EV3414A-J-00A

3A, 1MHz Synchronous Step-Up Converter with Output Disconnect Evaluation Board

The Future of Analog IC Technology

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
- 22μA Quiescent Current
- <1μA 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

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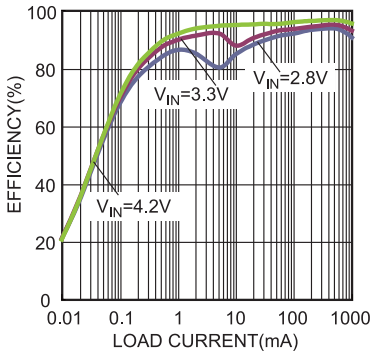
EV3414A-J-00A EVALUATION BOARD



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

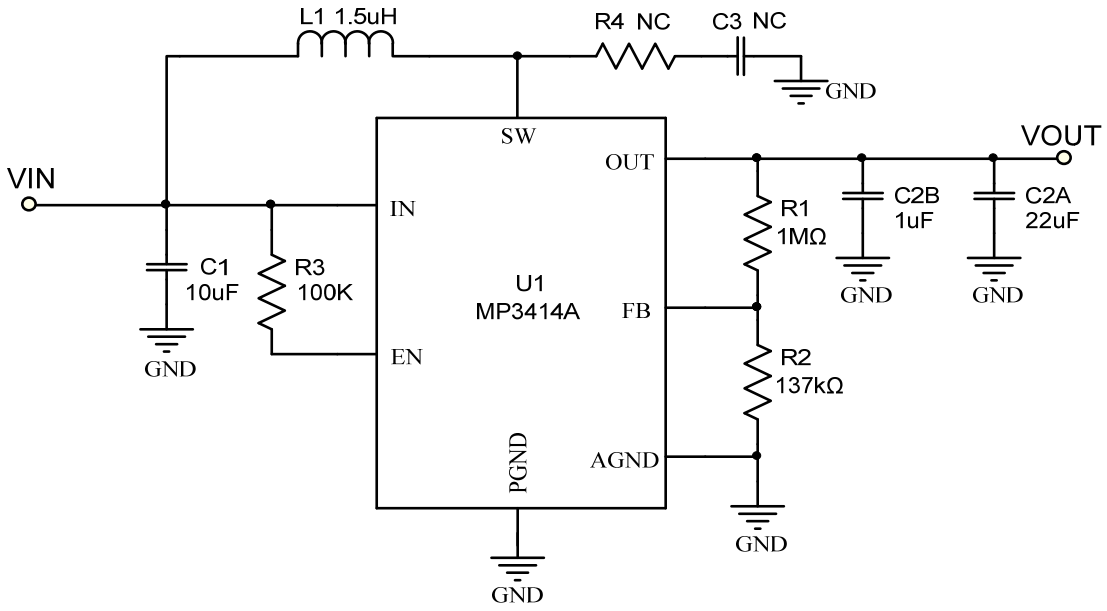
Board Number	MPS IC Number
EV3414A-J-00A	MP3414AGJ

Efficiency vs. Load Current



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EVALUATION BOARD SCHEMATIC



EV3414A-J-00A BILL OF MATERIALS

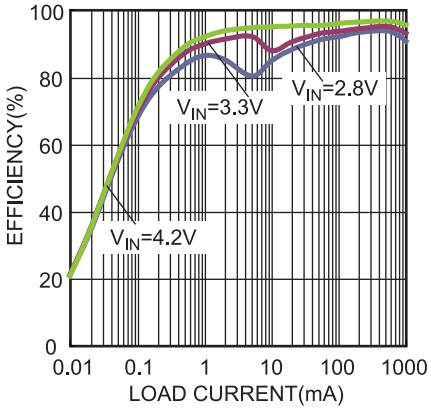
Qty	Ref	Value	Description	Package	Manufacturer	Part Number
1	C1	10uF	Ceramic Cap.,10V,X7R	1210	muRata	GRM32ER71A106KA01L
1	C2A	22uF	Ceramic Cap.,10V,X7R	1210	muRata	GRM32ER71A226KE20L
1	C2B	1uF	Ceramic Cap.,10V,X7R	0603	muRata	GRM188R71A105KA61D
1	C3	NC				
1	R1	1M	Film Res.,1%	0603	ROYAL	RC0603FR-071ML
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	Wurth	744 311 150

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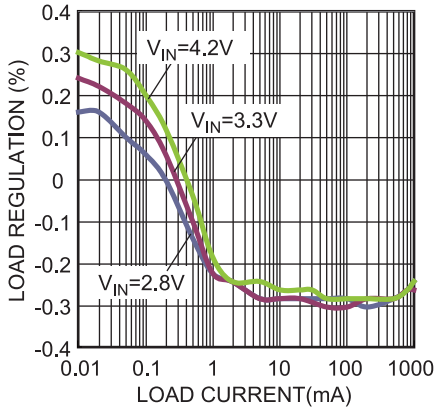
EVB TEST RESULTS

V_{IN} = 3.3V, V_{OUT} = 5V, L = 1.5µH, T_A = 25ºC, unless otherwise noted.

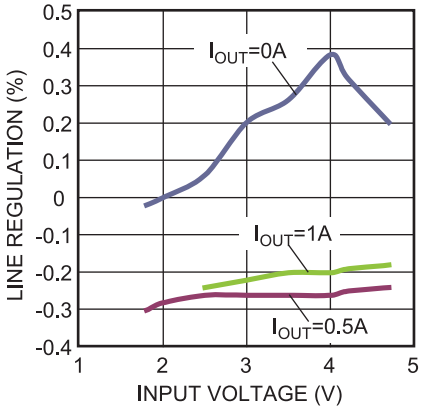
Efficiency vs. Load Current



Load Regulation

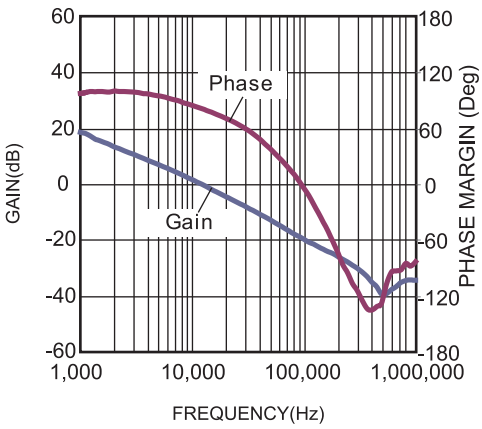


Line Regulation

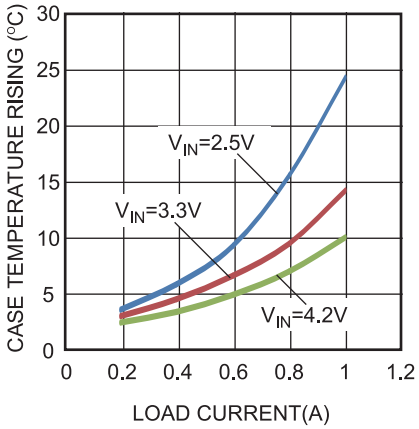


Bode Plot

I_{OUT}=1A



Case Temperature Rising

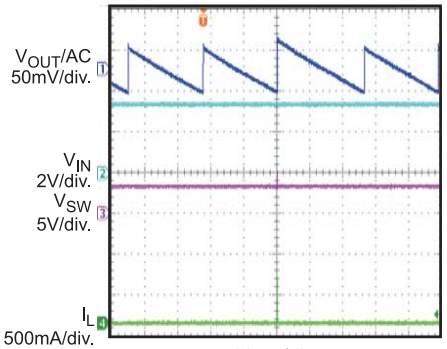


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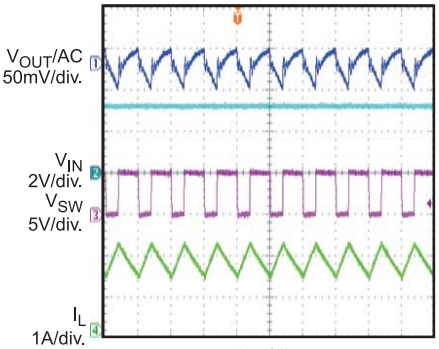
EVB TEST RESULTS *(continued)*

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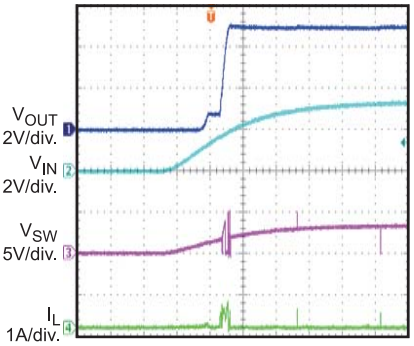
Steady State
I_{OUT} = 0A



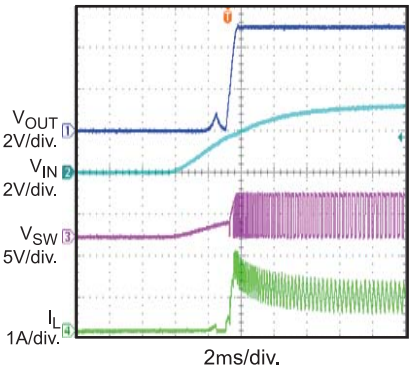
Steady State
I_{OUT} = 1A



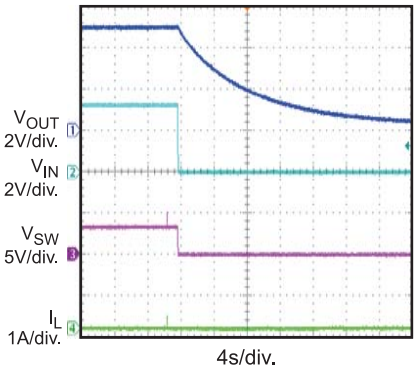
V_{IN} Startup
I_{OUT} = 0A



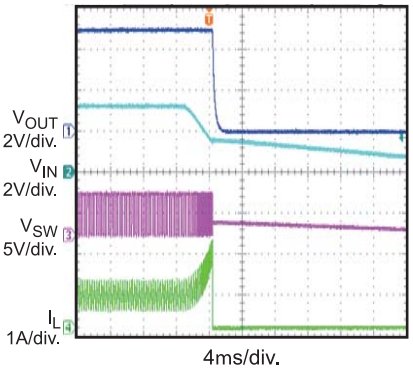
V_{IN} Startup
R_{LOAD} = 10Ω



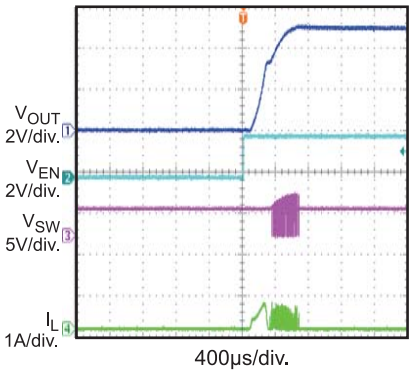
V_{IN} Shutdown
I_{OUT} = 0A



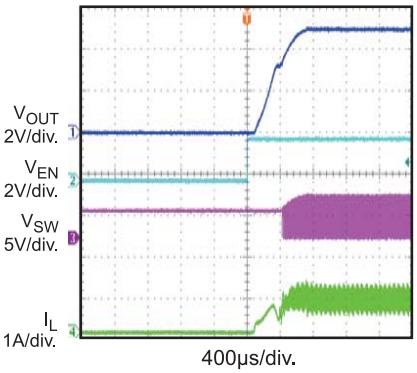
V_{IN} Shutdown
R_{LOAD} = 10Ω



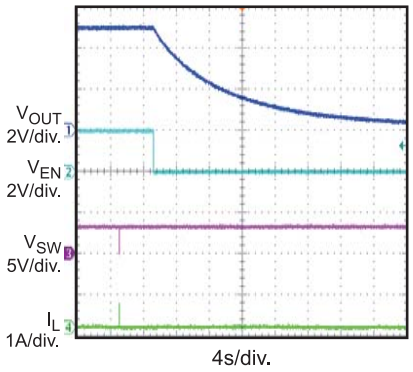
EN Startup
I_{OUT} = 0A



EN Startup
R_{LOAD} = 10Ω



EN Shutdown
I_{OUT} = 0A

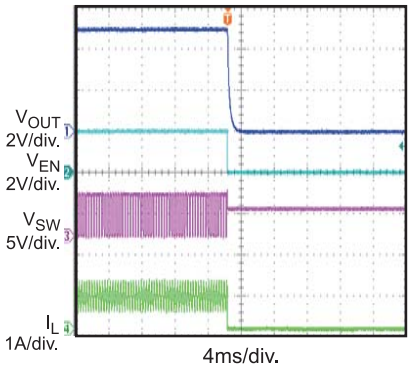


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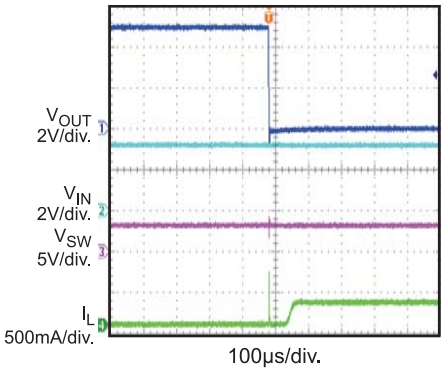
EVB TEST RESULTS *(continued)*

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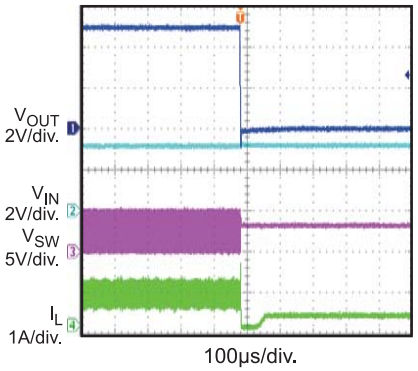
EN Shutdown
R_{LOAD} = 10Ω



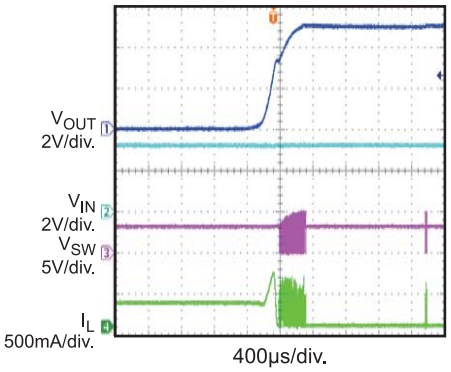
SCP Entry
I_{OUT} = 0A to Short



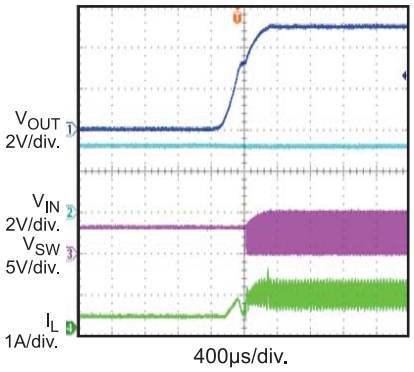
SCP Entry
R_{LOAD} = 10Ω to Short



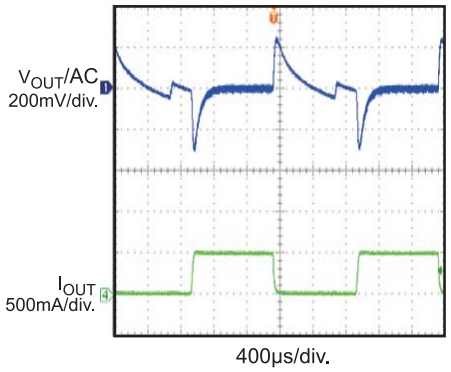
SCP Recovery
I_{OUT} = Short to 0A



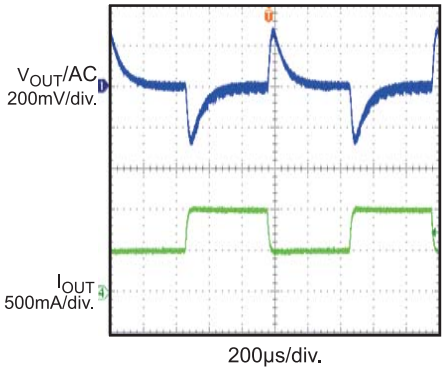
SCP Entry
R_{LOAD} = Short to 10Ω



Load Transient
I_{OUT} = 0A to 0.5A



Load Transient
I_{OUT} = 0.5A to 1A



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PRINTED CIRCUIT BOARD LAYOUT

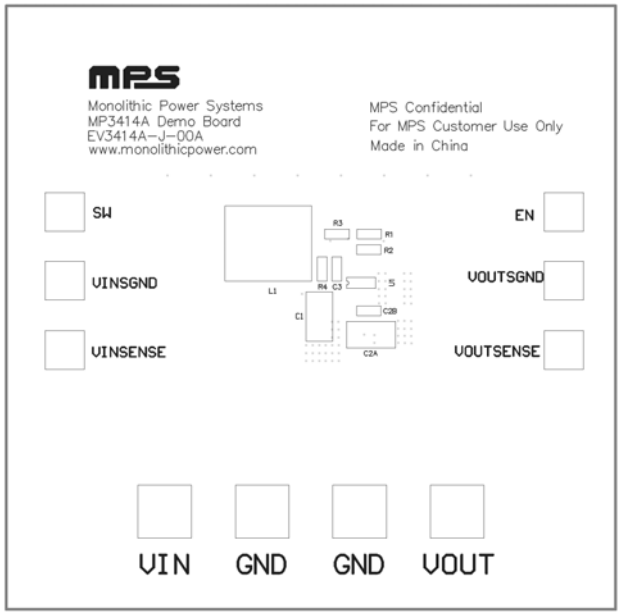


Figure 1—Top Silk Layer

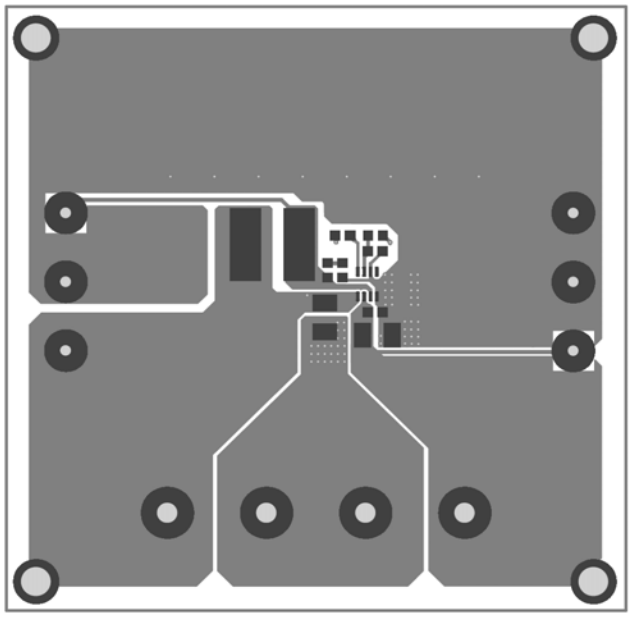


Figure 2—Top Layer

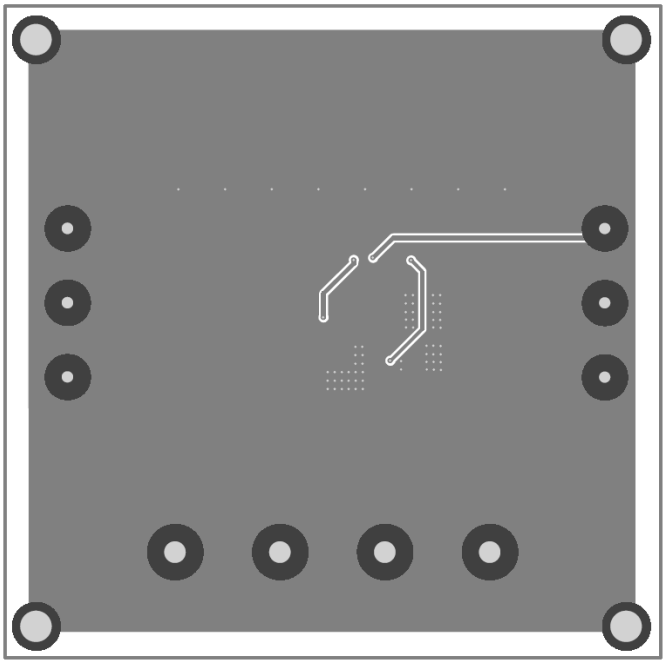


Figure 3—Bottom Layer

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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 ≤ V_{IN} ≤ 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:

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

   Where V_{FB} = 0.6V and R1=1MΩ.
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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