



EVBL4423A-Q-00A

3A, 36V, Synchronous
Step-Down Converter
Evaluation Board

DESCRIPTION

The EVBL4423A-Q-00A is an evaluation board for the MP4423A/MPQ4423A with MPS power inductor stuffed. MP4423A/MPQ4423A is a high-frequency, synchronous, rectified, step-down, switch-mode converter with build-in power MOSFETs. It offers a very compact solution to achieve a 3A continuous output current with excellent load and line regulation over a wide input supply range. The MP4423A/MPQ4423A 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 EVBL4423A-Q-00A is assembled and tested with QFN-8 (3mmx3mm) package.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	V _{IN}	4-36	V
Output Voltage	V _{OUT}	3.3	V
Output Current	I _{OUT}	3	A

FEATURES

- Wide 4V to 36V Continuous Operating Input Range
- 85mΩ/55mΩ Low RDS(ON) Internal Power MOSFETs
- High-Efficiency Synchronous Mode Operation
- Forced CCM Mode with default 410kHz Switching Frequency
- Synchronizes to a 200kHz to 2.2MHz External Clock
- High Duty Cycle for Automotive Cold-crank
- Internal Soft-Start
- Power Good
- Over-Current Protection (OCP) and Hiccup
- Thermal Shutdown
- Fully Assembled and Tested
- MPS Power Inductor Stuffed

APPLICATIONS

- Automotive
- Industrial Control System
- Distributed Power Systems

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EVBL4423A-Q-00A EVALUATION BOARD

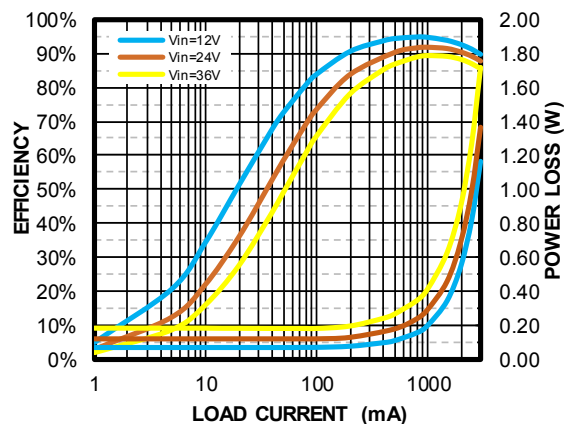


(L x W x H) 2.5" x 2.5" x 0.2"
(6.35cm x 6.35cm x 0.5cm)

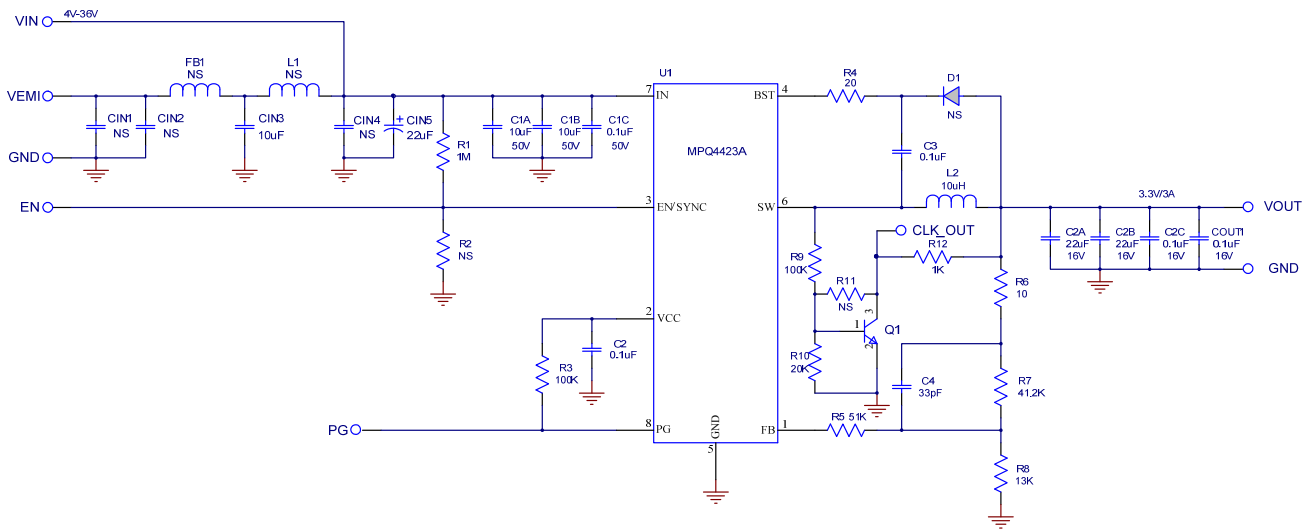
Board Number	MPS IC Number
EVBL4423A-Q-00A	MP4423AGQ

Efficiency vs. Load Current

V_{OUT} = 3.3V



EVALUATION BOARD SCHEMATIC



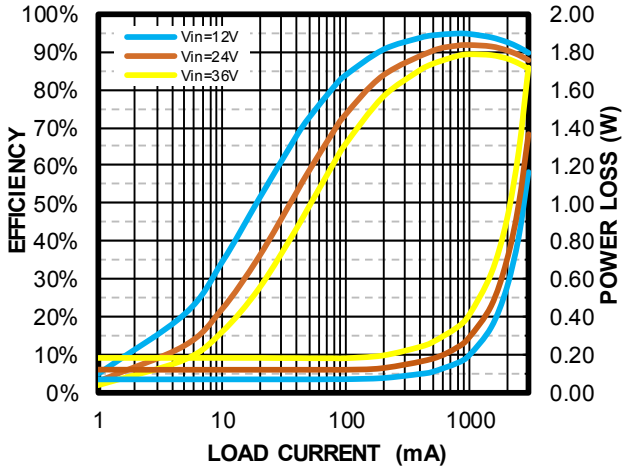
EVBL4423A-Q-00A BILL OF MATERIALS

Qty	RefDes	Value	Description	Package	Manufacturer	Manufacturer_P/N
2	C1A,C1B	10uF	Ceramic Cap., 50V, X7R	1210	muRata	GRM32ER71H106K A12L
1	C1C	0.1uF	Ceramic Cap., 50V, X7R	0603	muRata	GRM188R71H104K A93D
2	C2A,C2B	22uF	Ceramic Cap., 16V, X7R	1210	muRata	GRM32ER71C226K E79
4	C2,C2C,C3,COU1	0.1uF	Ceramic Cap., 16V, X7R	0603	muRata	GRM188R71C104K A01D
1	C4	33pF	Ceramic Cap., 50V, C0G	0603	muRata	GRM1885C1H330JA 01D
4	CIN1-CIN4	NS				
1	CIN5	22uF	Electrolytic Cap.	SMD	Jianghai	VTD-63V22
1	D1	NS				
1	FB1	NS				
1	L1	NS				
1	L2	10uH	Inductor, 27mOhm DCR, 7A	SMD	MPS	MPL-AL6060-100
1	R1	1M	Film Res., 5%	0603	Yageo	RC0603JR-071ML
2	R3,R9	100K	Film Res., 1%	0603	Yageo	RC0603FR-07100KL
1	R4	20	Film Res., 1%	0603	Yageo	RC0603FR-0720RL
1	R5	51K	Film Res., 1%	0603	Yageo	RC0603FR-0751KL
1	R6	10	Film Res., 1%	0603	Yageo	RC0603FR-0710RL
1	R7	41.2K	Film Res., 1%	0603	Yageo	RC0603FR-0741K2L
1	R8	13K	Film Res., 1%	0603	Yageo	RC0603FR-0713KL
1	R10	20K	Film Res., 1%	0603	Yageo	RC0603FR-0720KL
1	R12	1K	Film Res., 1%	0603	Yageo	RC0603FR-071KL
2	R2,R11	NS				
1	Q1		Transistor, 40V, 0.2A	SOT-23	ON Semiconductor	MMBT3904LT1
1	U1		Step-Down Regulator	QFN3X3-8	MPS	MP4423AGQ
5	VIN, VEMI, GND, VOUT, GND		2.0 Golden Pin		HZ	
5	EN/SYNC, GND, PG, GND, CLK, OUT		1.0 Golden Pin		HZ	

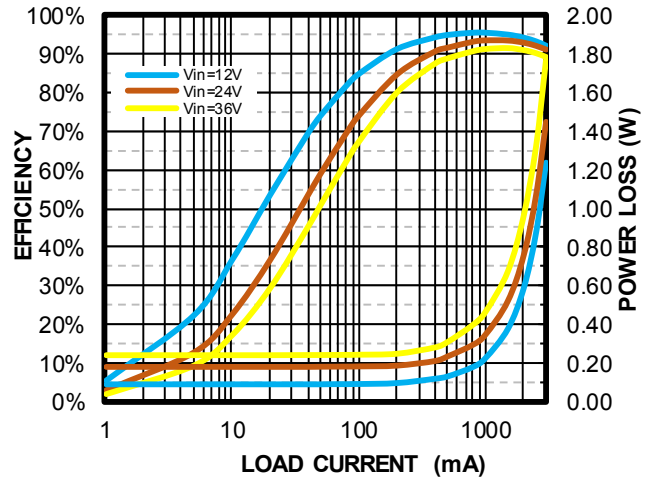
EVB TEST RESULTS

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $C_{OUT} = 2x22\mu F$, $L = 10\mu H$, $T_A = +25^\circ C$, unless otherwise noted.

Efficiency vs. Load Current
 $V_{OUT} = 3.3V$



Efficiency vs. Load Current
 $V_{OUT} = 5V$

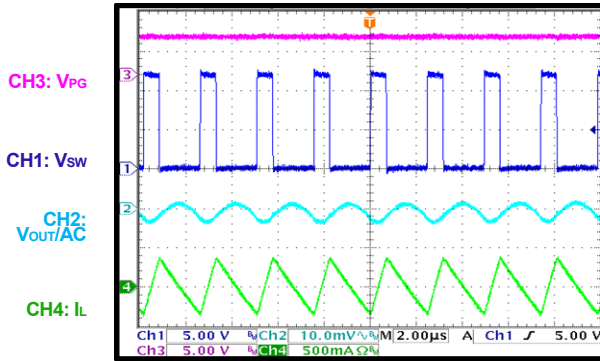


EVB TEST RESULTS (continued)

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $C_{OUT} = 2 \times 22\mu F$, $L = 10\mu H$, $T_A = +25^\circ C$, unless otherwise noted.

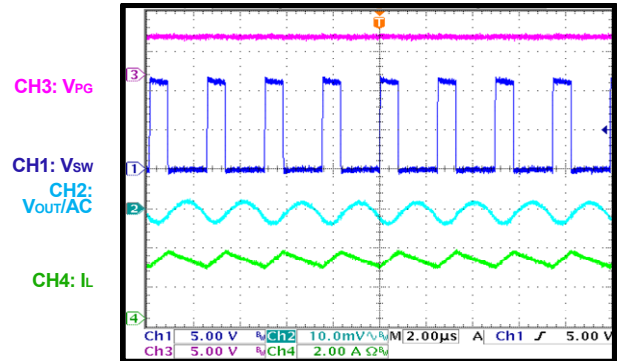
Steady State

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 0A$



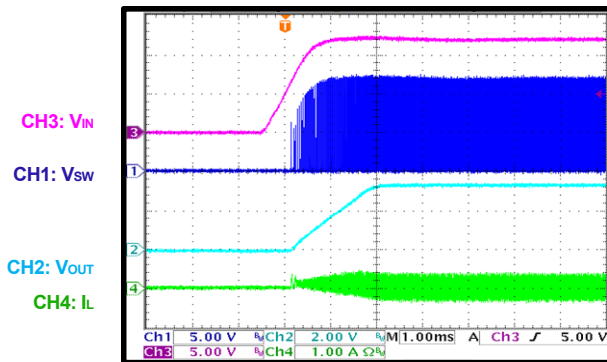
Steady State

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 3A$



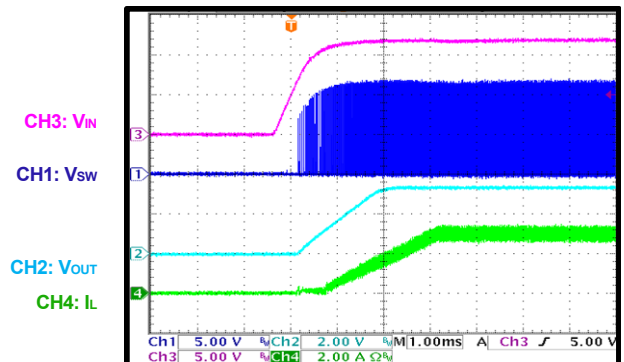
Power On

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 0A$



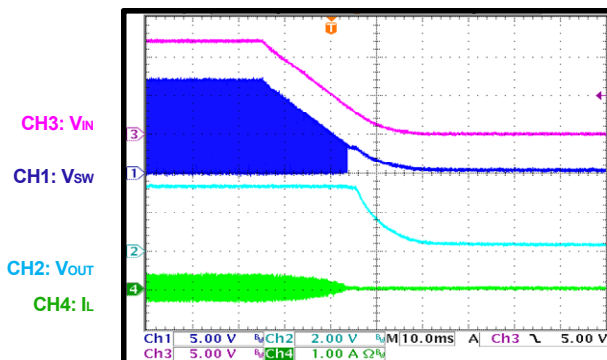
Power On

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 3A$



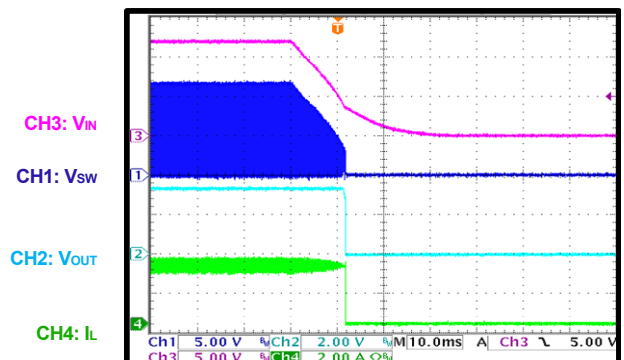
Power Off

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 0A$



Power Off

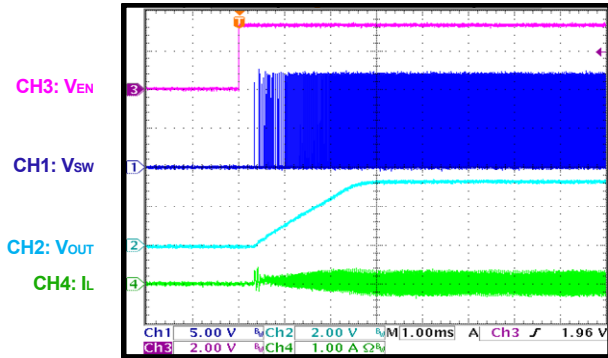
$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 3A$



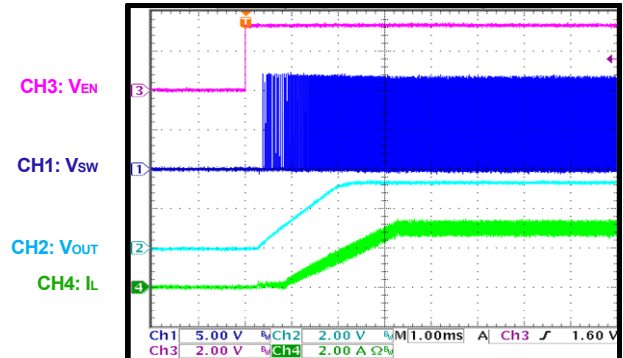
EVB TEST RESULTS (continued)

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $C_{OUT} = 2 \times 22\mu F$, $L = 10\mu H$, $T_A = +25^\circ C$, unless otherwise noted.

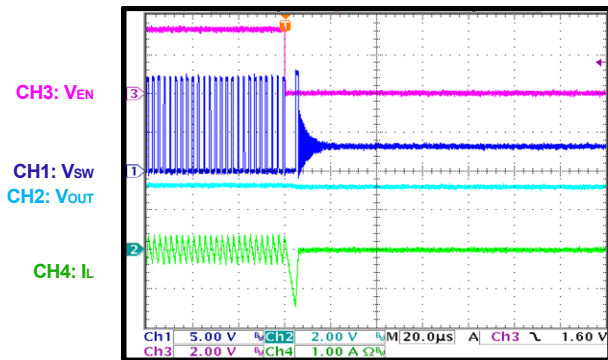
En On
 $V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 0A$



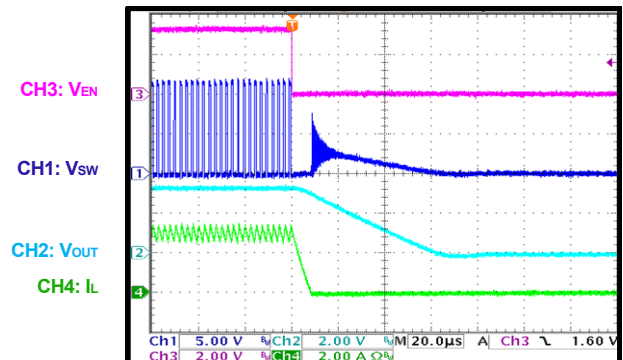
En On
 $V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 3A$



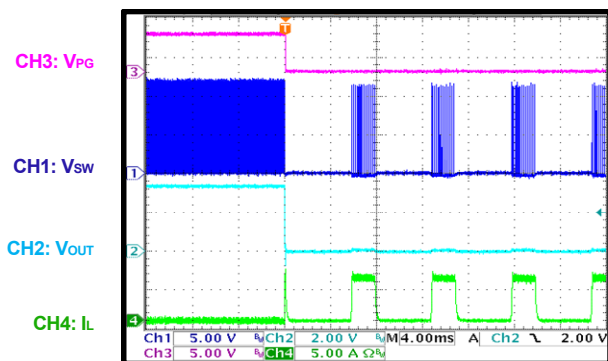
En Off
 $I_{OUT} = 0A$



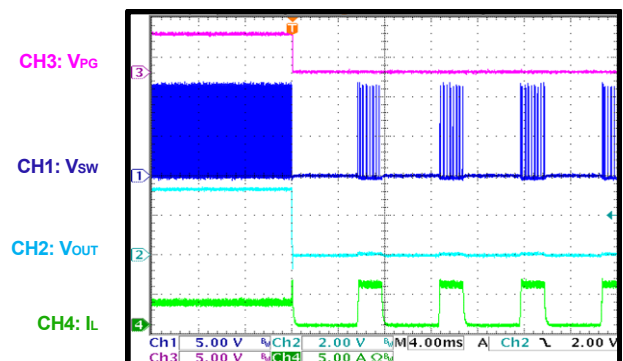
En Off
 $I_{OUT} = 3A$



SCP Entry
 $V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 0A$



SCP Entry
 $V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 3A$

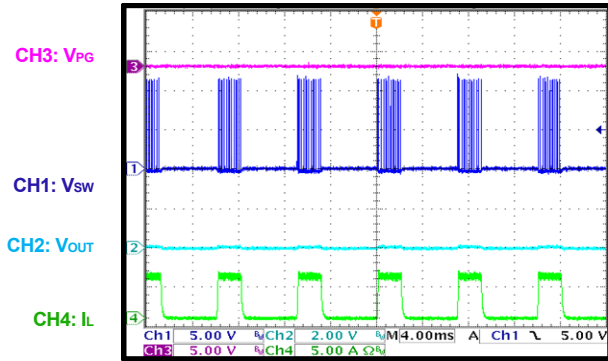


EVB TEST RESULTS (continued)

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $C_{OUT} = 2 \times 22\mu F$, $L = 10\mu H$, $T_A = +25^\circ C$, unless otherwise noted.

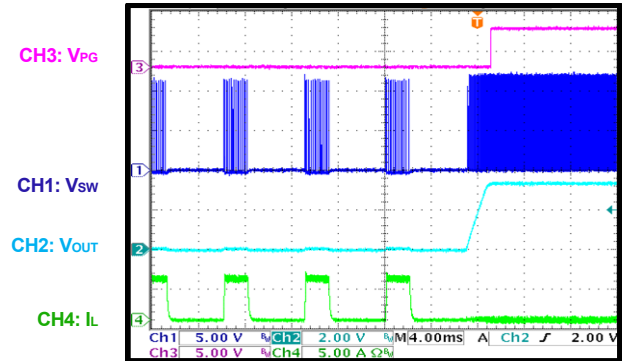
SCP Steady State

$V_{IN} = 12V$



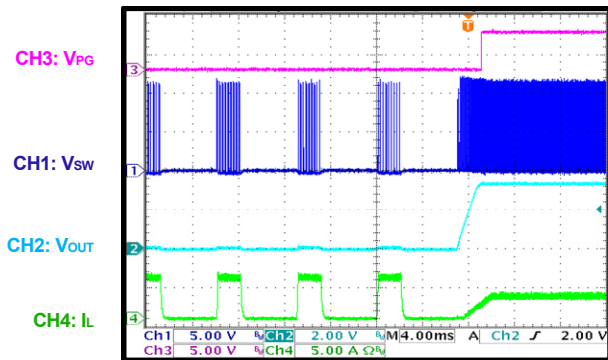
SCP Recovery

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 0A$



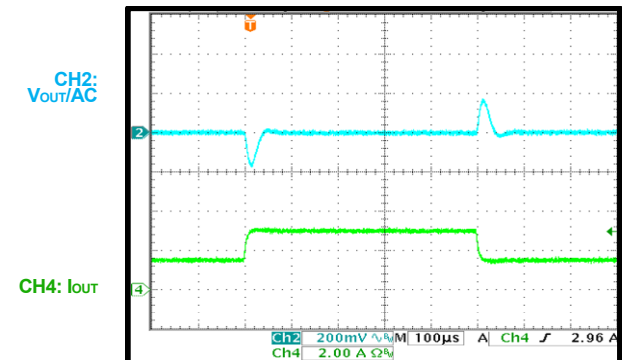
SCP Recovery

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 3A$



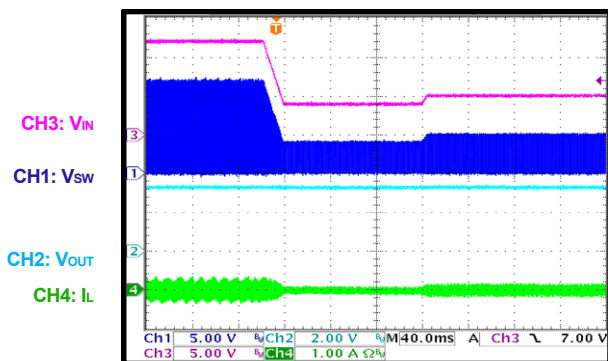
Load Transient

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 1.5A - 3A$



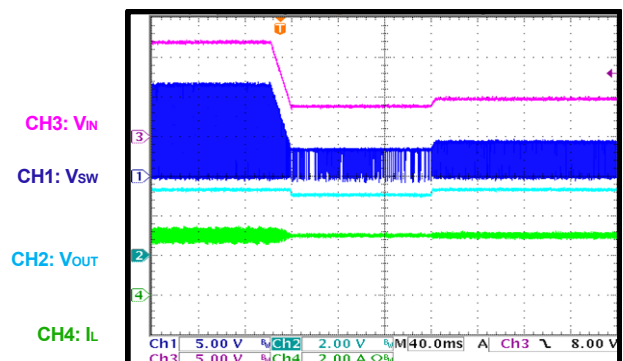
Cold Crank

$V_{IN} = 12V \rightarrow 4V \rightarrow 5V$, $I_{OUT} = 0A$



Cold Crank

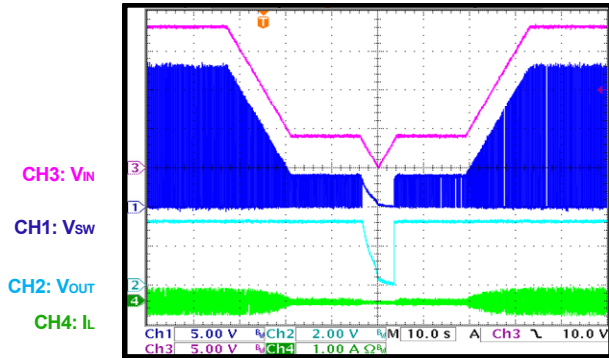
$V_{IN} = 12V \rightarrow 4V \rightarrow 5V$, $I_{OUT} = 3A$



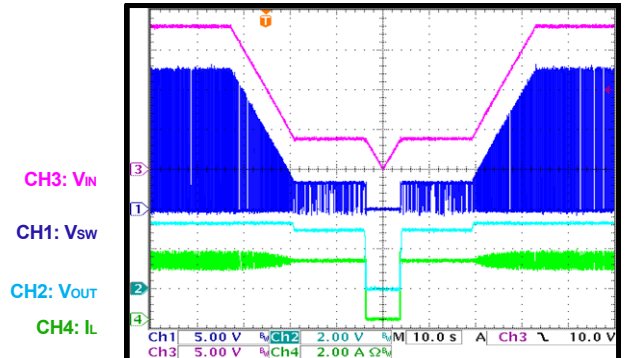
EVB TEST RESULTS (continued)

$V_{IN} = 12V$, $V_{OUT} = 3.3V$, $C_{OUT} = 2 \times 22\mu F$, $L = 10\mu H$, $T_A = +25^\circ C$, unless otherwise noted.

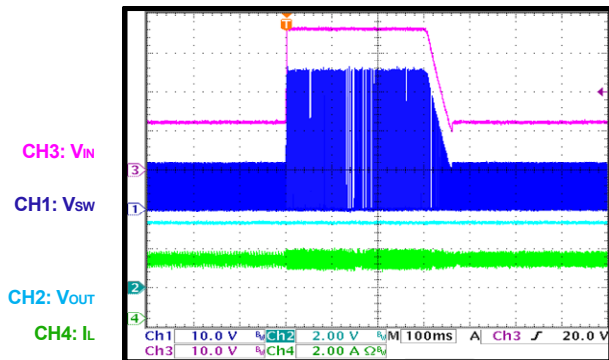
V_{IN} Ramp Down and Up
 $V_{IN} = 18V \rightarrow 4V \rightarrow 0V \rightarrow 4V \rightarrow 18V$, $I_{OUT} = 0A$



V_{IN} Ramp Down and Up
 $V_{IN} = 18V \rightarrow 4V \rightarrow 0V \rightarrow 4V \rightarrow 18V$, $I_{OUT} = 3A$



Load Dump
 $V_{IN} = 12V \rightarrow 36V \rightarrow 12V$, $I_{OUT} = 3A$



PRINTED CIRCUIT LAYOUT

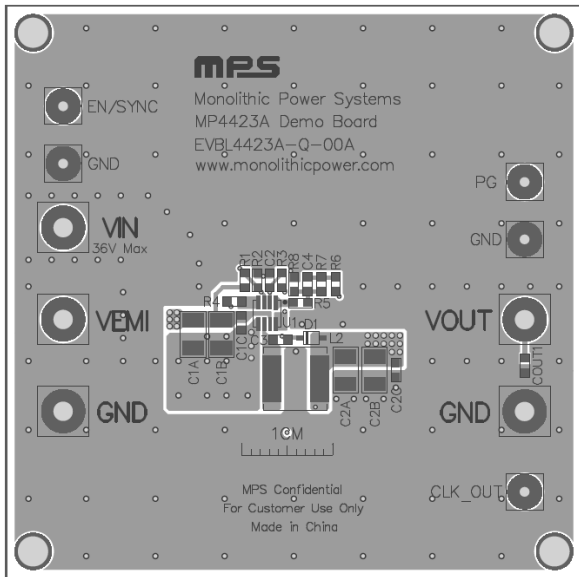


Figure 1: Top Silk Layer And Top Layer

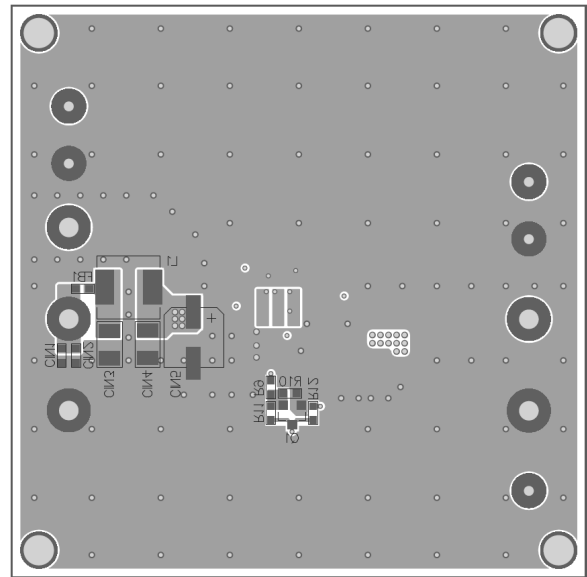


Figure 2: Bottom Silk Layer And Bottom Layer

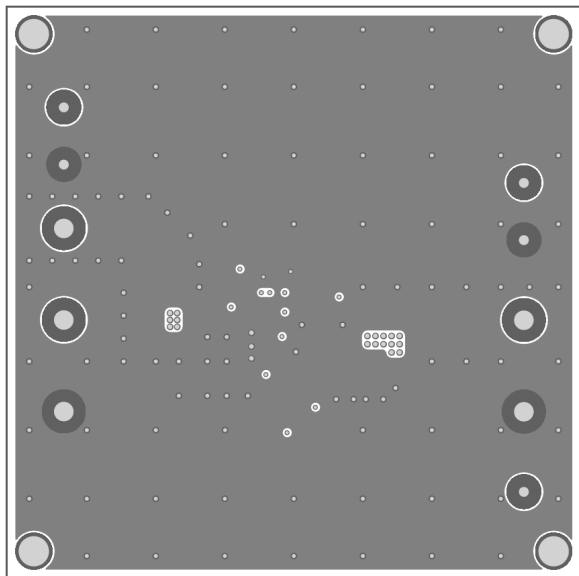


Figure 3: Inner1 Layer

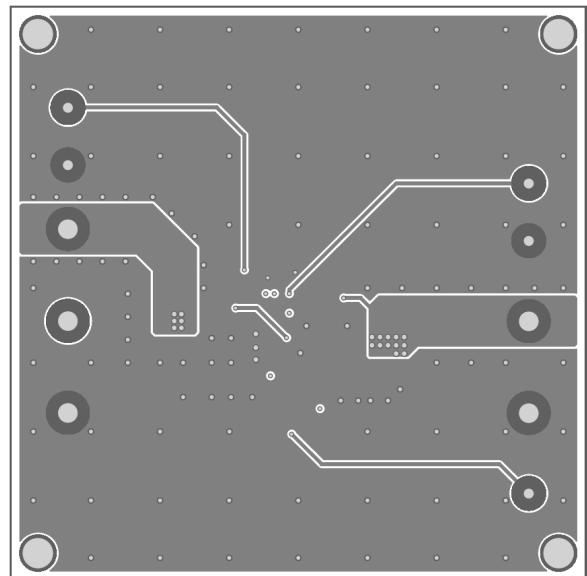


Figure 4: Inner2 Layer

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