

## DESCRIPTION

The EV5042-J-00A evaluation board is designed to demonstrate the capabilities of the MP5042, a protection device designed to protect circuitry on the output from transients on the input. The MP5042 also protects the input from undesired shorts and transients coming from the output.

During start-up, the inrush current is limited by limiting the slew rate at the output. The slew rate is controlled by the DV/DT pin setting.

The maximum load at the output is current-limited. The magnitude of the current limit is controlled by an external resistor from the ILIMIT pin to GND. The current limit threshold can be set between 25mA and 2A. There is a fixed 260mA current limit when ILIMIT is floating.

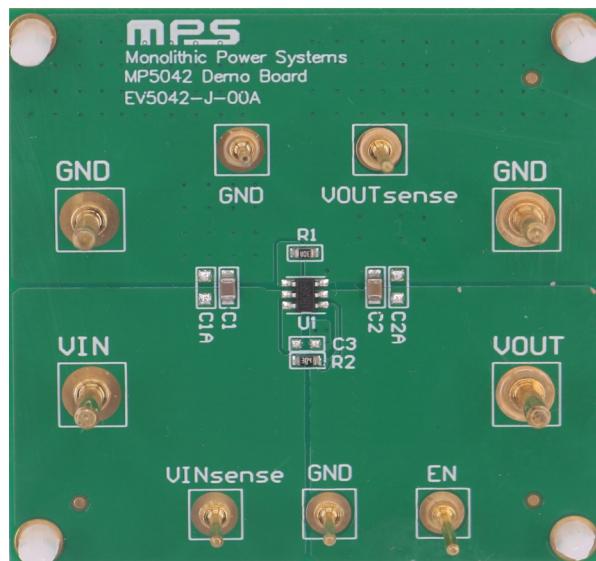
The device is available in a TSOT23-6 package.

## PERFORMANCE SUMMARY <sup>(1)</sup>

Specifications are at  $T_A = 25^\circ\text{C}$ , unless otherwise noted.

Parameters	Conditions	Value
Input voltage ( $V_{IN}$ ) range		4.2V to 28V
Current limit ( $I_{LIMIT}$ )	Float the LIMIT pin	260mA
	$R_{LIMIT} = 200\Omega$	2A
	$R_{LIMIT} = 604\Omega$	800mA
DV/DT slew rate ( $dV/dt$ )	DV/DT floating	0.9V/ms

## EV5042-J-00A EVALUATION BOARD



LxWxH (5cmx5cmx1.8cm)

Board Number	MPS IC Number
EV5042-J-00A	MP5042GJ

## QUICK START GUIDE

The EV5042-J-00A evaluation board is easy to set up and use to evaluate the performance of the MP5042. For the proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

1. Preset the power supply to 12V, then turn off the power supply. <sup>(1)</sup>
2. Connect the power supply terminals to:
  - a. Positive (+): VIN
  - b. Negative (-): GND
3. Connect the load terminals to:
  - a. Positive (+): VOUT
  - b. Negative (-): GND
4. After making the connections, turn on the power supply. The board should automatically start up. <sup>(1)</sup>
5. Check for the proper output voltage ( $V_{OUT}$ ) between the VOUTSENSE and GNDSEN terminals.
6. After completing all tests, adjust the load to 0A, then turn off the input power supply.

**Note:**

- 1) The hold current folds back according to the voltage drop on the power MOSFET:
  - a. When  $V_{IN} - V_{OUT} < 7V$ , the hold current is clamped at 100% of  $I_{LIMIT}$ .
  - b. When  $7V < V_{IN} - V_{OUT} < 14V$ , and the set  $I_{LIMIT} > 260mA$ , the hold current is clamped at 50% of  $I_{LIMIT}$ . If the set  $I_{LIMIT} < 260mA$ , the hold current is clamped at 100% of  $I_{LIMIT}$ .
  - c. When  $V_{IN} - V_{OUT} > 14V$ , and the set  $I_{LIMIT} > 260mA$ , the hold current is clamped at 260mA. If the set  $I_{LIMIT} < 260mA$ , the hold current is clamped at 100% of  $I_{LIMIT}$ .

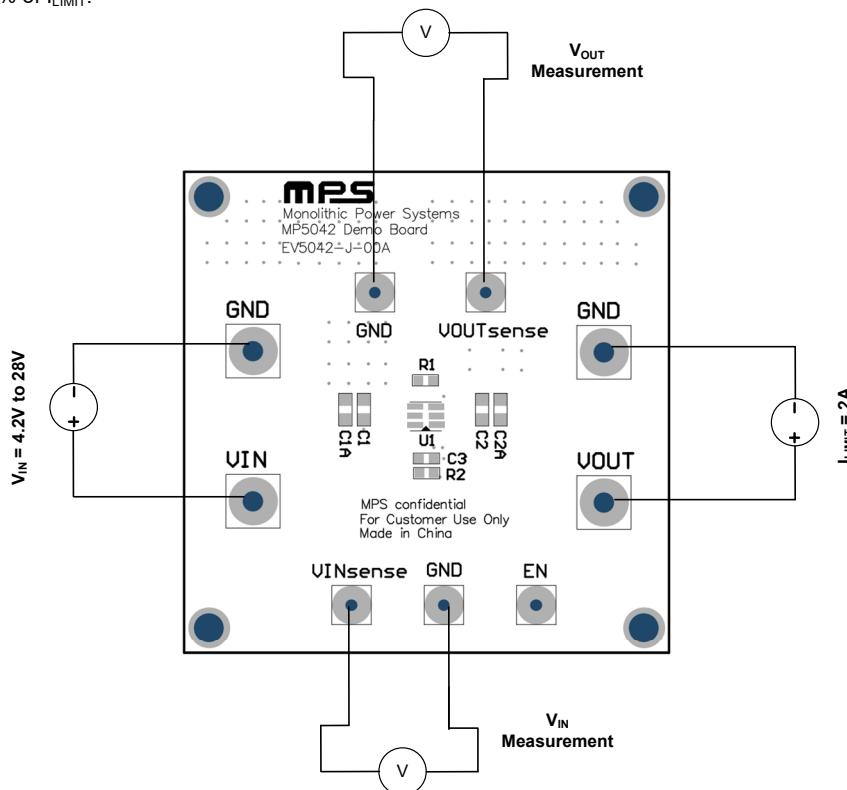
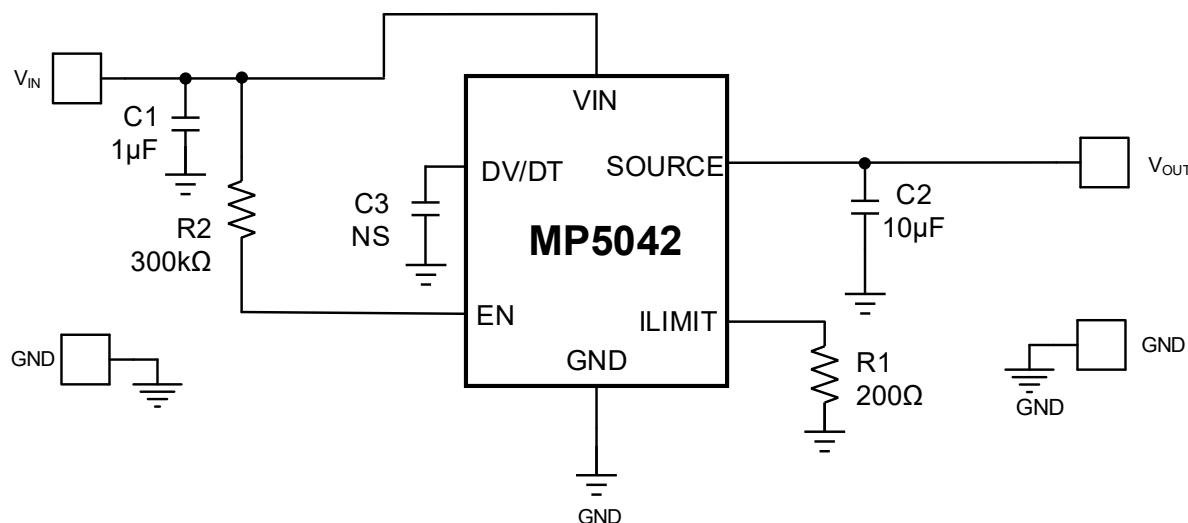


Figure 1: Proper Measurement Equipment Set-Up

**EVALUATION BOARD SCHEMATIC****Figure 2: Evaluation Board Schematic**

**EV5042-J-00A BILL OF MATERIALS**

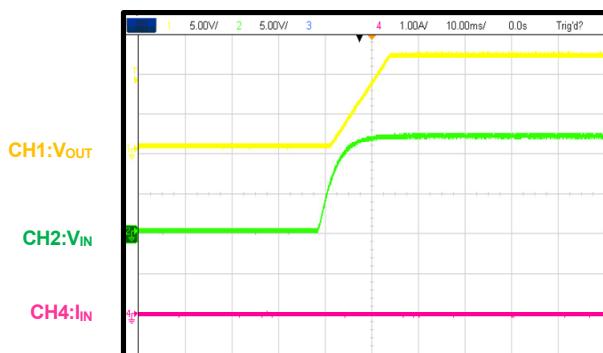
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	C1	1 $\mu$ F	Ceramic capacitor, 25V, X7R	0805	Murata	GRM21BR71E105KA99L
1	C2	10 $\mu$ F	Ceramic capacitor, 25V, X7R	0805	Murata	GRM21BR61E106KA73L
0	C1A, C2A, C3	NS				
1	R1	200 $\Omega$	Film resistor, 1%	0603	Yageo	RC0603FR-07200RL
1	R2	300k $\Omega$	Film resistor, 1%	0603	Yageo	RC0603FR-07300KL
1	U1	MP5042	28V, 2A, electronic fuse	TSOT23-6	MPS	MP5042GJ

## EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board.  $V_{IN} = 12V$ ,  $R_{LIMIT} = 200\Omega$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

### Start-Up through VIN

$I_{OUT} = 0A$



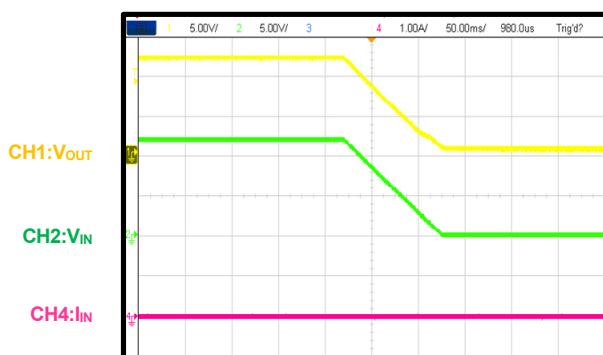
### Start-Up through VIN

$I_{OUT} = 0.6A$



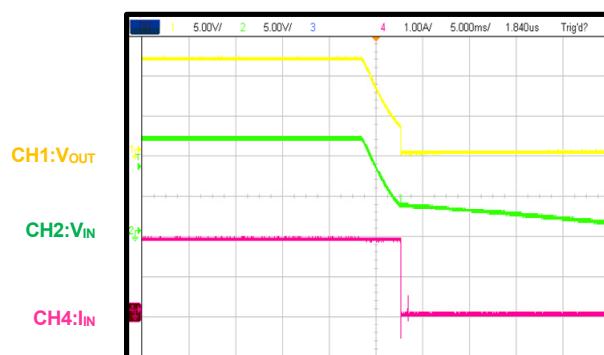
### Shutdown through VIN

$I_{OUT} = 0A$



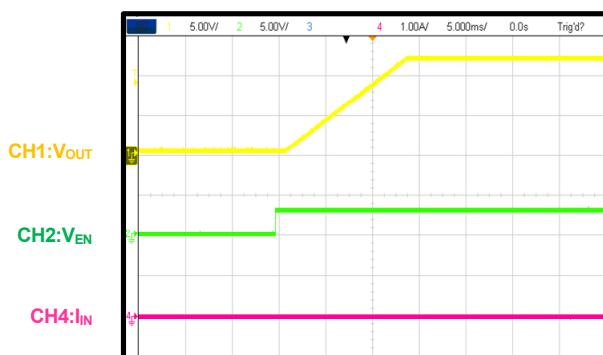
### Shutdown through VIN

$I_{OUT} = 2A$



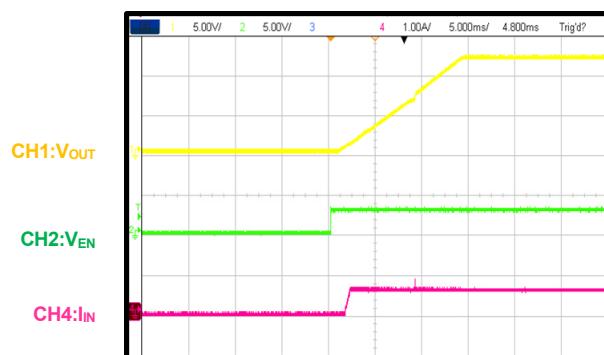
### Start-Up through EN

$I_{OUT} = 0A$



### Start-Up through EN

$I_{OUT} = 0.6A$

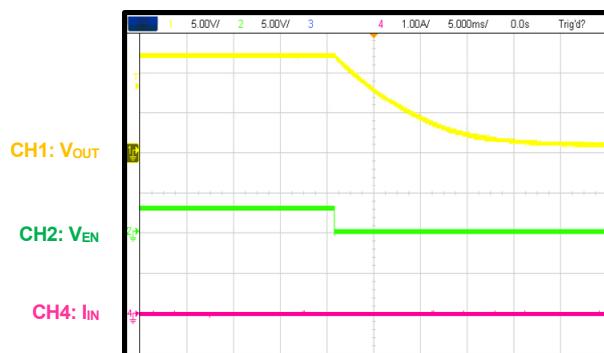


## EVB TEST RESULTS (continued)

Performance curves and waveforms are tested on the evaluation board.  $V_{IN} = 12V$ ,  $R_{LIMIT} = 200\Omega$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

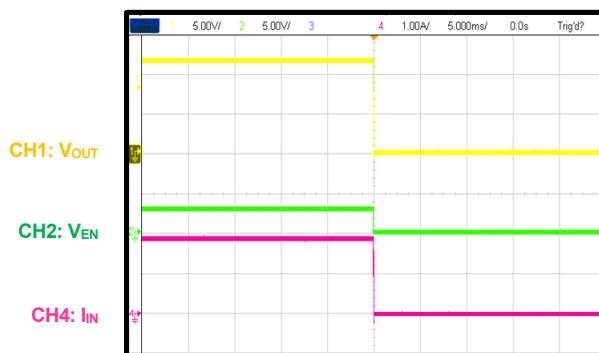
### Shutdown through EN

$I_{OUT} = 0A$



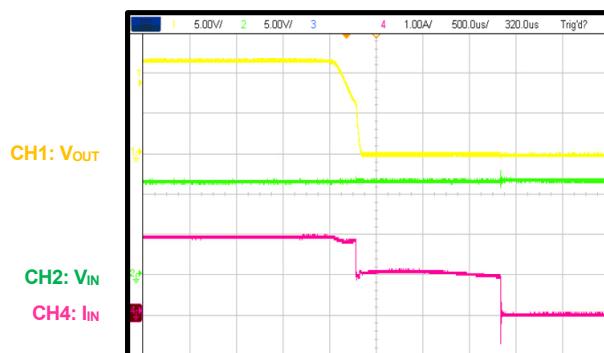
### Shutdown through EN

$I_{OUT} = 2A$



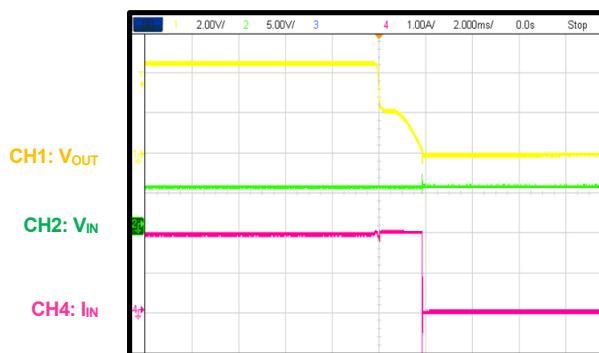
### Current Limit (Increasing I<sub>OUT</sub> Slowly)

$V_{IN} = 12V$



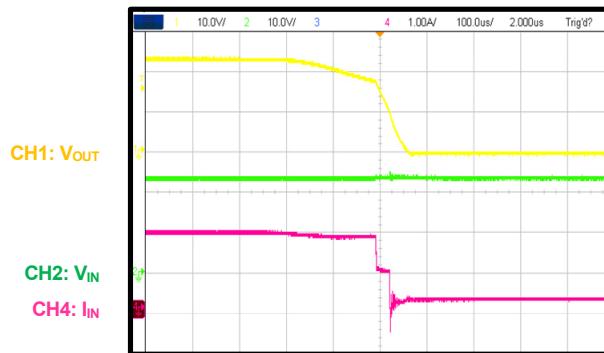
### Current Limit (Increasing I<sub>OUT</sub> Slowly)

$V_{IN} = 5V$



### Current Limit (Increasing I<sub>OUT</sub> Slowly)

$V_{IN} = 24V$



## PCB LAYOUT

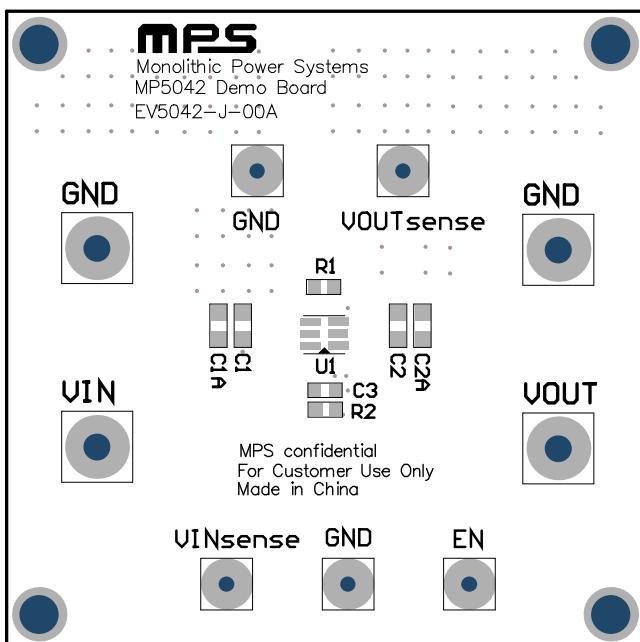


Figure 3: Top Silk

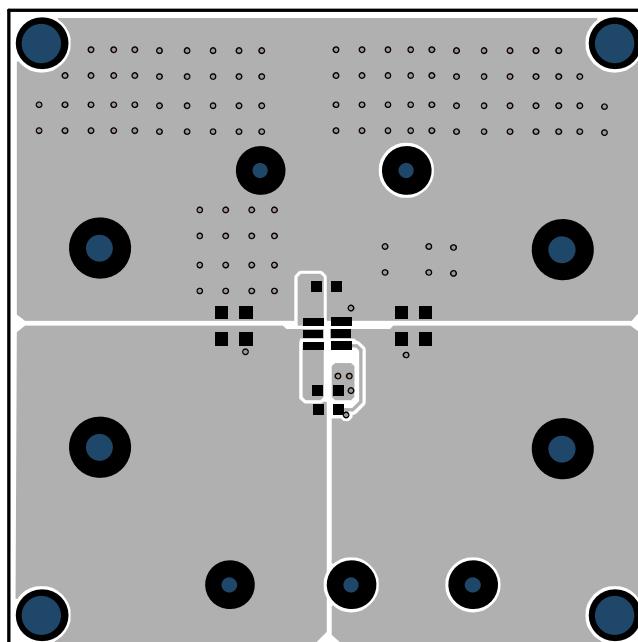


Figure 4: Top Layer

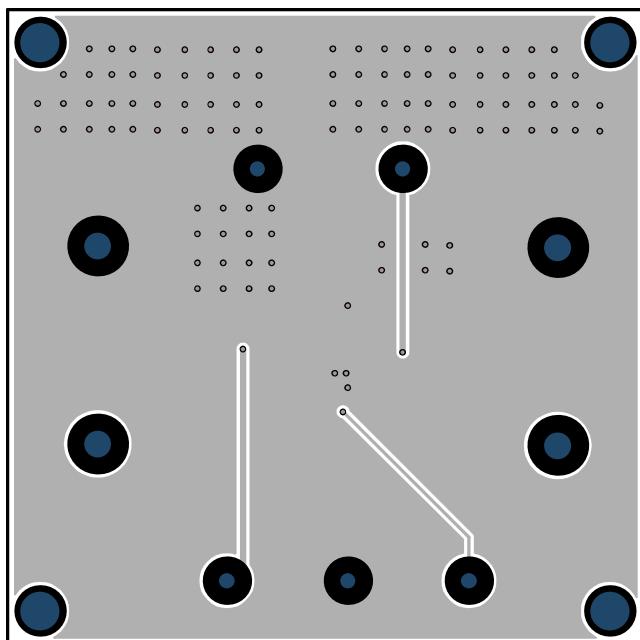


Figure 5: Bottom Layer

**REVISION HISTORY**

<b>Revision #</b>	<b>Revision Date</b>	<b>Description</b>	<b>Pages Updated</b>
1.0	3/13/2024	Initial Release	-

**Notice:** The information in this document is subject to change without notice. Please contact MPS for current specifications. Users should warrant and guarantee that third-party Intellectual Property rights are not infringed upon when integrating MPS products into any application. MPS will not assume any legal responsibility for any said applications.