



EV2451-J-00A

0.6A, 2MHz, 36V Step-Down Converter Evaluation Board

DESCRIPTION

The EV2451-J-00A is an evaluation board for the MP/MPQ2451, a fixed 2MHz frequency step-down switching regulator with an integrated internal high-side high voltage power MOSFET. The IC provides 0.6A output with current mode control for fast loop response and easy compensation.

High power conversion efficiency over a wide load range is achieved by scaling down the switching frequency at light load condition to reduce the switching and gate driving losses.

The soft-start function helps prevent inductor current runaway during startup and thermal shutdown provides reliable, fault tolerant operation.

By switching at 2MHz, smaller value inductor and input/output capacitor can be used to lower down cost and save board space.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	8-36	V
Output Voltage	V_{OUT}	5	V
Output Current	I_{OUT}	0-0.6	A

FEATURES

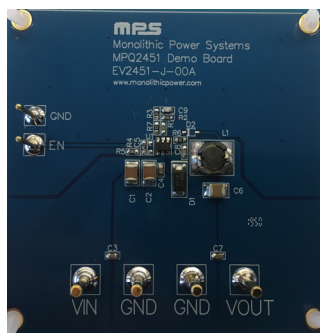
- 130 μ A Operating Quiescent Current
- Wide 3.3V-to-36V Operating Input Range
- 500m Ω Internal Power MOSFET
- 2MHz Fixed Switching Frequency
- Internally Compensated
- Stable with Ceramic Output Capacitors
- Internal Soft-Start
- Precision Current Limit Without Current Sensing Resistor
- > 90% Efficiency
- Output Adjustable from 0.8V to 0.9 $\cdot V_{IN}$, Fixed 5V & 3.3V Output
- Includes SOT23 and TSOT23 Packages
- Available in AEC-Q100 Grade 1

APPLICATIONS

- High Voltage Power Conversion
- Automotive Systems
- Industrial Power Systems
- Distributed Power Systems
- Battery Powered Systems

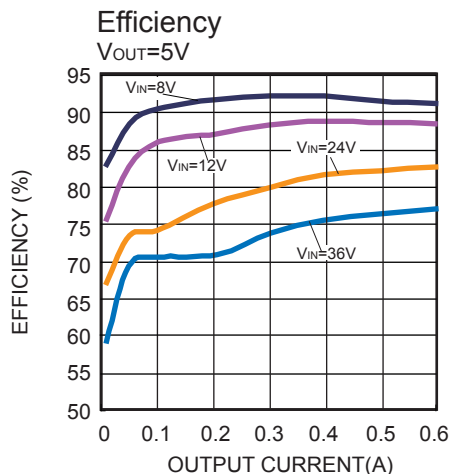
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EV2451-J-00A EVALUATION BOARD



(L x W x H) 2.5" x 2.5" x 0.4"
6.35cm x 6.35cm x 1.0cm

Board Number	MPS IC Number
EV2451-J-00A	MP/MPQ2451DJ



QUICK START GUIDE

1. Connect the positive terminal of the load to VOUT pins, and the negative terminal of the load to GND pins.

Be aware that electronic loads represent a negative impedance to the regulator and if set to a too high current will trigger SCP mode.

2. Preset the power supply output to 8V-36V and turn off the power supply.

If longer cables are used between the source and the EVB (>0.5m total), a damping capacitor should be installed at the input terminals. Especially when V_{IN} is $\geq 24V$.

3. Connect the positive terminal of the power supply output to the VIN pin and the negative terminal of the power supply output to the GND pin.
4. Turn on the power supply. The MP/MPQ2451 will automatically start up.
5. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 1.5V to turn on the regulator or less than 1.1V to turn it off. Note that floating the EN pin will turn it off.
6. To adjust the output voltage, change the values of R1 and R2. Generally, Choose R2 around 124k Ω for optimal transient response. For $V_{FB}=0.8V$, R2=124k Ω , R1 can be determined by:

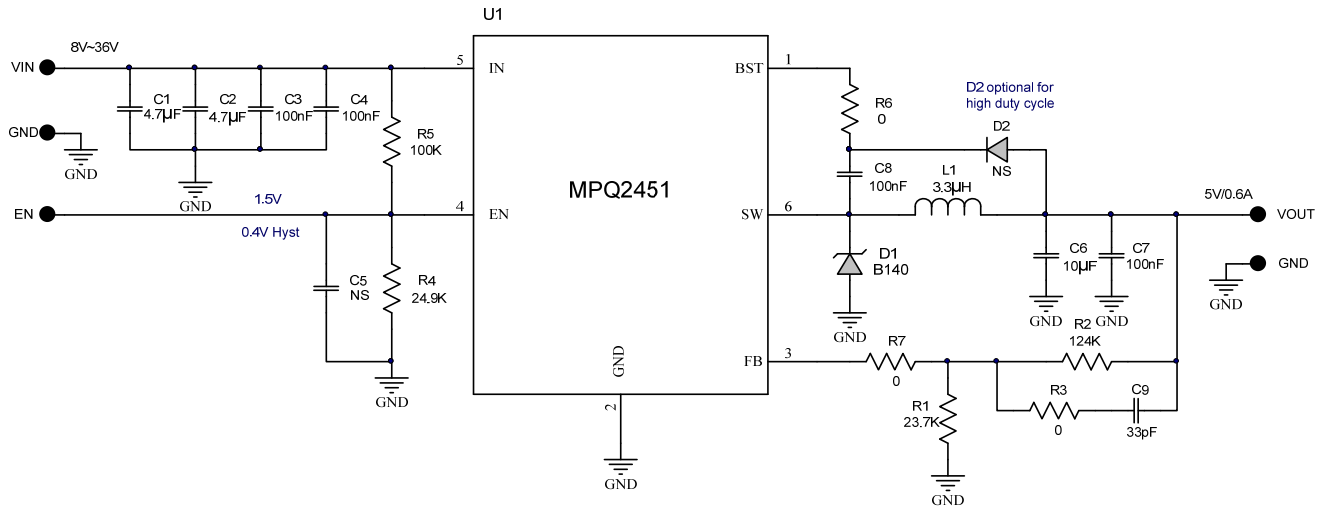
$$R1 = \frac{R2}{\frac{V_{OUT}}{0.8V} - 1}$$

Please follow the application information on the MP/MPQ2451 datasheet to recalculate/select compensation values, the inductor value and the output capacitor value if the output voltage needs to be reprogrammed.

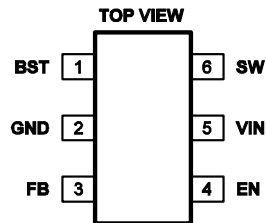
Below table lists the recommended feedback resistor values for common output voltages

V _{OUT} (V)	R1(k Ω)	R2(k Ω)
0.8	NS	124(1%)
1.2	249(1%)	124(1%)
3.3	40.2(1%)	124(1%)
5	23.7(1%)	124(1%)

EVALUATION BOARD SCHEMATIC



Package Reference



Resistor Selection vs. Output Voltage Setting

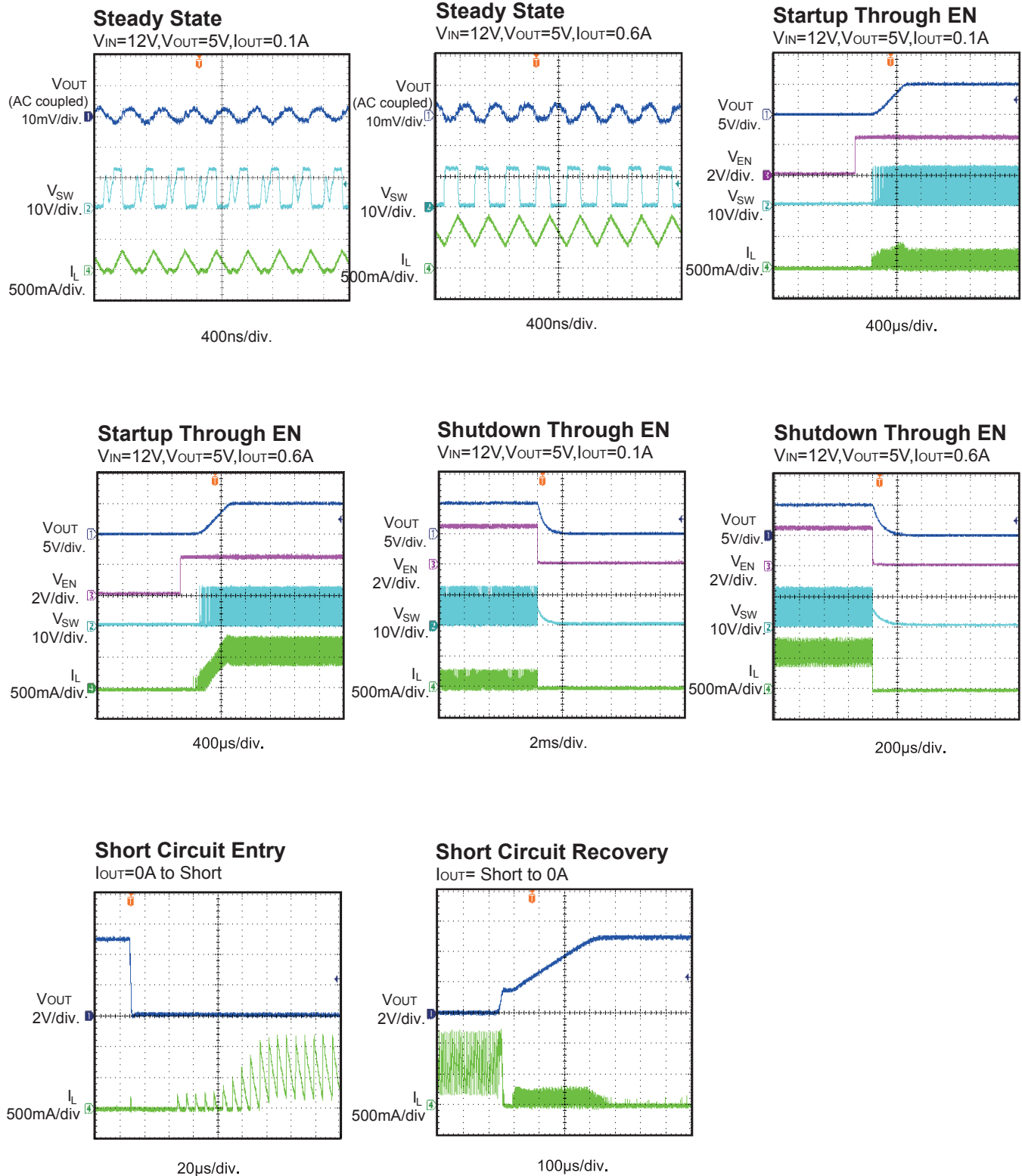
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EV2451-J-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
2	C1,C2	4.7μF	Ceramic Cap, X7R, 50V	1210	muRata	GRM32ER71H475KA88L
2	C3,C4	0.1μF	Ceramic Cap, X7R, 50V	0603	muRata	GRM188R71H104KA93D
1	C5	NS				
1	C6	10μF	Ceramic Cap, X7R, 16V	1210	muRata	GRM32DR71C106KA01L
2	C7,C8	0.1μF	Ceramic Cap, X7R, 16V	0603	muRata	GRM188R71C104KA01D
1	C9	33pF	Ceramic Cap, C0G, 50V	0603	muRata	GRM1885C1H330JA01
1	R1	23.7k	Film Res, 1%	0603	Yageo	RC0603FR-0723K7L
1	R2	124k	Film Res, 1%	0603	Yageo	RC0603FR-07124KL
3	R3,R6, R7	0R	Film Res, 5%	0603	Yageo	RC0603JR-070RL
1	R4	24.9k	Film Res, 1%	0603	Yageo	RC0603FR-0724K9L
1	R5	100k	Film Res, 1%	0603	Yageo	RC0603FR-07100KL
1	D1		Diode Schottky, 40V, 1A	SMA	Diodes Inc	B140-13-LF
1	D2	NS				
1	L1	3.3μH	Inductor, 3.3μH, 1.89A	SMD	TOKO	D62CB-#A920CY-3R3M
1	U1		Step-Down Regulator	TSOT23-6	MPS	MP/MPQ2451DJ

EVB TEST RESULTS

$V_{IN}=12V$, $C1=4.7\mu F$, $C2=10\mu F$, $L=3.3\mu H$ and $T_A=+25^{\circ}C$, unless otherwise noted.



PRINTED CIRCUIT BOARD LAYOUT

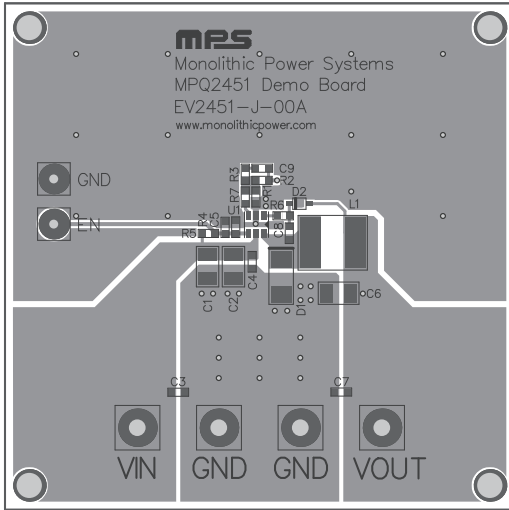


Figure 1: Top Silk Layer and Top Layer

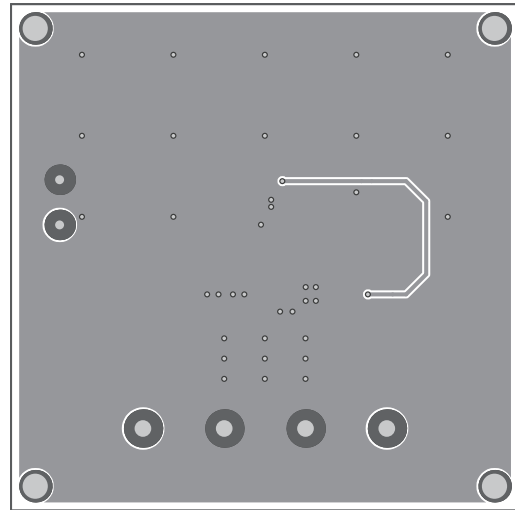


Figure 2: Bottom Layer

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