

### DESCRIPTION

The EV2314S-J-00A demonstrates MPS's MP2314S, a high-frequency, synchronous, rectified, step-down converter with built-in high-side and low-side power MOSFETs. The MP2314S offers a very compact solution to achieve a 2A continuous output current with excellent load and line regulation over a wide input supply range. The MP2314S 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 MP2314S 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 | $V_{OUT}$ | 5        | V     |
| Output Current | $I_{OUT}$ | 2        | A     |

### FEATURES

- Wide 4.5V to 24V Operating Input Range
- 140mΩ/65mΩ Low  $R_{DS(ON)}$  Internal Power MOSFET
- Low Quiescent Current
- High-Efficiency Synchronous Mode Operation
- Fixed 500kHz Switching Frequency
- AAM Power-Save Mode
- Internal Soft-Start
- Output Over Voltage Protection
- OCP Protection and Hiccup
- Thermal Shutdown
- Output Adjustable from 0.8V
- Available in an 8-pin TSOT-23 Package

### APPLICATIONS

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

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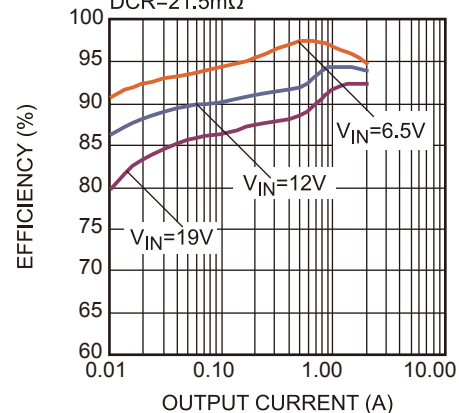
### EV2314S-J-00A EVALUATION BOARD

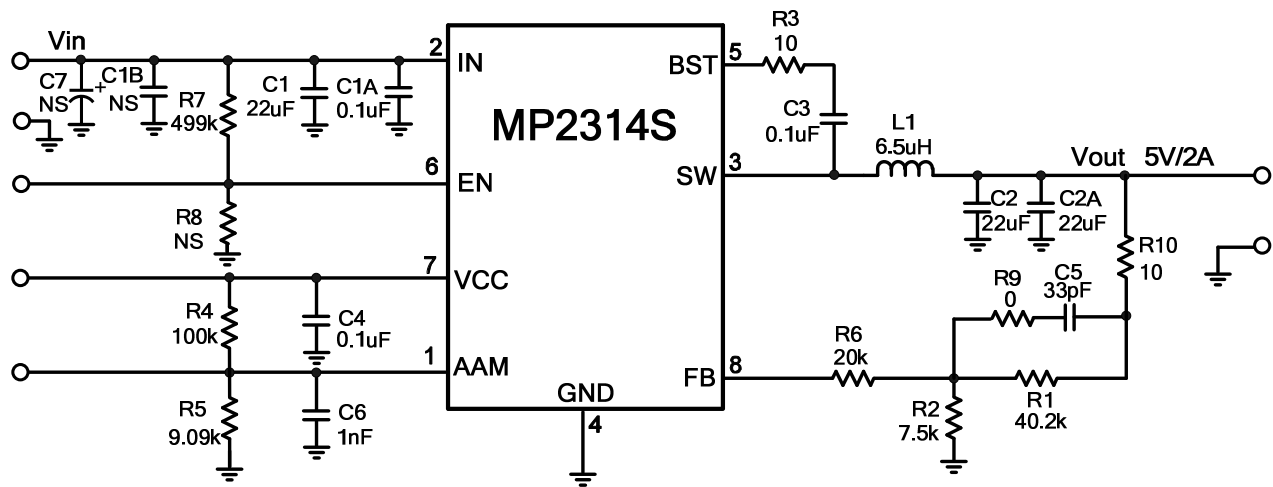


| Board Number  | MPS IC Number |
|---------------|---------------|
| EV2314S-J-00A | MP2314SGJ     |

### Efficiency vs. Output Current

$V_{OUT}=5V$ ,  $V_{AAM}=0.48V$ , inductor  $DCR=21.5m\Omega$



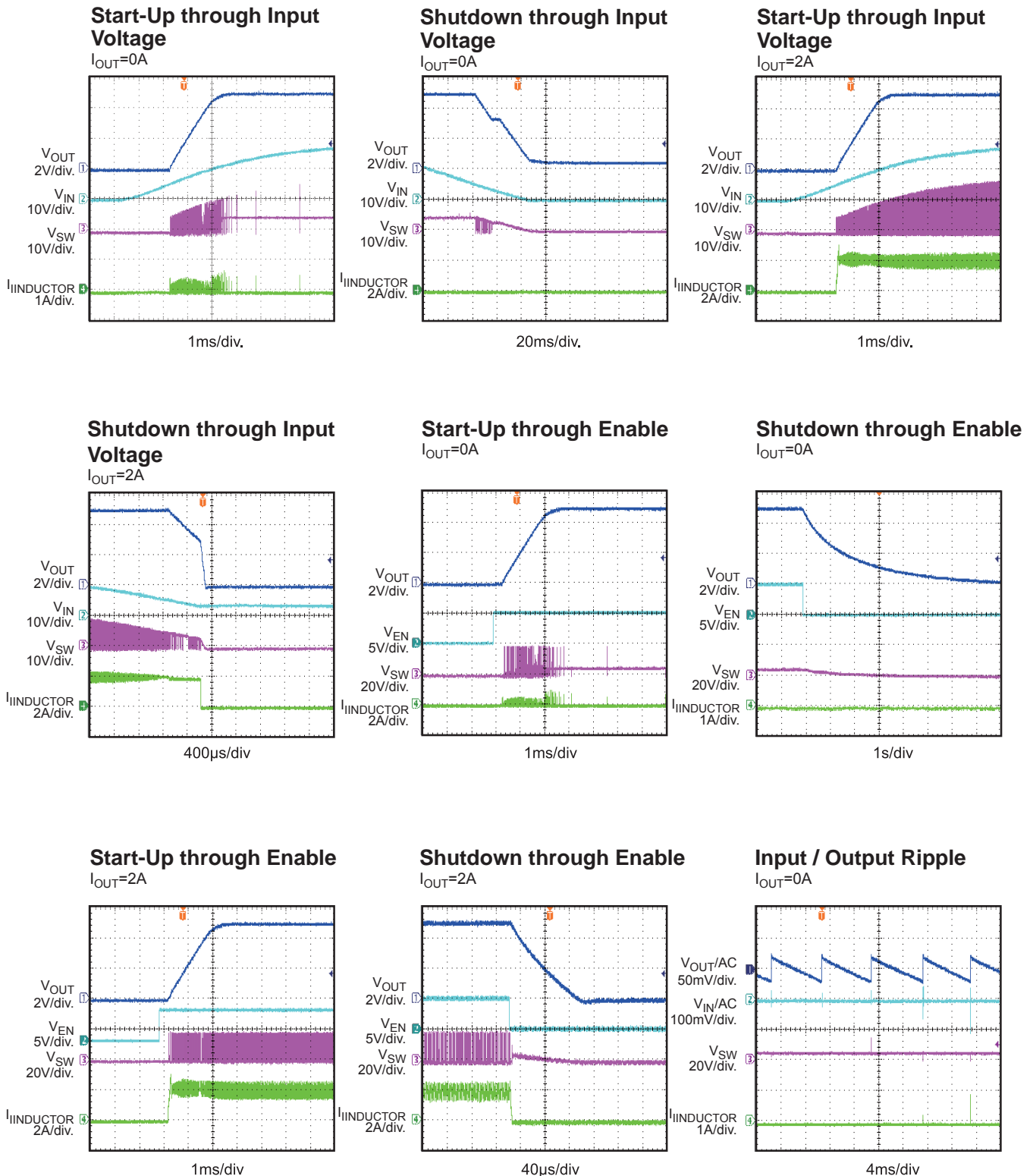
**EVALUATION BOARD SCHEMATIC**

**EV2314S-J-00A BILL OF MATERIALS**

| Qty | Ref     | Value   | Description                   | Package     | Manufacturer | Manufacturer P/N   |
|-----|---------|---------|-------------------------------|-------------|--------------|--------------------|
| 1   | C1      | 22µF    | Ceramic Cap., 25V, X5R        | 1206        | muRata       | GRM31CR61E226KE15L |
| 1   | C1A     | 0.1µF   | Ceramic Cap., 25V, X5R        | 0805        | muRata       | GRM21BR71E104KA01L |
| 0   | C1B, C7 | NS      |                               |             |              |                    |
| 2   | C2, C2A | 22µF    | Ceramic Cap., 16V, X5R        | 1206        | muRata       | GRM31CR61C226ME15L |
| 2   | C3, C4  | 0.1µF   | Ceramic Cap., 16V, X5R        | 0603        | muRata       | GRM188R71C104KA01D |
| 1   | C5      | 33pF    | Ceramic Cap., 50V, C0G        | 0603        | muRata       | GRM1885C1H330JA01D |
| 1   | C6      | 1nF     | Ceramic Cap., 50V, X7R        | 0603        | muRata       | GRM188R71H102KA01D |
| 1   | R1      | 40.2k   | Thick Film Res., 1%           | 0603        | Yageo        | RL0603FR-0740K2L   |
| 1   | R2      | 7.5k    | Thick Film Res., 1%           | 0603        | Yageo        | RL0603FR-077K5L    |
| 2   | R3, R10 | 10Ω     | Thick Film Res., 1%           | 0603        | Yageo        | RL0603FR-0710RL    |
| 1   | R4      | 100k    | Thick Film Res., 1%           | 0603        | Yageo        | RL0603FR-07100KL   |
| 1   | R5      | 9.09k   | Thick Film Res., 1%           | 0603        | Yageo        | RL0603FR-079K09L   |
| 1   | R6      | 20k     | Thick Film Res., 1%           | 0603        | Yageo        | RL0603FR-0720KL    |
| 1   | R7      | 499k    | Thick Film Res., 1%           | 0603        | Yageo        | RL0603FR-07499KL   |
| 0   | R8      | NS      |                               |             |              |                    |
| 1   | R9      | 0       | Thick Film Res., 1%           | 0603        | Yageo        | RC0603FR-070RL     |
| 1   | L1      | 6.5µH   | DCR=21.5mΩ, Isat=6A           | 7.0x6.9x5.0 | Wurth        | 744314650          |
| 1   | U1      | MP2314S | Synchronous Step-Down Convert | TSOT23-8    | MPS          | MP2314SGJ          |

## EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

$V_{IN} = 12V$ ,  $V_{OUT} = 5V$ ,  $L = 6.5\mu H$ ,  $T_A = 25^\circ C$ , unless otherwise noted.



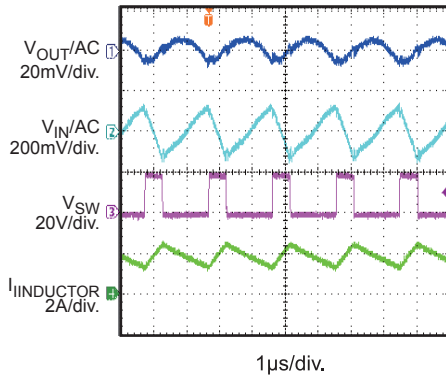
## EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

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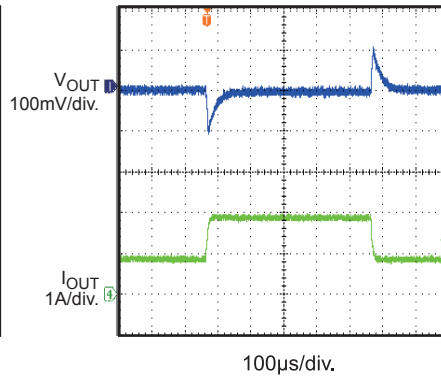
### Input / Output Ripple

$I_{OUT}=2A$



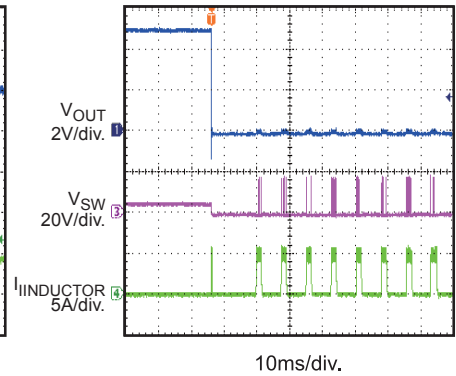
### Transient Response

$I_{OUT}=1A-2A$ , 2.5A/µs



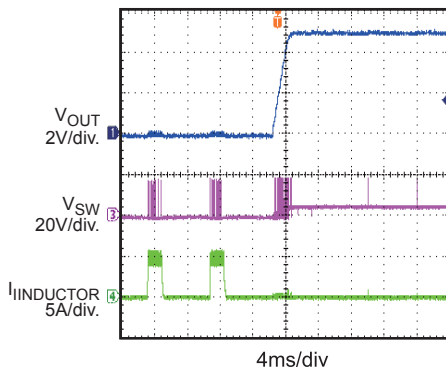
### Short Circuit Entry

$I_{OUT}=0A$



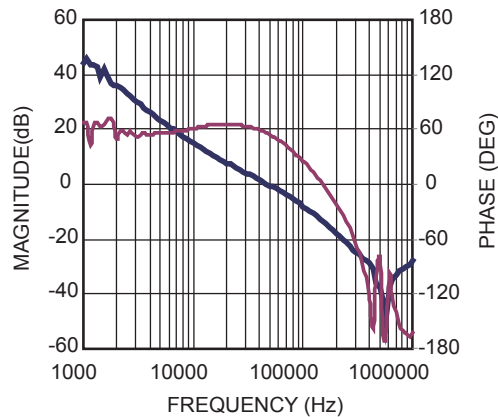
### Short Circuit Recovery

$I_{OUT}=0A$



### Bode Plot

$I_{OUT}=2A$



## PRINTED CIRCUIT BOARD LAYOUT

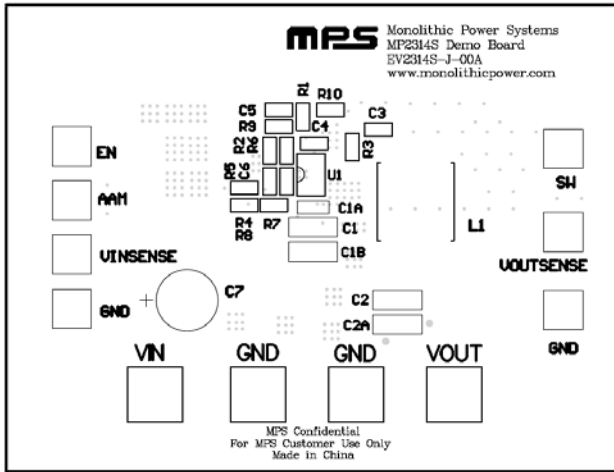


Figure 1—Top Silk Layer

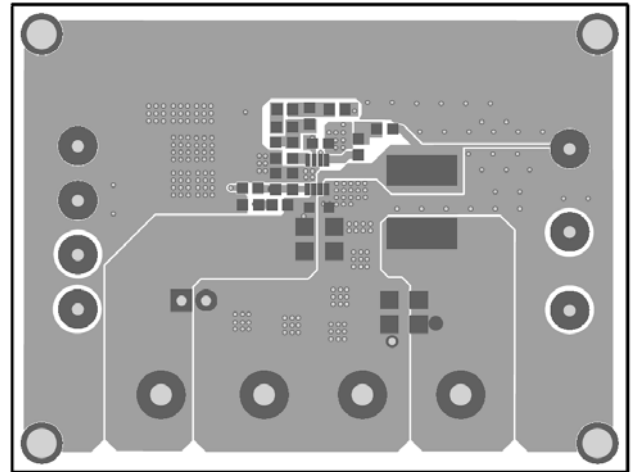


Figure 2—Top Layer

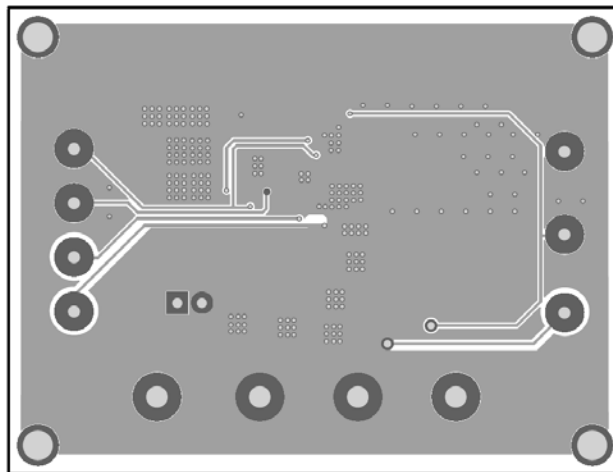


Figure 3—Bottom Layer

## 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.

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