



The Future of Analog IC Technology®

EV0020 (MP1591DN)

2A, 32V, 330KHz
Step-Down Converter

EVALUATION BOARD

DESCRIPTION

The EV0020 is the evaluation board for the MP1591; a high voltage step-down converter ideal for automotive power adapter battery chargers. Its wide 6.5V to 32V input voltage range covers the automotive battery's requirements. It achieves 2A continuous output for quick charge capability.

Current mode operation provides fast transient response and eases loop stabilization. Fault protection includes cycle-by-cycle current limiting and thermal shutdown. In shutdown mode, the converter draws only 20µA of supply current.

The MP1591 requires a minimum number of readily available external components to complete a 2A step-down DC to DC converter solution.

FEATURES

- Wide 6.5V to 32V Input Operating Range
- 34V Absolute Maximum Input
- 2A Output Current
- Ceramic Input and Output Capacitors
- Up to 95% Efficiency
- 20µA Shutdown Mode
- Fixed 330KHz Frequency
- Thermal Shutdown
- Cycle-by-Cycle Over Current Protection
- Output Adjustable From 1.23V to 21V
- Under Voltage Lockout

APPLICATIONS

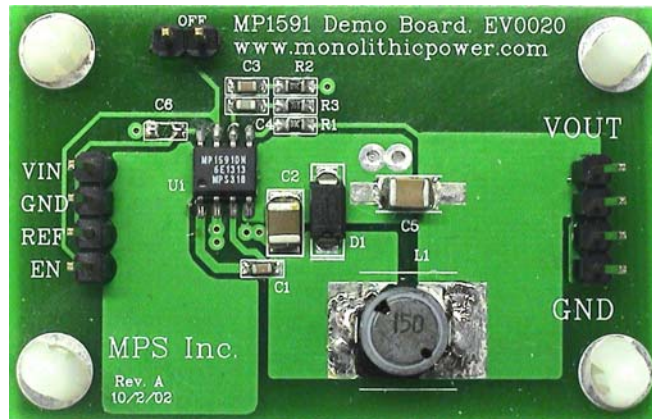
- Automotive Power Adapters
- PDA and Cellular Phone Battery Chargers
- Distributed Power Systems
- Automotive Aftermarket Electronics

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	V _{IN}	6.5 to 32	V
Output Voltage	V _{OUT}	5	V
Output Current	I _{OUT}	2	A

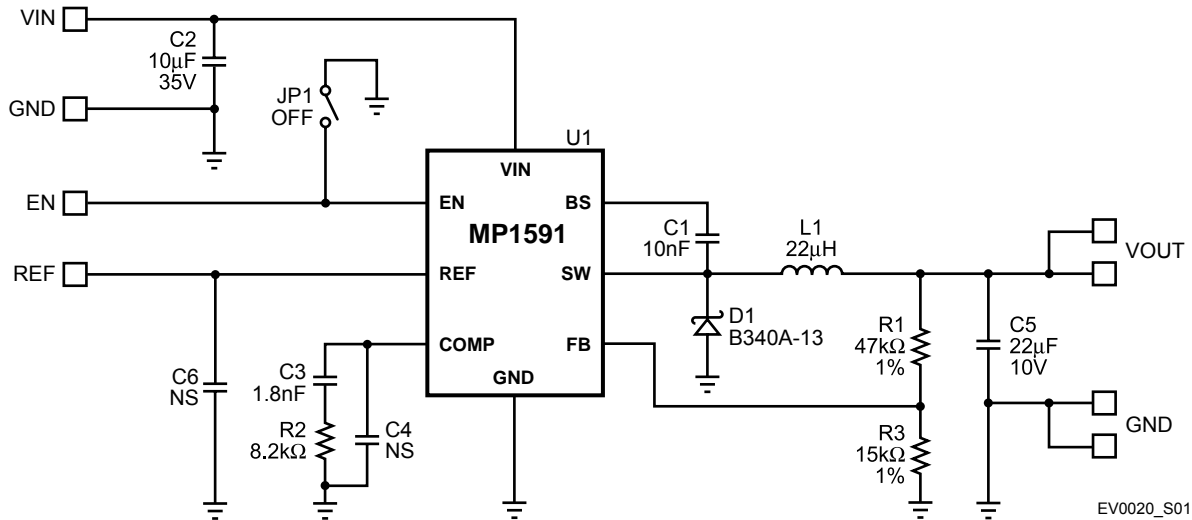
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EV0020 EVALUATION BOARD



(L x W x H) 2.1" x 1.4" x 0.5" (5.3cm x 3.5cm x 1.1cm)

Board Number	MPS IC Number
EV0020	MP1591DN

EVALUATION BOARD SCHEMATIC

EV0020 BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
1	C1	10nF	Ceramic Capacitor, 50V, X7R	0805	AVX	08055C103KAT2A
1	C2	10µF	Ceramic Capacitor, 35V	1210	Taiyo Yuden	GMK325F106MH
1	C3	1.8nF	Ceramic Capacitor, 50V, X7R	0805	AVX	08055C182KAT2A
2	C4, C6	NS	Not Stuffed			
1	C5	22µF	Ceramic Capacitor, 10V, 1210	1210	Taiyo Yuden	LMK325BJ226MM
1	D1		Schottky Diode, 40V, 3A, SMA		Diodes Inc	B340A-13
1	R1	47kΩ	Film Resistor, 1%	0805	Yageo	9C08052A4702FKHFT
1	R2	8.2kΩ	Film Resistor, 5%	0805	Panasonic	ERJ-6GEYJ822V
1	R3	15kΩ	Film Resistor, 1%	0805	Yageo	9C08052A1502FKHFT
1	L1	22µH	Inductor, 2.6A		Sumida	CDRH8D43-220
	L1 Alternate	22µH	Inductor, 2.5A, Type D104C		Toko	919AS-220M
1	U1		Step-Down Converter	SO8	MPS	MP1591DN

PRINTED CIRCUIT BOARD LAYOUT

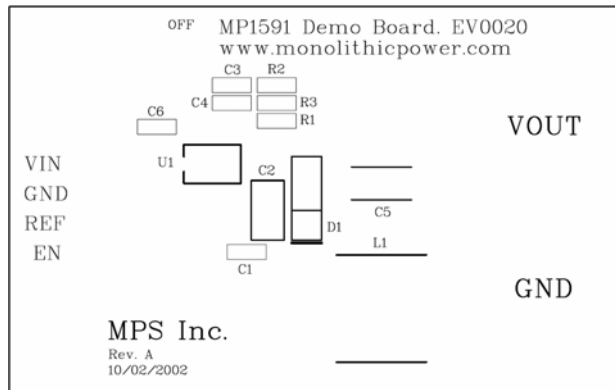


Figure 1—Top Silk Layer

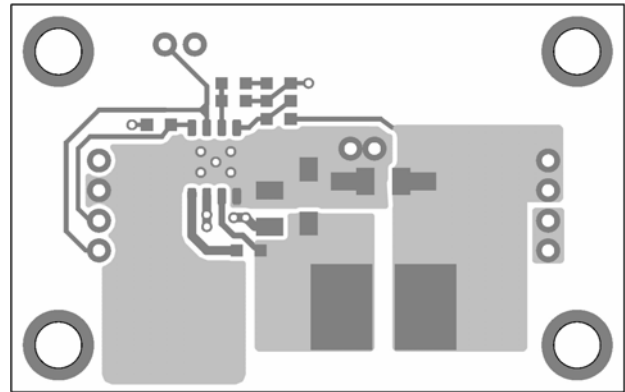


Figure 2—Top Layer

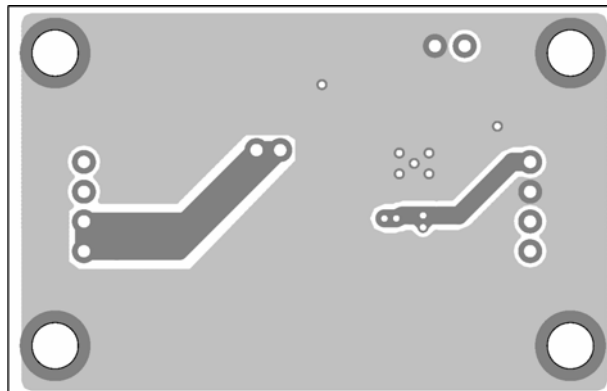


Figure 3—Bottom Layer

QUICK START GUIDE

The output voltage of this board is set to 5V. The board layout accommodates most commonly used inductors and output capacitors.

1. Attach the positive and negative ends of the load to V_{OUT} and GND, respectively.
2. Attach the input voltage ($6.5V \leq V_{IN} \leq 32V$) and input ground to V_{IN} and GND, respectively.
3. To enable the MP1591, apply a voltage ($V_{EN} \geq 2V$) to the EN pin. To disable it, connect the EN pin to ground.
4. The REF pin outputs a 5V reference voltage. If used, a 0.01 μ F capacitor should be connected from this pin to GND to reduce switching ripple. Leave unconnected if not used.
5. The output voltage V_{OUT} can be changed by varying R1. Calculate R1 using the formula:

$$R1 = R3 \times \left(\frac{V_{OUT}}{V_{FB}} - 1 \right) \text{ where } V_{FB} = 1.23V \text{ and } R3 \text{ is set at } 15k\Omega.$$

For example, for V_{OUT} = 5.0V:

$$R1 = R3 \times \left(\frac{V_{OUT}}{V_{FB}} - 1 \right) = 15k\Omega \times \left(\frac{5.0V}{1.23V} - 1 \right) = 45.98k\Omega \approx 47k\Omega \text{ standard } 1\% \text{ value.}$$

See Maximum Duty Cycle limits to determine allowable output voltage range.

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