

DESCRIPTION

The EV2420-F-00A is an evaluation board for MPMPQ2420GF, a synchronous step-down switching regulator with integrated high-side/low-side, high-voltage power MOSFETs. It provides a highly efficient output of up to 0.3A. The integrated watchdog adds an additional security redundancy to the system.

It allows for high power conversion efficiency over a wide load range by scaling down the switching frequency under light-load condition to reduce the switching and gate driver losses.

The EV2420-F-00A is assembled and tested with TSSOP-16 EP package.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	4.5–75	V
Output Voltage	V_{OUT}	3.3	V
Output Current	I_{OUT}	0.3	A

FEATURES

- 20 μ A Quiescent Current (Active mode)
- Wide 4.5V to 75V Operating Input Range
- 1.2 Ω /0.45 Ω Internal Power MOSFETs
- Programmable Soft-Start
- FB-Tolerance: 1% at Room Temperature; 2% at Full Temperature
- Adjustable Output Voltage
- Integrated Windowed Watchdog
- Power on Reset during Power-up and Under voltage
- Programmable Short Window Mode or Long Window Mode
- Low Shutdown Mode Current: 5 μ A
- TSSOP-16 EP Package
- Available in AEC-Q100 Grade 1

APPLICATIONS

- Automotive Systems
- Industrial Power Systems
- Distributed Power Systems
- Battery Powered Systems

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

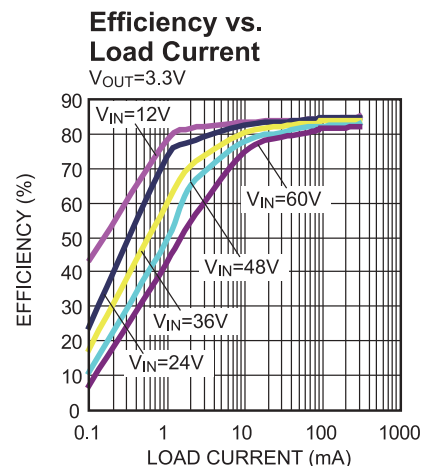
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EV2420-F-00A EVALUATION BOARD

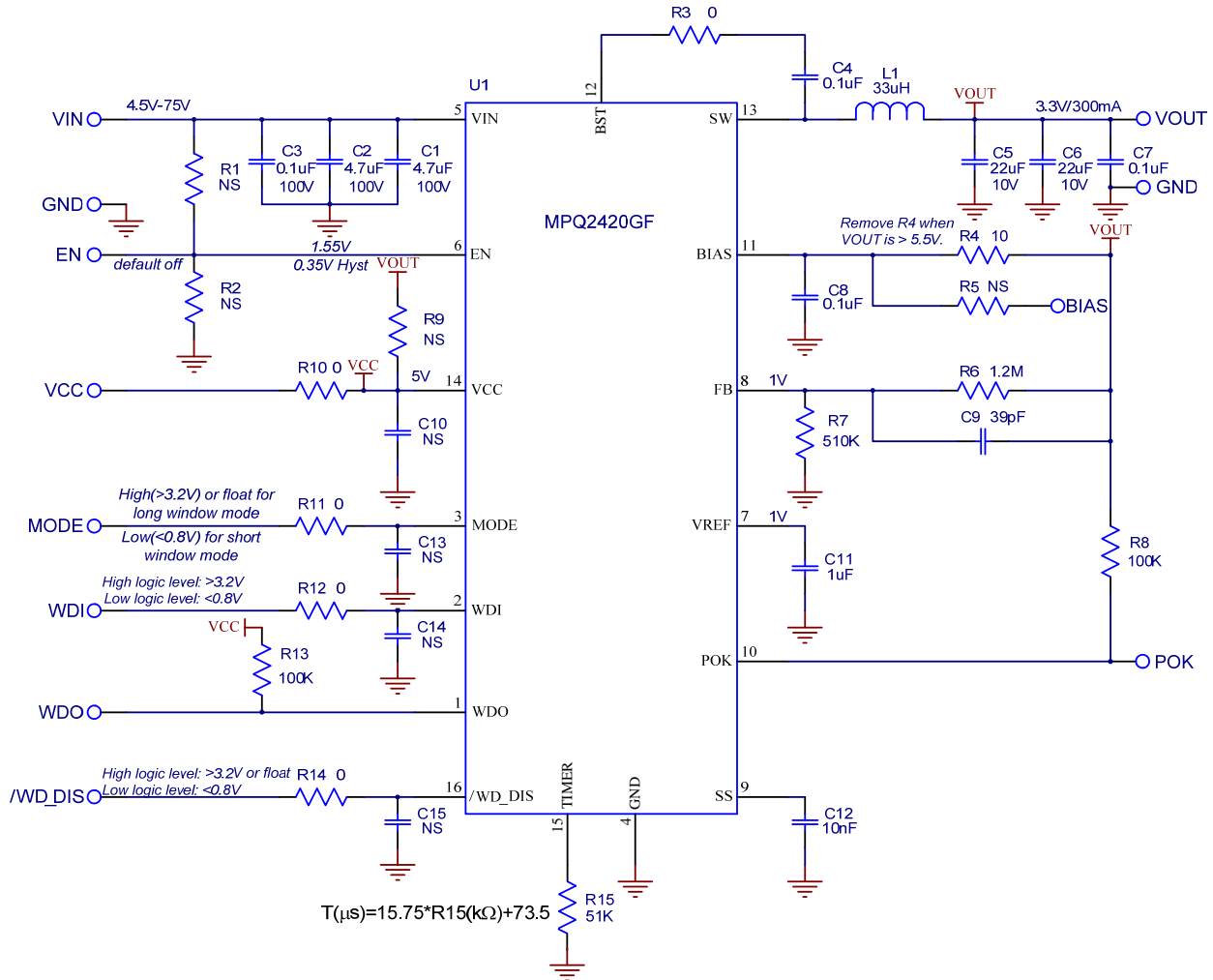


(L × W × H) 6.3cm × 6.3cm × 0.5cm

Board Number	MPS IC Number
EV2420-F-00A	MPQ2420GF



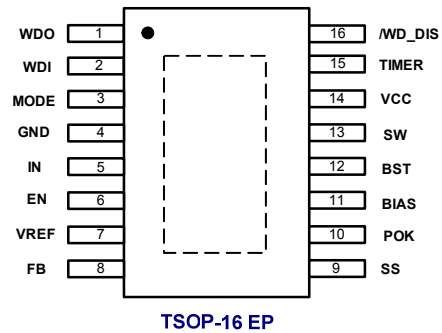
EVALUATION BOARD SCHEMATIC



Reference for FB Divider Selection

VOUT (V)	R7 (kΩ)	R6 (kΩ)
3.3	510 (1%)	1200 (1%)
5	301 (1%)	1200 (1%)
12	110 (1%)	1200 (1%)

Package Reference



EV2420-F-00A BILL OF MATERIALS

Qty.	Designator	Value	Description	Package	Manufacture	Manufacture PN
2	C1, C2	4.7uF	Ceramic Capacitor; 100V;X7S;1210	1210	TDK	C3225X7S2A475K
1	C3	0.1uF	Ceramic Capacitor; 100V;X7R;0603;	0603	muRata	GRM188R72A104KA35D
3	C4, C7, C8	0.1uF	Ceramic Capacitor; 16V;X7R;0603	0603	muRata	GRM188R71C104KA01D
2	C5, C6	22uF	Ceramic Capacitor; 16V;X7R;1210	1210	muRata	GRM32ER71C226KE18L
1	C9	39pF	Ceramic Capacitor; 50V;C0G;0603	0603	muRata	GRM1885C1H390JA01
1	C11	1uF	Ceramic Capacitor; 16V;X7R;0603;	0603	muRata	GRM188R71C105KA12D
1	C12	10nF	Ceramic Capacitor; 50V;X7R;0603;	0603	muRata	GRM188R71H103KA01D
4	C10, C13, C14, C15	NS				
1	L1	33uH	Inductor;33uH; 110mohm;1.55A	SMD	TDK	CLF7045T-330M-H
1	R1	1M	Film Resistor;5%;	0603	Yageo	RC0603JR-071ML
6	R3, R8, R10 R11,R12,R14	0	Film Resistor;5%;	0603	Yageo	RC0603JR-070RL
1	R4	10	Film Resistor;5%;	0603	Yageo	RC0603JR-0710RL
1	R6	1.2M	Film Resistor;1%;	0603	Yageo	RC0603FR-071M2L
1	R7	510K	Film Resistor;1%;	0603	Yageo	RC0603FR-07510KL
2	R8, R13	100K	Film Resistor;1%;	0603	Yageo	RC0603FR-07100KL
1	R15	51K	Film Resistor;1%;	0603	Yageo	RC0603FR-0751KL
4	R2, R5, R6, R9	NS				
1	U1		Step-Down Converter	TSSOP 16-EP	MPS	MPQ2420GF

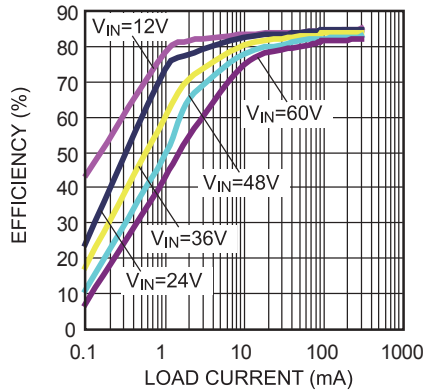
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

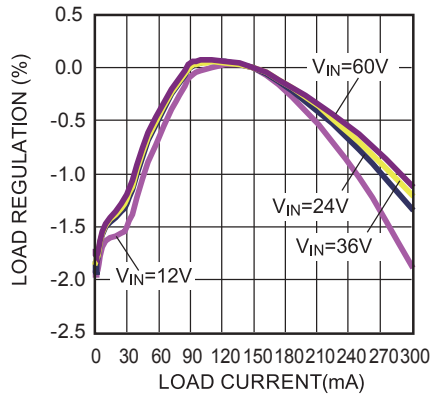
DC-DC Converter

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $L = 33\mu H$, $C_{OUT} = 2 \times 22\mu F$, $T_A = +25^\circ C$, unless otherwise noted.

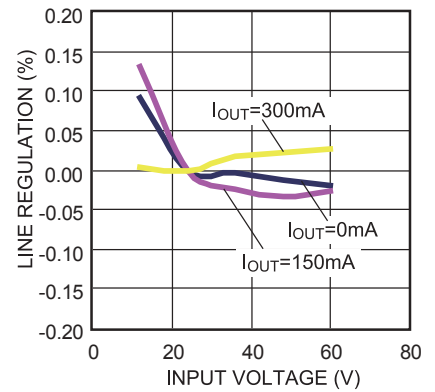
Efficiency vs. Load Current



Load Regulation

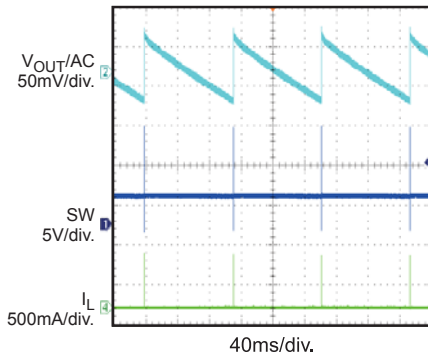


Line Regulation



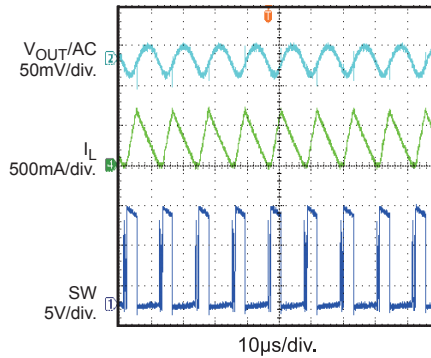
Steady State

$I_{OUT} = 0A$



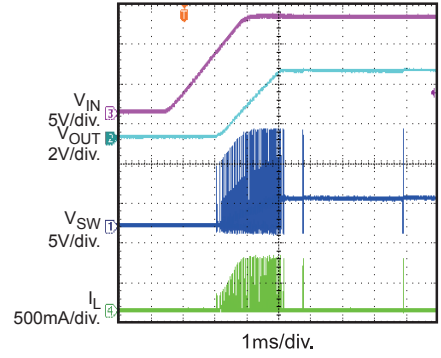
Steady State

$I_{OUT} = 0.3A$



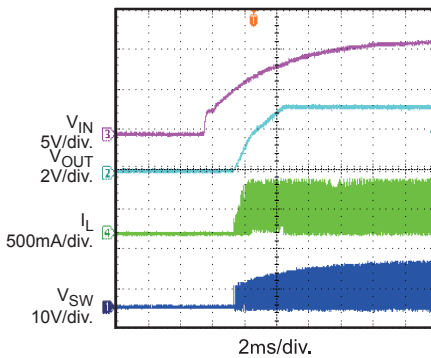
Start-Up through V_{IN}

$I_{OUT} = 0A$



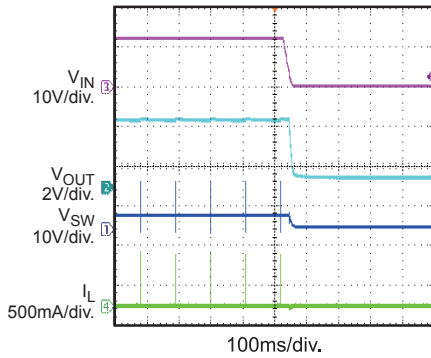
Startup through V_{IN}

$I_{OUT} = 0.3A$



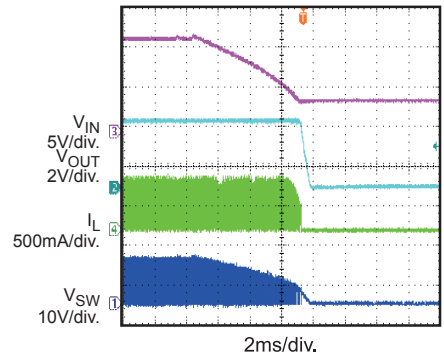
Shutdown through V_{IN}

$I_{OUT} = 0A$



Shutdown through V_{IN}

$I_{OUT} = 0.3A$



EVB TEST RESULTS (continued)

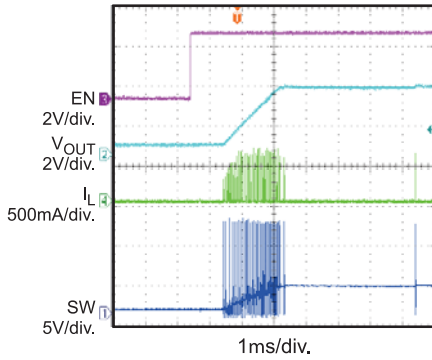
Performance waveforms are tested on the evaluation board.

DC-DC Converter

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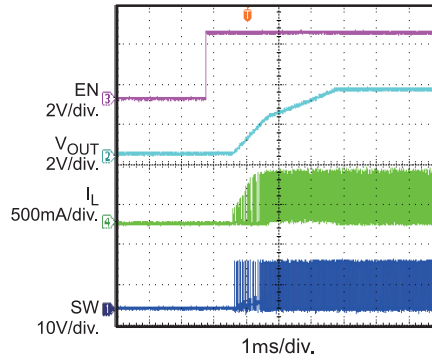
Startup Through EN

$I_{OUT} = 0A$



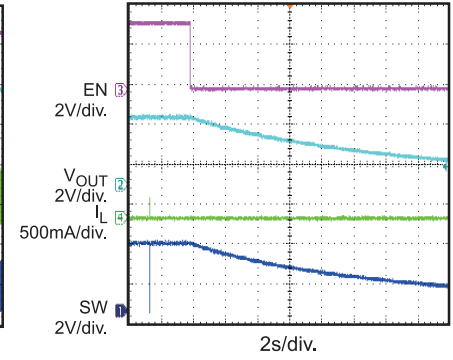
Startup Through EN

$I_{OUT} = 0.3A$



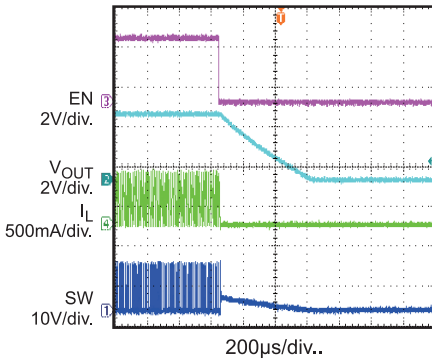
Shutdown Through EN

$I_{OUT} = 0A$



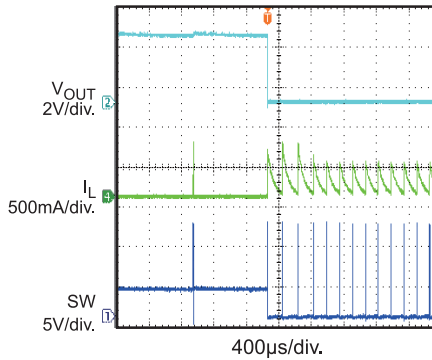
Shutdown Through EN

$I_{OUT} = 0.3A$



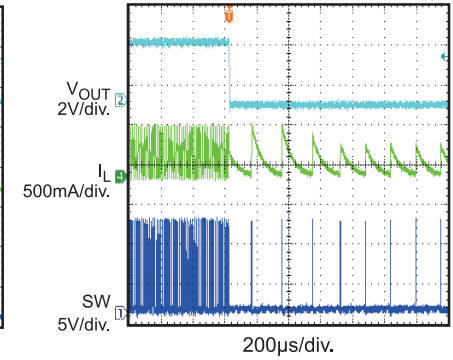
SCP Entry

$I_{OUT} = 0A$ to Short Circuit

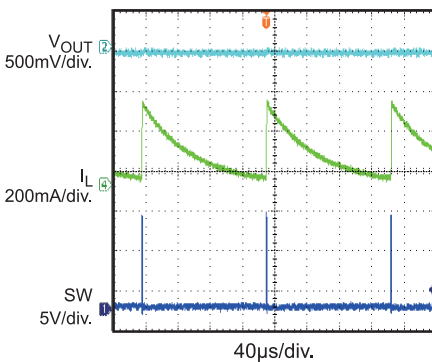


SCP Entry

$I_{OUT} = 0.3A$ to Short Circuit

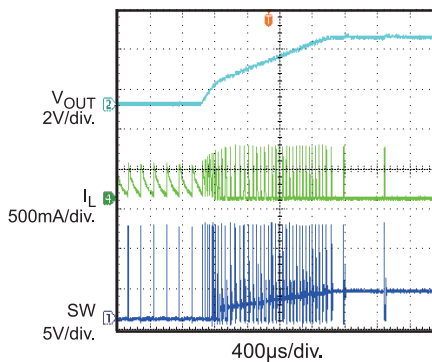


SCP Steady State



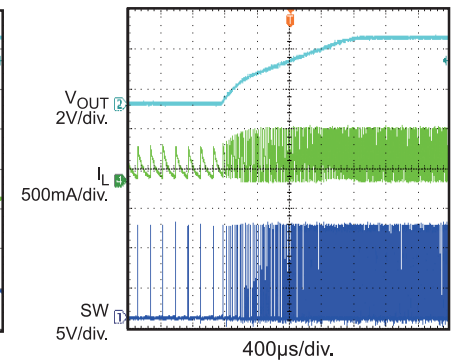
SCP Recovery

Short Circuit to $I_{OUT} = 0A$



SCP Recovery

Short Circuit to $I_{OUT} = 0.3A$



PRINTED CIRCUIT BOARD LAYOUT

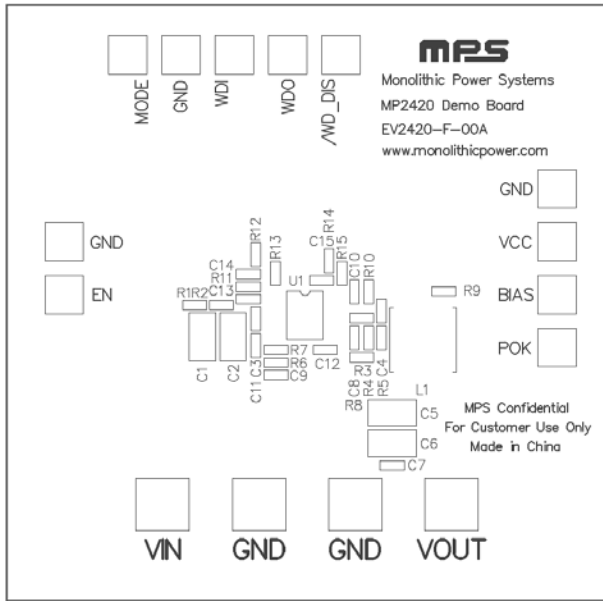


Figure 1: Top Silk Layer

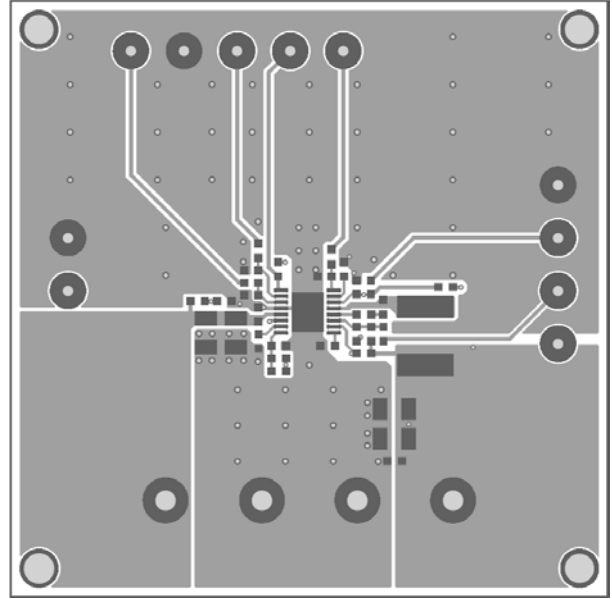


Figure 2: Top Layer

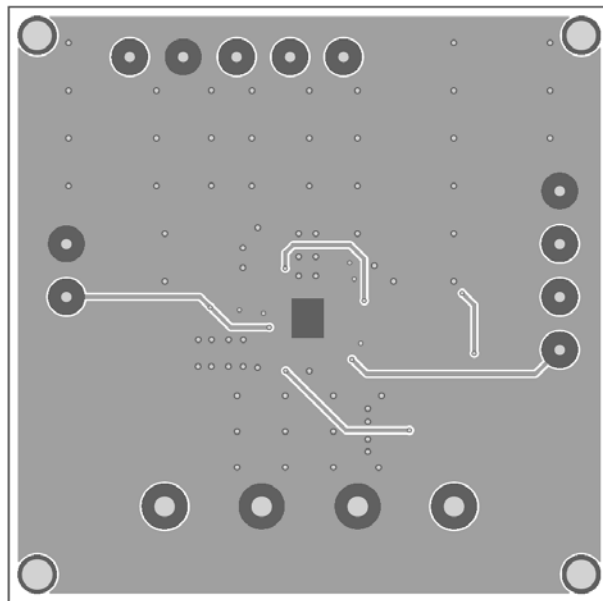


Figure 3: Bottom Layer