically improving time to market.

The MPM3632S is available in a space-saving LGA10 (3mmx3mmx1.45mm) package.

FEATURES

- Complete Switch Mode Power Supply
- Wide 4V-to-18V Operation Input Range
- 36mΩ/18mΩ Low RDS(ON) Internal Power MOSFETs
- 0.5% Accuracy Output Voltage
- 3A Continuous Output Current
- 2.2MHz Switching Frequency
- Forced CCM Mode
- Power Good Indicator
- 500μA Low Quiescent Current
- Hiccup OCP Protection
- Programmable Soft Start (Metal option)
- Output Over Voltage Protection
- Fast Transient Response
- Available in LGA3x3x1.45mm Package

APPLICATIONS

- Sever Systems
- Medical and Imaging Equipment
- Distributed Power Systems

ELECTRICAL SPECIFICATION (1)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>V_IN</td>
<td>12</td>
<td>V</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>V_OUT</td>
<td>3.3</td>
<td>V</td>
</tr>
<tr>
<td>Output Current</td>
<td>I_OUT</td>
<td>3</td>
<td>A</td>
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</tbody>
</table>

Notes:

1) For different Input/output voltage specs and different output capacitor/inductor may need change the application circuit parameters.

APPLICATIONS

- Sever Systems
- Medical and Imaging Equipment
- Distributed Power Systems

All MPS parts are lead-free, halogen free, and adhere to the RoHS directive. For MPS green status, please visit MPS website under Quality Assurance.

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EVM3632S-PQ-00A EVALUATION BOARD

(L x W x H) 63.7mm x 63.7mm x 6.4mm

<table>
<thead>
<tr>
<th>Board Number</th>
<th>MPS IC Number</th>
</tr>
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<tr>
<td>EVM3632S-PQ-00A</td>
<td>MPM3632SGPQ</td>
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</tbody>
</table>

Efficiency

V_IN=12V, V_OUT=3.3V

<table>
<thead>
<tr>
<th>LOAD CURRENT (A)</th>
<th>EFFICIENCY (%)</th>
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<tbody>
<tr>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>1</td>
<td>70</td>
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<tr>
<td>2</td>
<td>80</td>
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<tr>
<td>3</td>
<td>90</td>
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(Out=3.3V, Out=5V)
EVALUATION BOARD SCHEMATIC

EVM3632S-PQ-00A BILL OF MATERIALS

<table>
<thead>
<tr>
<th>Qty</th>
<th>RefDes</th>
<th>Value</th>
<th>Description</th>
<th>Package</th>
<th>Manufacturer</th>
<th>Manufacturer_P/N</th>
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<tbody>
<tr>
<td>2</td>
<td>C1,C1A</td>
<td>10μF</td>
<td>Ceramic Cap,25V,X5R</td>
<td>0805</td>
<td>muRata</td>
<td>GRM21BR61E106KA73L</td>
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<tr>
<td>2</td>
<td>C2,C2A</td>
<td>22μF</td>
<td>Ceramic Cap,16V,X5R</td>
<td>0805</td>
<td>muRata</td>
<td>RM21BR61C226ME44L</td>
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<tr>
<td>1</td>
<td>C3</td>
<td>100pF</td>
<td>Ceramic Cap,16V,X5R</td>
<td>0402</td>
<td>muRata</td>
<td>GRM1555C1E101JA01D</td>
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<tr>
<td>1</td>
<td>C1B</td>
<td>0.1μF</td>
<td>Ceramic Cap,25V,X7R</td>
<td>0402</td>
<td>muRata</td>
<td>GRM188R71E104KA01D</td>
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<tr>
<td>1</td>
<td>C4</td>
<td>1μF</td>
<td>Ceramic Cap,16V,X6S</td>
<td>0402</td>
<td>muRata</td>
<td>GRM155C81C105KE11D</td>
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<tr>
<td>0</td>
<td>C2B</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
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<tr>
<td>1</td>
<td>R1</td>
<td>40.2kΩ</td>
<td>Film Res.1%,0402,40K2</td>
<td>0402</td>
<td>Yageo</td>
<td>RC0402FR-0740K2L</td>
</tr>
<tr>
<td>1</td>
<td>R2</td>
<td>13kΩ</td>
<td>Film Res.1%,0402,13K</td>
<td>0402</td>
<td>Yageo</td>
<td>RC0402FR-0713KL</td>
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<tr>
<td>2</td>
<td>R3,R5</td>
<td>100kΩ</td>
<td>Thick Film Res., 1%</td>
<td>0402</td>
<td>Yageo</td>
<td>RC0402FR-07100KL</td>
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<tr>
<td>1</td>
<td>R4</td>
<td>1kΩ</td>
<td>Thick Film Res., 1%</td>
<td>0402</td>
<td>Yageo</td>
<td>RC0402FR-071KL</td>
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<tr>
<td>0</td>
<td>R6</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
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<tr>
<td>1</td>
<td>U1</td>
<td>MPM3632S</td>
<td>Synchronous Step-Down Convert</td>
<td>NS</td>
<td>MPS</td>
<td>MPM3632SGPQ</td>
</tr>
</tbody>
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EVB TEST RESULTS

Vin = 12V, Vout = 3.3V, Ta = +25°C, unless otherwise noted.

- Efficiency vs. Load Current
  Vout = 5V
  Vout = 3.3V

- Load Regulation vs. Load Current
  Vout = 3.3V

- Line Regulation vs. Input Voltage
  Vin = 12V, Vout = 3.3V

- Temperature Rise vs. Load Current
  Vin = 12V

EVM3632S HIGH-FREQUENCY 18V/3A DC/DC REGULATOR WITH INTEGRATED INDUCTOR
EVB TEST RESULTS (continued)

$V_{\text{IN}} = 12\, \text{V}, \; V_{\text{OUT}} = 3.3\, \text{V}, \; T_A = +25^\circ\text{C}$, unless otherwise noted.

- **Vo Ripple ($I_{\text{OUT}} = 0\, \text{A}$)**
  - CH1: $V_{\text{OUT}}$ (AC)
    - 20mV/div.
  - CH3: $V_{\text{SW}}$
    - 10V/div.
  - CH4: $I_{L}$
    - 5A/div.

- **Vo Ripple ($I_{\text{OUT}} = 3\, \text{A}$)**
  - CH1: $V_{\text{OUT}}$ (AC)
    - 20mV/div.
  - CH3: $V_{\text{SW}}$
    - 10V/div.
  - CH4: $I_{L}$
    - 5A/div.

- **VIN Start-Up Through Input Voltage ($I_{\text{OUT}} = 0\, \text{A}$)**
  - CH1: $V_{\text{OUT}}$
    - 2V/div.
  - CH2: $V_{\text{IN}}$
    - 10V/div.
  - CH3: $V_{\text{SW}}$
    - 10V/div.
  - CH4: $I_{L}$
    - 5A/div.

- **VIN Start-Up Through Input Voltage ($I_{\text{OUT}} = 3\, \text{A}$)**
  - CH1: $V_{\text{OUT}}$
    - 2V/div.
  - CH2: $V_{\text{IN}}$
    - 10V/div.
  - CH3: $V_{\text{SW}}$
    - 10V/div.
  - CH4: $I_{L}$
    - 5A/div.

- **Shutdown Through Input Voltage ($I_{\text{OUT}} = 0\, \text{A}$)**
  - CH1: $V_{\text{OUT}}$
    - 2V/div.
  - CH2: $V_{\text{IN}}$
    - 10V/div.
  - CH3: $V_{\text{SW}}$
    - 10V/div.
  - CH4: $I_{L}$
    - 5A/div.

- **Shutdown Through Input Voltage ($I_{\text{OUT}} = 3\, \text{A}$)**
  - CH1: $V_{\text{OUT}}$
    - 2V/div.
  - CH2: $V_{\text{IN}}$
    - 10V/div.
  - CH3: $V_{\text{SW}}$
    - 10V/div.
  - CH4: $I_{L}$
    - 5A/div.
EVB TEST RESULTS (continued)

\(V_{IN} = 12V, V_{OUT} = 3.3V, T_A = +25^\circ C\), unless otherwise noted.

**Start-Up Through Enable**

\(I_{OUT} = 0A\)

**Shutdown Through Enable**

\(I_{OUT} = 0A\)

**Short Circuit Entry**

\(I_{OUT} = 0A\)
EVB TEST RESULTS *(continued)*

V\textsubscript{IN} =12V, V\textsubscript{OUT} =3.3V, T\textsubscript{A} = +25°C, unless otherwise noted.

**Short Circuit Recovery**

I\textsubscript{OUT}=0A

**Short Circuit Recovery**

I\textsubscript{OUT}=3A

**Short Circuit Steady State**

**Transient Response**

I\textsubscript{OUT}=1.5A-3A, 800mA/μs

CH1: V\textsubscript{OUT} 2V/div.
CH2: V\textsubscript{IN} 10V/div.
CH3: V\textsubscript{SW} 10V/div.
CH4: I\textsubscript{L} 5A/div.

10ms/div.

CH1: V\textsubscript{OUT} 2V/div.
CH2: V\textsubscript{IN} 10V/div.
CH3: V\textsubscript{SW} 10V/div.
CH4: I\textsubscript{L} 5A/div.

10ms/div.

CH1: V\textsubscript{OUT}/AC 20mV/div.
CH4: I\textsubscript{L} 2A/div.

100μs/div.
PRINTED CIRCUIT BOARD LAYOUT

Figure1: Top Silk Layer

Figure2: Top Layer

Figure3: Bottom Layer

Figure4: Inner1 Layer
Figure 5: Inner 2 Layer
QUICK START GUIDE

1. Preset Power Supply to 12V.
2. Turn Power Supply off.
3. Connect Power Supply terminals to:
   a. Positive (+): VIN
   b. Negative (−): GND
4. Connect Load to:
   a. Positive (+): VOUT
   b. Negative (−): GND
5. Turn Power Supply on after making connections. The board will automatically start up.
6. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 1.2V to turn on the regulator, or less than 1V to turn it off.