

## DESCRIPTION

The MP9442 is a high-frequency, synchronous, rectified, step-down, switch-mode converter with built-in power MOSFETs. It offers a very compact solution to achieve a 2A continuous output current with excellent load and line regulation over a wide input supply range. The MP9442 has synchronous mode operation for higher efficiency over the output current load range.

Current-mode operation provides fast transient response and eases loop stabilization.

Full protection features include over-current protection and thermal shut down.

The MP9442 requires a minimal number of readily-available standard external components, and is available in a space-saving 8-pin TSOT23 package.

## ELECTRICAL SPECIFICATIONS (1)

Parameter	Symbol	Value	Units
Input Voltage	$V_{IN}$	12	V
Output Voltage	$V_{OUT}$	3.3	V
Output Current	$I_{OUT}$	0-2	A

### Notes:

- 1) For different Input/output voltage specs and different output capacitor/inductor may need change the application circuit parameters.

## FEATURES

- Wide 4V to 36V Continuous Operating Input Range
- 90mΩ/55mΩ Low  $R_{DS(ON)}$  Internal Power MOSFETs
- High-Efficiency Synchronous Mode Operation
- 600kHz Switching Frequency
- Synchronizes from 200kHz to 2.2MHz External Clock
- High Duty Cycle for Automotive Cold-crank
- Internal Power-Save Mode
- Internal Soft-Start
- Power Good Indicator
- Over-Current Protection with Hiccup
- Thermal Shutdown
- Output Adjustable from 0.8V
- Available in an 8-Pin TSOT23 Package

## PACKAGEAPPLICATIONS

- Automotive
- Industrial Control System
- Distributed Power Systems

All MPS parts are lead-free, halogen free, and adhere to the RoHS directive. For MPS green status, please visit MPS website under Quality Assurance.

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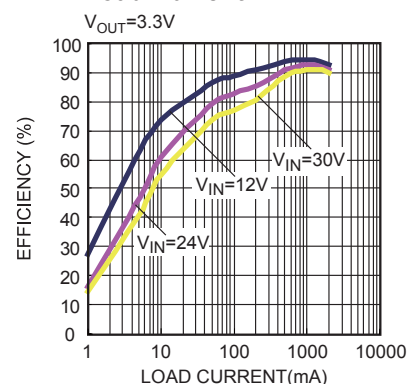
## TYPICAL APPLICATION



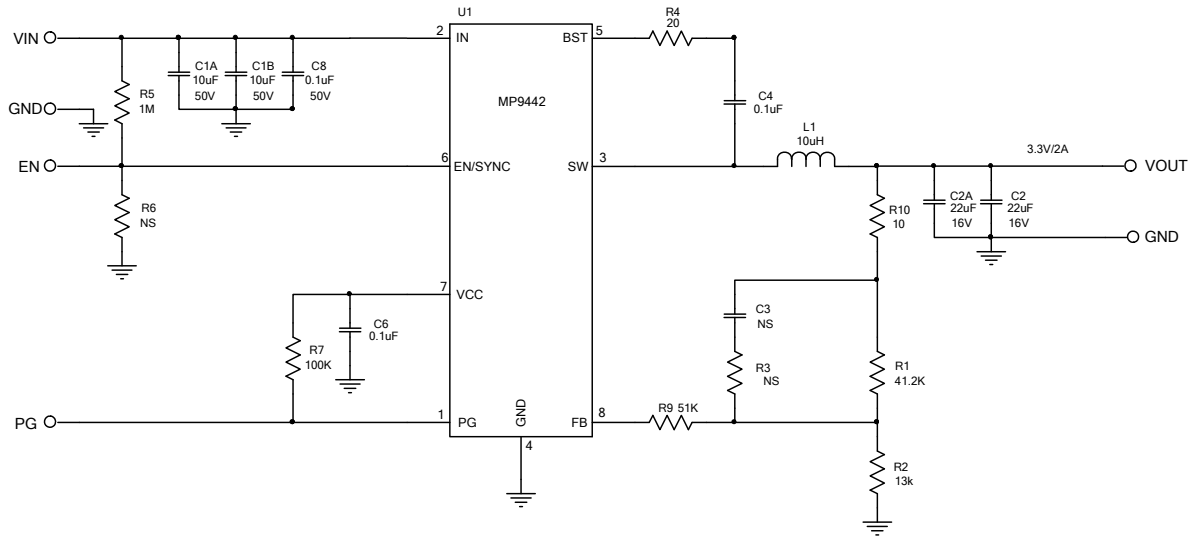
(L x W x H) 6.3cm x 4.9cm x 1.3cm

Board Number	MPS IC Number
EV9442-J-00A	MP9442GJ

### Efficiency vs. Load Current



**EVALUATION BOARD SCHEMATIC**



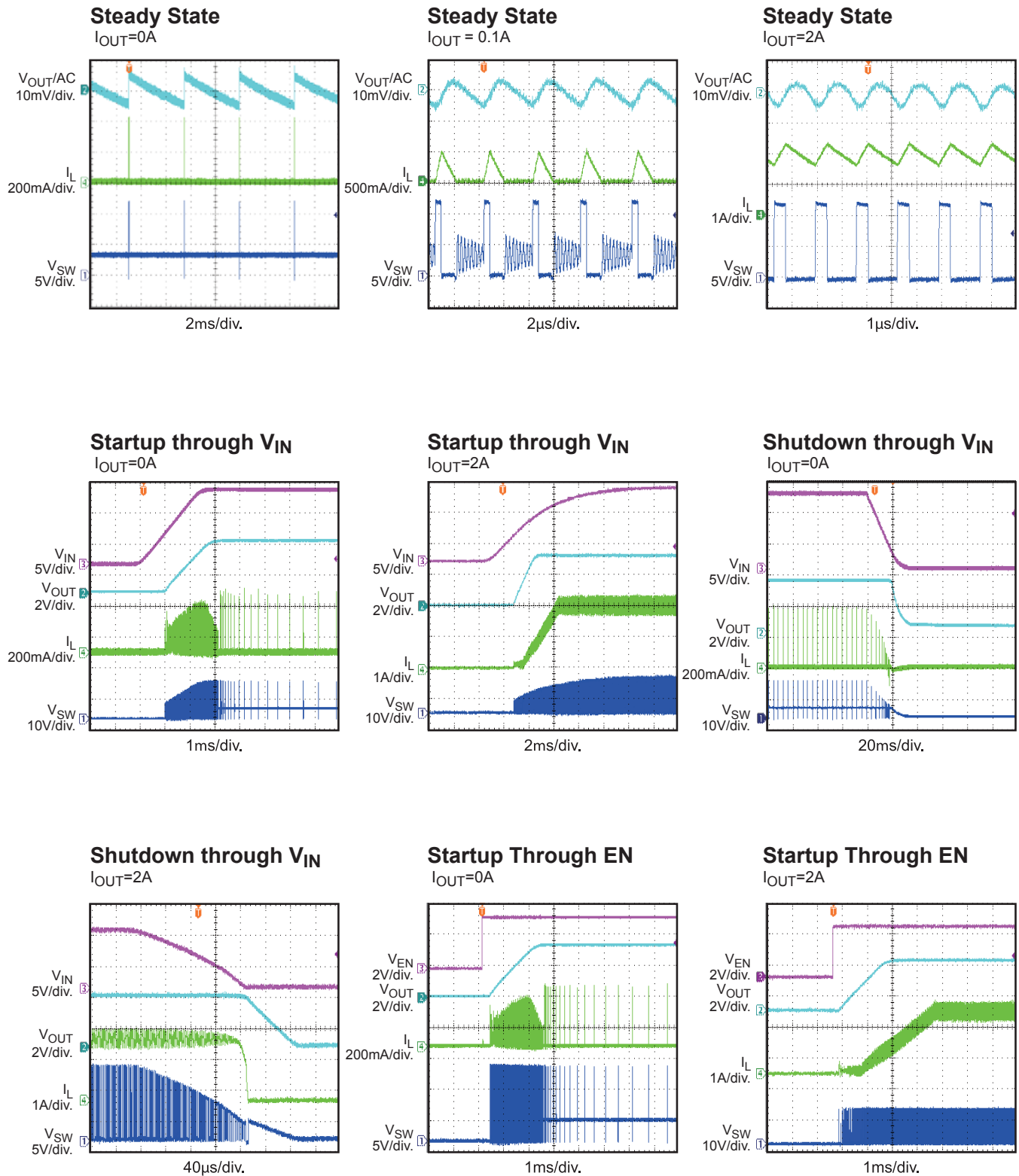
**EV9442 BILL OF MATERIALS**

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
2	C1A, C1B	10 $\mu$ F	Ceramic Cap., 50V, X5R	1210	muRata	GRM32ER61H106KA12L
1	C8	0.1 $\mu$ F	Ceramic Cap., 50V, X7R	0603	muRata	GRM188R71H104KA93D
2	C2,C2A	22 $\mu$ F	Ceramic Cap., 16V, X5R	1206	muRata	GRM31CR61C226ME15L
1	C3	NS				
2	C4,C6	0.1 $\mu$ F	Ceramic Cap., 25V, X7R	0603	muRata	GRM188R71E104KA01D
1	R1	41.2k	Thick Film Res., 1%	0603	Yageo	RC0603FR-0741K2L
1	R2	13k	Thick Film Res., 1%	0603	Yageo	RC0603FR-0713KL
1	R3	NS				
1	R4	20 $\Omega$	Thick Film Res., 1%	0603	Yageo	RC0603FR-0720RL
1	R5	1M	Thick Film Res., 1%	0603	Yageo	RC0603FR-071ML
0	R6	NS				
1	R7	100k	Thick Film Res., 1%	0603	Yageo	RC0603FR-07100KL
1	R9	51k	Thick Film Res., 1%	0603	Yageo	RC0603FR-0751KL
1	R10	10 $\Omega$	Thick Film Res., 1%	0603	Yageo	RC0603FR-0710RL
1	L1	10 $\mu$ H	Inductor, DCR=33m $\Omega$ , Is=4A	SMD	Würth	744314101
1	U1	MP9442GJ	Synchronous Step- Down Converter	TSOT23- 8	MPS	MP9442GJ

## EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

$V_{IN} = 12V$ ,  $V_{OUT} = 3.3V$ ,  $L = 10\mu H$ ,  $R_{BST} = 20\Omega$ ,  $T_A = +25^\circ C$ , unless otherwise noted.



**EVB TEST RESULTS (continued)**

Performance waveforms are tested on the evaluation board.

$V_{IN} = 12V$ ,  $V_{OUT} = 3.3V$ ,  $L = 10\mu H$ ,  $R_{BST}=20\Omega$ ,  $T_A = +25^\circ C$ , unless otherwise noted.



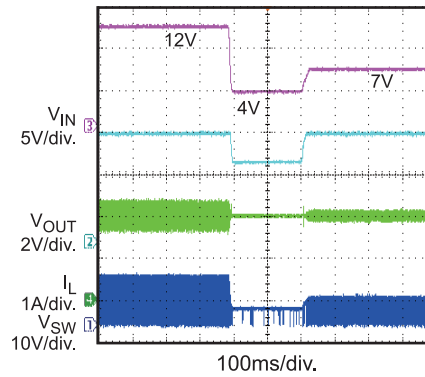
### **EVB TEST RESULTS (continued)**

Performance waveforms are tested on the evaluation board.

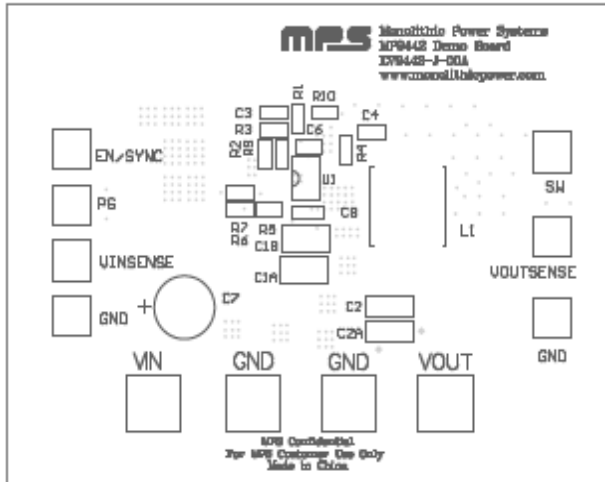
$V_{IN} = 12V$ ,  $V_{OUT} = 3.3V$ ,  $L = 10\mu H$ ,  $R_{BST}=20\Omega$ ,  $T_A = +25^\circ C$ , unless otherwise noted.

#### **Cold-Crank**

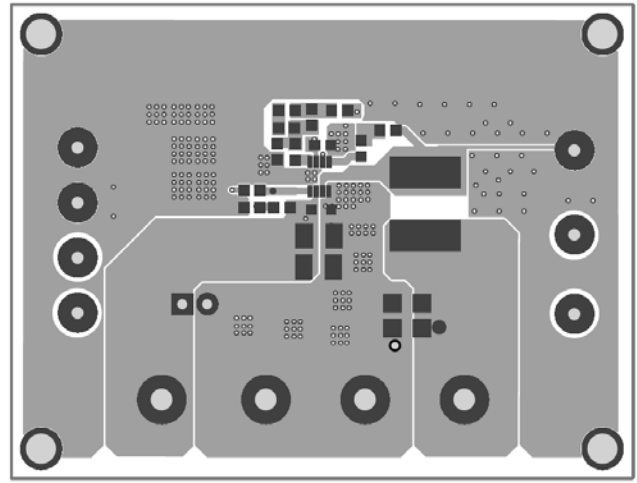
$V_{OUT}=5V$ ,  $I_{OUT}=2A$



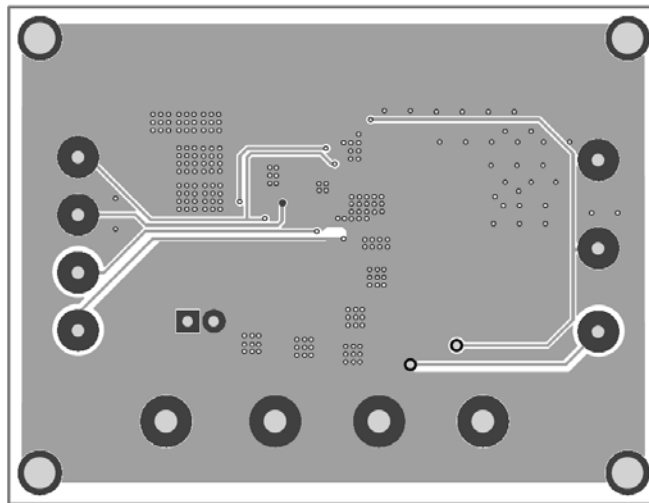
**PRINTED CIRCUIT BOARD LAYOUT**



**Figure 1—Top Silk Layer**



**Figure 2—Top Layer**



**Figure 3—Bottom Layer**