



# EVQ5073-G-00A

## 5.5V, 2A, Programmable Current, Low $R_{DS(ON)}$ Load Switch, AEC-Q100 Qualified Evaluation Board

### DESCRIPTION

The EVQ5073-G-00A is an evaluation board for the MPQ5073, a low  $R_{DS(ON)}$  load switch with current limit. The MPQ5073 is a load switch that provides 2A of load protection, covering a 0.5V to 5.5V voltage range. With a small  $R_{DS(ON)}$  in a tiny package, the MPQ5073 provides a highly efficient, space-saving solution in notebook, tablet, and other portable device applications.

The max load at the output (source) is current-limited. This is accomplished by utilizing a sense FET topology. The magnitude of the current limit is controlled by an external resistor from the ILIM pin to ground.

The EVQ5073-G-00A board can deliver a continuous 2A load current across a 0.5V to 5.5V operating input range.

### ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input voltage <sup>(1)</sup>	$V_{IN}$	3 to 5.5	V
Output voltage	$V_{OUT}$	3 to 5.5	V
Output current	$I_{OUT}$	2	A

#### Note:

1) For specifications of lower voltage, please contact factory.

### FEATURES

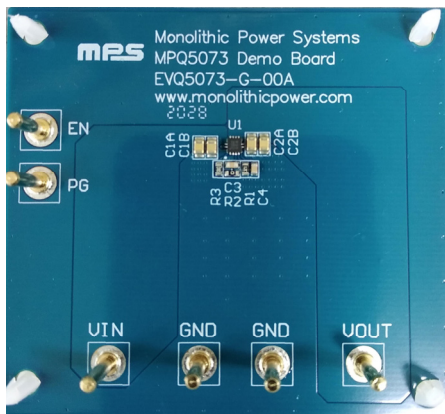
- Integrated 50m $\Omega$  Low  $R_{DS(ON)}$  FETs
- Adjustable Start-Up Slew Rate
- Wide  $V_{IN}$  Range: 0.5V to 5.5V
- <1 $\mu$ A Shutdown Current
- Programmable 2.5A Current Limit Range
- Power Good Indicator
- Output Discharge function
- Enable Pin
- <200ns Short-Circuit Protection Response Time
- Thermal Protection
- Available in a Small, Space-Saving QFN-12 (2mmx2mm) Package

### APPLICATIONS

- Notebook and Tablet Computers
- Portable Devices
- Solid State Drives (SSDs)
- Handheld Devices

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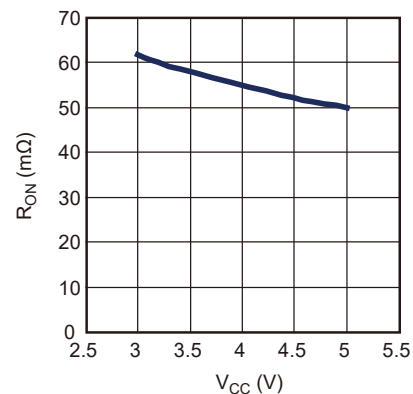
## EVQ5073-G-00A EVALUATION BOARD



(LxWxH) 6.4cmx6.4cmx1.3cm

Board Number	MPS IC Number
EVQ5073-G-00A	MPQ5073GG

$R_{ON}$  vs.  $V_{CC}$



## QUICK START GUIDE

1. Connect the load terminals to:
  - a. Positive (+): VOUT
  - b. Negative (-): GND
2. Preset the power supply output between 3V to 5.5V, then turn off the power supply.
3. Connect the power supply output terminals to:
  - a. Positive (+): VIN
  - b. Negative (-): GND
4. Turn the power supply on. The board should automatically start up.
5. To use the enable function, apply a digital input to the EN pin. Drive EN above 2.6V to turn the regulator on; drive it below 0.4V to turn it off.
6. Use R1 to set the output current limit. Use C4 to set the soft-start time. Refer to the Application Information section MPQ5073's datasheet to select appropriate values for R1 and C4.

## EVALUATION BOARD SCHEMATIC

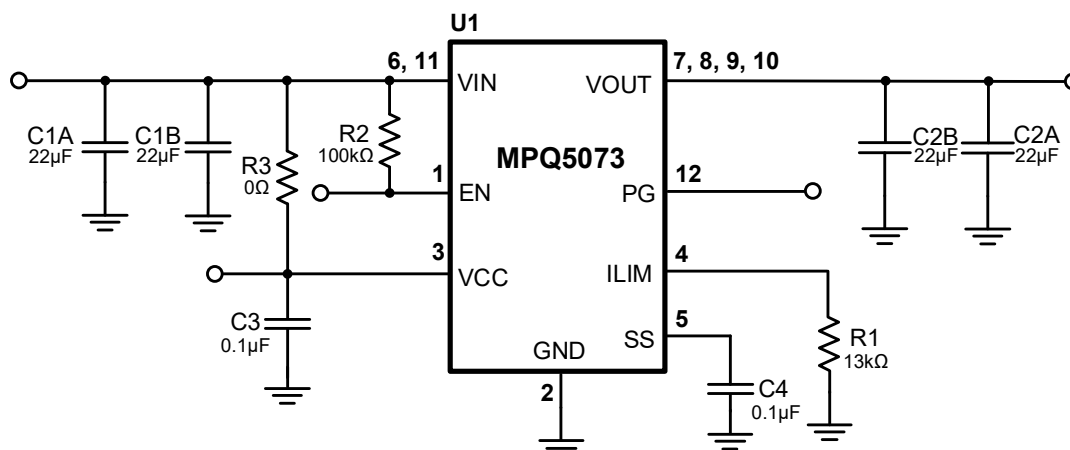


Figure 1: Evaluation Board Schematic

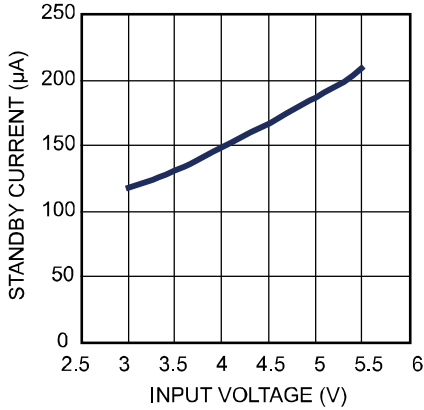
## EVQ5073-G-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
1	R1	13kΩ	Film resistor, 1%	0603	Royal Ohm	RL0603FR-0713KL
1	R2	100kΩ	Film resistor, 1%	0603	Royal Ohm	RL0603FR-07100KL
1	R3	0Ω	Film resistor, 1%	0603	Royal Ohm	RC0603FR-070RL
4	C1A, C1B, C2A, C2B	22 μ F	Ceramic capacitor, 10V, X5R	0805	Murata	GRM21BR61A226ME51L
2	C3,C4	0.1μF	Ceramic capacitor, 16V, X7R	0603	Murata	GRM188R71C104KA01D
1	U1	MPQ5073	2A load switch	QFN-12 (2mmx2mm)	MPS	MPQ5073GG

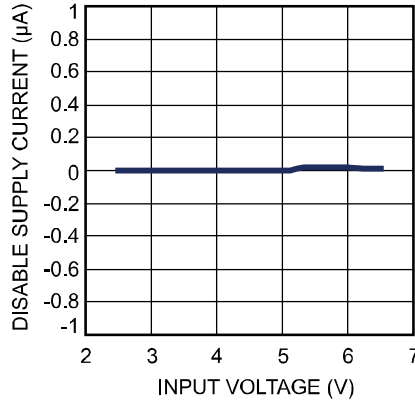
## EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.  $V_{IN} = 3.6V$ ,  $V_{CC} = 3.6V$ ,  $EN = 2.5V$ ,  $R_{LIM} = 13k\Omega$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

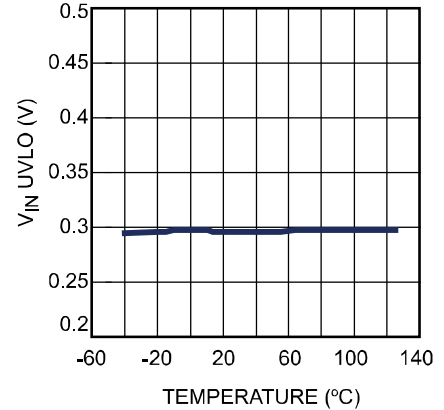
**Quiescent Current**



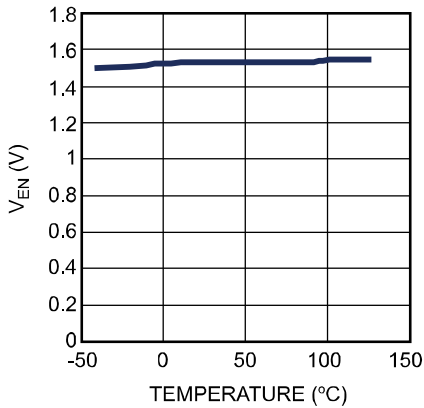
**Disabled Supply Current vs. Input Voltage**



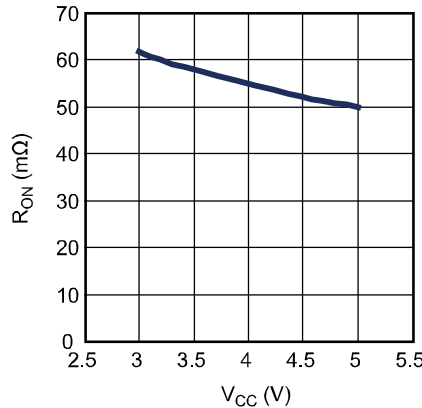
**$V_{IN}$  UVLO vs. Temperature**



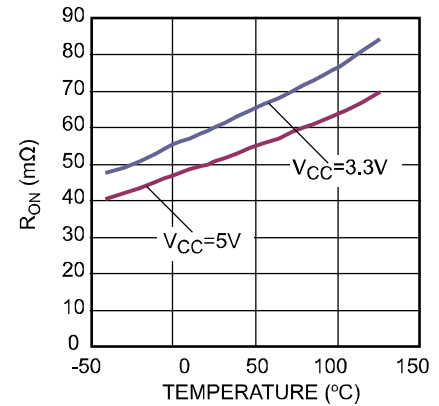
**EN Rising Threshold vs. Temperature**



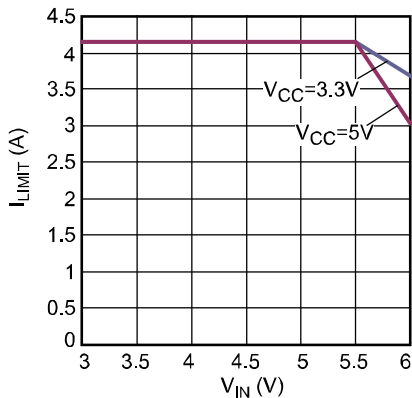
**$R_{ON}$  vs.  $V_{CC}$**



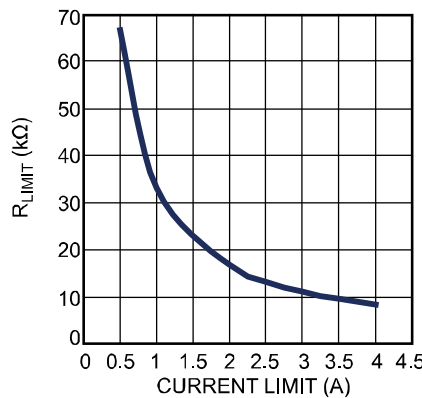
**$R_{ON}$  vs. Temperature**



**Maximum Current Limit vs.  $V_{IN}$**

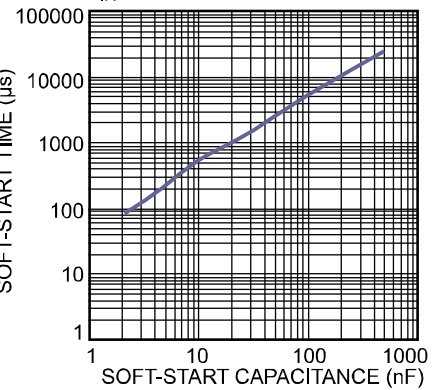


**$R_{LIMIT}$  vs. Current Limit**



**Soft-Start Time vs. Soft-Start Capacitance**

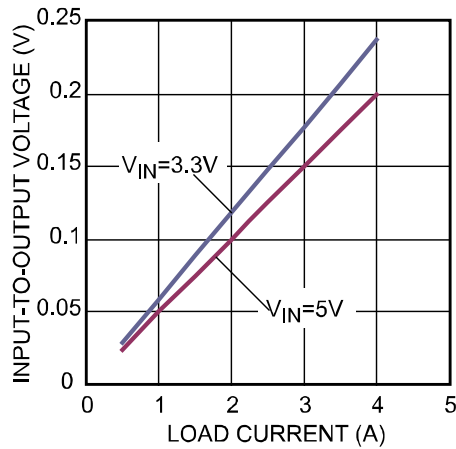
$V_{IN} = 3.6V$



### EVB TEST RESULTS *(continued)*

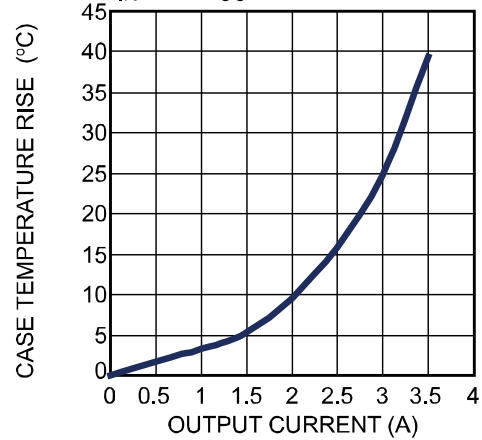
Performance waveforms are tested on the evaluation board.  $V_{IN} = 3.6V$ ,  $V_{CC} = 3.6V$ ,  $EN = 2.5V$ ,  $R_{LIM} = 13k\Omega$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

**Input-to-Output Voltage vs. Load Current**



**Case Temperature Rise vs. Output Current**

$V_{IN} = 5V$ ,  $V_{CC} = 3.6V$

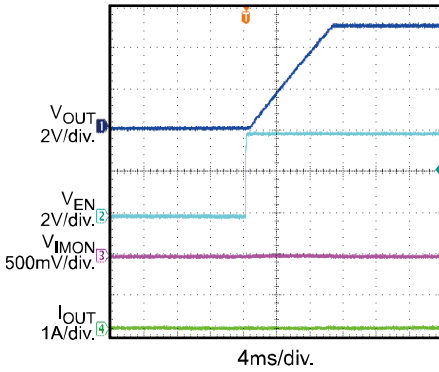


**EVB TEST RESULTS (continued)**

Performance waveforms are tested on the evaluation board.  $V_{IN} = 3.6V$ ,  $V_{CC} = 3.6V$ ,  $EN = 2.5V$ ,  $R_{LIM} = 13k\Omega$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

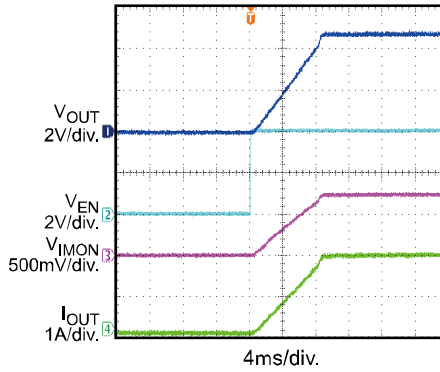
**Start-Up through EN**

$V_{IN} = 5V$ ,  $V_{CC} = 3.6V$ , no load



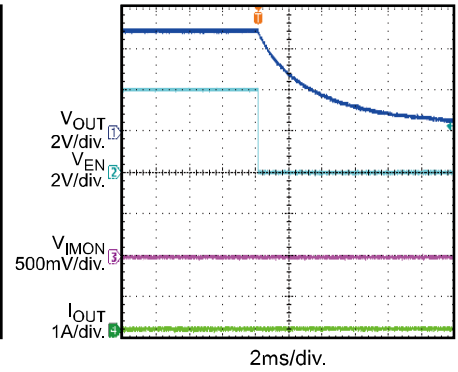
**Start-Up through EN**

$V_{IN} = 5V$ ,  $V_{CC} = 3.6V$ , 2A load



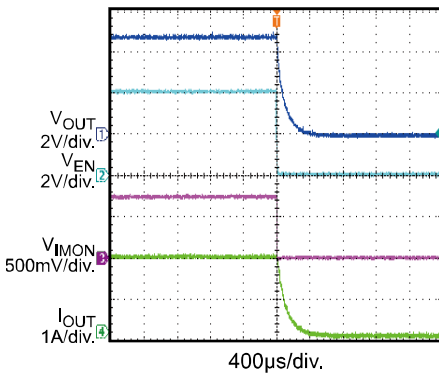
**Shutdown through EN**

$V_{IN} = 5V$ ,  $V_{CC} = 3.6V$ , no load



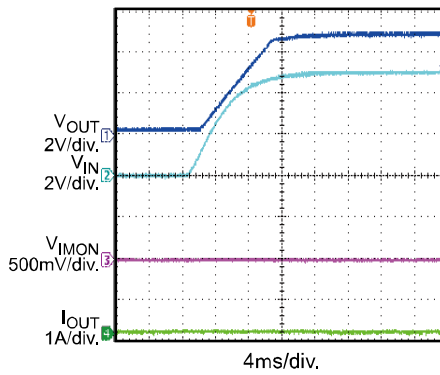
**Shutdown through EN**

$V_{IN} = 5V$ ,  $V_{CC} = 3.6V$ , 2A load



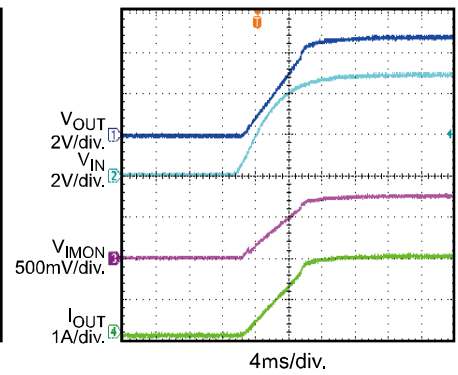
**Start-Up**

$V_{IN} = 5V$ ,  $V_{CC} = 3.6V$ ,  $I_{OUT} = 0A$



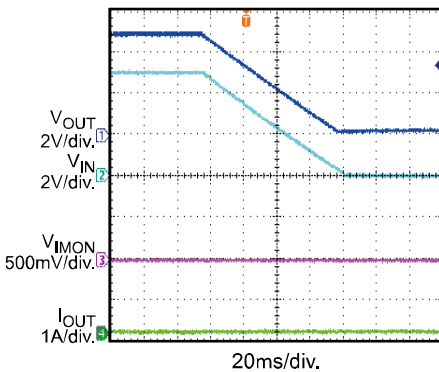
**Start-Up**

$V_{IN} = 5V$ ,  $V_{CC} = 3.6V$ ,  $I_{OUT} = 2A$



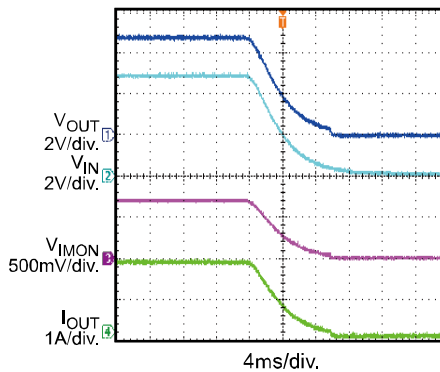
**Shutdown**

$V_{IN} = 5V$ ,  $V_{CC} = 3.6V$ ,  $I_{OUT} = 0A$



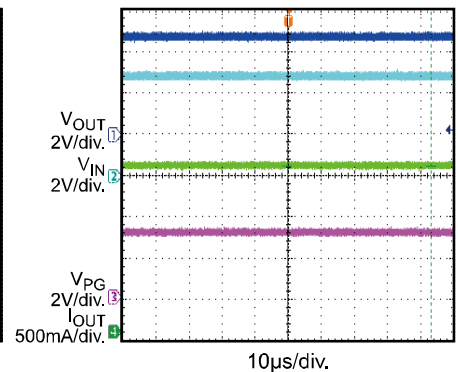
**Shutdown**

$V_{IN} = 5V$ ,  $V_{CC} = 3.6V$ ,  $I_{OUT} = 2A$



**Steady State**

$V_{IN} = 5V$ ,  $V_{CC} = 3.6V$ ,  $I_{OUT} = 2A$

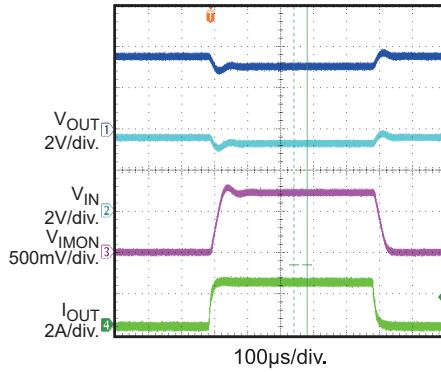


## EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.  $V_{IN} = 3.6V$ ,  $V_{CC} = 3.6V$ ,  $EN = 2.5V$ ,  $R_{LIM} = 13k\Omega$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

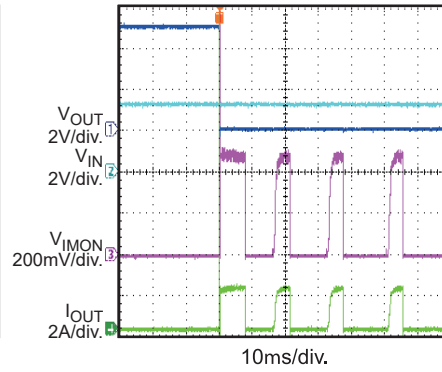
### Load Transient Response

$V_{IN} = 3.6V$ ,  $V_{CC} = 3.6V$ ,  $I_{OUT} = 0A$  to  $2.5A$



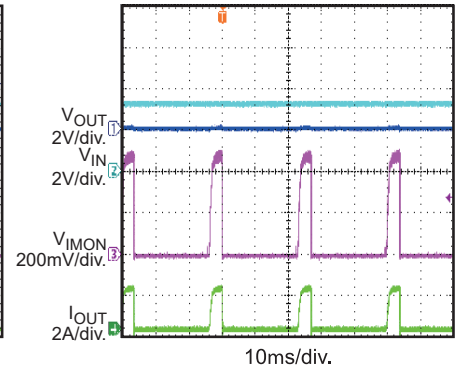
### SCP Entry

$V_{IN} = 5V$ ,  $V_{CC} = 3.6V$



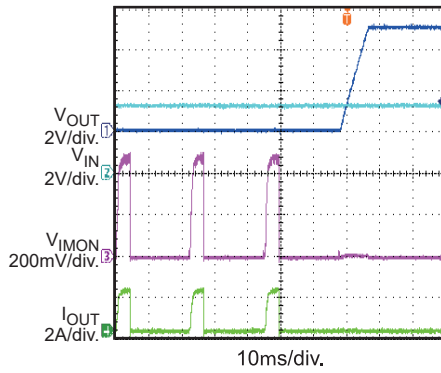
### SCP Steady State

$V_{IN} = 5V$ ,  $V_{CC} = 3.6V$

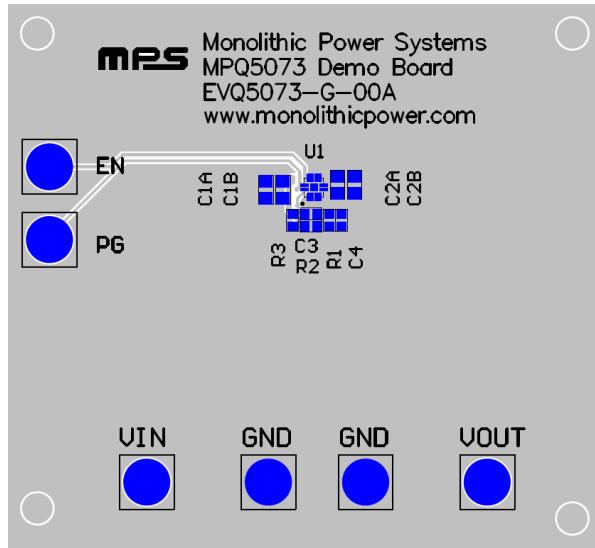


### SCP Recovery

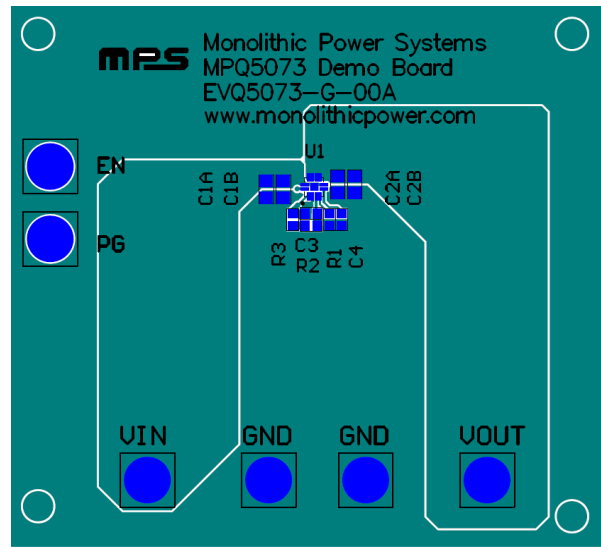
$V_{IN} = 5V$ ,  $V_{CC} = 3.6V$



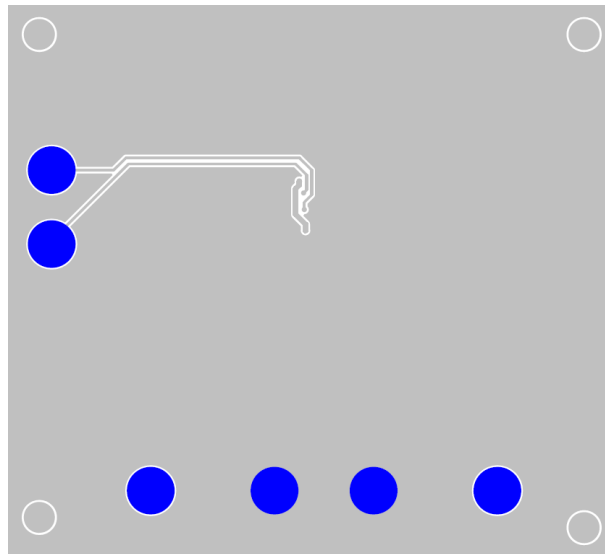
## PCB LAYOUT



**Figure 2: Top Silk Layer**



**Figure 3: Top Layer**



**Figure 4: Bottom Layer**



## REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	2/25/2021	Initial Release	-

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