EV3415-G-00A

3.6A, 1MHz Synchronous Step-up Converter with Output Disconnect Evaluation Board

The Future of Analog IC Technology

DESCRIPTION

EV3415-G-00A Evaluation Board is designed to demonstrate the capability of MP3415. The MP3415 is a high-efficiency, synchronous, current-mode, step-up converter with output disconnect.

The MP3415 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 MP3415 is available in a small 12-pin QFN 2mm x 2mm package.

Electrical Specification

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	1.8-4.5(1)	V
Output Voltage	V_{OUT}	5	V
Output Current	Iout	1.5	A

Note:

1) This board can supply 5V/1.5A load from 2.8V-4.5V input power, it can work with lower than 2.8V input, but the load capability is lower than 1.5A.

FEATURES

- 1.8V to 4.5V Board Input
- Program up to 5.5V Output Voltage
- Internal Synchronous Rectifier
- 1MHz Fixed Frequency Switching
- 22μA Quiescent Current
- <1μA Shutdown Current
- True 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
- Small 2x2mm QFN12 Package

APPLICATIONS

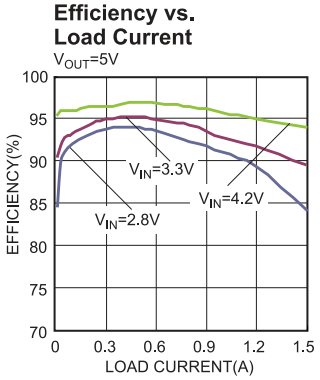
- Two-cell and Three-cell Alkaline, NiCd or NiMH or Single-cell Li Battery Consumer Products
- Personal Medical Devices
- Portable Media Players
- Wireless Peripherals
- Handheld Computers and Smart phones

EV3415-G-00A EVALUATION BOARD

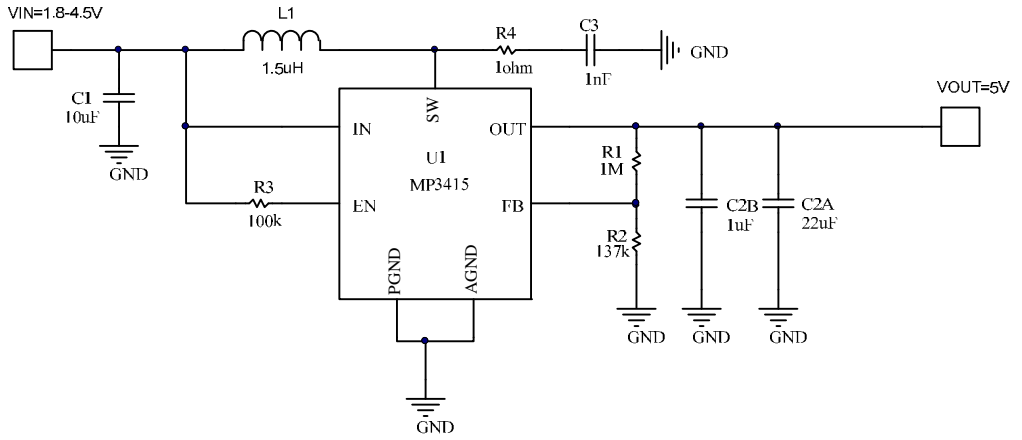
TBD

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

Board Number	MPS IC Number
EV3415-G-00A	MP3415GG



EVALUATION BOARD SCHEMATIC



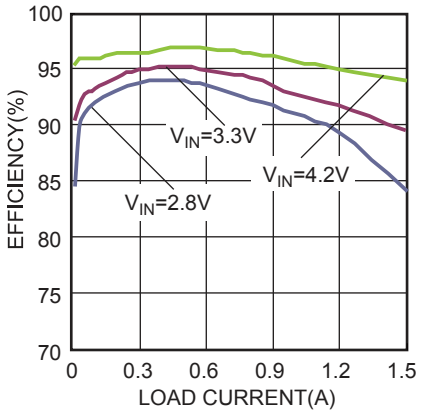
T-EV3415-G-00A BILL OF MATERIALS

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	1nF	Ceramic Cap.,50V,X7R	0603	muRata	GRM188R71H102KA01D
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	1Ω	Film Res.,1%	0603	ROYAL	RC0603FR-071RL
1	L1	1.5uH	IR=11A,Isat=14A, DCR=6.6mΩ	SMD	Wurth	744 311 150
1	U1		3.6A, 1MHz Synchronous Step-up Converter	QFN 2mm*2mm	MPS	MP3415GG

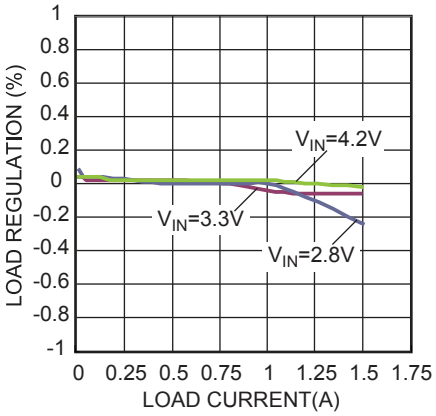
EVB TEST RESULTS

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

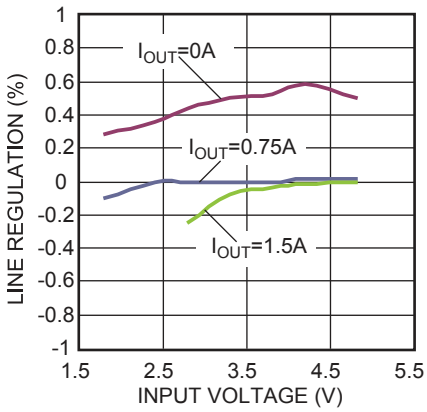
Efficiency vs. Load Current



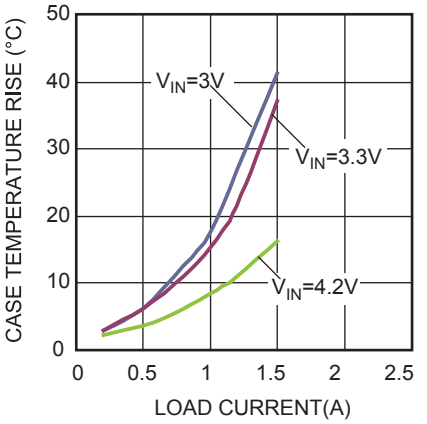
Load Regulation



Line Regulation

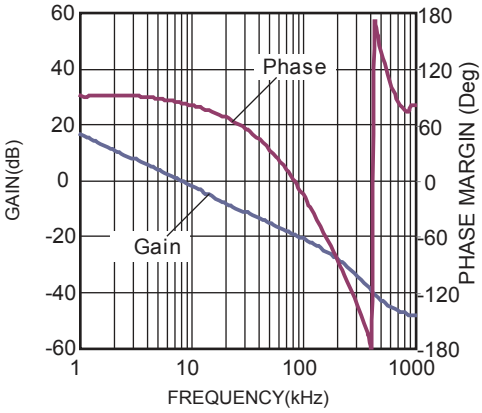


Case Temperature Rise vs. Load Current



Bode Plot

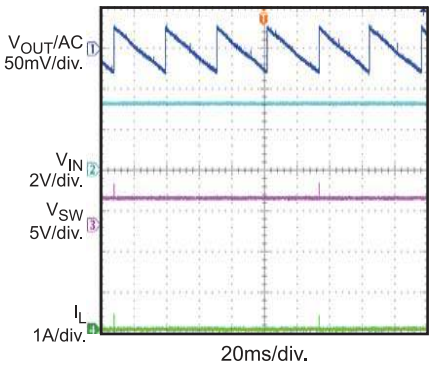
V_{IN}=3.3V, V_{OUT}=5V, I_{OUT}=1.5A



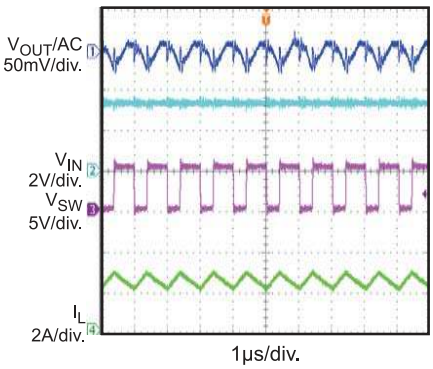
EVB TEST RESULTS *(continued)*

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

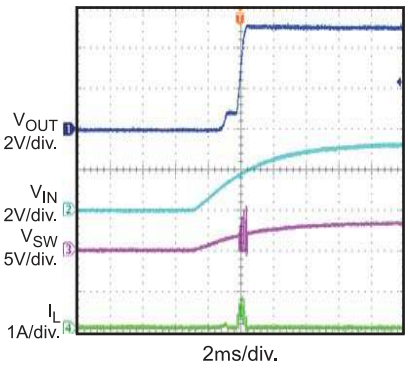
Steady State
I_{OUT} = 0A



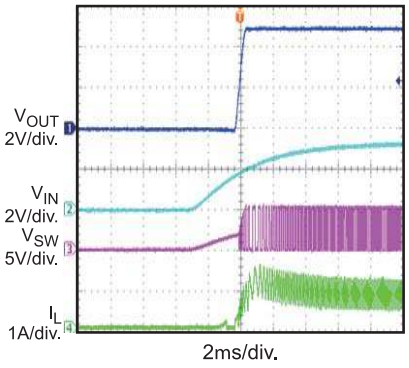
Steady State
I_{OUT} = 1.5A



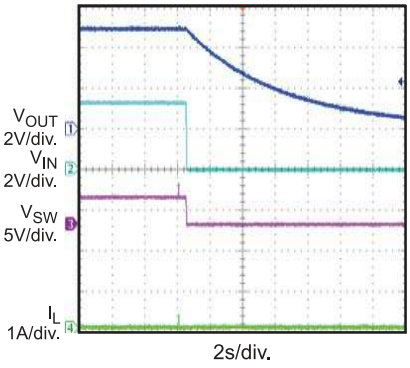
V_{IN} Start-Up
I_{OUT} = 0A



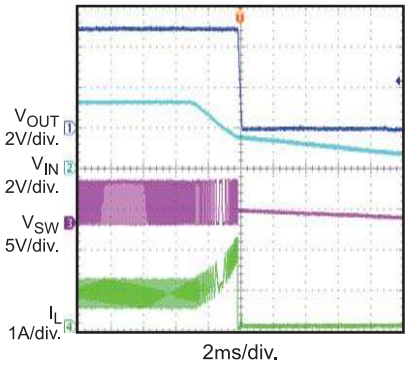
V_{IN} Start-Up
R_{LOAD} = 10Ω



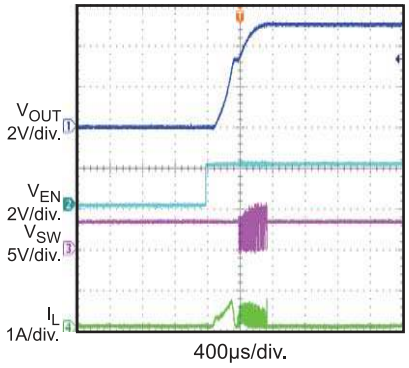
V_{IN} Shutdown
I_{OUT} = 0A



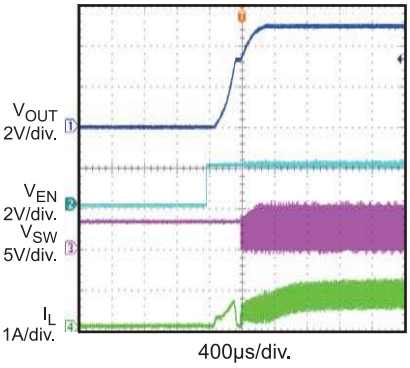
V_{IN} Shutdown
R_{LOAD} = 10Ω



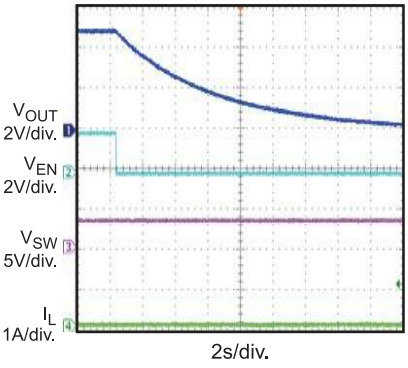
EN Start-Up
I_{OUT} = 0A



EN Start-Up
R_{LOAD} = 10Ω



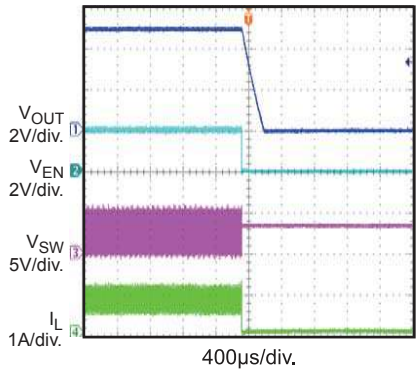
EN Shutdown
I_{OUT} = 0A



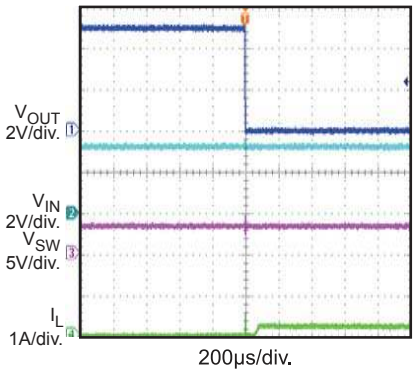
EVB TEST RESULTS *(continued)*

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

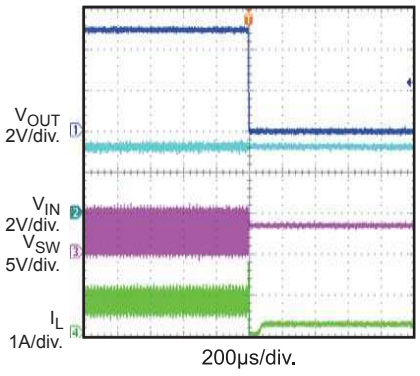
EN Shutdown
R_{LOAD} = 10Ω



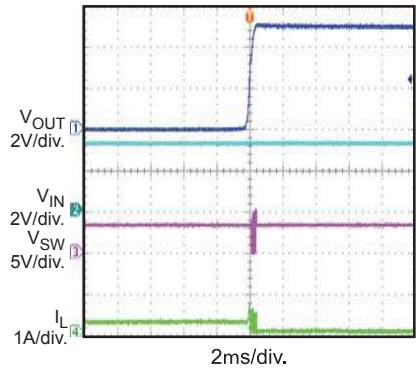
SCP Entry
I_{OUT} = 0A to Short



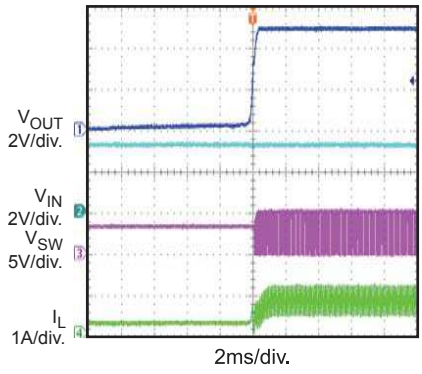
SCP Entry
R_{LOAD} = 10Ω to Short



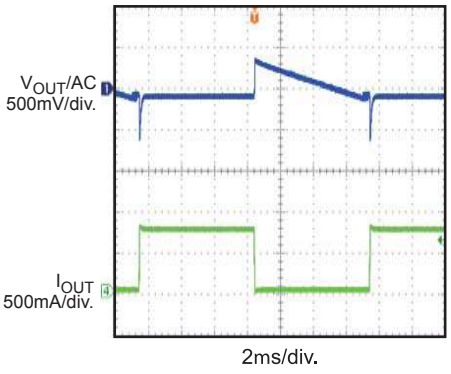
SCP Recovery
I_{OUT} = Short to 0A



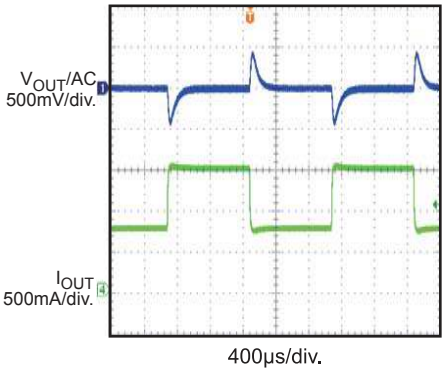
SCP Recovery
R_{LOAD} = Short to 10Ω



Load Transcient
I_{OUT}= 0A to 0.75A
di/dt=100mA/µs



Load Transcient
I_{OUT}= 0.75A to 1.5A
di/dt=100mA/µs



PRINTED CIRCUIT BOARD LAYOUT

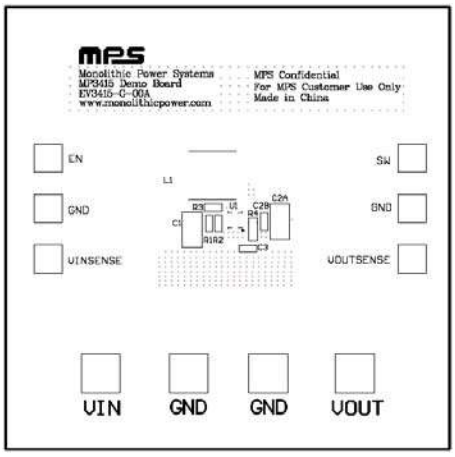


Figure 1—Top Silk Layer

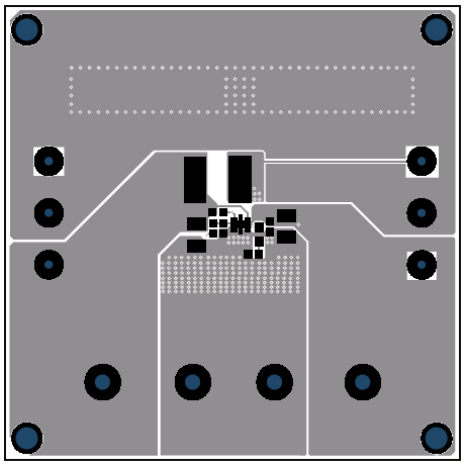


Figure 2—Top Layer

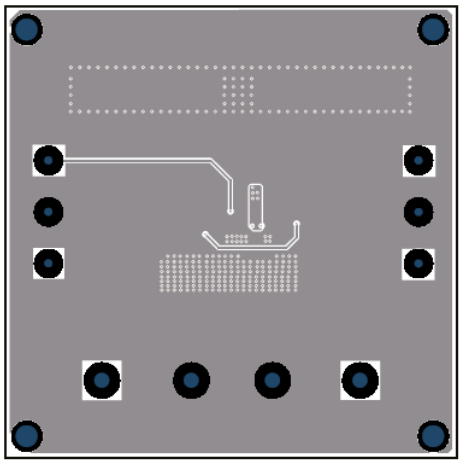


Figure 3—Bottom Layer

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 1.8V ≤ V_{IN} ≤ 4.5V.
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 MP3415 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 EV3415-G-00A or less than 0.4V to turn it off.