# EV3422-G-00A

**6.5A, 600kHz Synchronous Step-up Converter with Output Disconnect Evaluation Board**

## DESCRIPTION

EV3422-G-00A Evaluation Board is designed to demonstrate the capability of MP3422. MP3422 is a high-efficiency, synchronous, current-mode, step-up converter with output disconnect.

The MP3422 can provide inrush current limiting and output short-circuit protection. It can work with an input voltage as low as 2.5V. 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 600kHz switching frequency allows for small external components, while the internal compensation and soft-start minimize the external component count. The MP3422 is available in 14-pin QFN 2mmx2mm package.

## ELECTRICAL SPECIFICATION

| Parameter | Symbol | Value | Units |
|---|---|---|---|
| Input Voltage | $V_{IN}$ | 2.8 – 4.2 | V |
| Output Voltage | $V_{OUT}$ | 5 | V |
| Output Current | $I_{OUT}$ | 0 – 2.5 | A |

## FEATURES

- 2.5V to 5.5V Input Work Range
- 2.5V to 5.5V Output Range
- Internal Synchronous Rectifier
- 600kHz Fixed Frequency Switching
- >6.5A Switch Current Limit Capability
- 43uA Quiescent Current
- High Efficiency over Full Load Range
- Internal Soft-start and Compensation
- True Output Load Disconnect from Input
- OCP, SCP, OVP and OTP Protection
- Small QFN2x2-14 Package

## APPLICATIONS

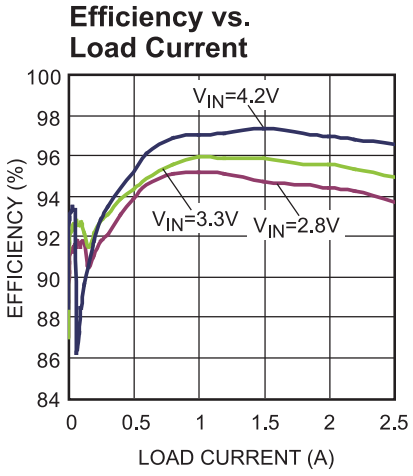
- Battery-Powered Products
- Personal Medical Devices
- Portable Media Players
- Wireless Peripherals
- Handheld Computers and Smart Phones



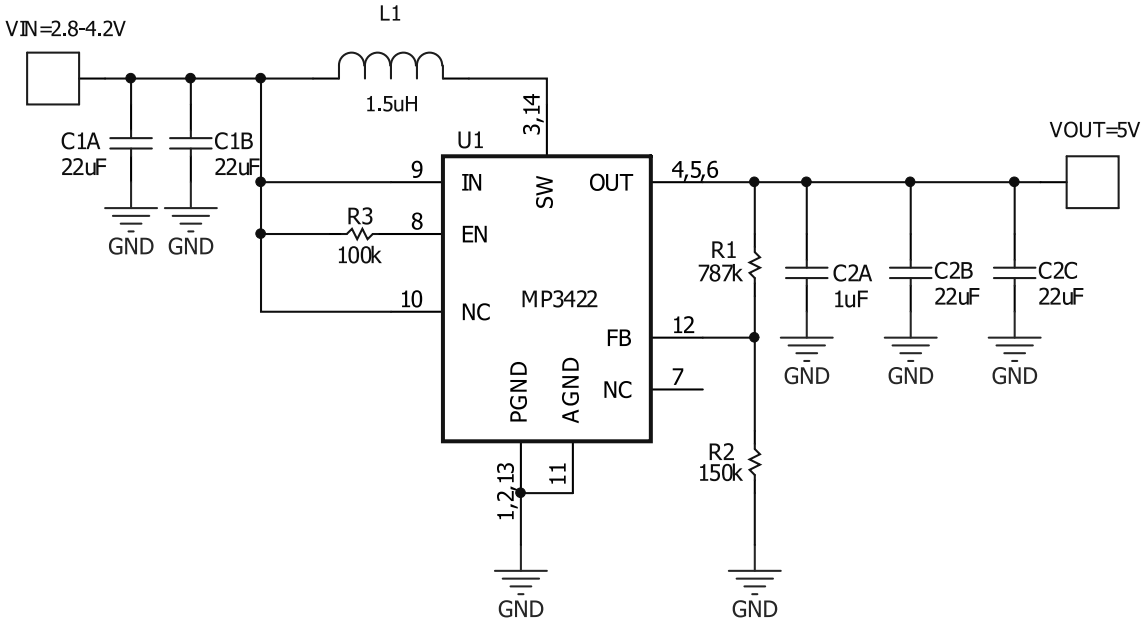
## EV3422-G-00A EVALUATION BOARD


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

| Board Number | MPS IC Number |
|---|---|
| EV3422-G-00A | MP3422GG |



## EVALUATION BOARD SCHEMATIC




**Notes:**

1) NC (PIN10) need short to VIN.

2) NC (PIN7) need float or connect to GND

3) It is strongly recommended control IC on/off through EN pin.

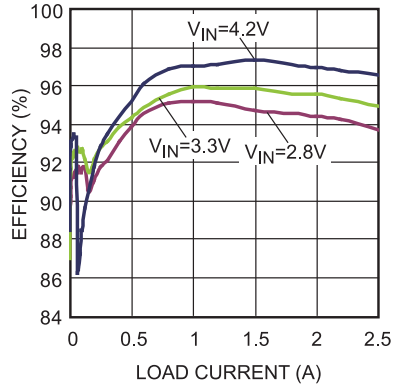
## EV3422-G-00A BILL OF MATERIALS

| Qty | Ref | Value | Description | Package | Manufacturer | Part Number |
|---|---|---|---|---|---|---|
| 4 | C1A, C1B, C2B, C2C | 22μF | Ceramic Cap, 10V,X7R | 1210 | Murata | GRM32ER71A226KE20L |
| 1 | C2A | 1μF | Ceramic Cap,10V,X5R | 0603 | Murata | GRM188R61A105KA61D |
| 1 | L1 | 1.5μH | RDC=6.6mΩ, IR=11A,Isat=14A, | SMD | Wurth | 744311150 |
| 1 | R1 | 787kΩ | Film Res,1% | 0603 | YAGEO | RC0603FR-07787KL |
| 1 | R2 | 150kΩ | Film Res,1% | 0603 | ROYAL | RL0603FR-07150KL |
| 1 | R3 | 100kΩ | Film Res,1% | 0603 | ROYAL | RL0603FR-07100KL |
| 1 | U1 | MP3422 | 6.5A Synchronous Step-up Converter with Output Disconnect | QFN-14 2mmx2mm | MPS | MP3422GG |

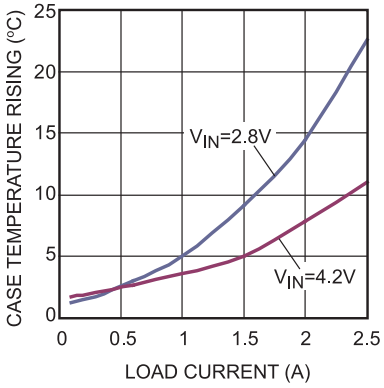
## EVB TEST RESULTS

**Performance waveforms are tested on the evaluation board.**
**$V_{IN}$ = 3.3V, $V_{OUT}$ = 5V, L = 1.5µH, $T_A$ = 25ºC, unless otherwise noted.**

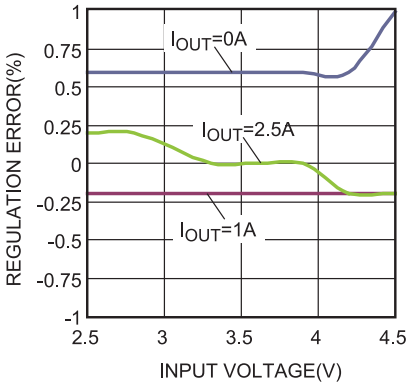
**Efficiency vs. Load Current**



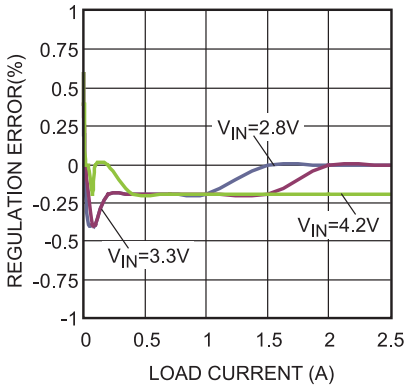

**Case Temperature Rising vs. Load Current**



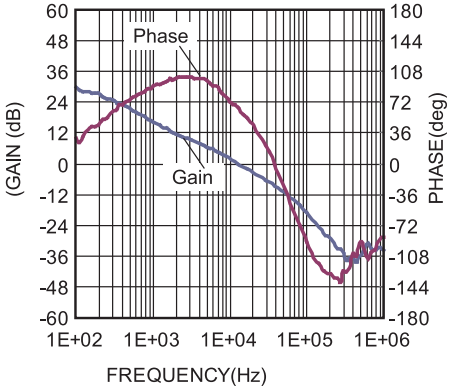

**Line Regulation**



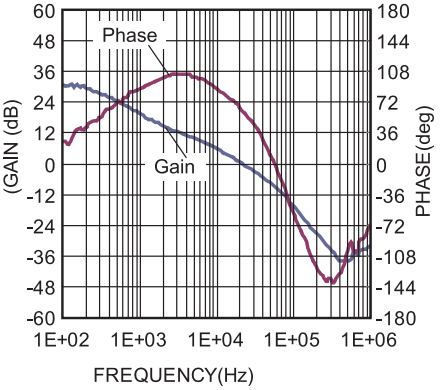

**Load Regulation**




**Bode Plot**
$V_{IN}$ =2.8V, $I_{OUT}$=2.5A



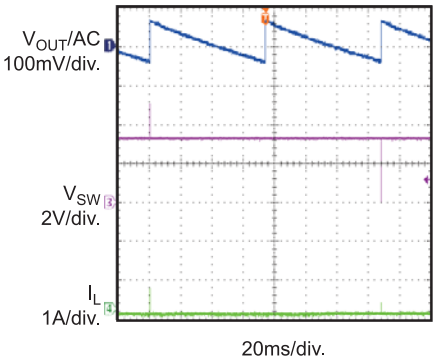

**Bode Plot**
$V_{IN}$ =4.2V, $I_{OUT}$=2.5A



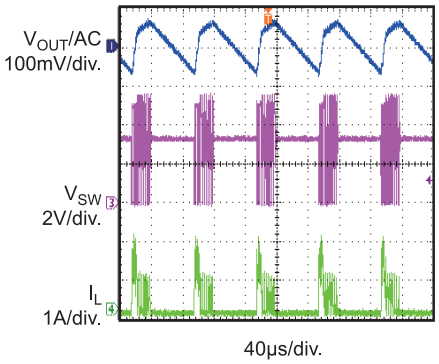
## EVB TEST RESULTS *(continued)*

**Performance waveforms are tested on the evaluation board.**
**$V_{IN}$ = 3.3V, $V_{OUT}$ = 5V, L = 1.5µH, $T_A$ = 25ºC, unless otherwise noted.**

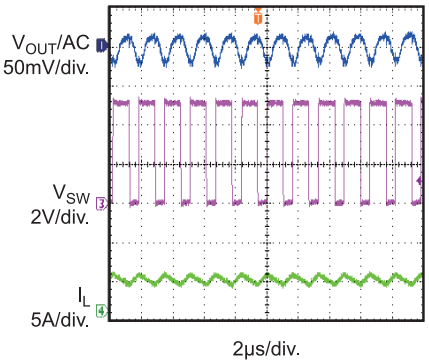
**Output Voltage Ripple**
$I_{OUT}$ = 0A



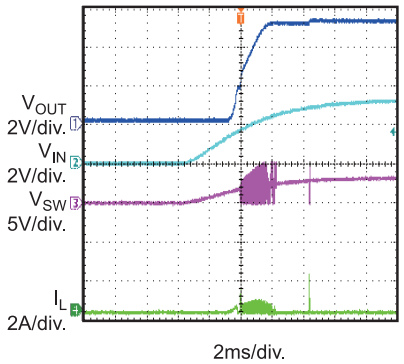

**Output Voltage Ripple**
$I_{OUT}$ = 0.1A



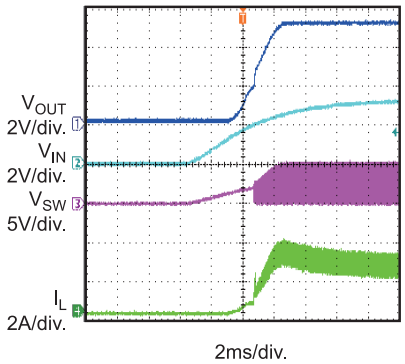

**Output Voltage Ripple**
$I_{OUT}$ = 2.5A



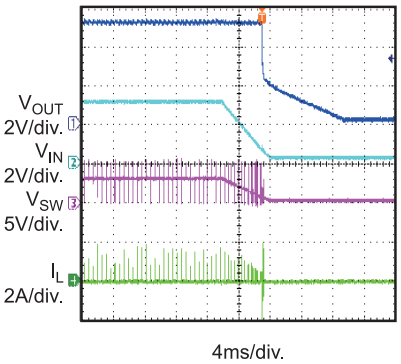

**$V_{IN}$ Startup**
$I_{OUT}$ = 0A



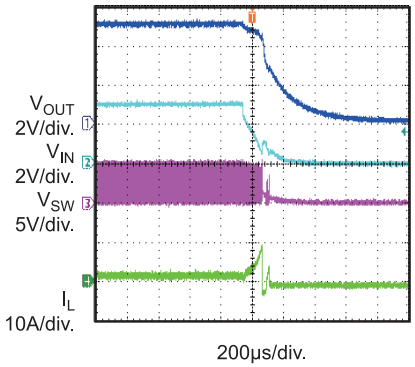

**$V_{IN}$ Startup**
$R_{LOAD}$ = 3.5Ω



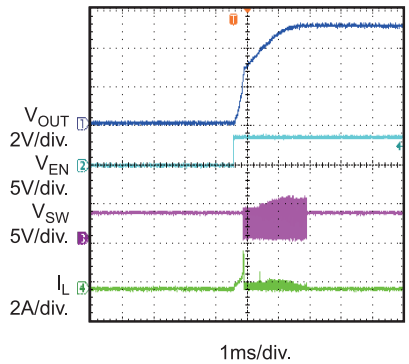

**$V_{IN}$ Shutdown**
$I_{OUT}$ = 0.01A



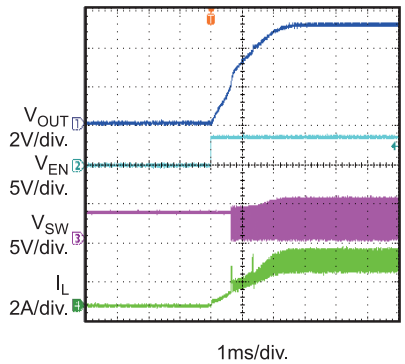

**$V_{IN}$ Shutdown**
$R_{LOAD}$ = 3.5Ω




**EN Startup**
$I_{OUT}$ = 0A



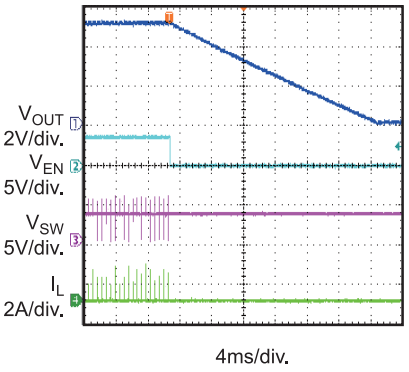

**EN Startup**
$R_{LOAD}$ = 3.5Ω



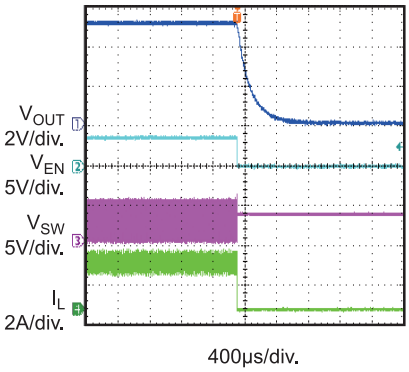
## EVB TEST RESULTS *(continued)*

**Performance waveforms are tested on the evaluation board.**
**$V_{IN}$ = 3.3V, $V_{OUT}$ = 5V, L = 1.5µH, $T_A$ = 25ºC, unless otherwise noted.**

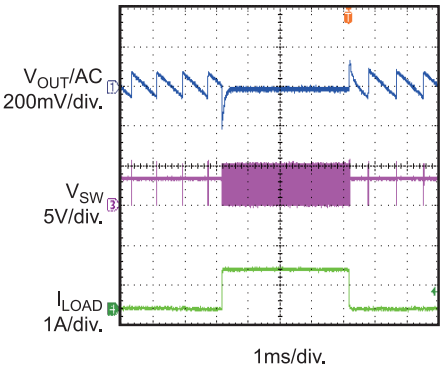
### EN Shutdown
$I_{OUT}$ = 0.01A



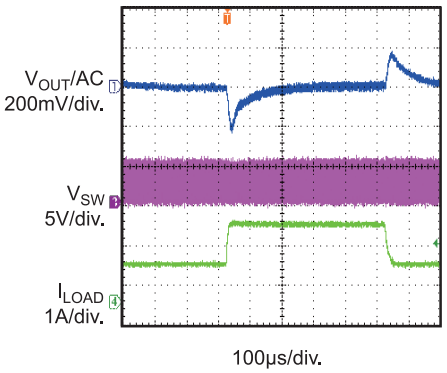

### EN Shutdown
$R_{LOAD}$ = 3.5Ω



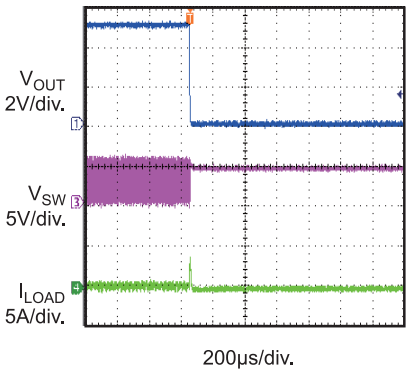

### Load Transient Response
Load = 0.01A --> 1A @ 100mA/µs



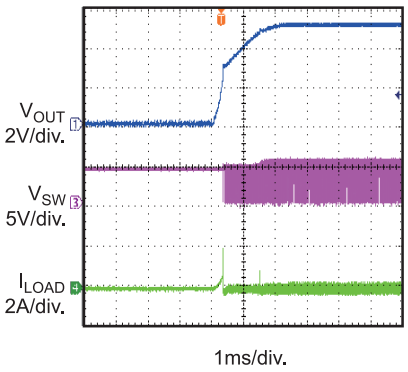

### Load Transient Response
Load = 1A --> 2A @ 100mA/µs




### Short Circuit Entry
$V_{IN}$=4.2V, $I_{OUT}$=0.5A




### Short Circuit Recovery
Recovers to 0.1A Load



## PRINTED CIRCUIT BOARD LAYOUT

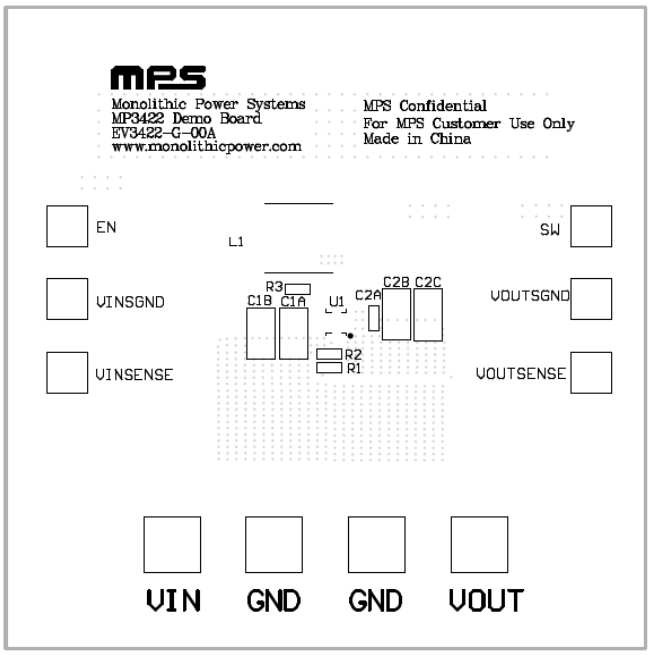



**Figure 1—Top Silk Layer**

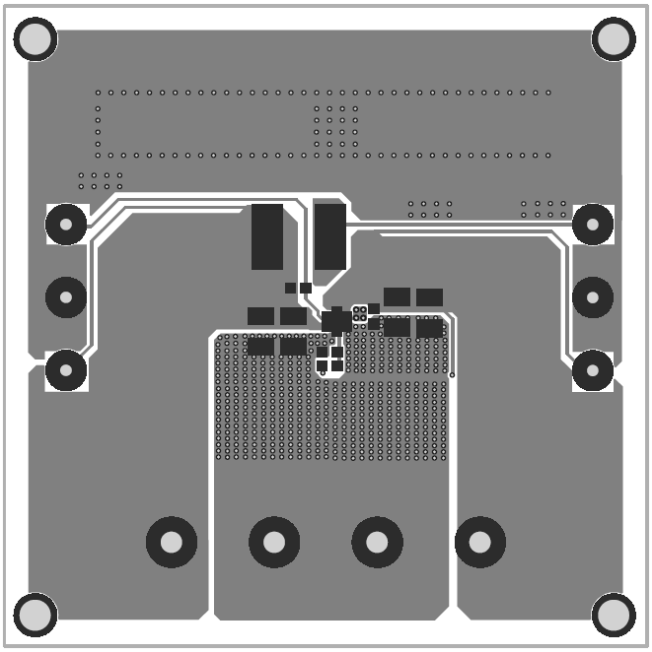


**Figure 2—Top Layer**

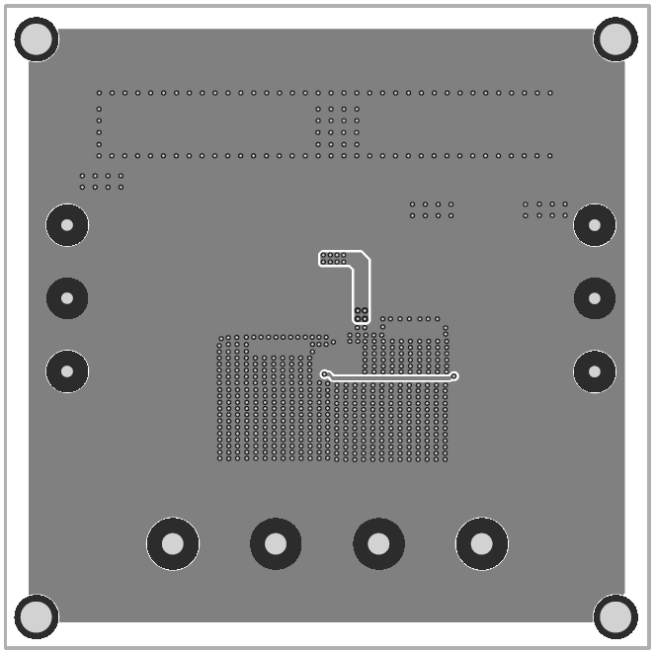


**Figure 3—Bottom Layer**

## 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 $2.8V \leq V_{IN} \leq 4.2V$.
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 MP3422 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:

$$V_{out} = V_{FB} \times \frac{R1 + R2}{R2}$$

Where $V_{FB}$ = 0.807V and R1=787kΩ.

8. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 1.2V to turn on MP3422 or less than 0.4V to turn it off.