# 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

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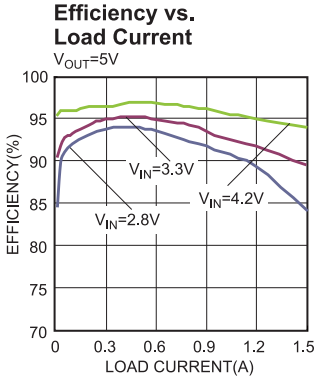
## EV3415-G-00A EVALUATION BOARD

TBD

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

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





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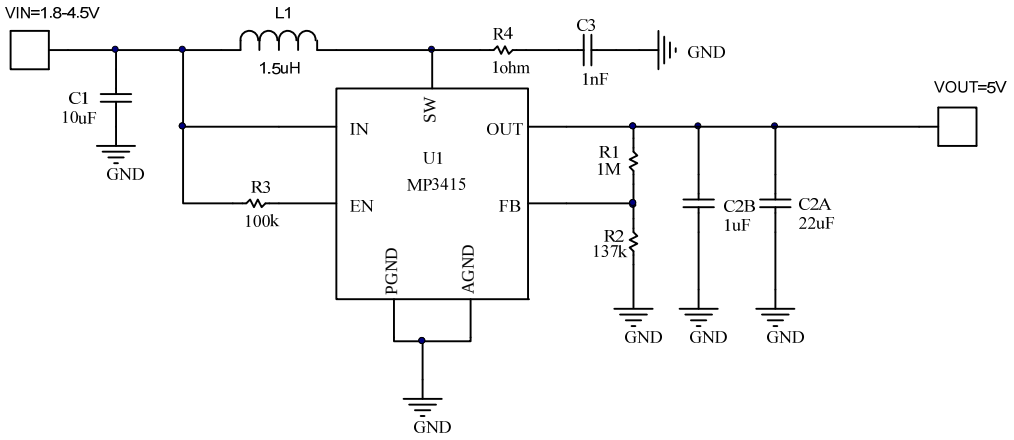
## EVALUATION BOARD SCHEMATIC




## 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 |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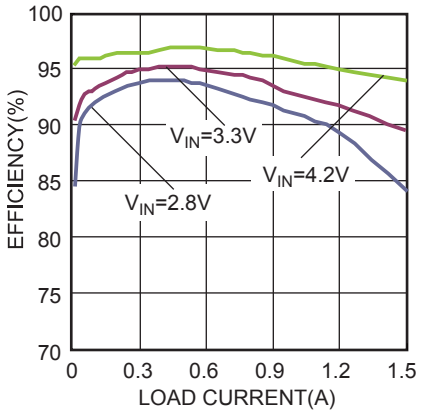
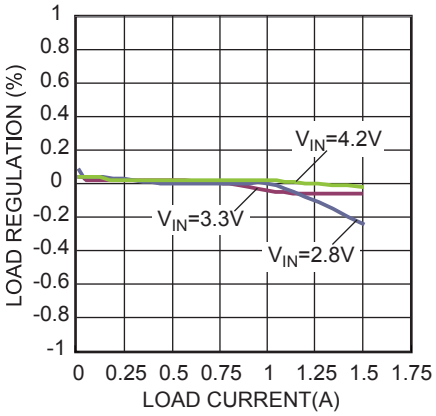
## EVB TEST RESULTS

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

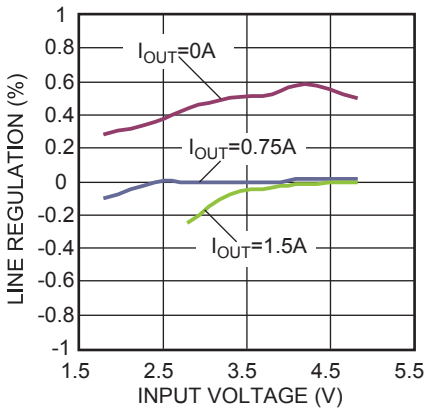
### Efficiency vs. Load Current



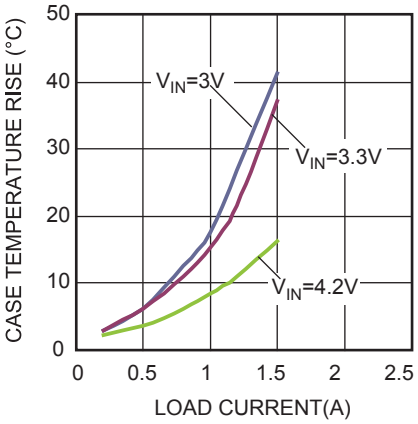

### Load Regulation




### Line Regulation

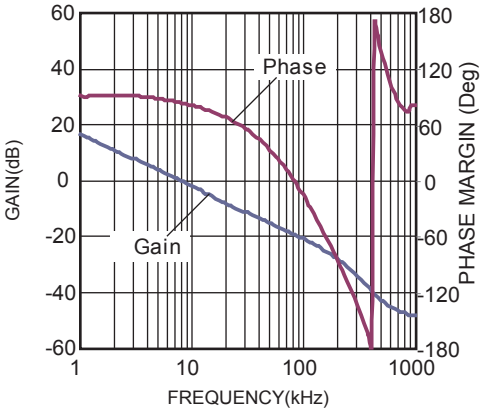



### Case Temperature Rise vs. Load Current




### Bode Plot

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





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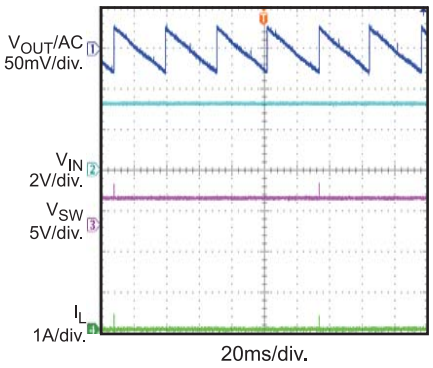
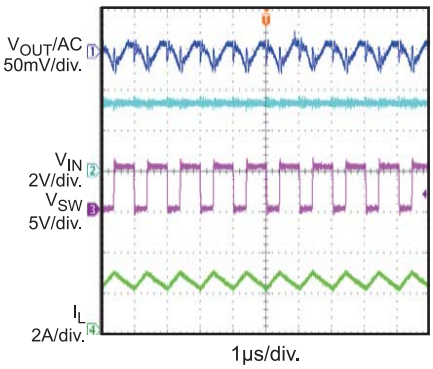
## EVB TEST RESULTS *(continued)*

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

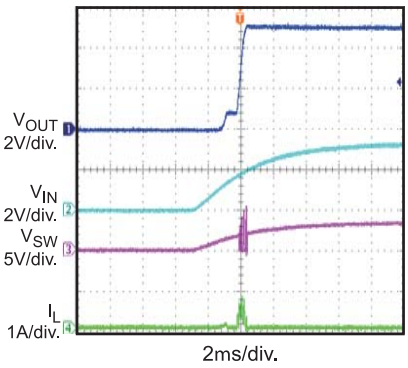
### Steady State
$I_{OUT}$ = 0A



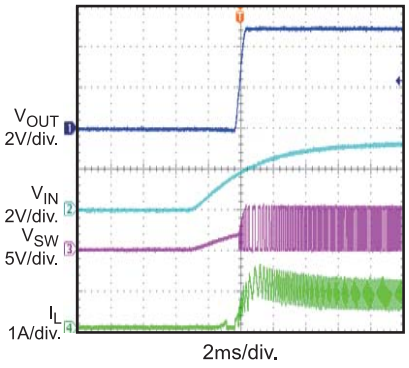

### Steady State
$I_{OUT}$ = 1.5A



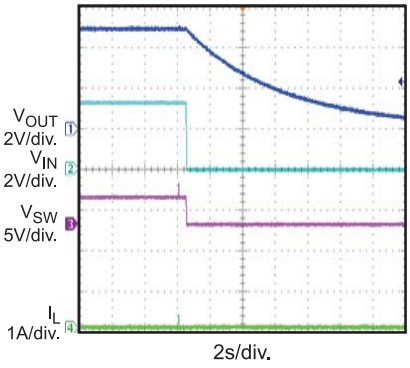

### $V_{IN}$ Start-Up
$I_{OUT}$ = 0A



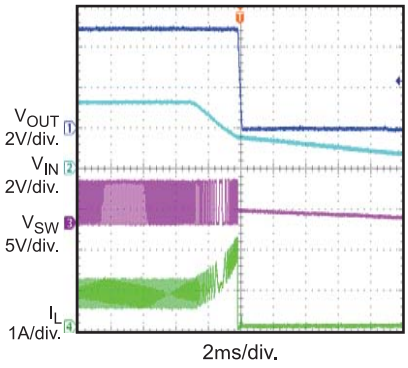

### $V_{IN}$ Start-Up
$R_{LOAD}$ = 10Ω



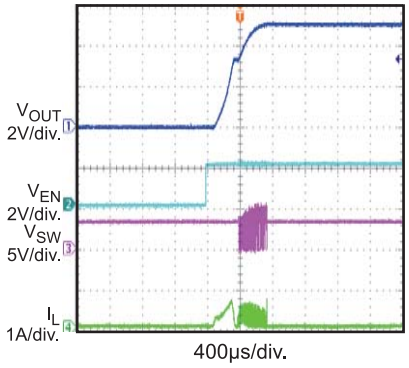

### $V_{IN}$ Shutdown
$I_{OUT}$ = 0A



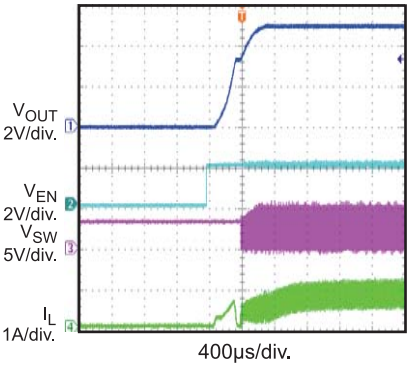

### $V_{IN}$ Shutdown
$R_{LOAD}$ = 10Ω



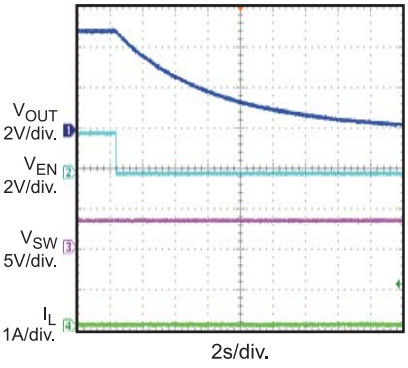

### EN Start-Up
$I_{OUT}$ = 0A




### EN Start-Up
$R_{LOAD}$ = 10Ω




### EN Shutdown
$I_{OUT}$ = 0A





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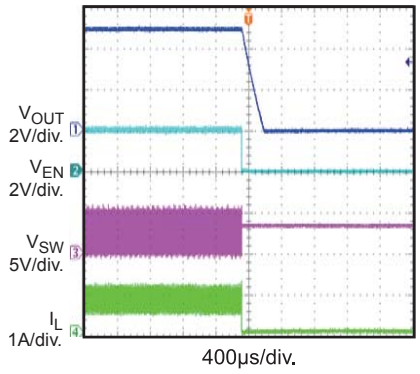
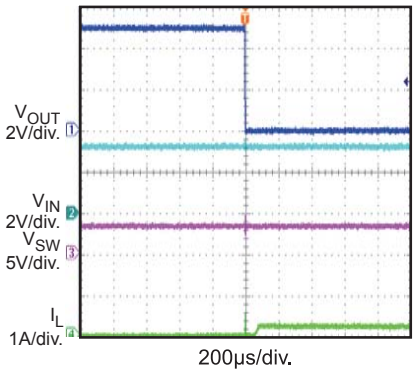
## EVB TEST RESULTS *(continued)*

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

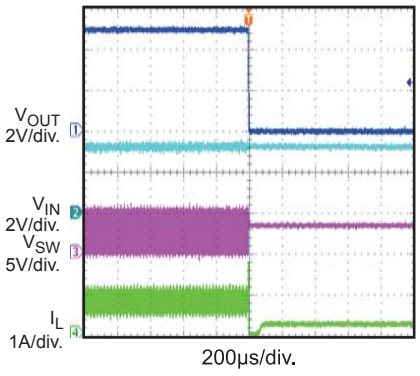
### EN Shutdown
$R_{LOAD}$ = 10Ω



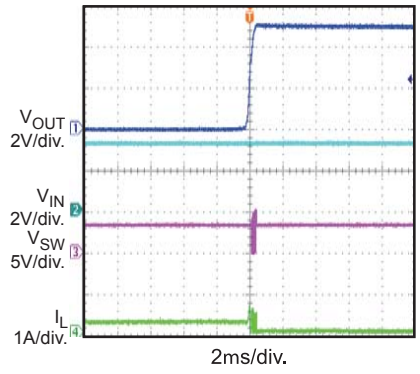

### SCP Entry
$I_{OUT}$ = 0A to Short



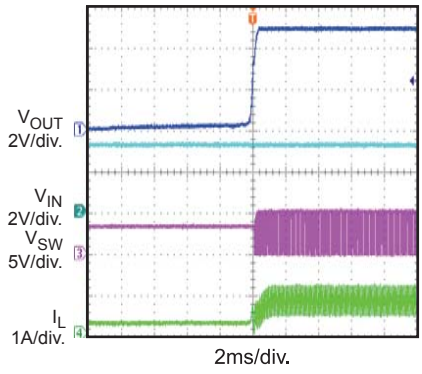

### SCP Entry
$R_{LOAD}$ = 10Ω to Short



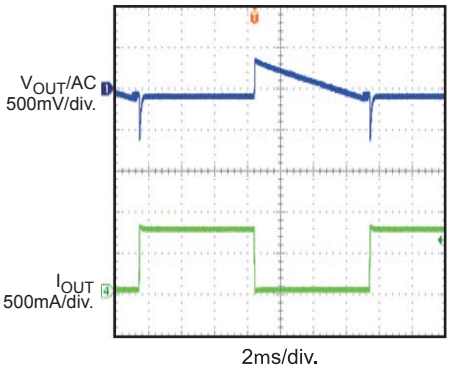

### SCP Recovery
$I_{OUT}$ = Short to 0A



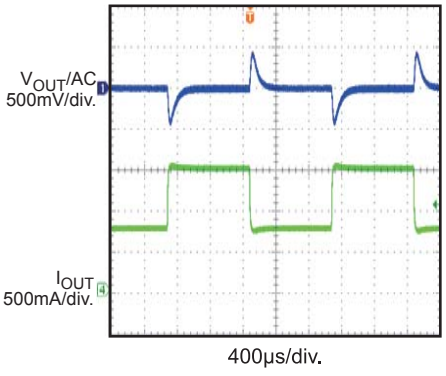

### SCP Recovery
$R_{LOAD}$ = Short to 10Ω




### 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





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# PRINTED CIRCUIT BOARD LAYOUT

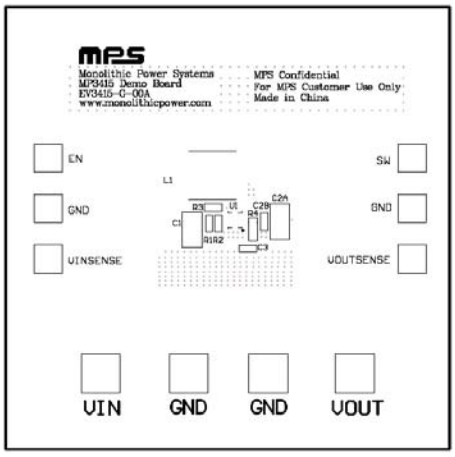


Figure 1—Top Silk Layer

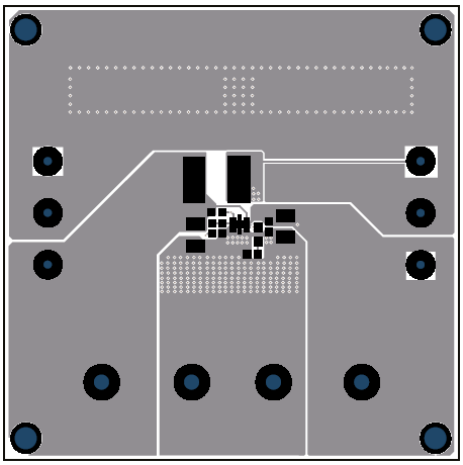

Figure 2—Top Layer

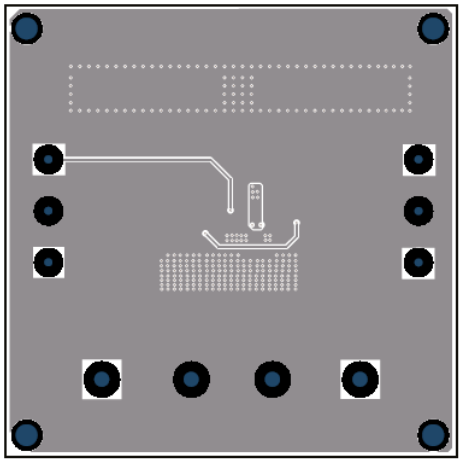

Figure 3—Bottom Layer


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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 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.

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