

DESCRIPTION

EV3414A-J-00A Evaluation Board is designed to demonstrate the capability of MP3414A. The MP3414A is a high-efficiency, synchronous, current-mode, step-up converter with output disconnect.

The MP3414A provides inrush current limiting and output short-circuit protection. The integrated, P-channel, synchronous rectifier improves efficiency and eliminates the need for an external Schottky diode. The PMOS disconnects the output from the input when the part shuts down.

The 1MHz switching frequency allows for small external components, while the internal compensation and the soft-start minimize the external component count. The MP3414A is available in a small 8-pin TSOT23 package.

Electrical Specification

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	2.5-4.7 ⁽¹⁾	V
Output Voltage	V_{OUT}	5	V
Output Current	I_{OUT}	1	A

Note:

1) This board can supply 5V/1A load from 2.5V-4.7V input power, it can work with lower than 2.5V input but the load capability is lower than 1A.

FEATURES

- 2.5V to 4.7V Input Voltage Range
- Program up to 5.5V Output Voltage
- Internal Synchronous Rectifier
- 1MHz Fixed Frequency Switching
- 22 μ A Quiescent Current
- <1 μ A Shutdown Current
- Truly Output Disconnect from Input
- Up to 97% Efficiency
- High Efficiency over Full Load Range
- Internal Compensation, Inrush Current Limiting and Internal Soft-Start
- Tiny External Components
- OVP, SCP and OTP Protection
- TSOT23-8 Package

APPLICATIONS

- Two-cell and Three-cell Alkaline, NiCd or NiMH or Single-cell Li Battery Consumer Products
- Personal Medical Devices
- Portable Media Players
- Wireless Peripherals
- Handheld Computers and Smart phones

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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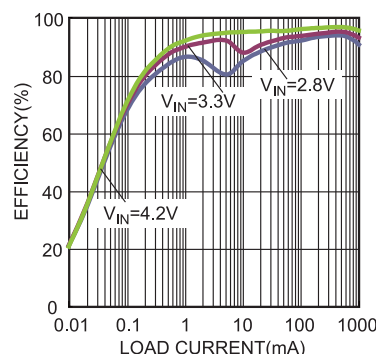
EV3414A-J-00A EVALUATION BOARD



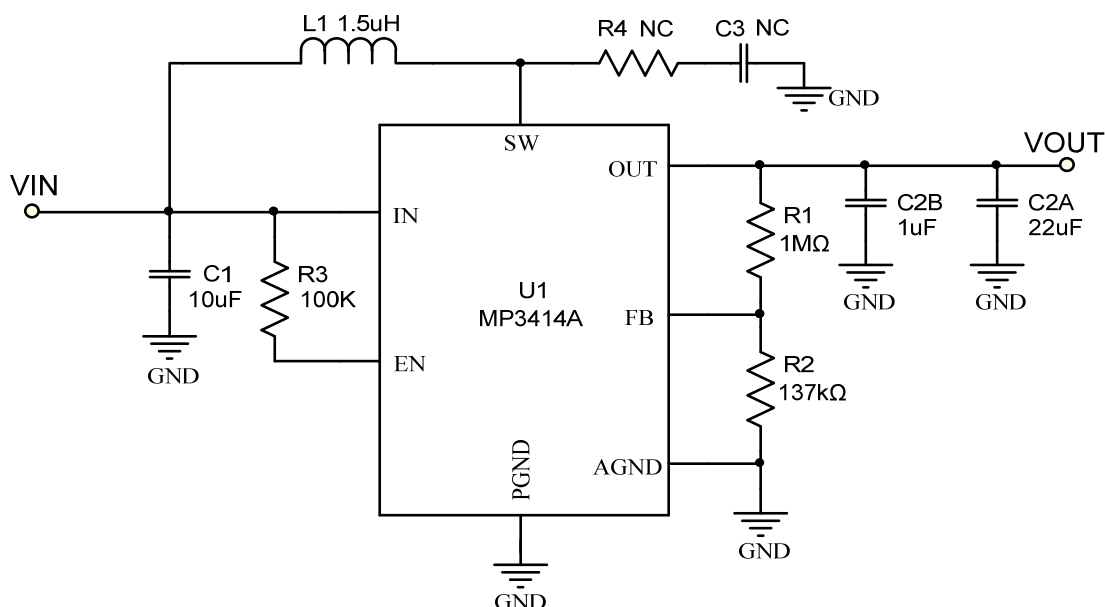
(L x W x H) 6.35cm x 6.35cm x 0.6cm

Board Number	MPS IC Number
EV3414A-J-00A	MP3414AGJ

Efficiency vs.
Load Current



EVALUATION BOARD SCHEMATIC



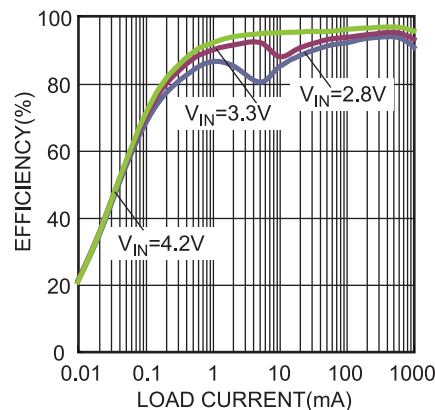
EV3414A-J-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Part Number
1	C1	10uF	Ceramic Cap.,10V,X7R	1210	muRata	GRM32ER71A106KA01L
1	C2A	22uF	Ceramic Cap.,10V,X7R	1210	muRata	GRM32ER71A226KE20L
1	C2B	1uF	Ceramic Cap.,10V,X7R	0603	muRata	GRM188R71A105KA61D
1	C3	NC				
1	R1	1M	Film Res.,1%	0603	ROYAL	RC0603FR-071ML
1	R2	137k	Film Res.,1%	0603	ROYAL	RC0603FR-07137KL
1	R3	100k	Film Res.,5%	0603	ROYAL	RC0603JR-07100KL
1	R4	NC				
1	L1	1.5uH	IR=11A,Isat=14A, DCR=6.6mΩ	SMD	Würth	744 311 150

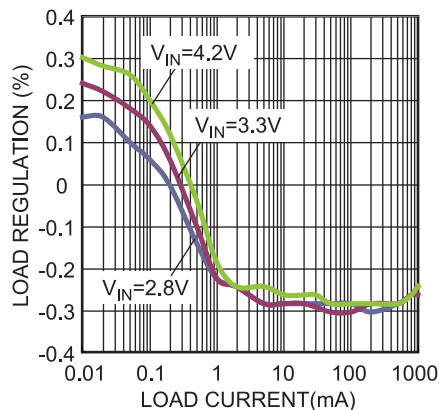
EVB TEST RESULTS

$V_{IN} = 3.3V$, $V_{OUT} = 5V$, $L = 1.5\mu H$, $T_A = 25^\circ C$, unless otherwise noted.

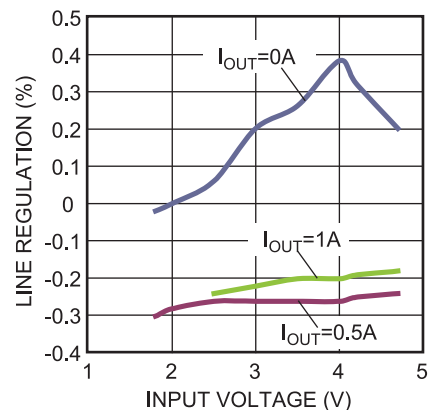
**Efficiency vs.
Load Current**



Load Regulation

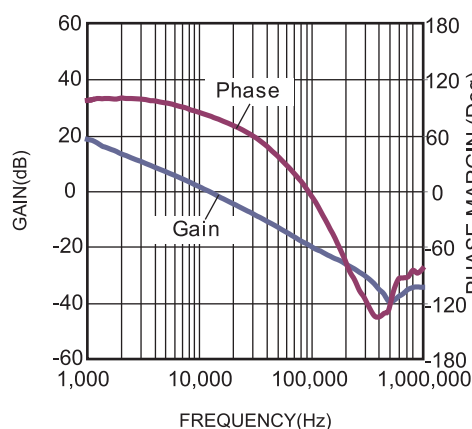


Line Regulation

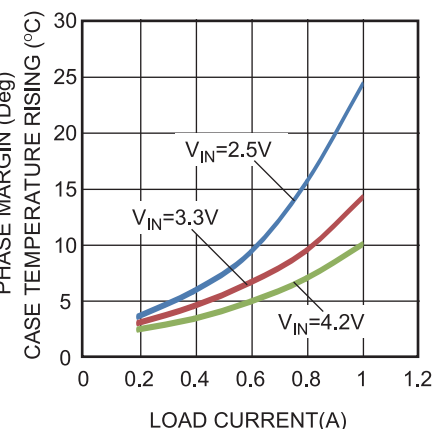


Bode Plot

$I_{OUT} = 1A$



Case Temperature Rising

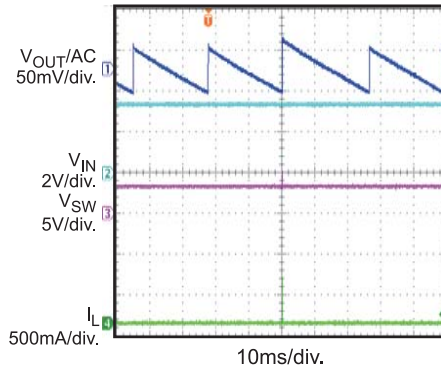


EVB TEST RESULTS (continued)

$V_{IN} = 3.3V$, $V_{OUT} = 5V$, $L = 1.5\mu H$, $T_A = 25^\circ C$, unless otherwise noted.

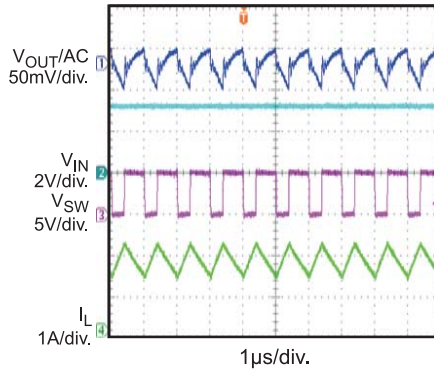
Steady State

$I_{OUT} = 0A$



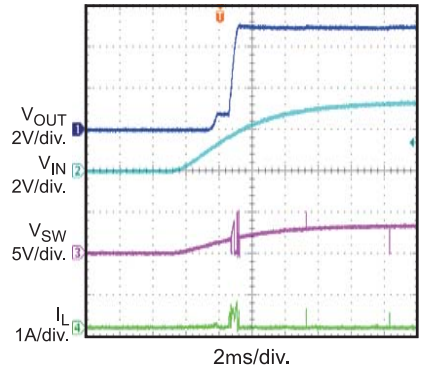
Steady State

$I_{OUT} = 1A$



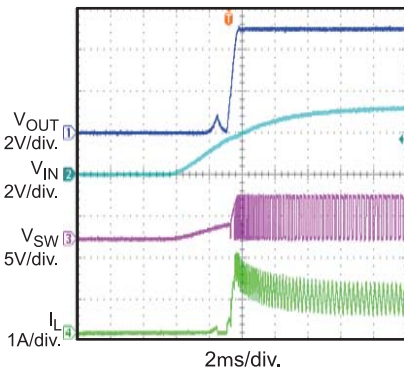
V_{IN} Startup

$I_{OUT} = 0A$



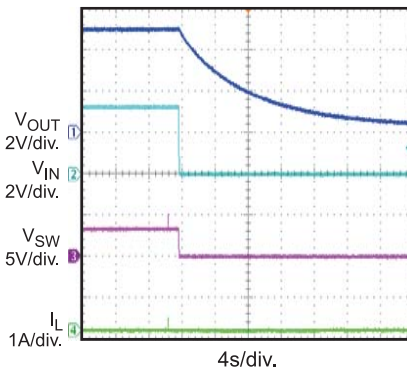
V_{IN} Startup

$R_{LOAD} = 10\Omega$



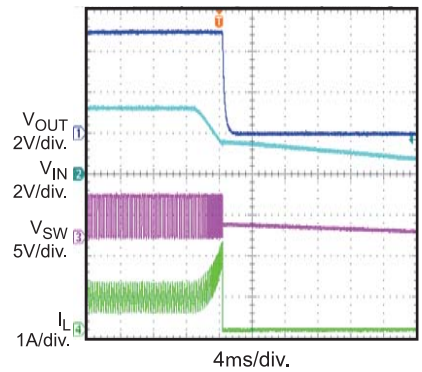
V_{IN} Shutdown

$I_{OUT} = 0A$



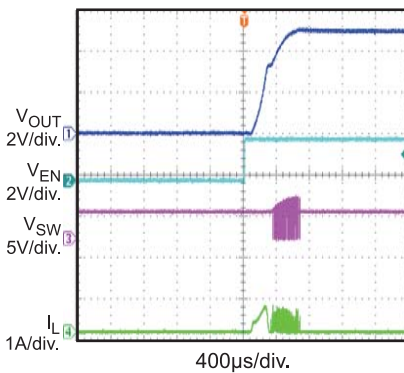
V_{IN} Shutdown

$R_{LOAD} = 10\Omega$



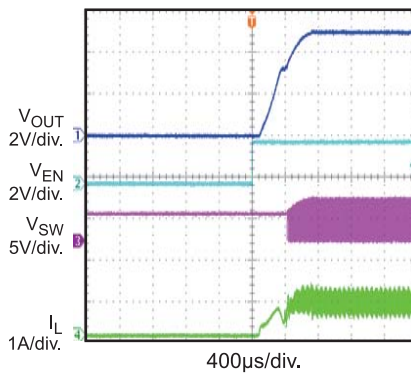
EN Startup

$I_{OUT} = 0A$



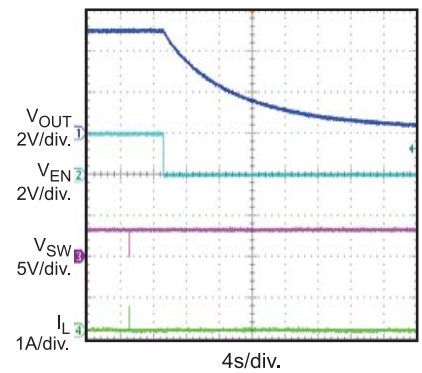
EN Startup

$R_{LOAD} = 10\Omega$



EN Shutdown

$I_{OUT} = 0A$

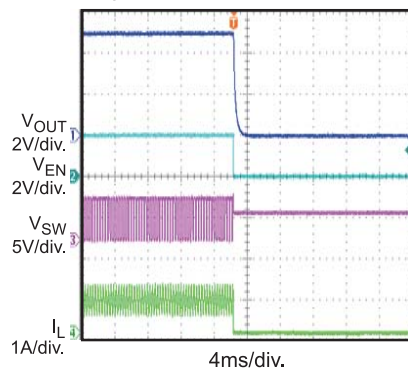


EVB TEST RESULTS (continued)

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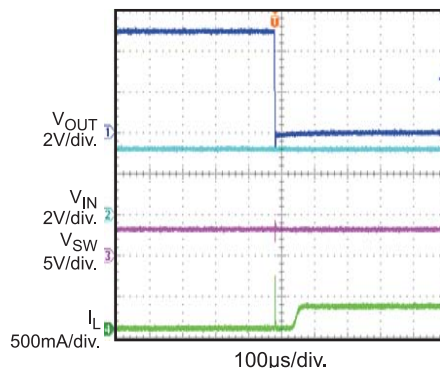
EN Shutdown

$R_{LOAD} = 10\Omega$



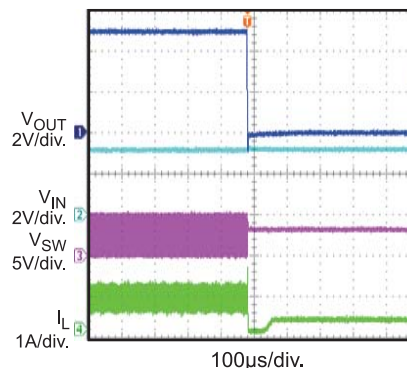
SCP Entry

$I_{OUT} = 0A$ to Short



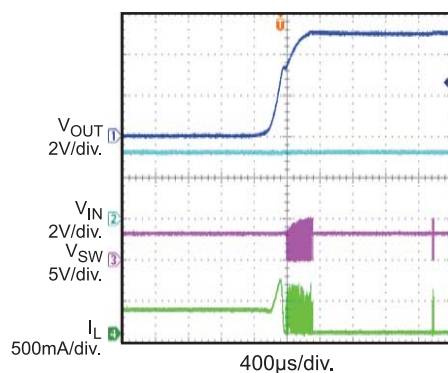
SCP Entry

$R_{LOAD} = 10\Omega$ to Short



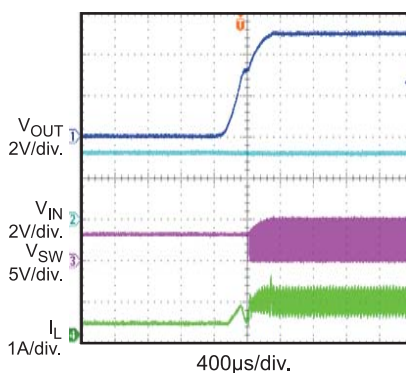
SCP Recovery

$I_{OUT} = \text{Short to } 0A$



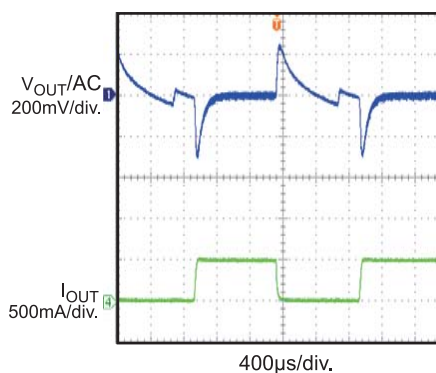
SCP Entry

$R_{LOAD} = \text{Short to } 10\Omega$



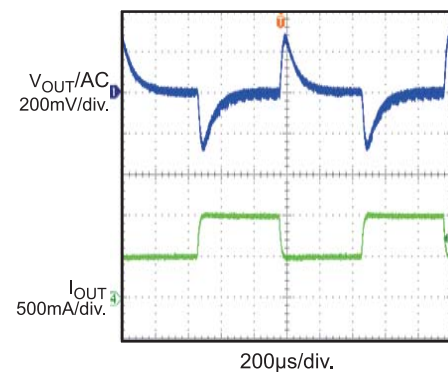
Load Transient

$I_{OUT} = 0A$ to 0.5A



Load Transient

$I_{OUT} = 0.5A$ to 1A



PRINTED CIRCUIT BOARD LAYOUT

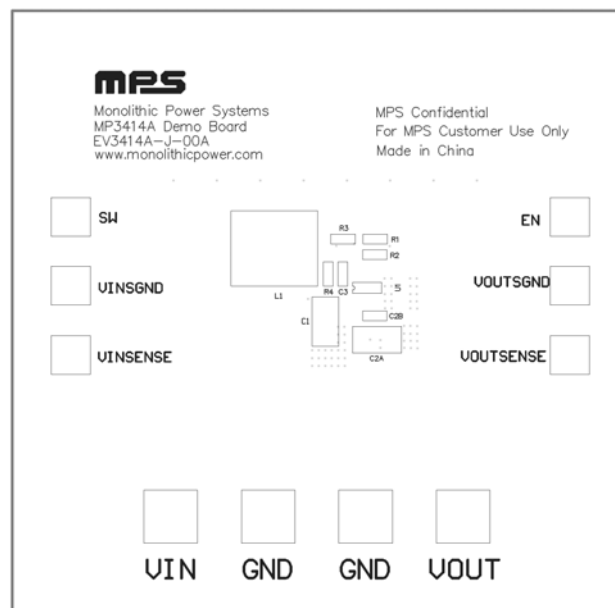


Figure 1—Top Silk Layer

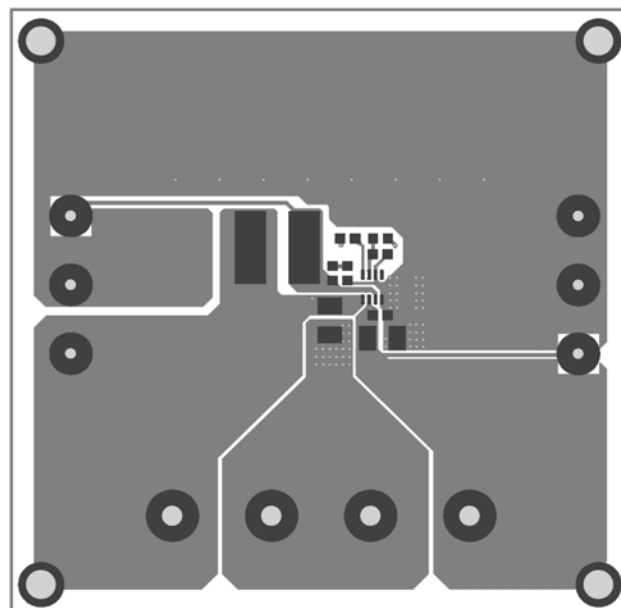


Figure 2—Top Layer

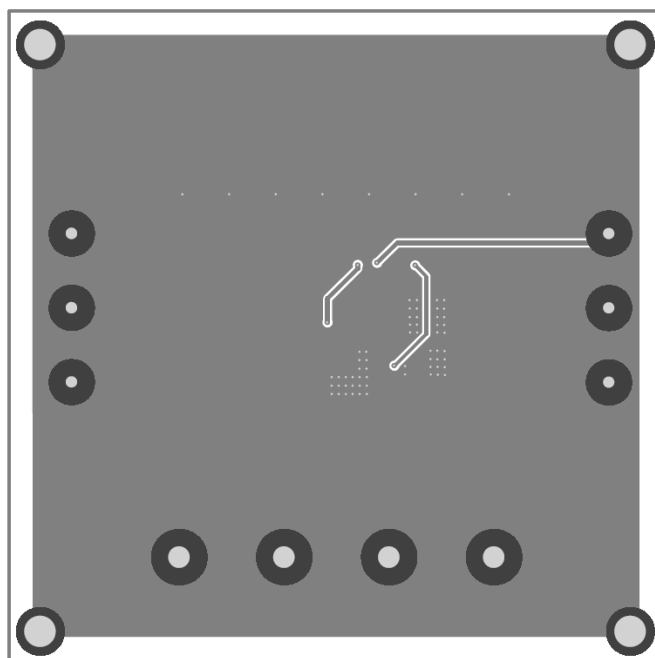


Figure 3—Bottom Layer

QUICK START GUIDE

The output voltage of this board is set to 5V. The board layout accommodates most commonly used components.

1. Preset Power Supply to $2.5V \leq V_{IN} \leq 4.7V$.
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.
6. The MP3414A is enabled on the evaluation board once VIN is applied.
7. The output voltage VOUT can be changed by varying R2. Calculate the new value using the formula:

$$V_{OUT} = V_{FB} \times \left(1 + \frac{R1}{R2}\right)$$

Where $V_{FB} = 0.6V$ and $R1 = 1M\Omega$.

8. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 1.2V to turn on EV3414A-J-00A or less than 0.4V to turn it off.

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