



EVL1652N-TF-00A

16V, 2A, Synchronous Step-Down Converter in SOT563 Package Evaluation Board

DESCRIPTION

The EVL1652N-TF-00A evaluation board is designed to demonstrate the capabilities of the MP1652N, a synchronous, rectified, step-down, switch-mode converter with built-in internal power MOSFETs.

The MP1652N can achieve up to 2A of continuous output current (I_{OUT}) from a 4.5V to 16V input voltage (V_{IN}) range, with excellent load and line regulation. The output voltage (V_{OUT}) can be regulated to as low as 0.6V.

Constant-on-time (COT) control provides fast transient response, easy loop design, and tight output regulation. Full protection features include short-circuit protection (SCP), over-current protection (OCP), under-voltage protection (UVP), and thermal shutdown.

The MP1652N requires a minimal number of readily available, standard external components, and is available in an ultra-small SOT563 package.

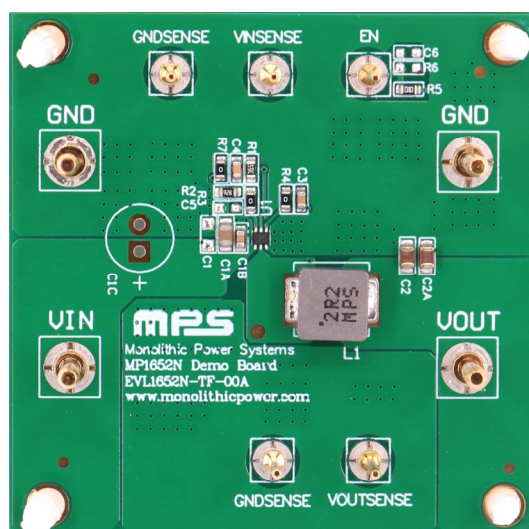
PERFORMANCE SUMMARY

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

Parameters	Conditions	Value
Input voltage (V_{IN}) range		4.5V to 16V
Output voltage (V_{OUT})	$V_{IN} = 4.5\text{V to } 16\text{V}$, $I_{OUT} = 0\text{A to } 2\text{A}$	$V_{OUT} = 3.3\text{V}$
Maximum output current (I_{OUT})	$V_{IN} = 4.5\text{V to } 16\text{V}$	2A
Full load efficiency	$V_{IN} = 12\text{V}$, $V_{OUT} = 3.3\text{V}$, $I_{OUT} = 2\text{A}$	91.5%
Peak efficiency	$V_{IN} = 12\text{V}$, $V_{OUT} = 3.3\text{V}$, $I_{OUT} = 1\text{A}$	93.4%
Switching frequency (f_{SW})		1100kHz

 Optimized Performance with MPS Inductor MPL-AL6050 Series

EVL1652N-TF-00A EVALUATION BOARD



LxWxH (50mmx50mmx1.6mm)

2 Layers, 2oz/2oz

Board Number	MPS IC Number
EVL1652N-TF-00A	MP1652NGTF

QUICK START GUIDE

The EVL1652N-TF-00A evaluation board is easy to set up and use to evaluate the performance of the MP1652N. For 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. ⁽¹⁾
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.
5. Check for the proper output voltage (V_{OUT}) between the VOUTSENSE and GNDSENSE terminals.
6. Once the proper V_{OUT} is established, adjust the load within the operating range and measure the efficiency, V_{OUT} ripple, and other parameters. ⁽²⁾
7. After completing all tests, adjust the load to 0A, then turn off the input power supply.

Notes:

- 1) Ensure that V_{IN} does not exceed 16V.
- 2) When measuring the V_{OUT} or V_{IN} ripple, do not use the long ground lead on the oscilloscope probe.

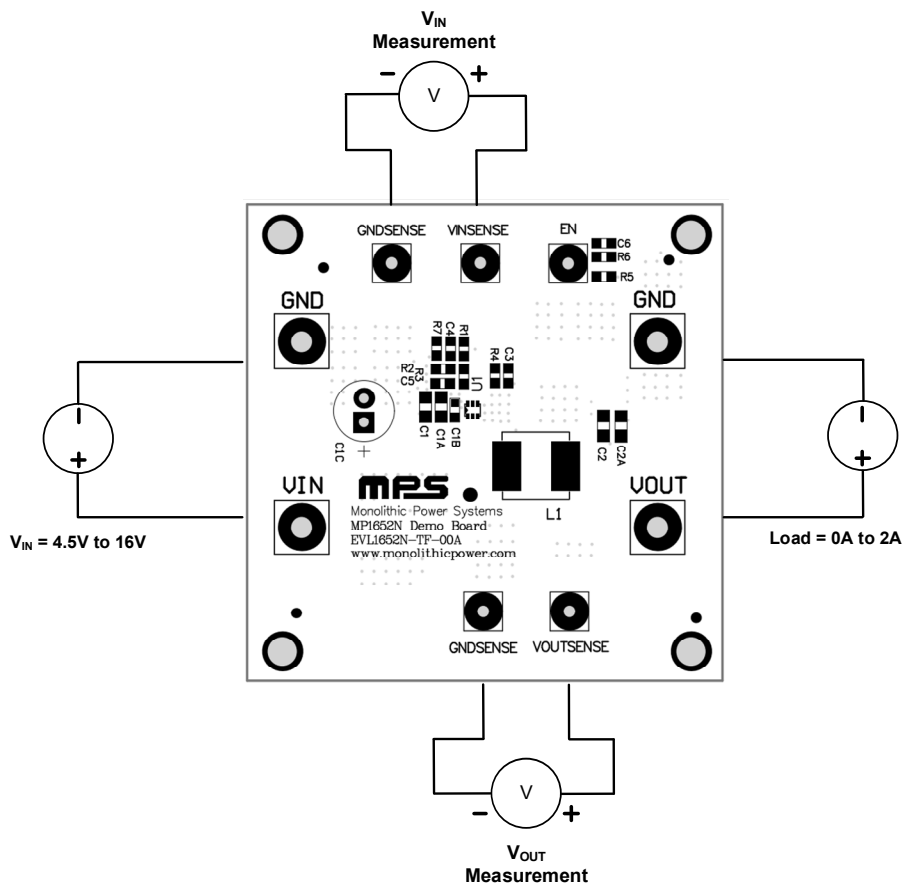


Figure 1: Proper Measurement Equipment Set-Up

EVALUATION BOARD SCHEMATIC

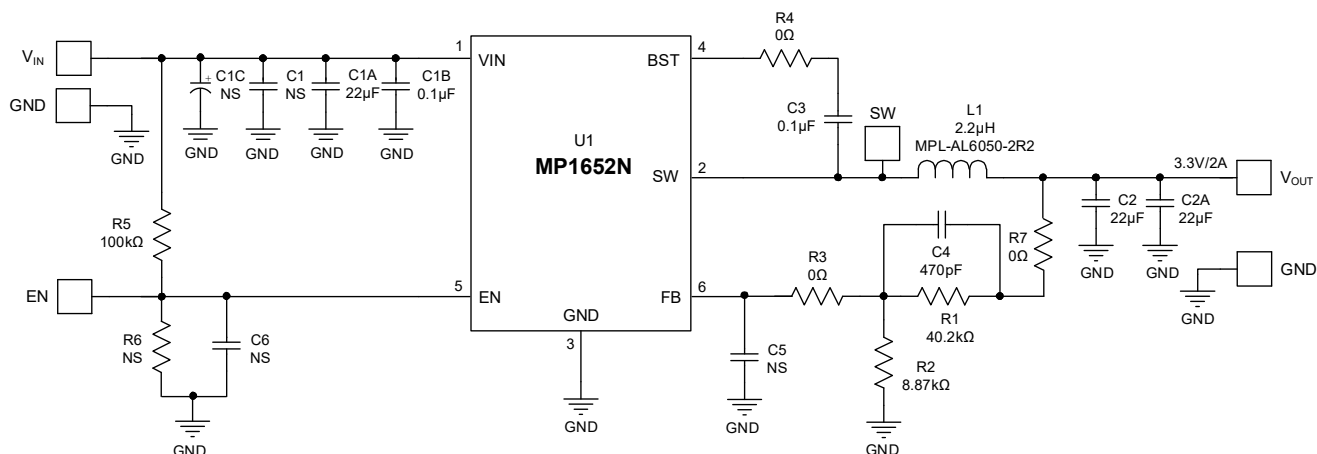


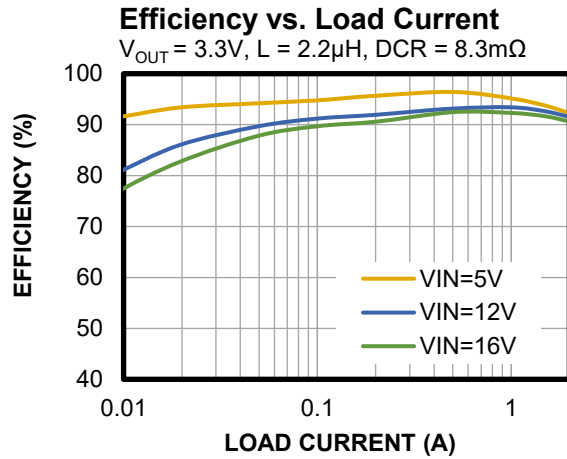
Figure 2: Evaluation Board Schematic

EVL1652N-TF-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	C1A	22 μ F	Ceramic capacitor, 25V, X5R	0805	Murata	GRM21BR61E226ME44L
0	C1, C1C, C5, C6	NS				
2	C2, C2A	22 μ F	Ceramic capacitor, 16V, X5R	0805	Murata	GRM21BR61C226ME44L
2	C1B, C3	0.1 μ F	Ceramic capacitor, 25V, X7R	0603	Würth	885012206071
1	C4	470pF	Ceramic capacitor, 50V, X7R	0603	Würth	885012206081
1	R1	40.2k Ω	Thick film resistor, 1%	0603	Yageo	RC0603FR-0740K2L
1	R2	8.87k Ω	Thick film resistor, 1%	0603	Yageo	RC0603FR-078K87L
3	R3, R4, R7	0 Ω	Thick film resistor, 1%	0603	Yageo	RC0603FR-070RL
1	R5	100k Ω	Thick film resistor, 1%	0603	Yageo	RC0603FR-07100KL
0	R6	NS				
1	L1	2.2 μ H	Inductor, D _{CR} = 8.3m Ω , I _{SAT} = 15A	6.6mmx 6.4mmx 4.8mm	MPS	MPL-AL6050-2R2
1	U1	MP1652N	16V, 2A, 1.1MHz, synchronous step- down converter	SOT563 (1.6mmx 1.6mm)	MPS	MP1652NGTF

EVB TEST RESULTS

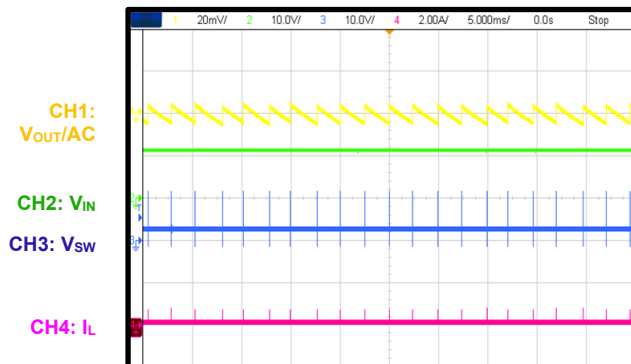
Performance curves and waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{OUT} = 3.3V$, $T_A = 25^\circ C$, unless otherwise noted.



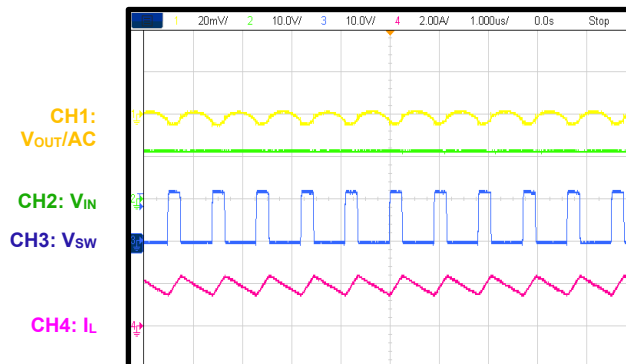
EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{OUT} = 3.3V$, $T_A = 25^{\circ}C$, unless otherwise noted.

Steady State and Output Ripple

 $I_{OUT} = 0A$


Steady State and Output Ripple

 $I_{OUT} = 2A$


Load Transient Output Ripple

 $I_{OUT} = 1A$ to $2A$, slew rate = $2.5A/\mu s$ (e-load)


PCB LAYOUT

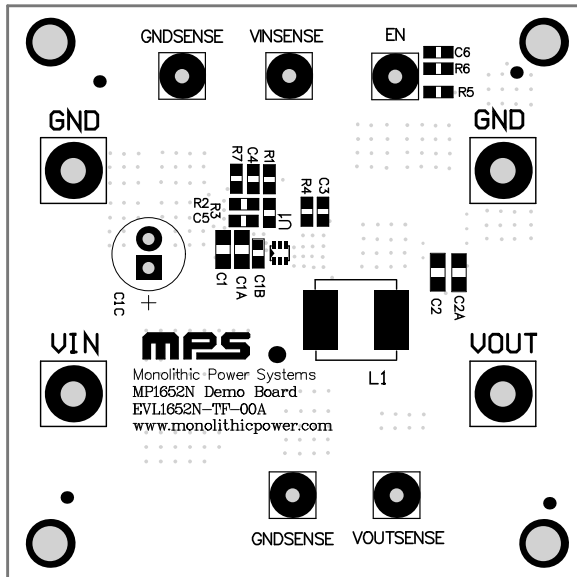


Figure 3: Top Silk

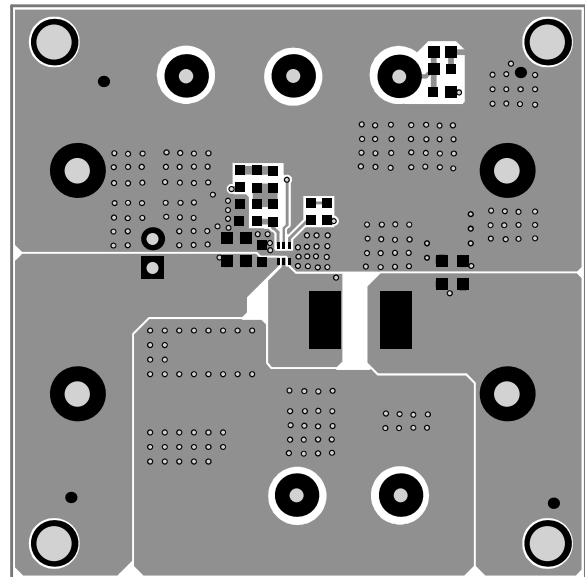


Figure 4: Top Layer

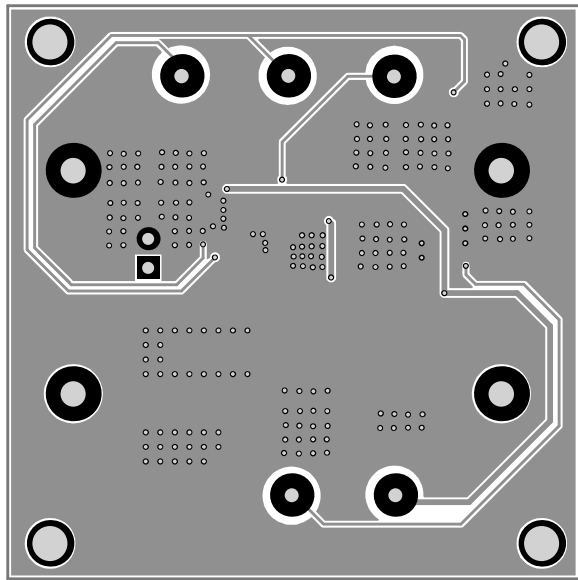


Figure 5: Bottom Layer

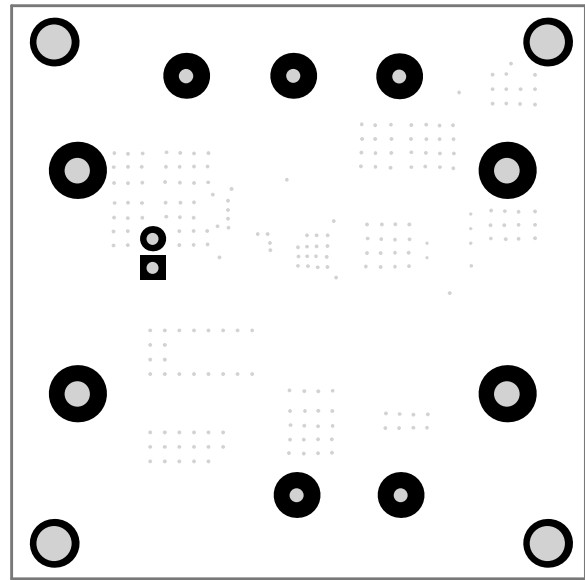


Figure 6: Bottom Silk



REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	9/23/2025	Initial Release	-

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