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..

ELECTRICAL SPECIFICATION (1)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
<th>Units</th>
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<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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Notes:
1) For different input/output voltage specs and different output capacitor/inductor may need change the application circuit parameters.

FEATURES

- Complete Switch Mode Power Supply
- Wide 4V-to-18V Operation Input Range
- 36mΩ/18mΩ Low $R_{DS(ON)}$ 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

- Server 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 BILL OF MATERIALS

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<th>Qty</th>
<th>RefDes</th>
<th>Value</th>
<th>Description</th>
<th>Package</th>
<th>Manufacturer</th>
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<td>2</td>
<td>C1,C1A</td>
<td>10μF</td>
<td>Ceramic Cap, 25V, X5R</td>
<td>0805</td>
<td>muRata</td>
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<td>NS</td>
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<td>0402</td>
<td>Yageo</td>
<td>RC0402FR-0740K2L</td>
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<td>Film Res, 1%, 0402, 13K</td>
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<td>Thick Film Res., 1%</td>
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<td>Yageo</td>
<td>RC0402FR-07100KL</td>
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<tr>
<td>1</td>
<td>R4</td>
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<td>MPM3632S</td>
<td>Synchronous Step-Down Convert</td>
<td>NS</td>
<td>MPS</td>
<td>MPM3632SGPQ</td>
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EVM3632S HIGH-FREQUENCY 18V/3A DC/DC REGULATOR WITH INTEGRATED INDUCTOR

EVB TEST RESULTS

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

- **Efficiency vs. Load Current**
  - $V_{\text{OUT}} = 5V$
  - $V_{\text{OUT}} = 3.3V$

- **Load Regulation vs. Load Current**
  - $V_{\text{OUT}} = 3.3V$

- **Line Regulation vs. Input Voltage**
  - $V_{\text{IN}} = 12V$, $V_{\text{OUT}} = 3.3V$

- **Temperature Rise vs. Load Current**
  - $V_{\text{IN}} = 12V$
EVB TEST RESULTS (continued)

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $T_A = +25°C$, unless otherwise noted.

### Vo Ripple

- **I$_{OUT}=0A$**
  - Channel 1: $V_{OUT}$/AC, 20mV/div.
  - Channel 3: $V_{SW}$, 10V/div.
  - Channel 4: $I_{L}$, 5A/div.
  - Time Scale: 200ns/div.

- **I$_{OUT}=3A$**
  - Channel 1: $V_{OUT}$/AC, 20mV/div.
  - Channel 3: $V_{SW}$, 10V/div.
  - Channel 4: $I_{L}$, 5A/div.
  - Time Scale: 200ns/div.

### VIN Start-Up Through Input Voltage

- **I$_{OUT}=0A$**
  - Channel 1: $V_{OUT}$, 2V/div.
  - Channel 2: $V_{IN}$, 10V/div.
  - Channel 3: $V_{SW}$, 10V/div.
  - Channel 4: $I_{L}$, 5A/div.
  - Time Scale: 5ms/div.

- **I$_{OUT}=3A$**
  - Channel 1: $V_{OUT}$, 2V/div.
  - Channel 2: $V_{IN}$, 10V/div.
  - Channel 3: $V_{SW}$, 10V/div.
  - Channel 4: $I_{L}$, 5A/div.
  - Time Scale: 1ms/div.

### Shutdown Through Input Voltage

- **I$_{OUT}=0A$**
  - Channel 1: $V_{OUT}$, 2V/div.
  - Channel 2: $V_{IN}$, 10V/div.
  - Channel 3: $V_{SW}$, 10V/div.
  - Channel 4: $I_{L}$, 5A/div.
  - Time Scale: 50ms/div.

- **I$_{OUT}=3A$**
  - Channel 1: $V_{OUT}$, 2V/div.
  - Channel 2: $V_{IN}$, 10V/div.
  - Channel 3: $V_{SW}$, 10V/div.
  - Channel 4: $I_{L}$, 5A/div.
  - Time Scale: 50ms/div.
EVB TEST RESULTS (continued)

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

**Start-Up Through Enable**

- **I\textsubscript{OUT} = 0A**
  - CH1: V\textsubscript{OUT} 2V/div.
  - CH2: V\textsubscript{EN} 1V/div.
  - CH3: V\textsubscript{SW} 10V/div.
  - CH4: I\textsubscript{L} 5A/div.

- **I\textsubscript{OUT} = 3A**
  - CH1: V\textsubscript{OUT} 2V/div.
  - CH2: V\textsubscript{EN} 1V/div.
  - CH3: V\textsubscript{SW} 10V/div.
  - CH4: I\textsubscript{L} 5A/div.

**Shutdown Through Enable**

- **I\textsubscript{OUT} = 0A**
  - CH1: V\textsubscript{OUT} 2V/div.
  - CH2: V\textsubscript{IN} 10V/div.
  - CH3: V\textsubscript{SW} 10V/div.
  - CH4: I\textsubscript{L} 5A/div.

- **I\textsubscript{OUT} = 3A**
  - CH1: V\textsubscript{OUT} 2V/div.
  - CH2: V\textsubscript{IN} 10V/div.
  - CH3: V\textsubscript{SW} 10V/div.
  - CH4: I\textsubscript{L} 5A/div.

**Short Circuit Entry**

- **I\textsubscript{OUT} = 0A**
  - CH1: V\textsubscript{OUT} 2V/div.
  - CH2: V\textsubscript{EN} 10V/div.
  - CH3: V\textsubscript{SW} 10V/div.
  - CH4: I\textsubscript{L} 5A/div.

- **I\textsubscript{OUT} = 3A**
  - CH1: V\textsubscript{OUT} 2V/div.
  - CH2: V\textsubscript{EN} 10V/div.
  - CH3: V\textsubscript{SW} 10V/div.
  - CH4: I\textsubscript{L} 5A/div.
EVB TEST RESULTS *(continued)*

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

**Short Circuit Recovery**

\( I_{\text{OUT}} = 0\, \text{A} \)

**Short Circuit Recovery**

\( I_{\text{OUT}} = 3\, \text{A} \)

**Short Circuit Steady State**

**Transient Response**

\( I_{\text{OUT}} = 1.5\, \text{A} - 3\, \text{A}, \ 800\, \text{mA}/\mu\text{s} \)

\( I_{\text{OUT}} = 1.5\, \text{A} - 3\, \text{A}, \ 800\, \text{mA}/\mu\text{s} \)
PRINTED CIRCUIT BOARD LAYOUT

Figure 1: Top Silk Layer

Figure 2: Top Layer

Figure 3: Bottom Layer

Figure 4: 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.