



EVL1604C-TL-00A

5.5V, 4A, Synchronous, Step-Down Converter in SOT583 Package Evaluation Board

DESCRIPTION

The EVL1604C-TL-00A evaluation board is designed to demonstrate the capabilities of the MP1604C, a monolithic, step-down, switch-mode converter with built-in internal power MOSFETs. The MP1604C can achieve up to 4A of continuous output current (I_{OUT}) across a 2.4V to 5.5V input voltage (V_{IN}) range, with excellent load and line regulation. The output voltage (V_{OUT}) can be regulated to as low as 0.4V.

Constant-on-time (COT) control provides fast

transient response, easy loop design, and tight output regulation.

Full protection features include over-current protection (OCP), current limiting with hiccup mode, and thermal shutdown.

The MP1604C requires a minimal number of readily available, standard external components, and is available in an ultra-small SOT583 package.

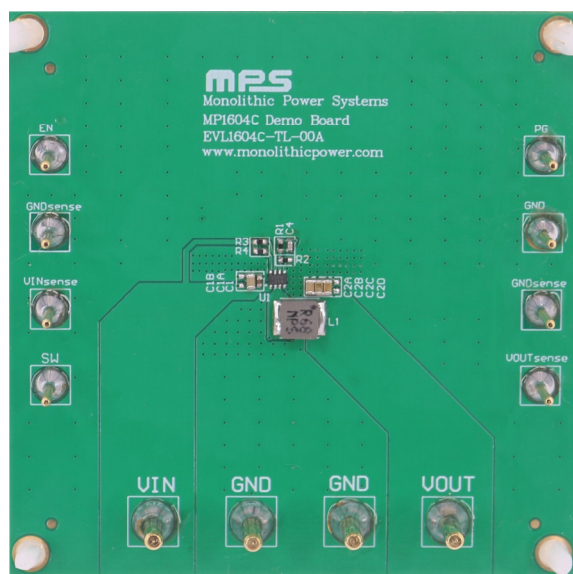
PERFORMANCE SUMMARY ⁽¹⁾

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

Parameters	Conditions	Value
Input voltage (V_{IN}) range		2.4V to 5.5V
Output voltage (V_{OUT})	$V_{IN} = 2.4\text{V to } 5.5\text{V}$, $I_{OUT} = 0\text{A to } 6\text{A}$	$V_{OUT} = 1.2\text{V}$
Maximum output current (I_{OUT})	$V_{IN} = 2.4\text{V to } 5.5\text{V}$	4A
Typical efficiency	$V_{IN} = 5\text{V}$, $V_{OUT} = 1.2\text{V}$, $I_{OUT} = 4\text{A}$	89.9%
Peak efficiency	$V_{IN} = 5\text{V}$, $V_{OUT} = 1.2\text{V}$, $I_{OUT} = 1.5\text{A}$	93.2%
Switching frequency (f_{SW})		1.2MHz

 Optimized Performance with MPS Inductor MPL-AL4020 Series

EVL1604C-TL-00A EVALUATION BOARD



LxWxH (6.35cmx6.35cmx1.8cm)

Board Number	MPS IC Number
EVL1604C-TL-00A	MP1604CGTL

QUICK START GUIDE

The EVL1604C-TL-00A evaluation board is easy to set up and use to evaluate the performance of the MP1604C. For proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

1. Preset the power supply to 5V, then turn off the power supply.
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 start up automatically.
5. Check for the proper output voltage (V_{OUT}) between the VOUTSENSE and GNDSENSE terminals.
6. Once V_{OUT} is established, adjust the load within the operating range, then measure the efficiency, output ripple voltage, and other parameters.
7. After completing all tests, adjust the load to 0A and turn off the input power supply.

Notes:

- 1) Ensure that V_{IN} does not exceed 5.5V.
- 2) When measuring the output or input voltage ripple, do not use the long ground lead on the oscilloscope probe.

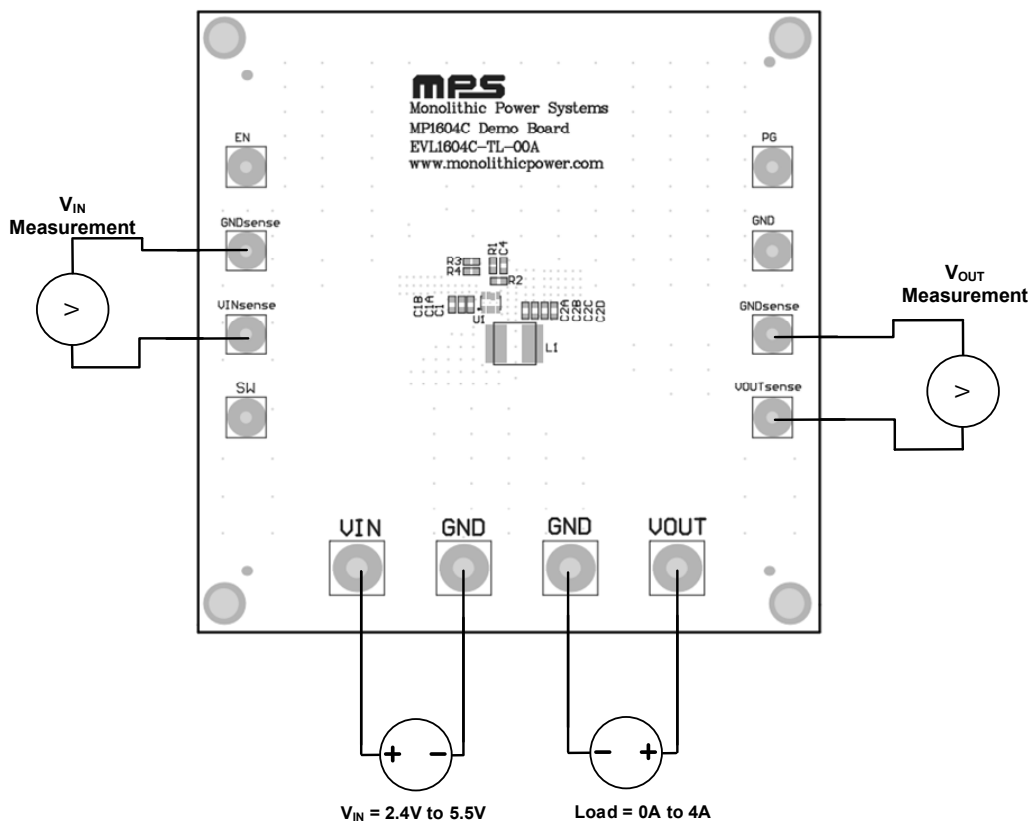


Figure 1: Proper Measurement Equipment Set-Up

EVALUATION BOARD SCHEMATIC

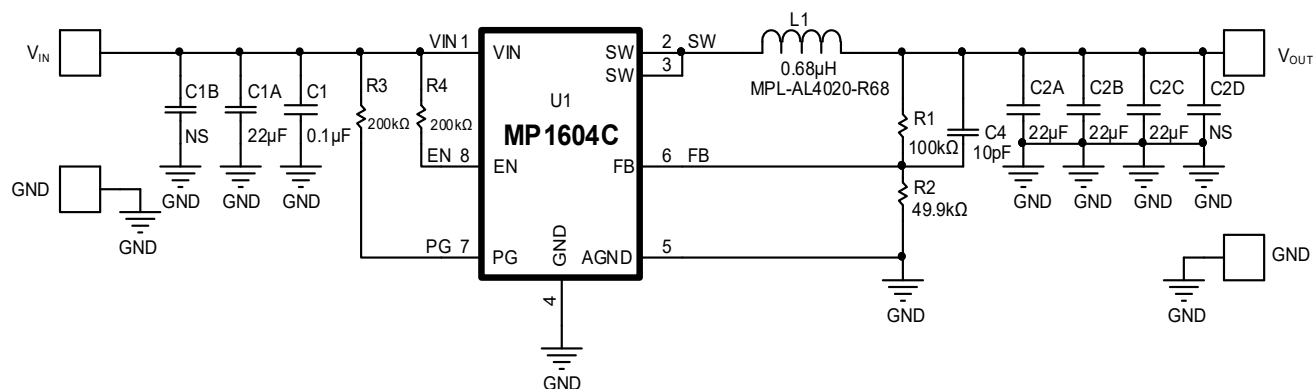


Figure 2: Evaluation Board Schematic

Note:

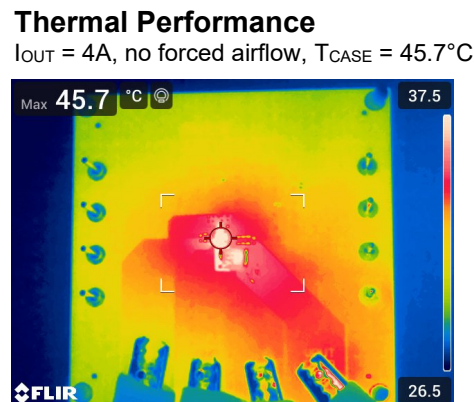
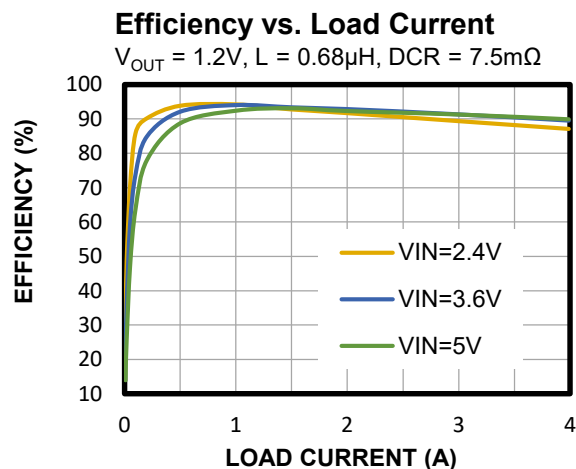
- 3) $V_{IN} < 3.3V$ may require greater input capacitance.

EVL1604C-TL-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	C1	0.1 μ F	Ceramic capacitor, 16V, X7R	0402	Murata	GRM155R71C104KA88D
4	C1A, C2, C2B, C2C	22 μ F	Ceramic capacitor, 16V, X7R	0603	Murata	GRM188R61C226ME01D
0	C2D	NS				
1	C4	10pF	Ceramic capacitor, 50V, X7R	0402	Würth	885012005040
1	R1	100k Ω	Film resistor, 1%	0402	Yageo	RC0402FR-07100KL
1	R2	49.9k Ω	Film resistor, 1%	0402	Yageo	RC0402FR-0749K9L
2	R3, R4	200k Ω	Film resistor, 1%	0402	Yageo	RC0402FR-07200KL
1	L1	0.68 μ H	Inductor, D _{CR} = 7.5m Ω , I _{SAT} = 11A	4.1mmx 4.1mmx 1.9mm	MPS	MPL-AL4020-R68
1	U1	MP1604C	5.5V, 4A, synchronous, step-down converter	SPT583 (1.6mmx 2.1mm)	MPS	MP1604CGTL

EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board. $V_{IN} = 5V$, $V_{OUT} = 1.2V$, $T_A = 25^{\circ}C$, unless otherwise noted.

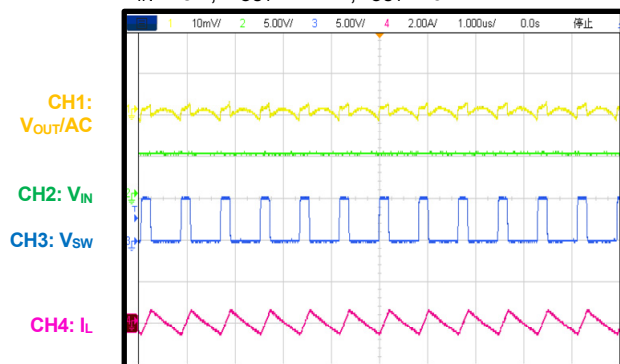


EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. $V_{IN} = 5V$, $V_{OUT} = 1.2V$, $T_A = 25^\circ C$, unless otherwise noted.

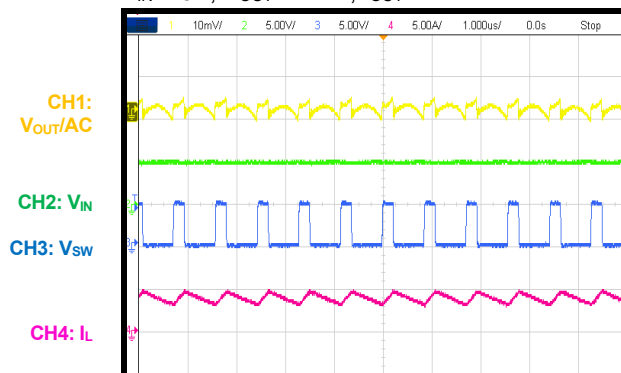
Output Voltage Ripple

$V_{IN} = 5V$, $V_{OUT} = 1.2V$, $I_{OUT} = 0A$



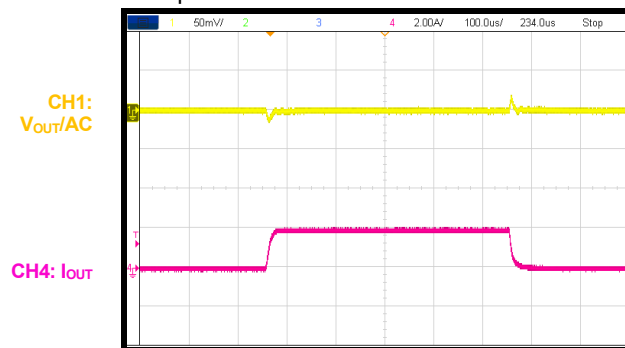
Output Voltage Ripple

$V_{IN} = 5V$, $V_{OUT} = 1.2V$, $I_{OUT} = 4A$



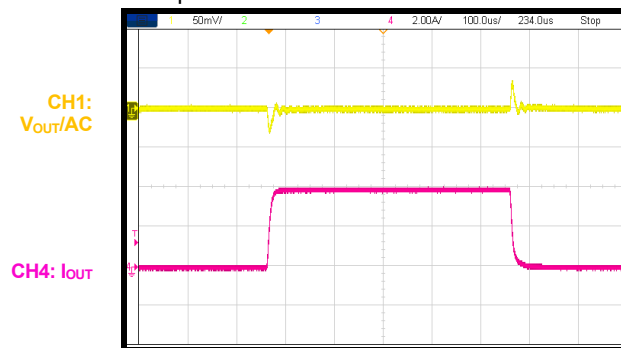
Load Transient Response

$V_{IN} = 5V$, $V_{OUT} = 1.2V$, $I_{OUT} = 0A$ to $2A$, $2.5A/\mu s$ with e-load



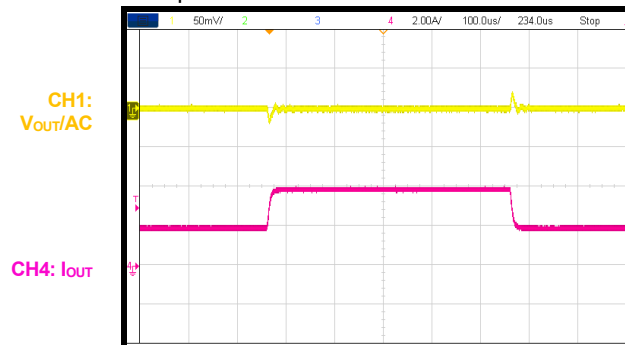
Load Transient Response

$V_{IN} = 5V$, $V_{OUT} = 1.2V$, $I_{OUT} = 0A$ to $4A$, $2.5A/\mu s$ with e-load



Load Transient Response

$V_{IN} = 5V$, $V_{OUT} = 1.2V$, $I_{OUT} = 2A$ to $4A$, $2.5A/\mu s$ with e-load



PCB LAYOUT

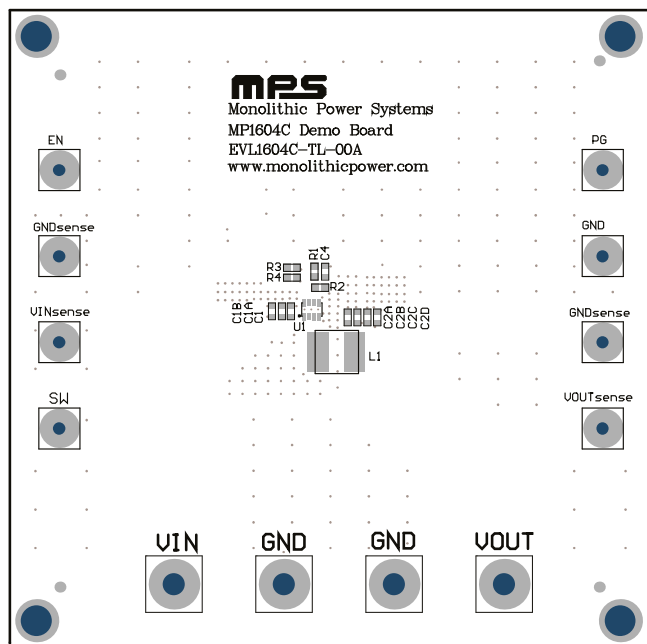


Figure 3: Top Silk

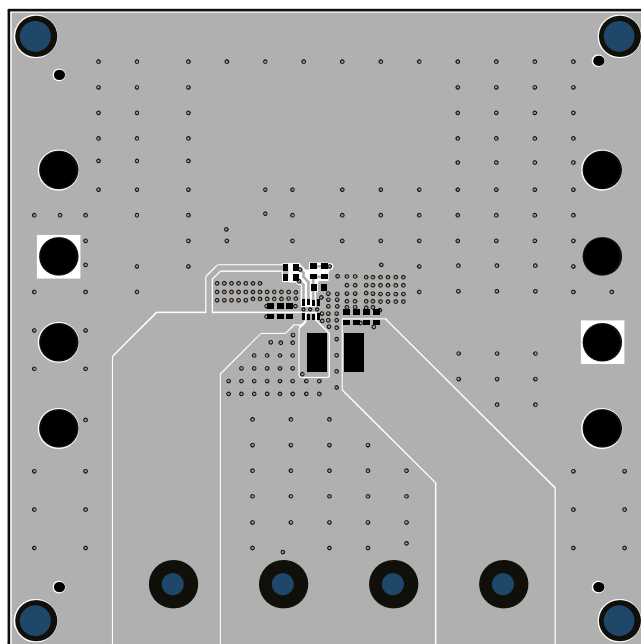


Figure 4: Top Layer

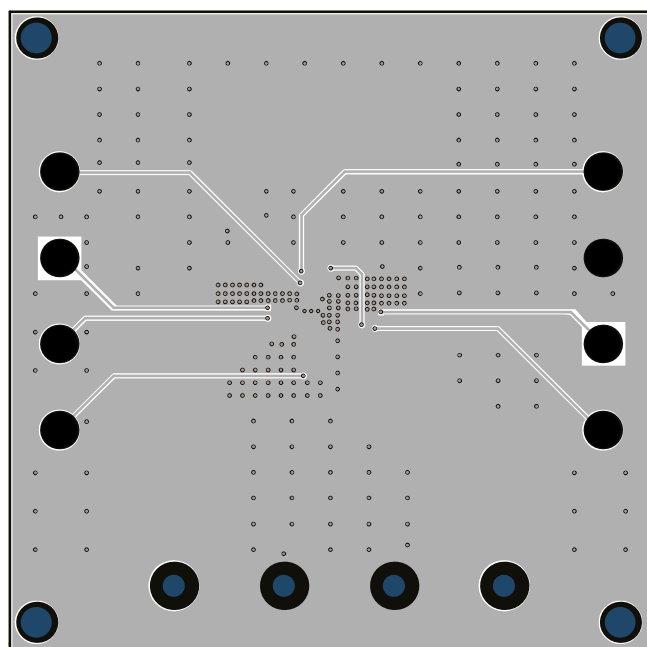


Figure 5: Bottom Layer

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	6/24/2024	Initial Release	-

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