EV1660-TF-00A

600kHz, 3A, 16V, High-Efficiency Step-Down Converter Evaluation Board

DESCRIPTION

The EV1660-TF-00A evaluation board is designed to demonstrate the capabilities of the MP1660, a fully integrated, high-frequency, synchronous, rectified, step-down switch-mode converter with internal power MOSFETs. It offers a very compact solution to achieve 3A of continuous output current across a wide input range with excellent load and line regulation. The MP1660 uses synchronous mode operation for higher efficiency across the output current load range.

Constant-on-time (COT) control operation provides fast transient response, easy loop design, and very tight output regulation.

Full protection features include short-circuit protection (SCP), over-current protection (OCP), under-voltage protection (UVP), and thermal shutdown.

The MP1660 requires a minimal number of readily available, standard external components, and is available in a space-saving SOT563 (1.6mmx1.6mm) package.

ELECTRICAL SPECIFICATIONS (1)

Parameter	Symbol	Value	Units
Input voltage	V_{IN}	12	V
Output voltage	V_{OUT}	3.3	V
Output current	I_{OUT}	3	A

Notes:

1) For different input/output voltage specifications and different output capacitors or inductors, the application circuit parameters may require changes.

FEATURES

- Wide 4.5V to 16V Operating Input Range
- 110mΩ/60mΩ Low $R_{DS(ON)}$ Internal Power MOSFETs
- 190μA Low I_Q
- High-Efficiency Synchronous Mode Operation
- Power-Save Mode at Light-Load
- Fast Load Transient Response
- 600kHz Switching Frequency
- Internal Soft Start (SS)
- Over-Current Protection (OCP) and Hiccup Mode
- Thermal Shutdown
- Output Adjustable from 0.6V
- Available in a SOT563 (1.6mmx1.6mm) package

APPLICATIONS

- Security Cameras
- Digital Set-Top Boxes
- Flat-Panel Televisions and Monitors
- General Purposes

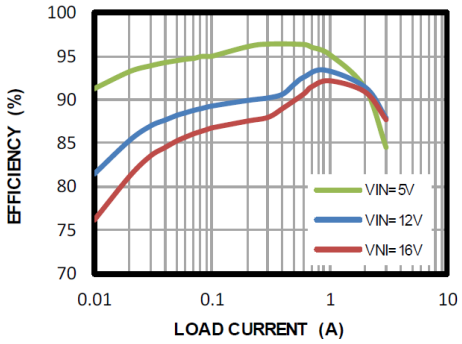
EV1660-TF-00A EVALUATION BOARD

(LxWxH) 63.7mmx48.4mmx6.4mm

Board Number	MPS IC Number
EV1660-TF-00A	MP1660GTF

Efficiency vs. Load Current

V_{OUT} = 3.3V, L= 4.7µH, DCR = 19.5mΩ



QUICK START GUIDE

1. Preset the power supply to 12V.
2. Turn the power supply off.
3. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
4. Connect the load to:
   a. Positive (+): VOUT
   b. Negative (-): GND
5. Turn the power supply on after making the connections. The board should automatically start up.
6. To use the enable function, apply a digital input to the EN pin. Drive EN above 1.3V to turn the regulator on; drive EN below 1V to turn the regulator off.

EVALUATION BOARD SCHEMATIC

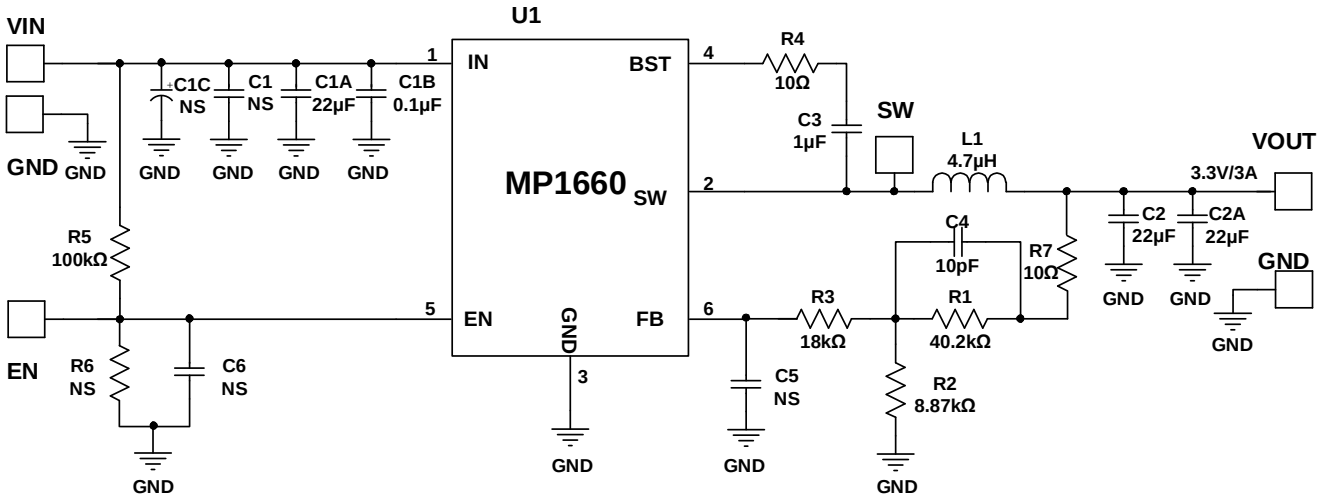


Figure 1: Evaluation Board Schematic

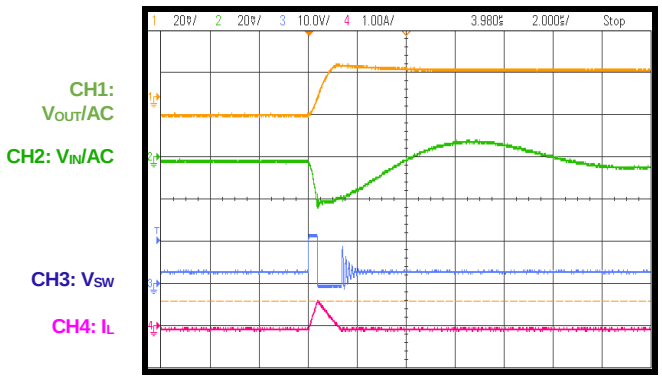
EV1660-TF-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
1	C1A	22µF	Ceramic capacitor, 25V, X5R	0805	Murata	GRM21BR61E226ME44L
2	C2, C2A	22µF	Ceramic capacitor, 16V, X5R	0806	Murata	RM21BR61C226ME44L
1	C1B	0.1µF	Ceramic capacitor, 25V, X7R	0603	Murata	GRM188R71E104KA01D
1	C3	1µF	Ceramic capacitor, 16V, X7R	0603	Murata	GRM188R71C105KA12D
1	C4	10pF	Ceramic capacitor, 50V, C0G	0603	Murata	GRM1885C1H100JA01D
0	C1, C1C, C5, C6	NS				
1	R1	40.2kΩ	Thick film resistor, 1%	0603	Yageo	RC0603FR-0740K2L
1	R2	8.87kΩ	Thick film resistor, 1%	0603	Yageo	RC0603FR-078K87L
1	R3	18kΩ	Thick film resistor, 1%	0603	Yageo	RC0603FR-0718KL
1	R5	100kΩ	Thick film resistor, 1%	0603	Yageo	RC0603FR-07100KL
2	R4, R7	10Ω	Thick film resistor, 1%	0603	Yageo	RC0603FR-0710RL
0	R6	NS				
1	L1	4.7µH	Inductor, DCR = 19.5mΩ, I_{SAT} = 7A	SMD	Wurth	744311470
1	U1	MP1660	Synchronous step-down converter	SOT563	MPS	MP1660GTF

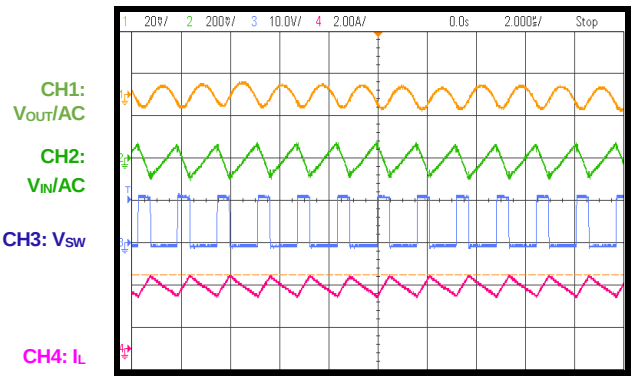
EVB TEST RESULTS

V_{IN} = 12V, V_{OUT} = 3.3V, L = 4.7µH, T_A = 25°C, unless otherwise noted.

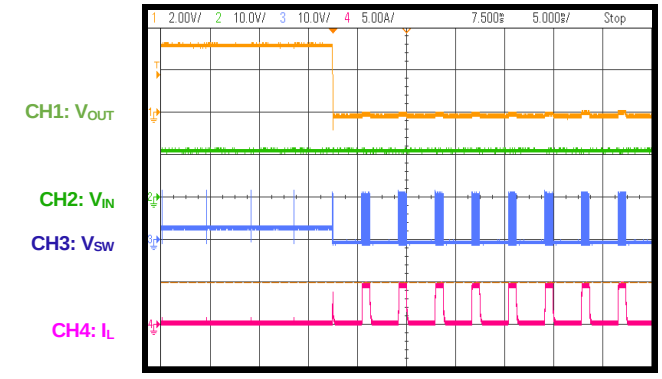
Input/Output Ripple
I_{OUT} = 0A



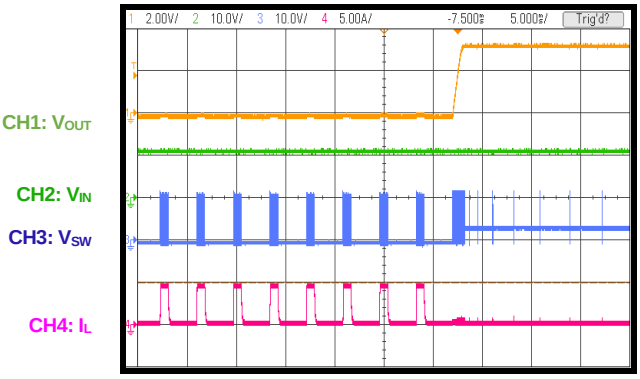
Input/Output Ripple
I_{OUT} = 3A



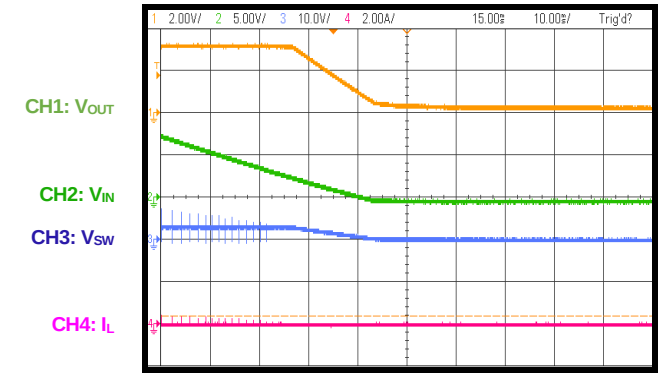
Short-Circuit Entry
I_{OUT} = 0A



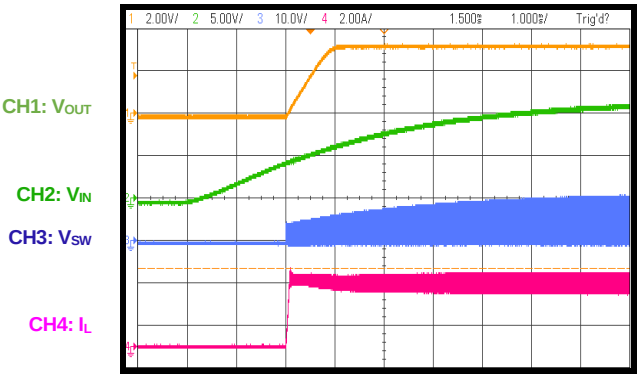
Short-Circuit Recovery
I_{OUT} = 0A



Shutdown through Input Voltage
I_{OUT} = 0A



Start-Up through Input Voltage
I_{OUT} = 3A

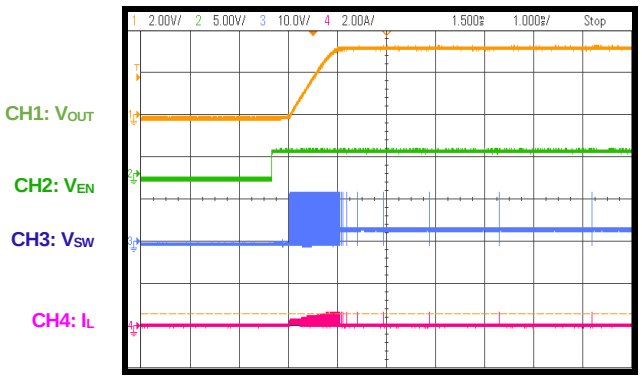


EVB TEST RESULTS *(continued)*

V_{IN} = 12V, V_{OUT} = 3.3V, L = 4.7µH, T_A = 25°C, unless otherwise noted.

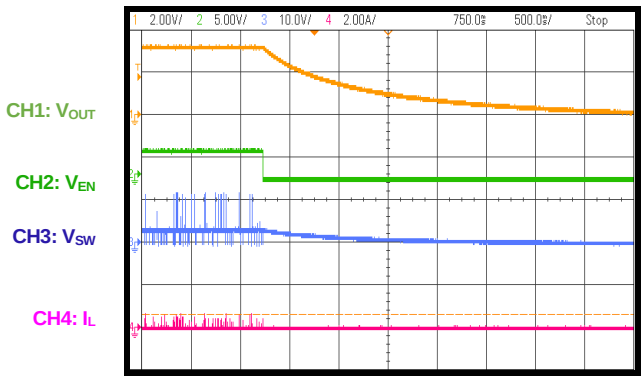
Start-Up through Enable

I_{OUT} = 0A



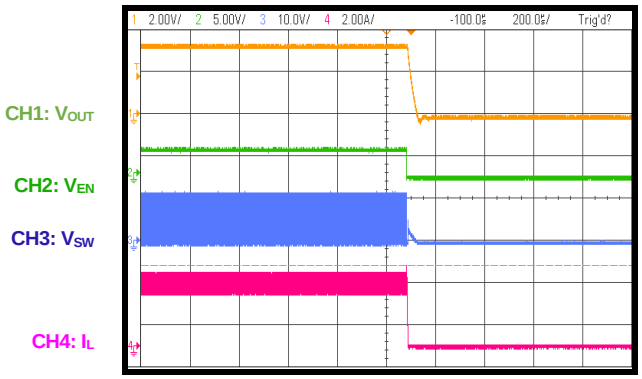
Shutdown through Enable

I_{OUT} = 0A



Shutdown through Enable

I_{OUT} = 3A



PCB LAYOUT

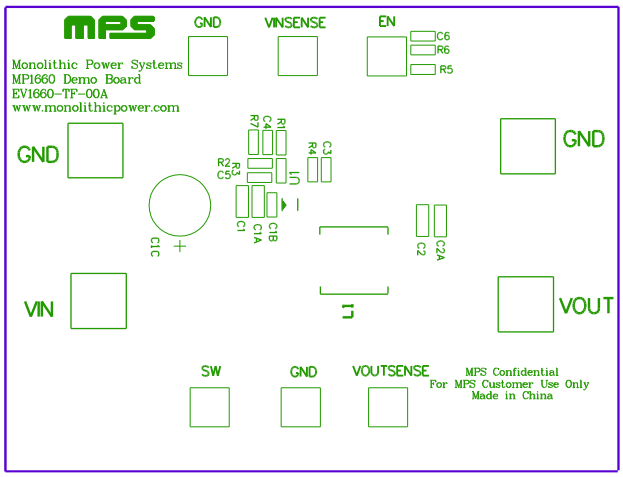


Figure 2: Top Silk Layer

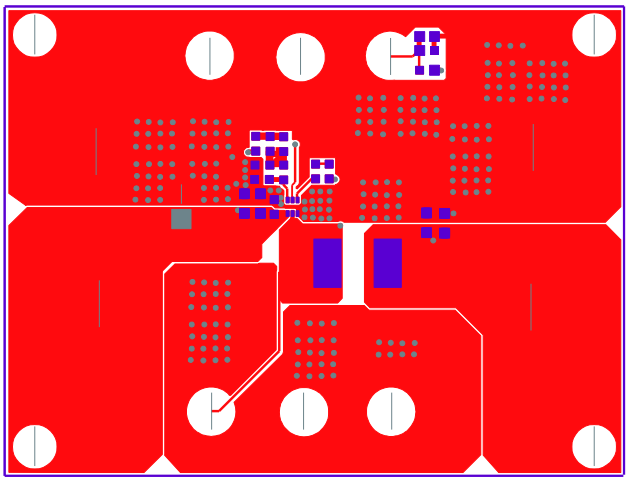


Figure 3: Top Layer

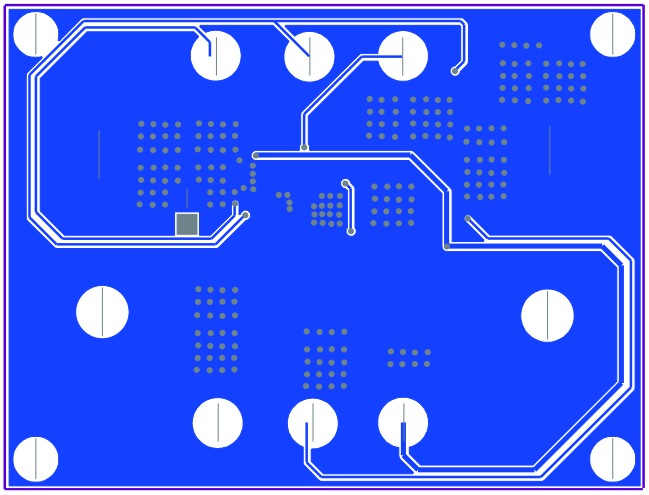


Figure 4: Bottom Layer

Revision History

Revision #	Revision Date	Description	Pages Updated
1.0	11/9/2020	Initial Release	-

Mouser Electronics

Authorized Distributor

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Monolithic Power Systems (MPS):

EV1660-TF-00A