



The Future of Analog IC Technology®

EV2169-RH-00A

6V, Dual 3A/1A or 2A/2A
Low IQ, Synchronous Buck
with PG and SS
Evaluation Board

DESCRIPTION

The EV2169-RH-00A is an evaluation board for the MPQ2169, an internally compensated, dual, PWM, synchronous, step-down regulator that operates from a 2.7V to 6V input and generates an output voltage as low as 0.6V.

The MPQ2169 can be configured as a 2A/2A or 3A/1A output current regulator and is ideal for powering portable equipment that runs on a single-cell lithium-ion (Li+) battery due to a low 60µA quiescent current.

The MPQ2169 integrates dual, 55mΩ, high-side switches and 20mΩ synchronous rectifiers for high efficiency without an external Schottky diode. The MPQ2169 has peak-current-mode control and internal compensation and is capable of low dropout configurations. Both channels can operate at 100% duty cycle.

Fault condition protections include cycle-by-cycle current limit and thermal shutdown.

The EV2169-RH-00A is assembled and tested with a QFN-18 (2.5mmx3.5mm) package.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	V _{IN}	2.7-6	V
Output Voltage	V _{OUT}	1.8/1.2	V
Output Current	I _{OUT}	3/1 or 2/2	A

FEATURES

- 2.7V to 6V Operating Input Range
- 3A/1A or 2A/2A Output Current
- Programmed Frequency up to 3MHz
- External Sync Clock Up to 3MHz
- 180° Phase Shifted Operation
- PG Indicators
- External SS and Track
- Adjustable Advanced Asynchronous Mode (AAM) or Forced Continuous Conduction Mode (CCM)
- Peak Efficiency >90%
- Output Adjustable from 0.6V to V_{IN}
- 100% Duty Cycle Operation
- Fully Assembled and Tested

APPLICATIONS

- Small/Handheld Devices
- DVD Drivers
- Smart phones and Feature Phones
- Battery-Powered Devices
- Portable Instruments

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

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EV2169-RH-00A EVALUATION BOARD

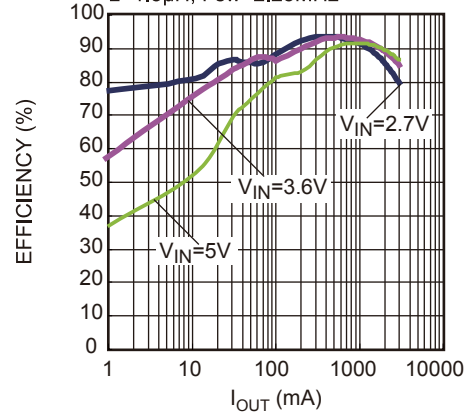


(L x W x H) 2.5" x 2.5" x 0.2"
(6.35cm x 6.35cm x 0.5cm)

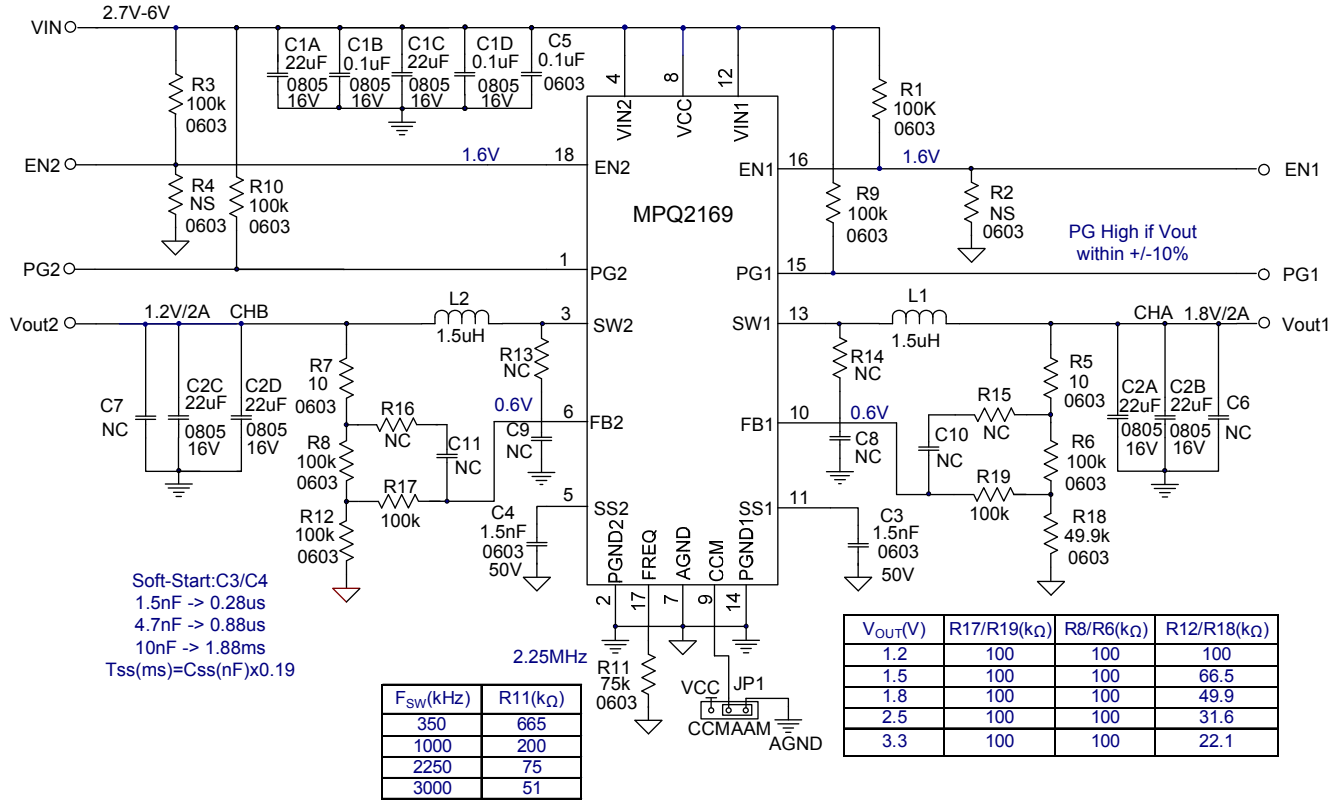
Board Number	MPS IC Number
EV2169-RH-00A	MPQ2169

Efficiency vs. Load Current

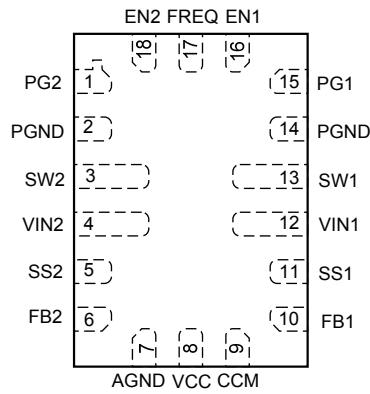
$V_{OUT1}=1.8V$, AAM, one channel on,
 $L=1.5\mu H$, $F_{sw}=2.25MHz$



EVALUATION BOARD SCHEMATIC



PACKAGE REFERENCE



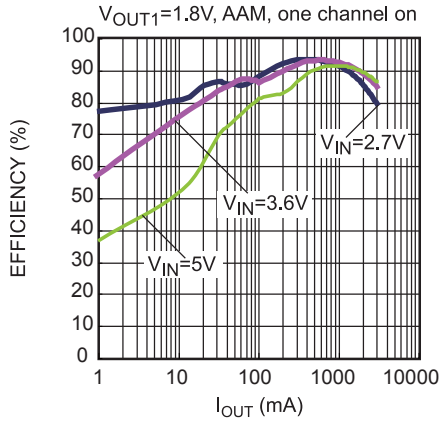
EV2169-RH-00A BILL OF MATERIALS

RefDes	Value	Description	Package	Manufacturer	Manufacturer_P/N
C1A, C1C, C2A, C2B C2C, C2D	22 μ F	Ceramic Cap;16V;X5R	0805	muRata	GRM21BR61C226ME44L
C1B, C1D	0.1 μ F	Ceramic Cap;16V;X7R	0805	muRata	GRM219R71C104KA01D
C3, C4	1.5nF	Ceramic Cap;50V;X7R	0603	muRata	GRM188R71H153KA01D
C5	0.1 μ F	Ceramic Cap;16V;X5R	0603	muRata	GRM188R61C104KA01D
C6, C7, C8, C9, C10, C11	NS				
L1, L2	1.5 μ H	Inductor; 1.5 μ H; 15.8m; 9.1A	SMD	Coilcraft	XFL4020-152MEB
R1,R3,R6, R8,R9, R10,R12, R17,R19	100K	Film Resistor;1%;	0603	Yageo	RC0603FR-07100KL
R5,R7	10	Film Resistor;1%;	0603	Yageo	RC0603FR-0710RL
R2, R4, R13, R14,R15, R16	NS				
R11	75K	Film Resistor;1%;	0603	Yageo	RC0603FR-0775KL
U1		Step-Down Converter	QFN-18 (2.5x3.5mm)	MPS	MPQ2169GRH
CN1		Connector; 2.54mm;		any	
VIN, VEMI,GND, GND, VOUT1, VOUT2	Test Point	2.0 Golden Pin		HZ	

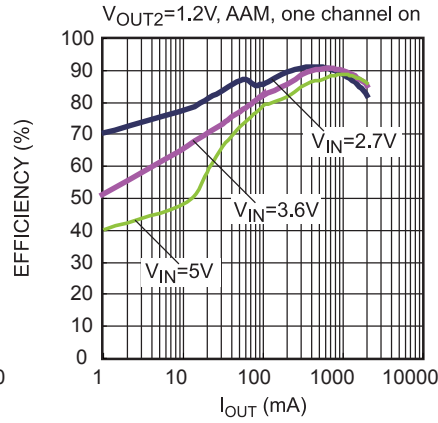
EVB TEST RESULTS

$V_{IN} = 5V$, $V_{OUT1} = 1.8V$, $V_{OUT2} = 1.2V$, $L1 = L2 = 1.5\mu H$, $F_{SW} = 2.25MHz$, $T_A = 25^\circ C$, unless otherwise noted.

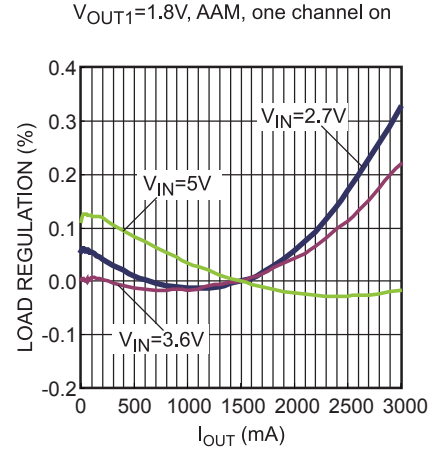
Efficiency vs. Load Current



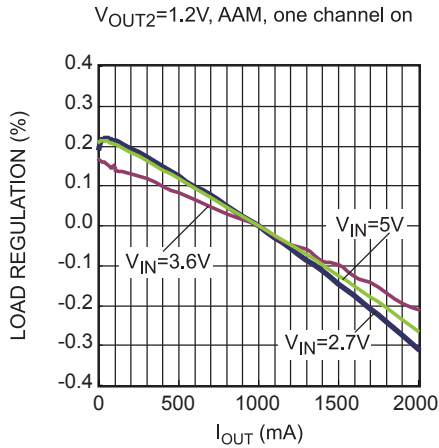
Efficiency vs. Load Current



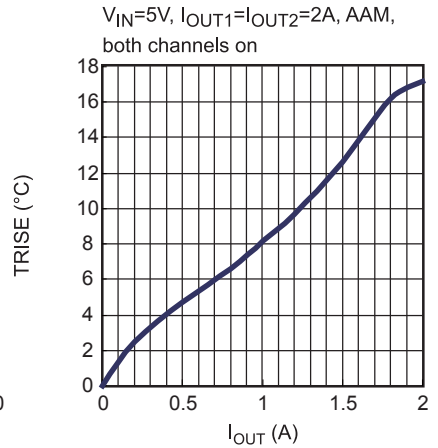
Load Regulation



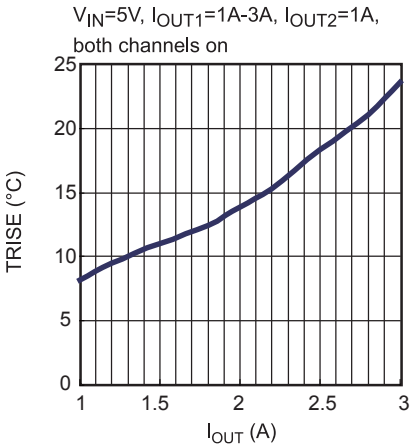
Load Regulation



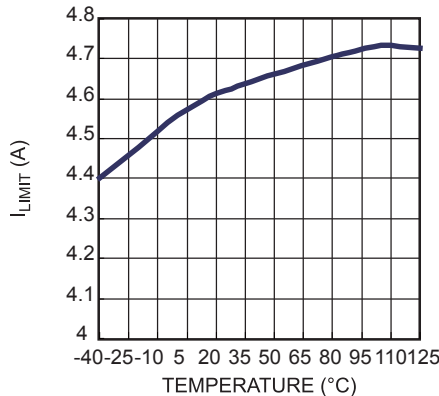
Case Thermal Rise



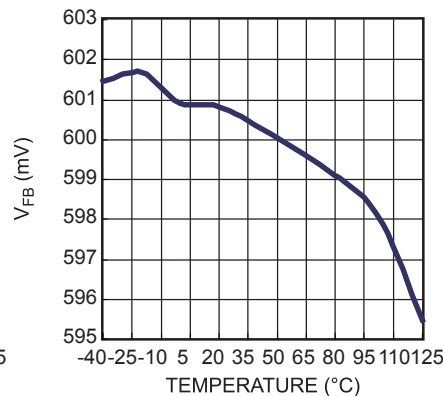
Case Temp Rise



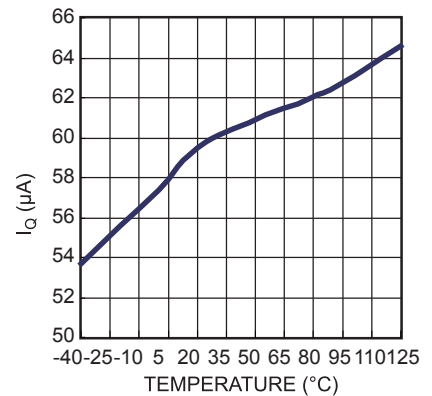
I_{LIMIT} vs. Temperature



V_{FB} vs. Temperature

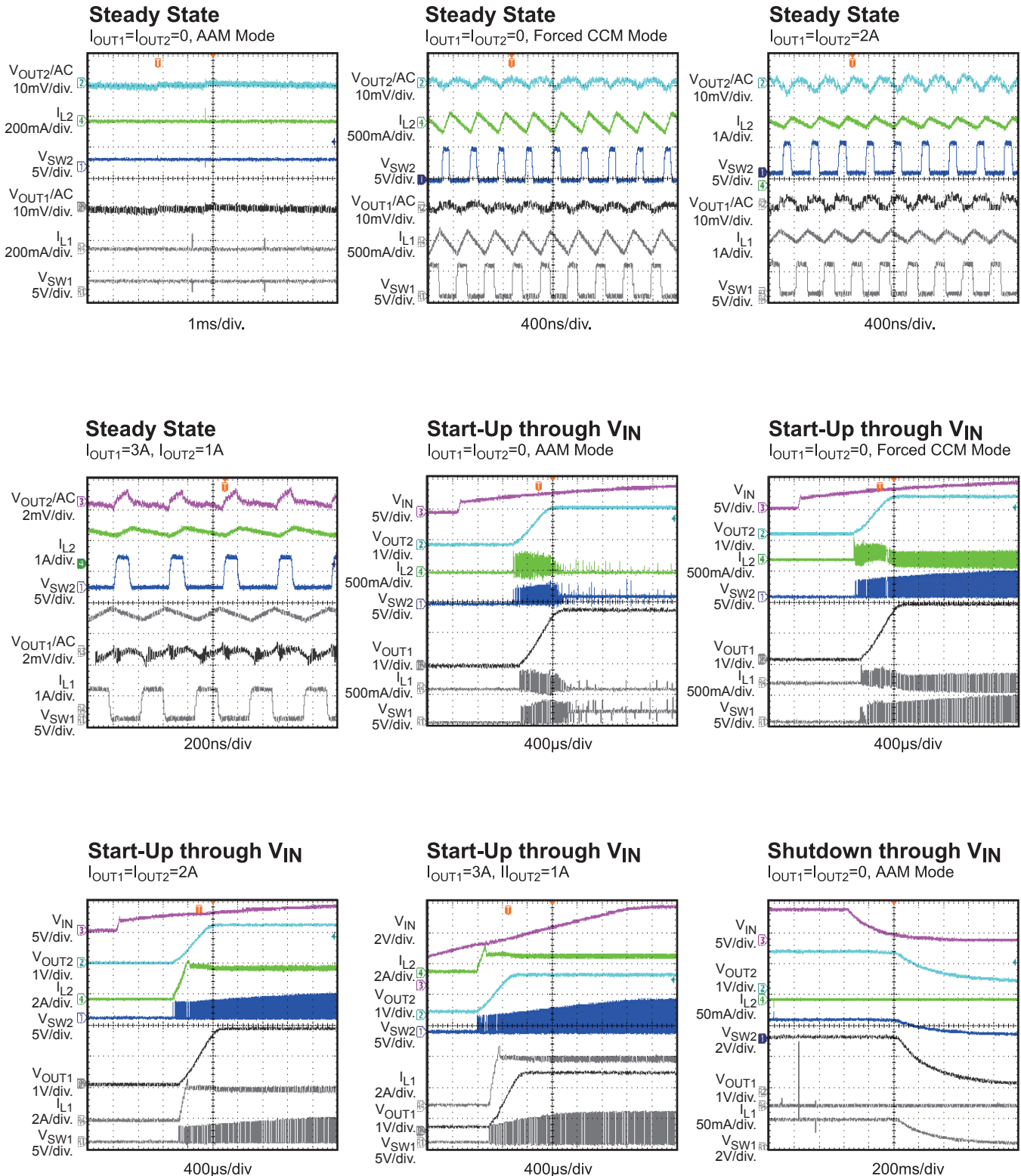


I_Q vs. Temperature



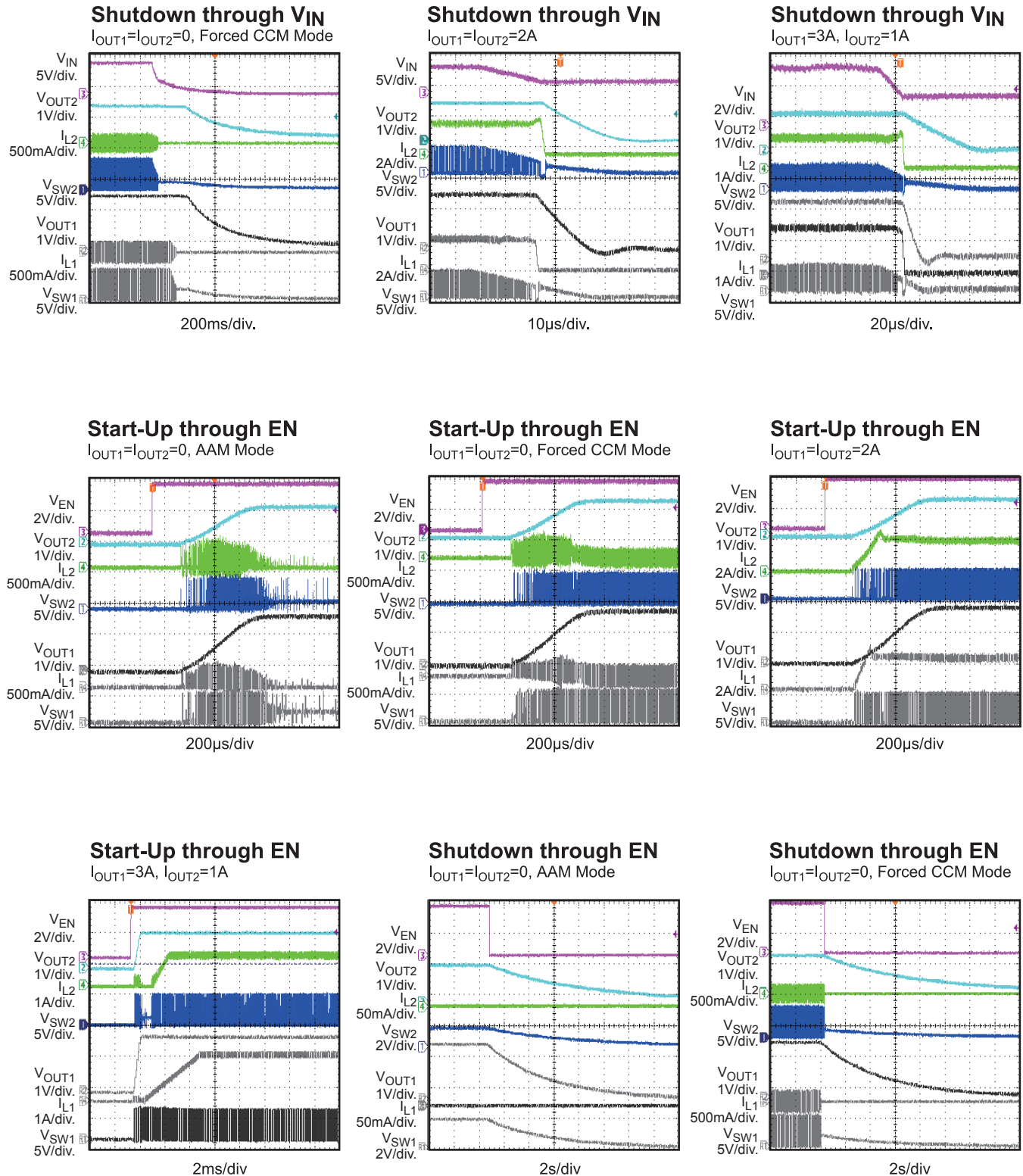
EVB TEST RESULTS

$V_{IN} = 5V$, $V_{OUT1} = 1.8V$, $V_{OUT2} = 1.2V$, $L1 = L2 = 1.5\mu H$, $F_{SW} = 2.25MHz$, $T_A = 25^\circ C$, unless otherwise noted.



EVB TEST RESULTS

$V_{IN} = 5V$, $V_{OUT1} = 1.8V$, $V_{OUT2} = 1.2V$, $L1 = L2 = 1.5\mu H$, $F_{SW} = 2.25MHz$, $T_A = 25^\circ C$, unless otherwise noted.

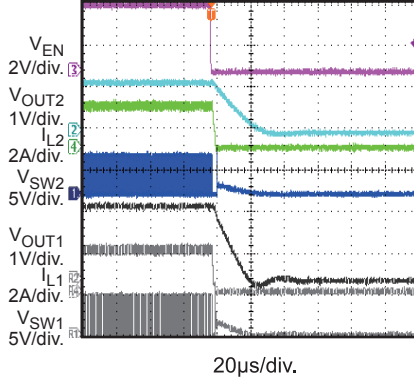


EVB TEST RESULTS

$V_{IN} = 5V$, $V_{OUT1} = 1.8V$, $V_{OUT2} = 1.2V$, $L1 = L2 = 1.5\mu H$, $F_{SW} = 2.25MHz$, $T_A = 25^\circ C$, unless otherwise noted.

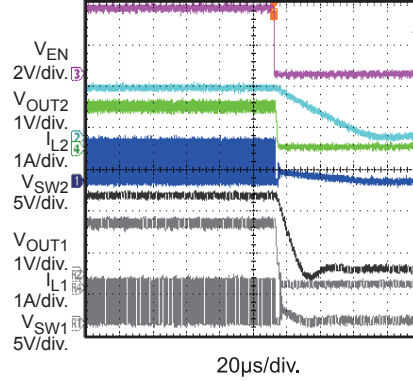
Shutdown through EN

$I_{OUT1} = I_{OUT2} = 2A$



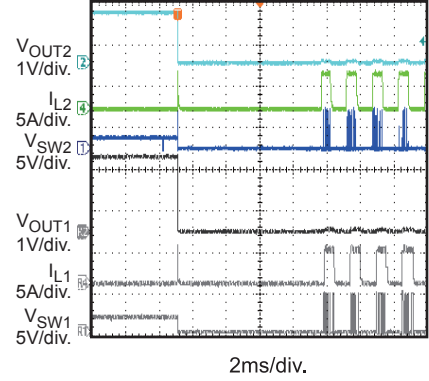
Shutdown through EN

$I_{OUT1} = 3A$, $I_{OUT2} = 1A$



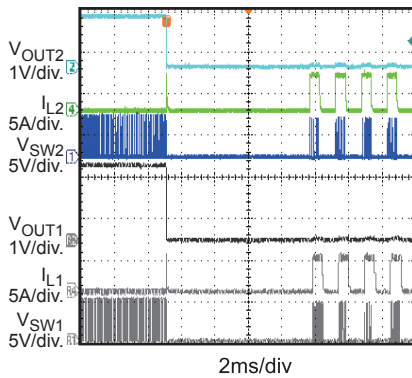
SCP Entry

$I_{OUT1} = I_{OUT2} = 0$, AAM Mode



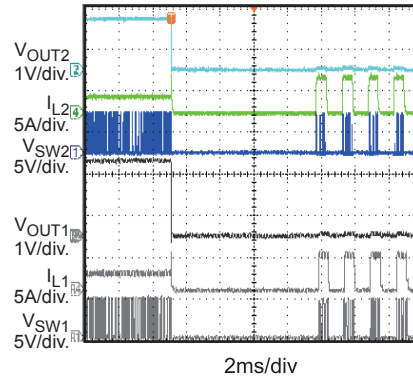
SCP Entry

$I_{OUT1} = I_{OUT2} = 0$, Forced CCM Mode



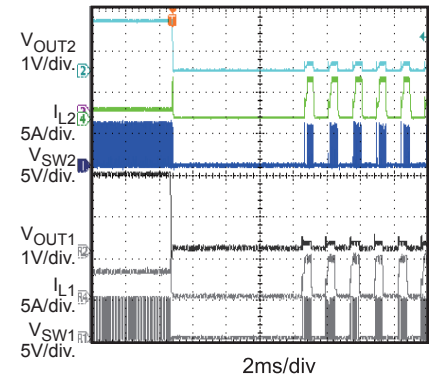
SCP Entry

$I_{OUT1} = I_{OUT2} = 2A$



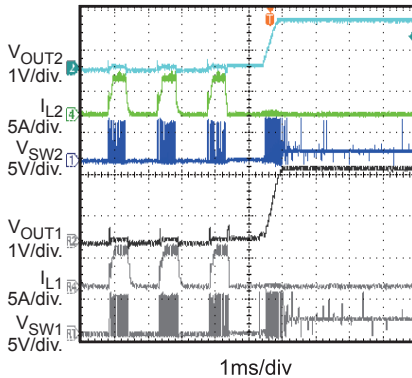
SCP Entry

$I_{OUT1} = 3A$, $I_{OUT2} = 1A$



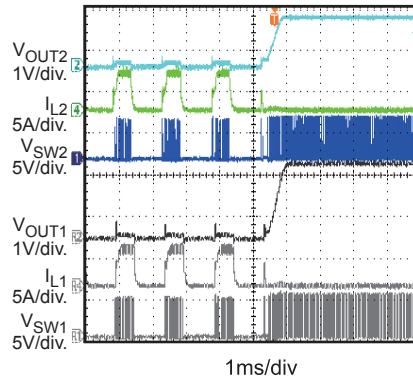
SCP Recovery

$I_{OUT1} = I_{OUT2} = 0$, AAM Mode



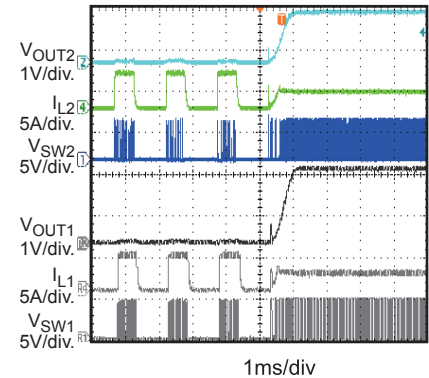
SCP Recovery

$I_{OUT1} = I_{OUT2} = 0$, Forced CCM Mode



SCP Recovery

$I_{OUT1} = I_{OUT2} = 2A$

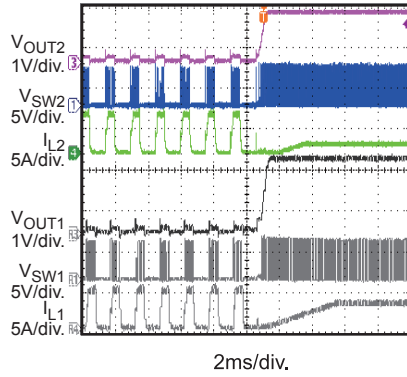


EVB TEST RESULTS

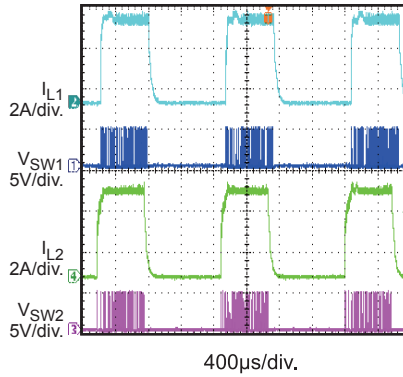
$V_{IN} = 5V$, $V_{OUT1} = 1.8V$, $V_{OUT2} = 1.2V$, $L1 = L2 = 1.5\mu H$, $F_{SW} = 2.25MHz$, $T_A = 25^\circ C$, unless otherwise noted.

SCP Recovery

$I_{OUT1}=3A$, $I_{OUT2}=1A$

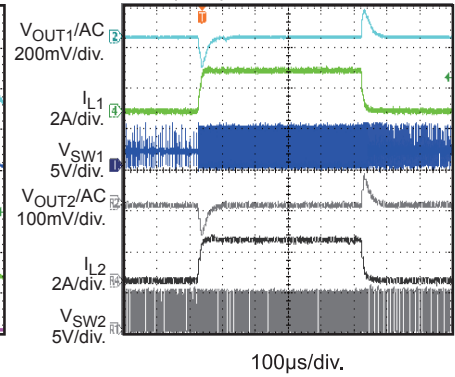


SCP Steady State



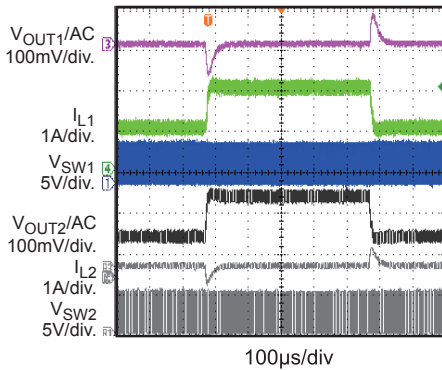
Load Transient

$I_{OUT1}=I_{OUT2}=0$ to 2A, AAM Mode, 1.6A/µS Speed



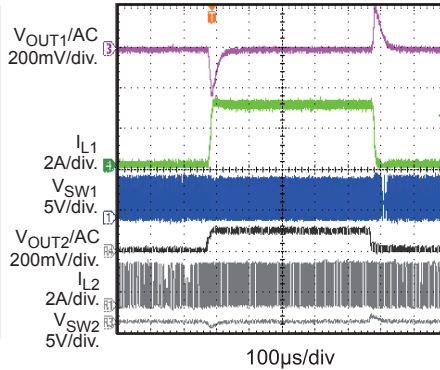
Load Transient

$I_{OUT1}=I_{OUT2}=1$ to 2A, AAM Mode, 1.6A/µS Speed



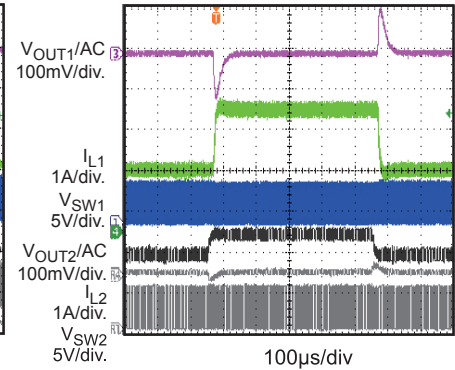
Load Transient

$I_{OUT1}=0$ to 3A, $I_{OUT2}=0$ to 1A, 1.6A/µS Speed

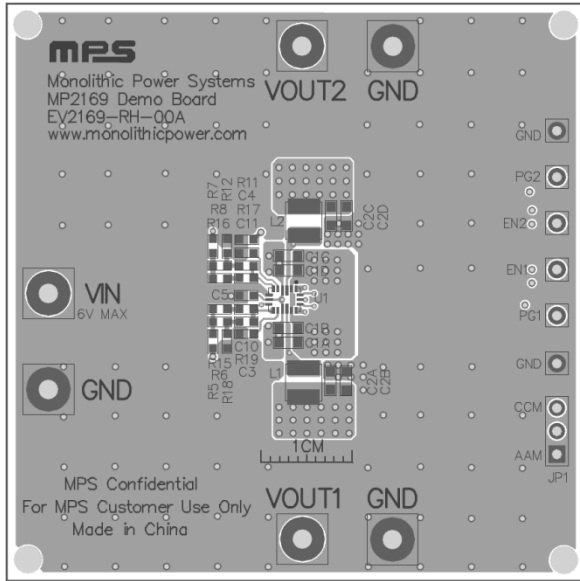


Load Transient

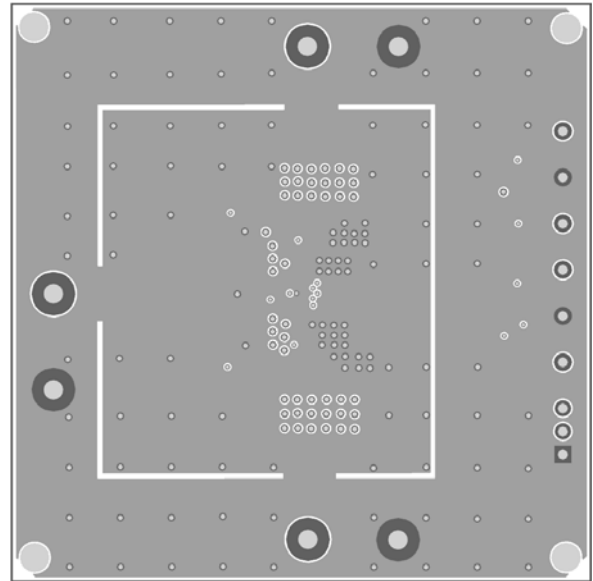
$I_{OUT1}=1.5$ to 3A, $I_{OUT2}=0.5$ to 1A, 1.6A/µS Speed



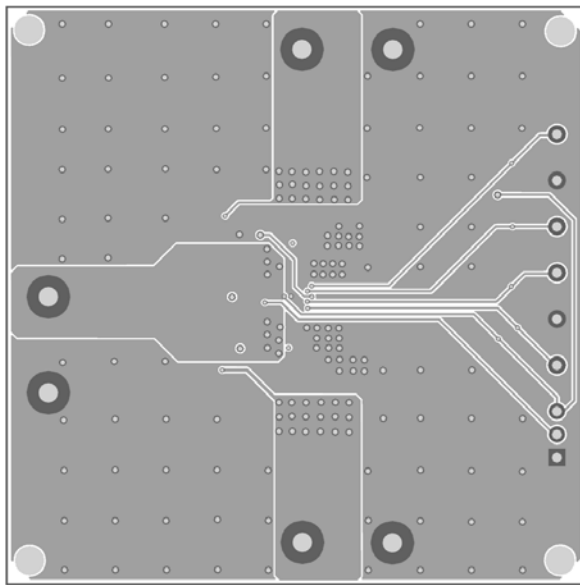
PRINTED CIRCUIT LAYOUT



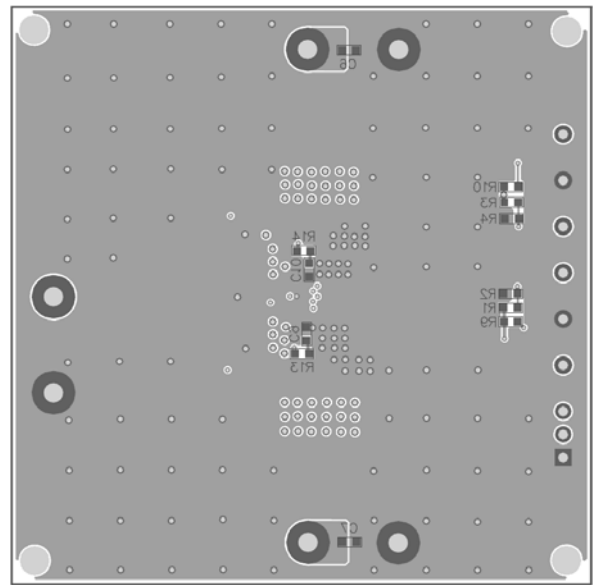
Top Silk & Top Layer



Inner1 Layer



Inner2 Layer



Bottom Silk & Bottom Layer