EV3424-G-00A

Current Programmable, CC/CV Step-up Converter with Output Disconnect Evaluation Board

The Future of Analog IC Technology

DESCRIPTION

EV3424-G-00A Evaluation Board is designed to demonstrate the capability of MP3424. MP3424 is a high-efficiency, synchronous, current-mode, step-up converter with output disconnect.

The MP3424 starts up from an input voltage as low as 2V, while providing inrush current limiting, output short-circuit protection, and programmable load current limit. The integrated P-channel, synchronous rectifier improves efficiency and eliminates the need for an external Schottky diode. The P-channel MOSFET disconnects the output from the input during shutdown.

The 580kHz switching frequency allows small external components, while the internal compensation and soft-start minimize external component count. The MP3424 provides flexible current limit program for up to 5V/3.1A load from a supply voltage down to 2.8V.The MP3424 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 – 3.1	A

FEATURES

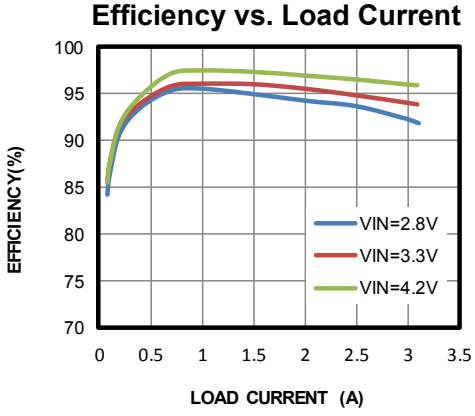
- 2V to 5.5V Input Work Range
- 3V to 5.5V Output Range
- Support 5V/3.1A Output from 2.8V Input
- Programmable up to 9.5A Switching Current Limit
- Programmable Average Load Current Limit
- 580kHz Fixed Frequency Switching
- Up to 97% Efficiency
- Internal Soft-start and Compensation
- True Output Load Disconnect from Input
- OCP, SCP and OTP Protection
- Small 2mmx2mm QFN-14 Package

APPLICATIONS

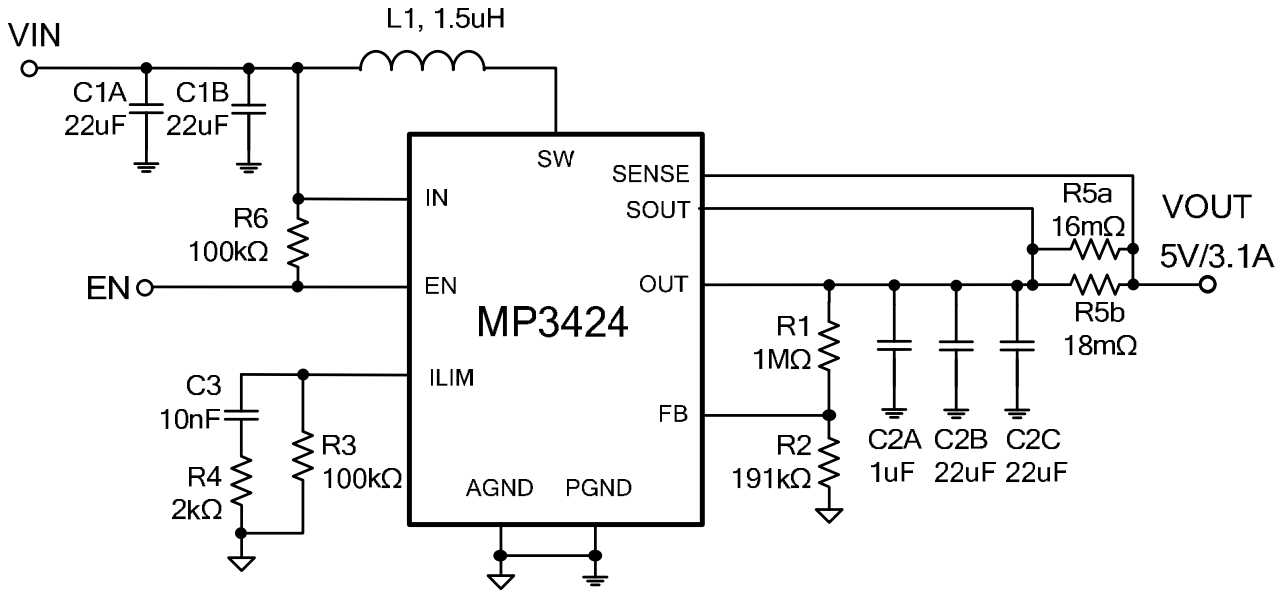
- Battery-Powered Products
- Power Banks, Juice Packs, Battery Back-up Units
- USB Power Supply
- Consumer Electronic Accessories
- Tablets

EV3424-G-00A EVALUATION BOARD

(L x W x H) 6.35cm x 6.35cm x 0.6cm	
Board Number	**MPS IC Number**
EV3424-G-00A	MP3424GG



EVALUATION BOARD SCHEMATIC



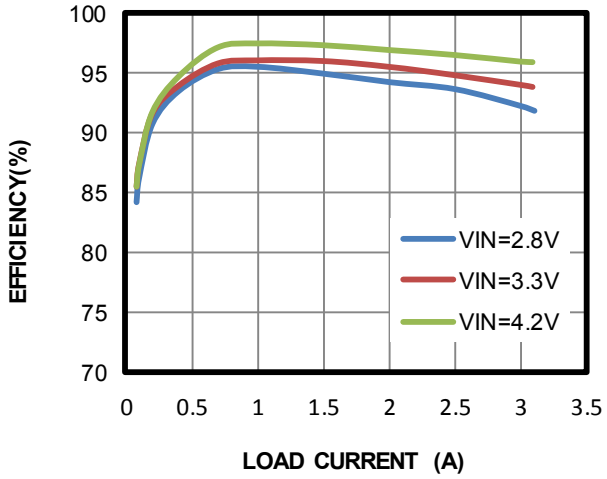
EV3424-G-00A BILL OF MATERIALS

Qty	RefDes	Value	Description	Package	Manufacturer	Manufacturer P/N
4	C1A, C1B, C2B,C2C	22μF	Ceramic Cap.,16V,X7R	1210	MuRata	GRM32ER71C226KEA8L
1	C2A	1μF	Ceramic Cap.,16V,X7R	0603	MuRata	GRM188R71C105KE15D
1	C3	10nF	Ceramic Cap.,16V,X7R	0603	MuRata	GRM188R71C103KA01D
1	L1	1.5μH	RDC=6.6mΩ, IR=11A,Isat=14A,	SMD	Wurth	744 311 150
1	R1	1MΩ	Film Res,1%	0603	YAGEO	RC0603FR-071ML
1	R2	191kΩ	Film Res,1%	0603	YAGEO	RC0603FR-07191KL
2	R3,R6	100kΩ	Film Res,1%	0603	YAGEO	RL0603FR-07100KL
1	R4	2 kΩ	Film Res,1%	0603	YAGEO	RC0603FR-072KL
1	R5a	16mΩ	Film Res,1%	0603	YAGEO	RL0603FR-070R016L
1	R6a	18mΩ	Film Res,1%	0603	YAGEO	RL0603FR-070R018L
1	U1	MP3424	Synchronous Step-up Converter with Disconnect	QFN2*2	MPS	MP3424GG

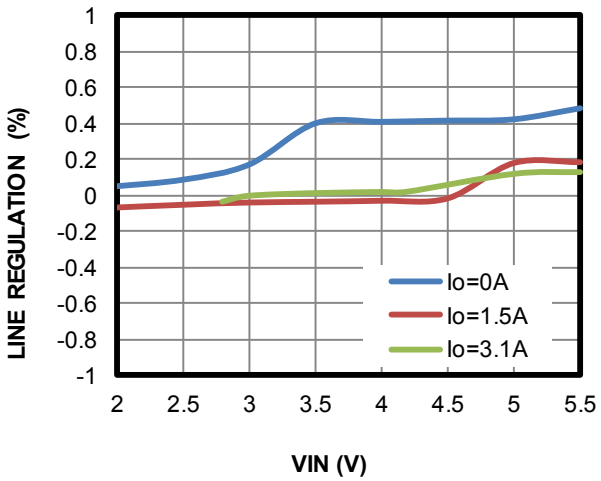
EVB TEST RESULTS

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

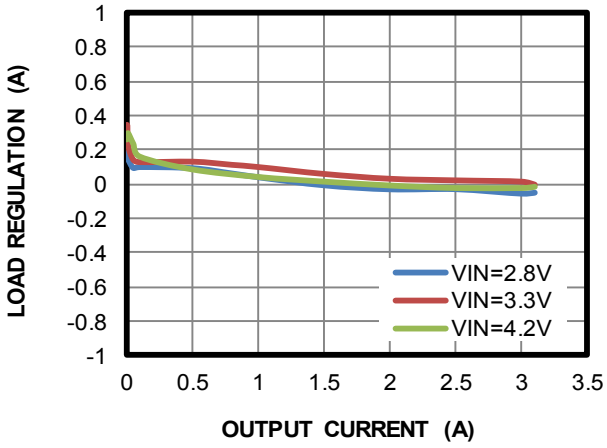
Efficiency vs. Load Current



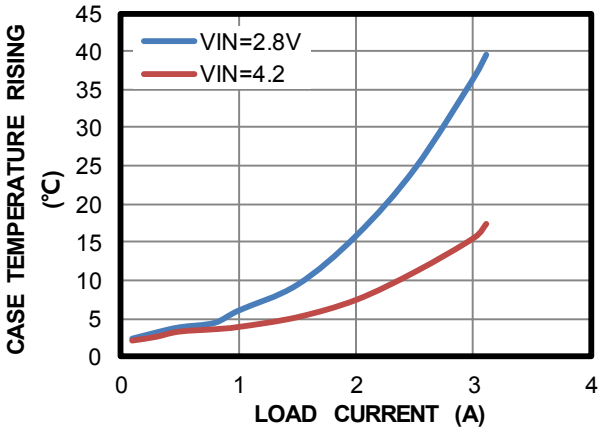
Line Regulation



Load Regulation



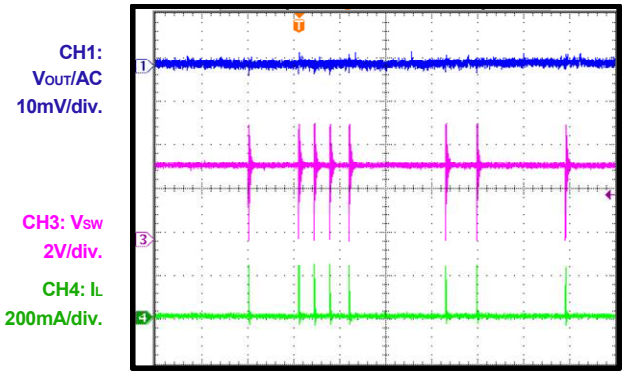
Case Temperature Rising vs. Load Current



EVB TEST RESULTS *(continued)*

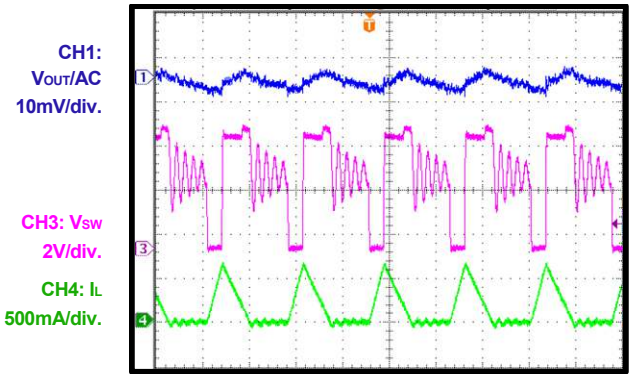
Performance waveforms are tested on the evaluation board.
V_{IN} = 3.3V, V_{OUT} = 5V, L = 1.5μH, T_A = 25ºC, unless otherwise noted.

Output Voltage Ripple
Load=0A



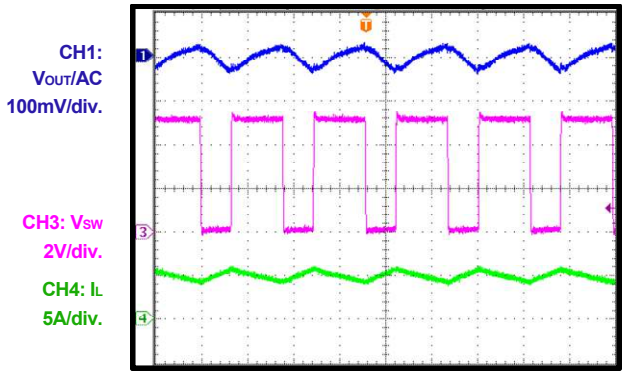
20μs/div.

Output Voltage Ripple
Load=0.1A



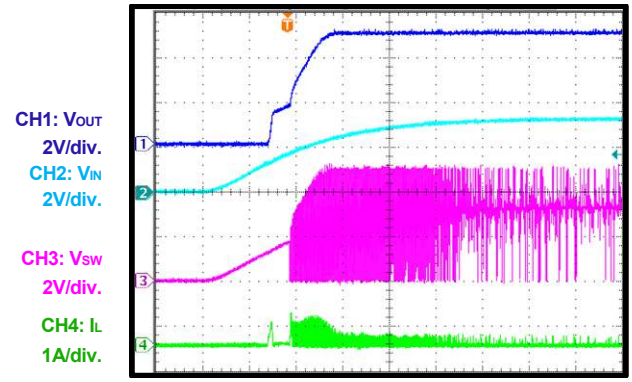
1μs/div.

Output Voltage Ripple
Load=3.1A



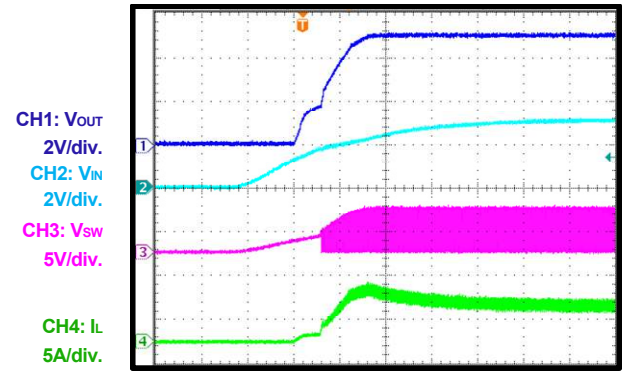
1μs/div.

VIN Start-Up
Load=0A



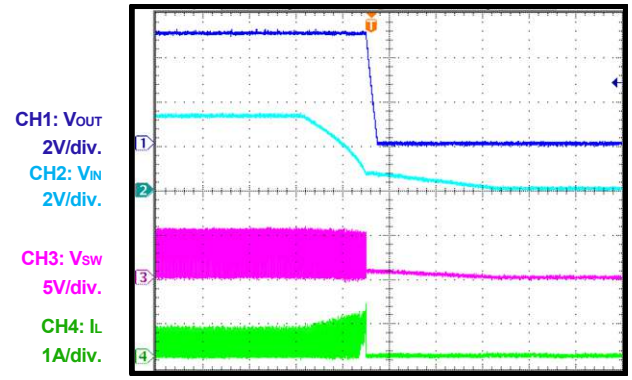
2ms/div.

VIN Start-Up
Load=2Ω



2ms/div.

VIN Shutdown
Load=0.1A

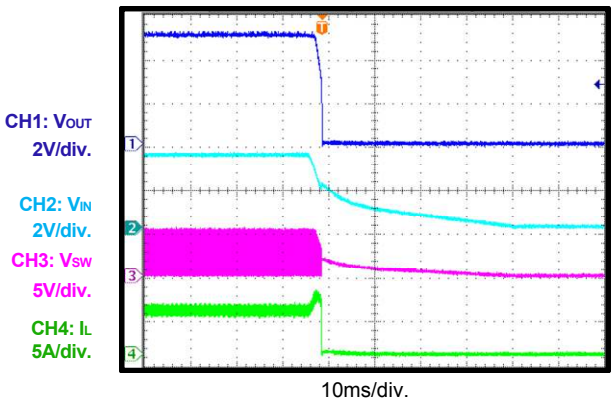


10ms/div.

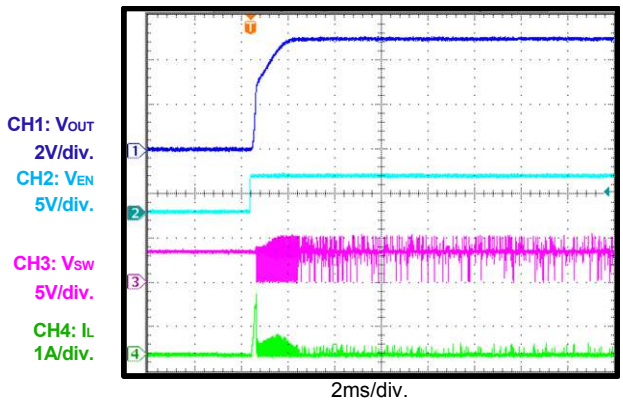
EVB TEST RESULTS *(continued)*

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

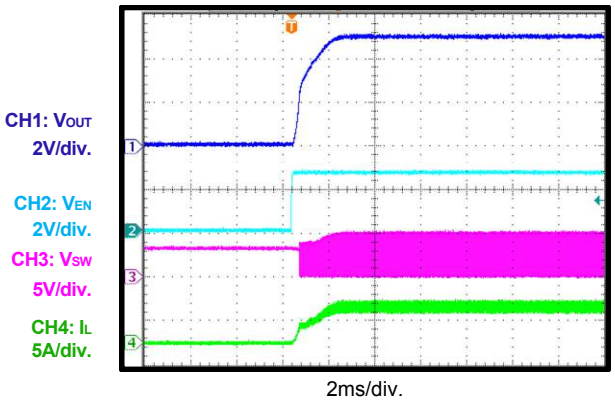
VIN Shutdown
Load=3.1A



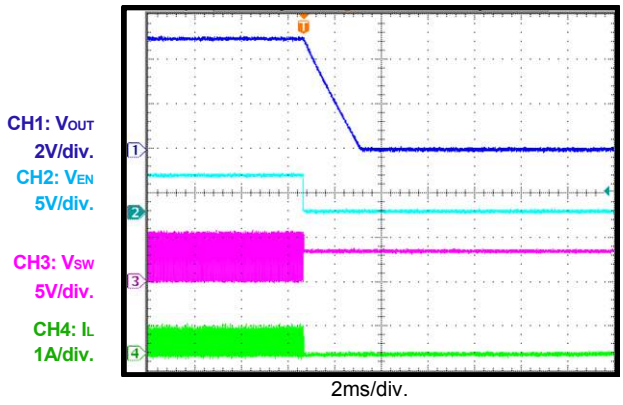
EN Start-Up
Load=0A



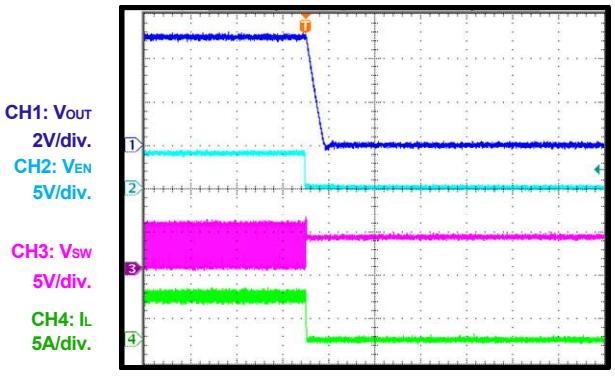
EN Start-Up
Load=2Ω



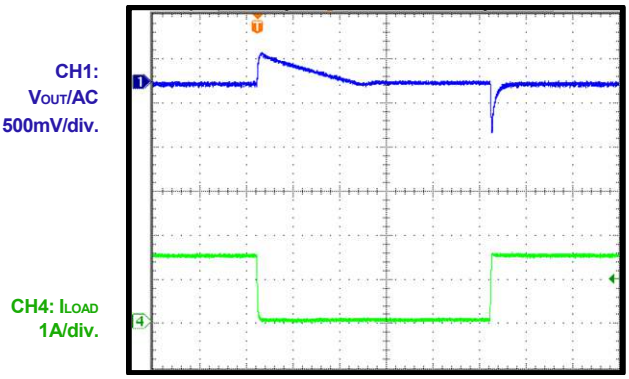
EN Shutdown
Load=0.1A



EN Shutdown
Load=3.1A



Load Transient
I_{LOAD}=0A to 1.5A at 150mA/µs

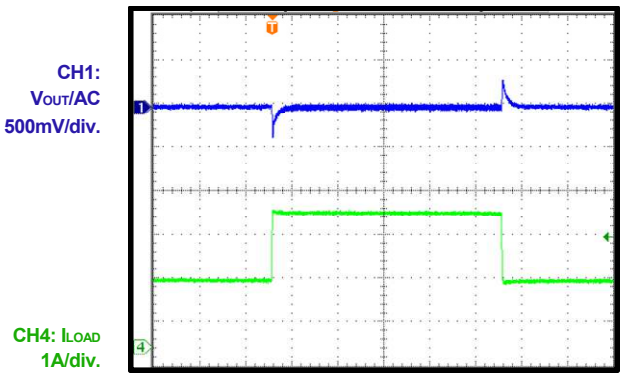


EVB TEST RESULTS *(continued)*

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

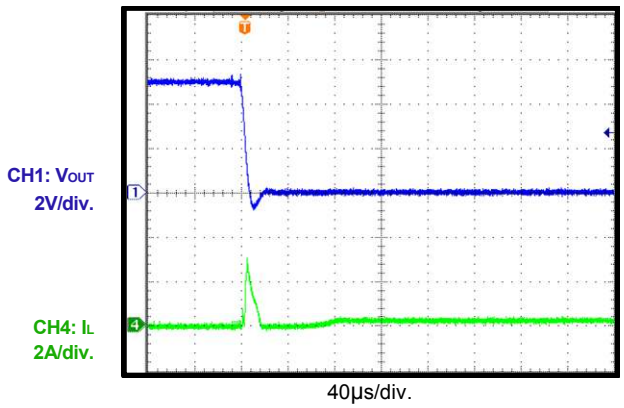
Load Transient

I_{LOAD}=1.5A to 3.1A at 150mA/µs



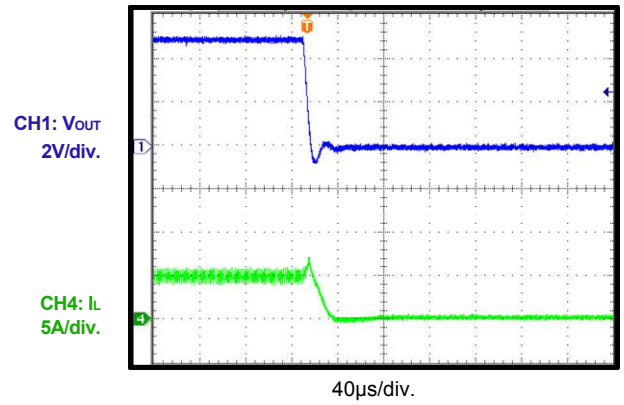
Short Circuit Entry

0A Load to Short



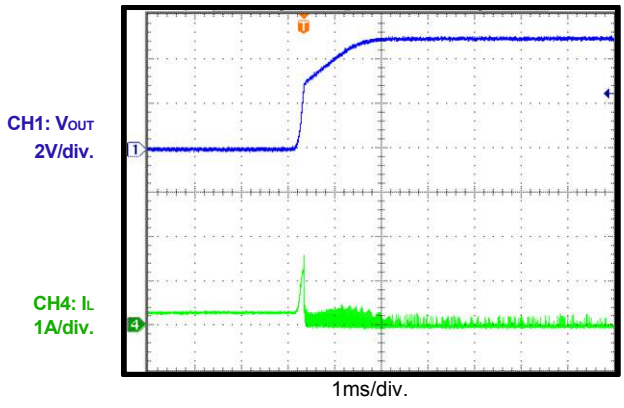
Short Circuit Entry

3.1A Load to Short



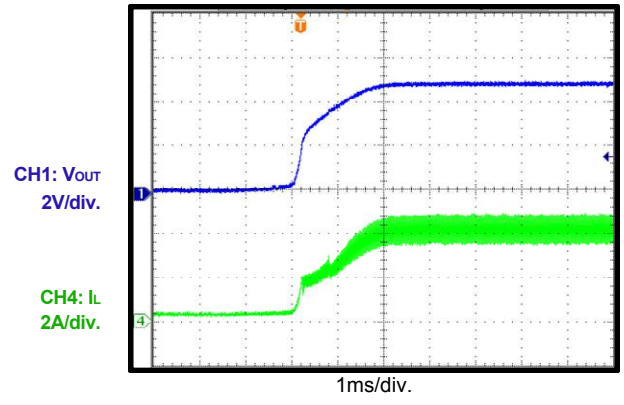
Short Circuit Recovery

Recover to 0A Load



Short Circuit Recovery

Recover to 2Ω Load



PRINTED CIRCUIT BOARD LAYOUT

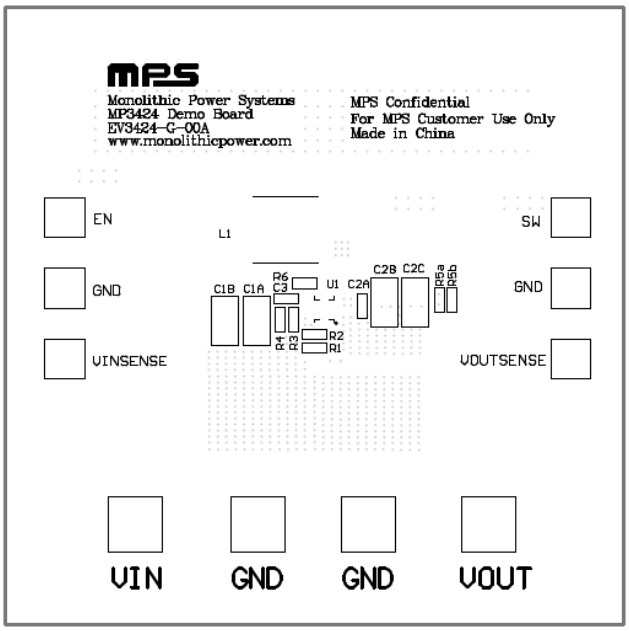


Figure 1—Top Silk Layer

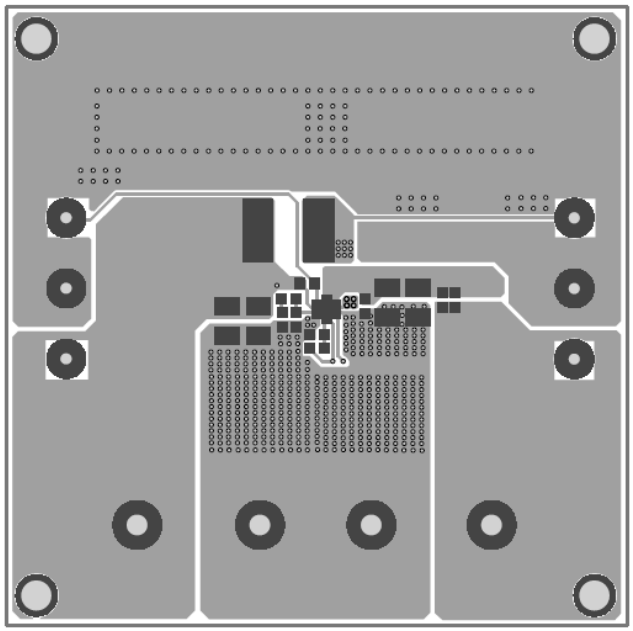


Figure 2—Top Layer

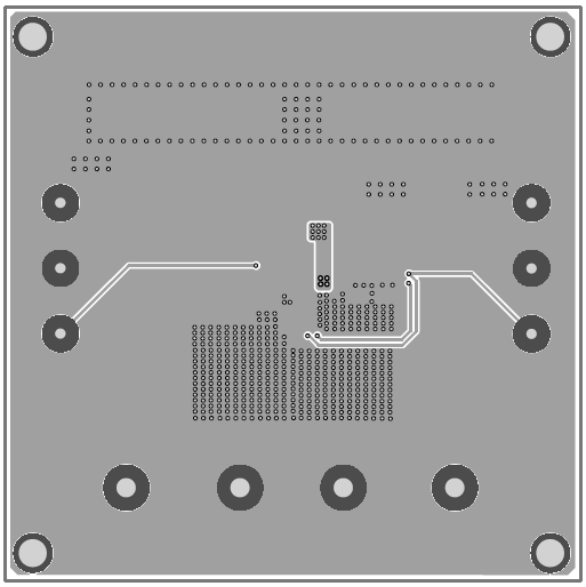


Figure 3—Bottom Layer

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 MP3424 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} = 0.805V 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 MP3424 or less than 0.4V to turn it off.