

### DESCRIPTION

The EV2325-J-00A demonstrates MPS's MP2325, a high-frequency, synchronous, rectified, step-down converter with built-in high-side and low-side power MOSFETs. The MP2325 offers a very compact solution to achieve a 3A continuous output current with excellent load and line regulation over a wide input supply range. The MP2325 has synchronous mode operation for higher efficiency over the output current load range.

Current-mode operation provides fast transient response and eases loop stabilization.

Full protection features includes over-current protection and thermal shutdown.

The MP2325 is available in a space-saving 8-pin TSOT23 package.

### ELECTRICAL SPECIFICATION

| Parameter      | Symbol    | Value    | Units |
|----------------|-----------|----------|-------|
| Input Voltage  | $V_{IN}$  | 4.5 – 24 | V     |
| Output Voltage | $V_{OUT}$ | 3.3      | V     |
| Output Current | $I_{OUT}$ | 3        | A     |

### FEATURES

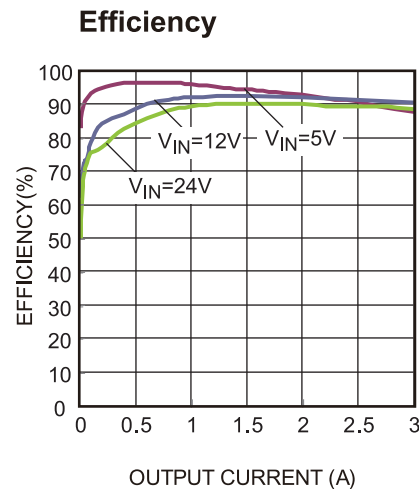
- Wide 4.5V to 24V Operating Input Range
- 90mΩ/40mΩ Low Rds(on) Internal Power MOSFETs
- Low Quiescent Current
- High Efficiency Synchronous Mode Operation
- Fixed 500kHz Switching Frequency
- Frequency Sync from 200kHz to 2MHz External Clock
- Power Save Mode at light load
- Internal Soft Start
- Power Good Indicator
- OCP Protection and Hiccup
- Thermal Shutdown
- Output Adjustable from 0.8V
- Available in an 8-pin TSOT-23 package

### APPLICATIONS

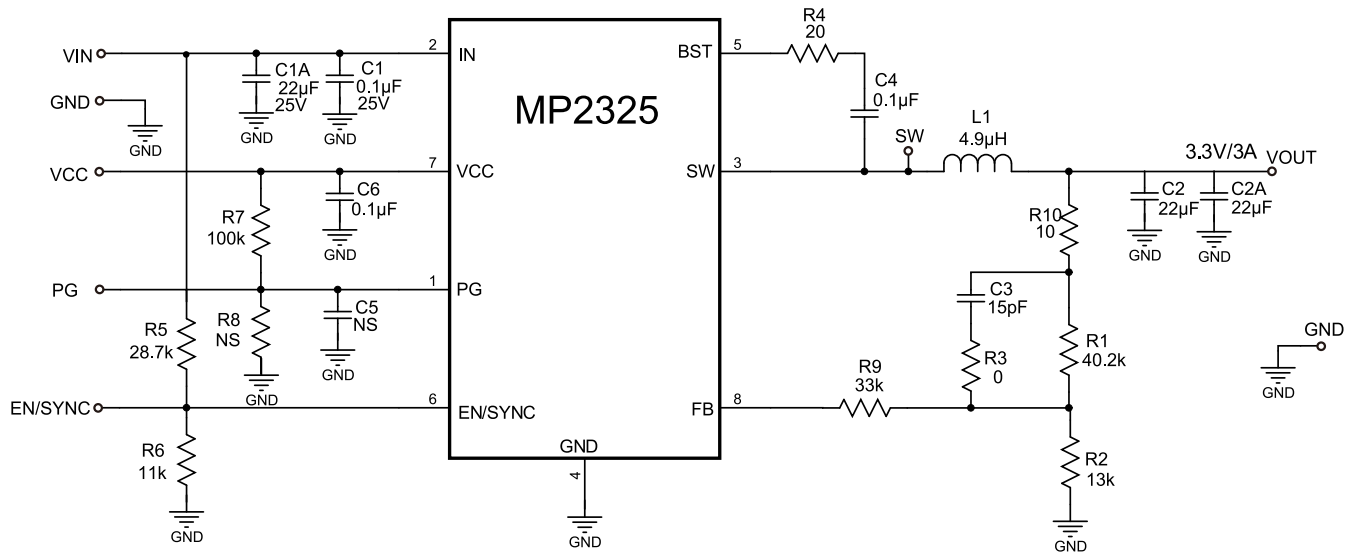
- Notebook Systems and I/O Power
- Digital Set Top Boxes
- Flat Panel Television and Monitors

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### EV2325-J-00A EVALUATION BOARD



| Board Number | MPS IC Number |
|--------------|---------------|
| EV2325-J-00A | MP2325GJ      |

**EVALUATION BOARD SCHEMATIC**

**EV2325-J-00A BILL OF MATERIALS**

| Qty | RefDes       | Value  | Description                      | Package      | Manufacturer | Manufacturer P/N   |
|-----|--------------|--------|----------------------------------|--------------|--------------|--------------------|
| 1   | C1           | 0.1μF  | Ceramic Cap., 25V, X7R           | 0805         | muRata       | GRM21BR71E104KA01L |
| 1   | C1A          | 22μF   | Ceramic Cap., 25V, X5R           | 1206         | muRata       | GRM31CR61E226KE15L |
| 0   | C7,R8,<br>C5 | NS     |                                  |              |              |                    |
| 2   | C2,C2A       | 22μF   | Ceramic Cap., 10V, X7R           | 1206         | muRata       | GRM21BR60J226ME39L |
| 1   | C3           | 15pF   | Ceramic Cap., 50V, C0G           | 0603         | muRata       | GRM1885C1H150JA01D |
| 2   | C4,C6        | 0.1μF  | Ceramic Cap., 16V, X7R           | 0603         | muRata       | GRM188R71C104KA01D |
| 1   | R1           | 40.2k  | Thick Film Res., 1%              | 0603         | Yageo        | 9C06031A4022FKHFT  |
| 1   | R2           | 13k    | Thick Film Res., 1%              | 0603         | Yageo        | 9C06031A132FKHFT   |
| 1   | R3           | 0Ω     | Thick Film Res., 1%              | 0603         | Yageo        | 9C06031A0R00JLHFT  |
| 1   | R4           | 20Ω    | Thick Film Res., 5%              | 0603         | Yageo        | 9C06031A20R0JLHFT  |
| 1   | R5           | 28.7k  | Thick Film Res., 1%              | 0603         | Yageo        | 9C06031A2872FKHFT  |
| 1   | R6           | 11k    | Thick Film Res., 1%              | 0603         | Yageo        | 9C06031A1102FKHFT  |
| 1   | R7           | 91k    | Thick Film Res., 1%              | 0603         | Yageo        | 9C06031A1003FKHFT  |
| 1   | R9           | 33k    | Thick Film Res., 1%              | 0603         | Yageo        | 9C06031A3302FKHFT  |
| 1   | R10          | 10Ω    | Thick Film Res., 1%              | 0603         | Yageo        | 9C06031A10R0FKHFT  |
| 1   | L1           | 4.9μH  | Inductor, DCR=14.5mΩ,<br>Is=6.5A | SMD          | Würth        | 744314490          |
| 1   | U1           | MP2325 | Synchronous Step-Down<br>Convert | TSOT23-<br>8 | MPS          | MP2325GJ           |

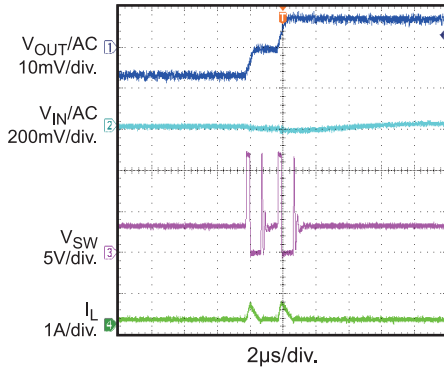
## EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

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

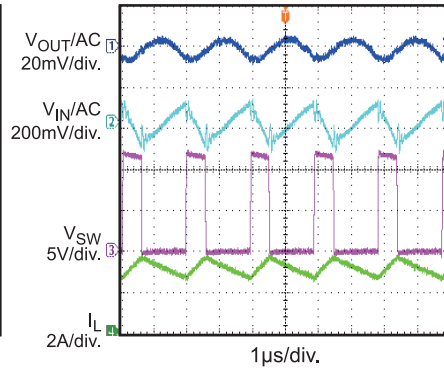
**Input/Output Ripple**

$I_{OUT} = 0A$



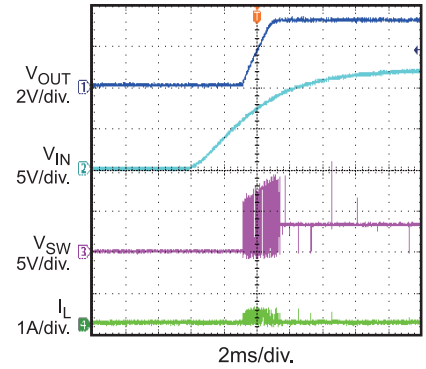
**Input/Output Ripple**

$I_{OUT} = 3A$



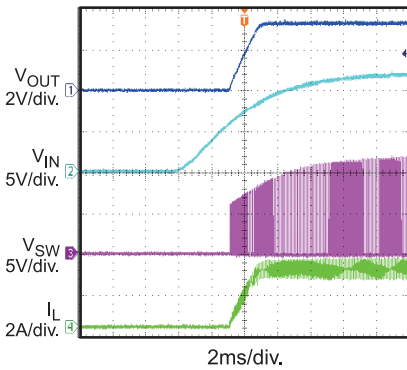
**$V_{IN}$  Start up**

$I_{OUT} = 0A$



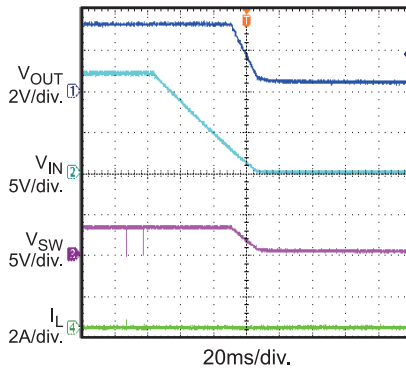
**$V_{IN}$  Start up**

$I_{OUT} = 3A$



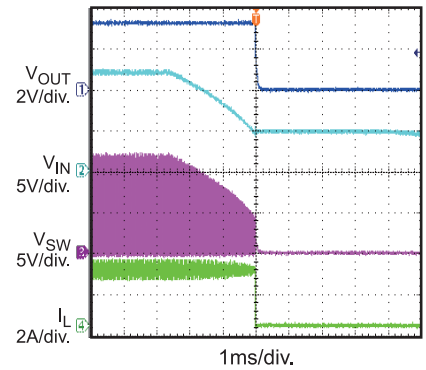
**$V_{IN}$  Shutdown**

$I_{OUT} = 0A$



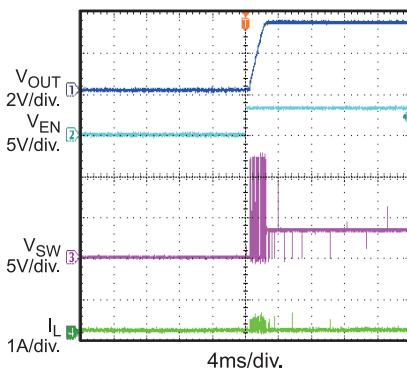
**$V_{IN}$  Shutdown**

$I_{OUT} = 3A$



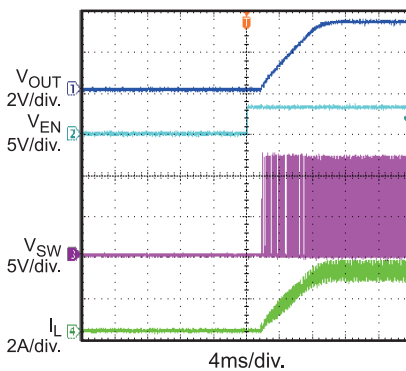
**EN Start up**

$I_{OUT} = 0A$



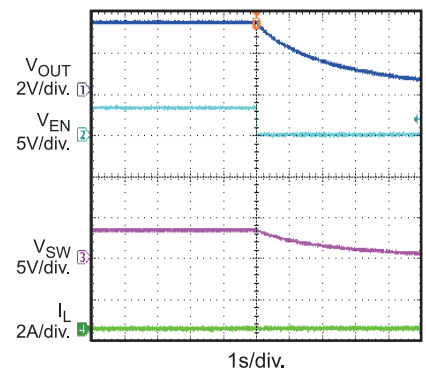
**EN Start up**

$I_{OUT} = 3A$



**EN Shutdown**

$I_{OUT} = 0A$



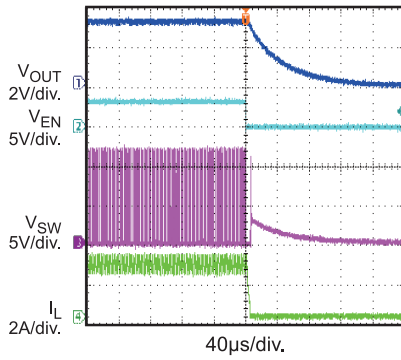
## EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

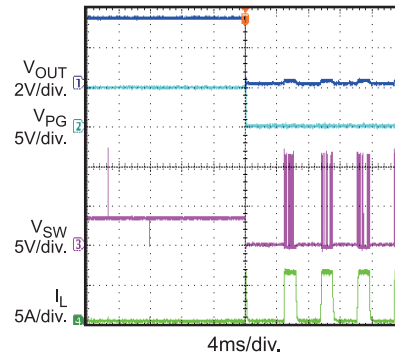
$V_{IN} = 12V$ ,  $V_{OUT} = 3.3V$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

**EN Shutdown**

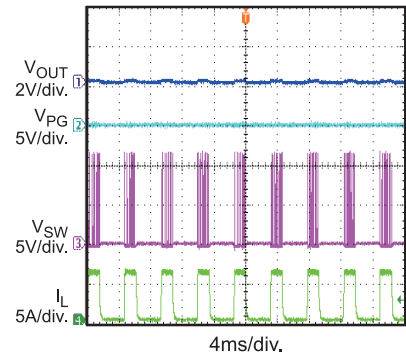
$I_{OUT} = 3A$



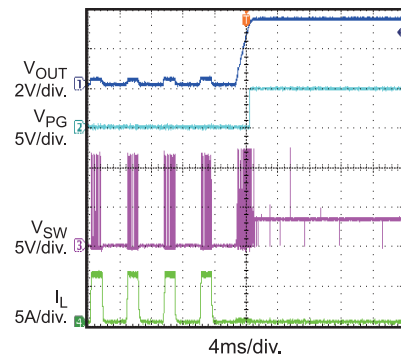
**Short Circuit Entry**



**Short Circuit**

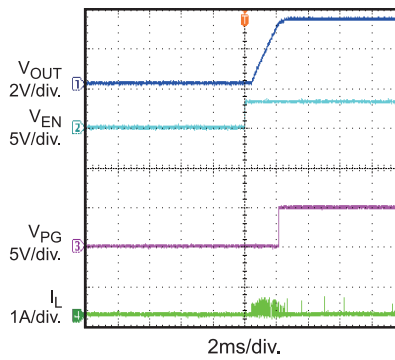


**Short Circuit Recovery**



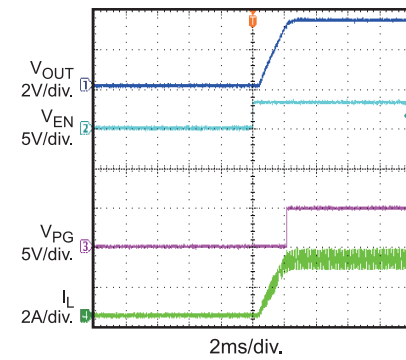
**EN Start up (PG)**

$I_{OUT} = 0A$



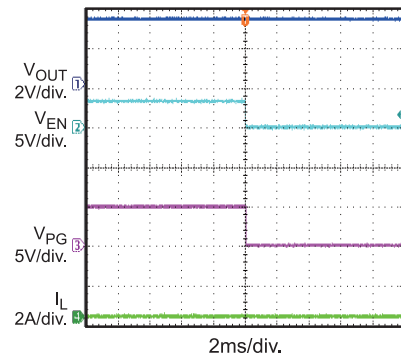
**EN Start up (PG)**

$I_{OUT} = 3A$



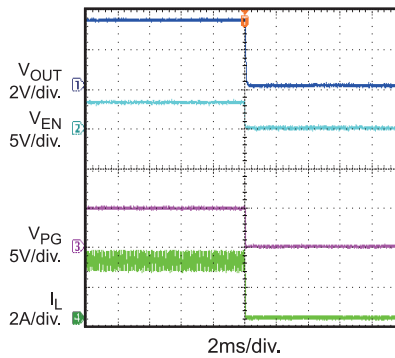
**EN Shutdown (PG)**

$I_{OUT} = 0A$



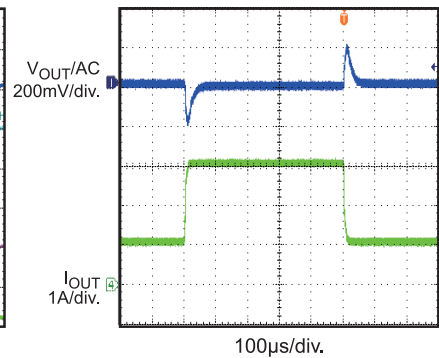
**EN Shutdown (PG)**

$I_{OUT} = 3A$

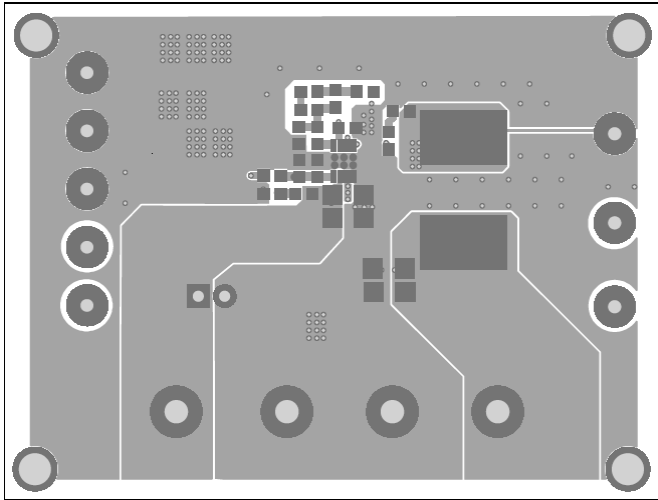


**Load Transient Response**

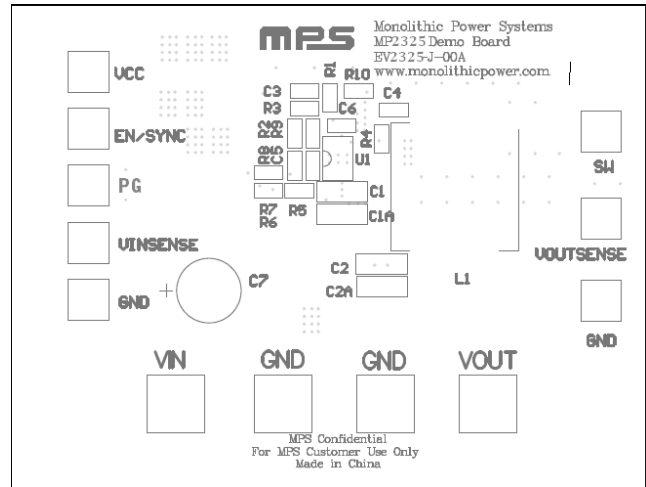
$I_{OUT} = 1A$  to  $3A$



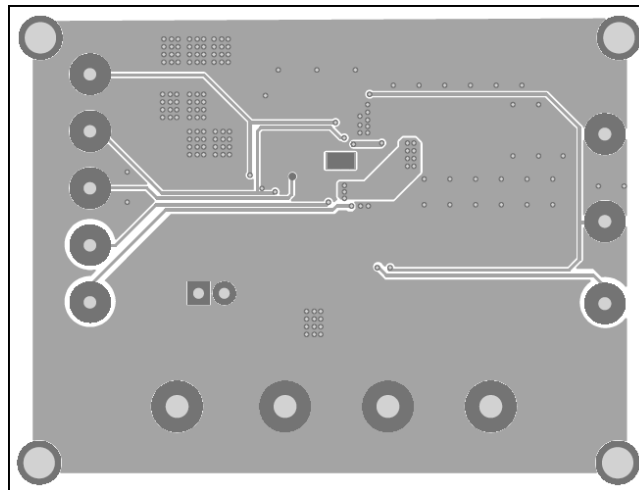
**PRINTED CIRCUIT BOARD LAYOUT**



**Figure 1—Top Layer**



**Figure 2—Top Silk Layer**



**Figure 3—Bottom Layer**

## QUICK START GUIDE

1. Connect the positive and negative terminals of the load to the VOUT and GND pins, respectively.
2. Preset the power supply output between 4.5V and 24V, and then turn off the power supply.
3. Connect the positive and negative terminals of the power supply output to the VIN and GND pins, respectively.
4. Turn the power supply on. The board will automatically start up.
5. To use the Enable function, apply a digital input to the EN/SYNC pin. Drive EN higher than 1.4V to turn on the regulator, or less than 1.25V to turn it off.
6. To use the external synchronous function to adjust the switching frequency, apply an external clock signal to EN/SYNC pin.

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