



## **Demo Note for the A8580 Evaluation Board**

**4.0V<sub>IN</sub> – 40V<sub>IN</sub>, 5.0V<sub>OUT</sub>, 2.5A, 425KHz  
Asynchronous Buck Regulator with  
Low IQ PFM Mode**



## GENERAL SPECIFICATIONS

Specification	Min	Nom	Max	Units
Absolute Maximum Input Voltage	-0.3	-	40	Volts
Operating Input Voltage Range	4.0	12	35	Volts
V <sub>IN</sub> <b>START</b> Threshold, V <sub>IN</sub> rising	3.6	3.8	4.0	Volts
V <sub>IN</sub> <b>STOP</b> Threshold, V <sub>IN</sub> falling	3.2	3.4	3.6	Volts
Output Voltage (FB: 47K/147K, ±1%)	4.90	5.08	5.28	Volts
Steady-State Output Current (12V <sub>IN</sub> )	-	2.5	-	A
Pulse-by-pulse Current Limit @ 30% duty	3.12	3.69	4.25	A
PWM/PFMn Input	-0.3	-	5.5	Volts

## OPERATING INSTRUCTIONS

### Input Power Connection:

Connect a 12V power supply from V<sub>IN</sub> to GND that is capable of at least 2.5A. **Once operational, V<sub>IN</sub> can fall as low as 3.4V<sub>TYP</sub> (3.6V<sub>MAX</sub>) before the A8580 is reset.**

### PWM/PFMn Input and DIP switch SW1 (SLEEPn):

**Connect an external voltage to the PWM/PFMn input and set SW1 (SLEEPn) to control the A8580's operating mode.** The following table summarizes the A8580's operating modes based on SW1 (SLEEPn) and the PWM/PFMn input. Also, PWM/PFMn may be used to synchronize the A8580 PWM switching frequency by applying a square wave above 510KHz.

SW1 (SLEEPn)	PWM/PFMn	Operating Mode
<b>OFF</b> (SLEEPn < 0.5V)	N/A	Low current SLEEP mode, no output voltage
<b>ON</b> (SLEEPn > 2.1V)	< 0.8V	Low IQ PFM mode, supports up to 500mA <sub>TYP</sub>
	> 2.6V	Normal PWM mode at 425KHz, supports up to 2.5A
	CLK signal	Normal PWM mode, synchronized to external CLK

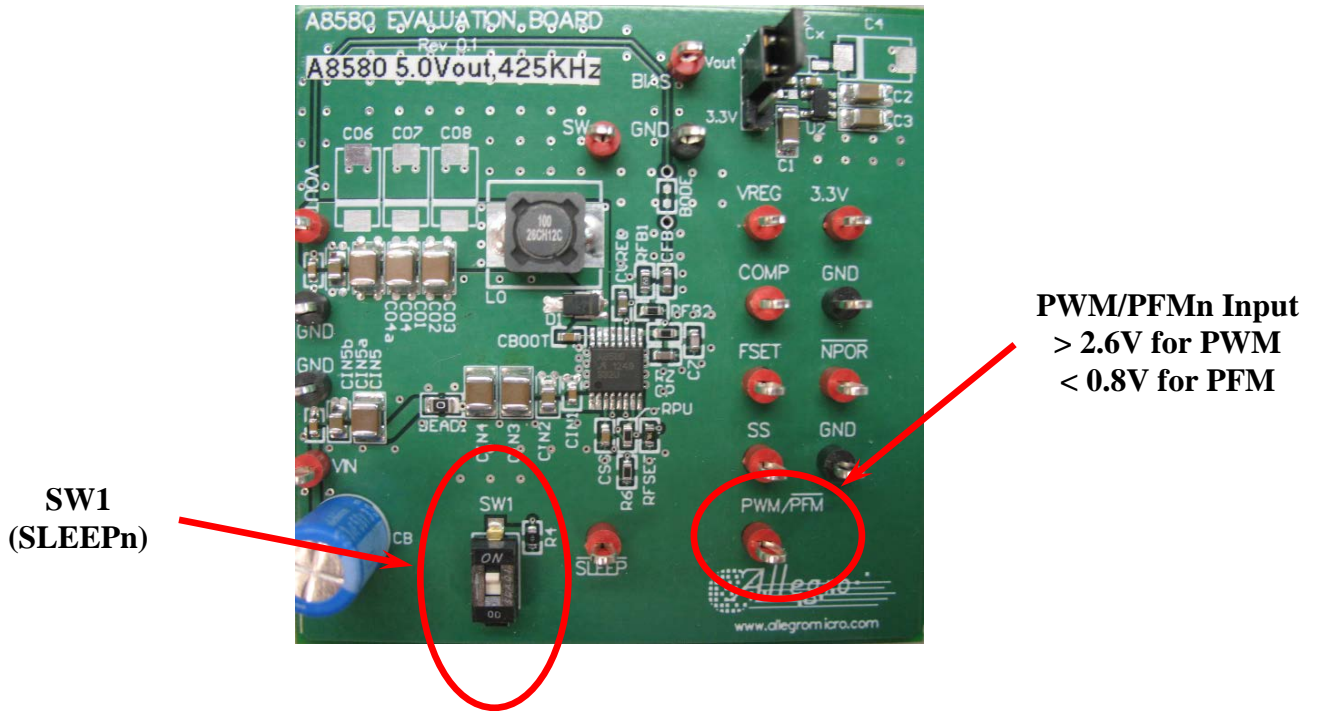
Note: Set SW1 to the "OFF" position before driving the SLEEPn test point by a pulse generator or an external power supply.

**Note: Continuously applying more than 5.5V to the PWM/PFMn pin may damage the A8580.**

### Output Load Connections:

Connect a load from V<sub>OUT</sub> to GND. The steady-state load current can be as high as 2.5A. Pulse-by-pulse current limit and/or thermal shutdown will occur if the load is greater than 3.7A.

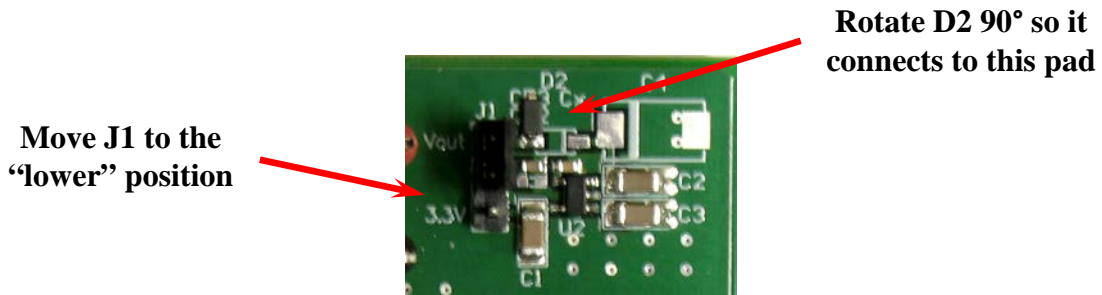
## DEMO BOARD PICTURE



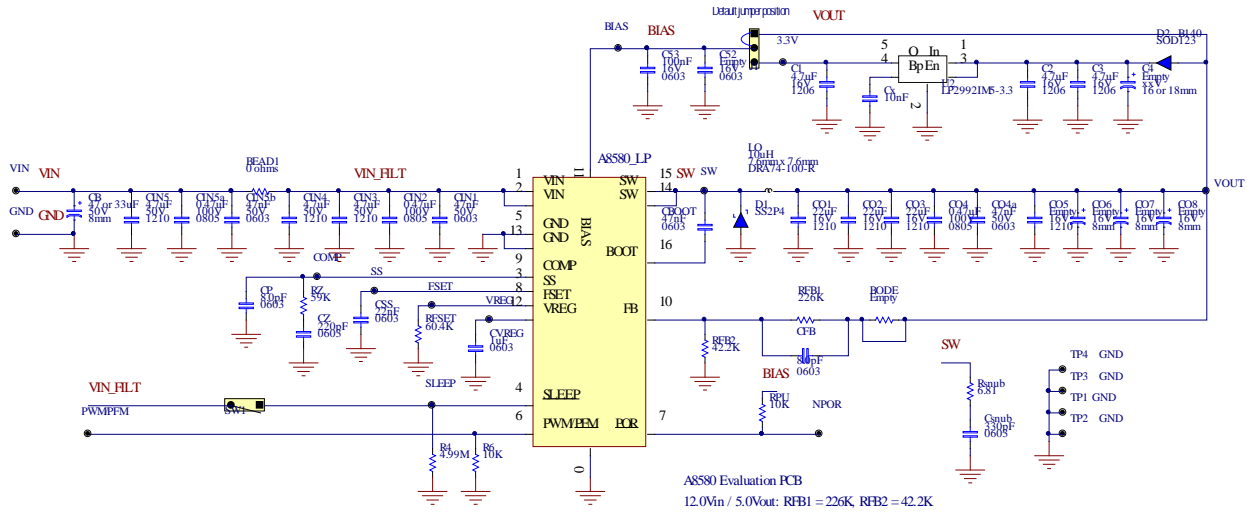
## MODIFYING THE DEMO BOARD TO PRODUCE $V_{OUT} > 5.5V$

If the demo board is modified to produce more than 5.5V<sub>out</sub> two changes must be made:

- 1) Jumper J1 must be set to the “lower” position (shown below) so the on-board 3.3V LDO (U2) will deliver the BIAS voltage to the A8580.
- 2) Diode D2 must be rotated 90° clockwise so it is “in circuit” and the 3.3V LDO (U2) will operate. If U2 is operational, the Low IQ current of the EVB will increase.



# DEMO BOARD SCHEMATIC

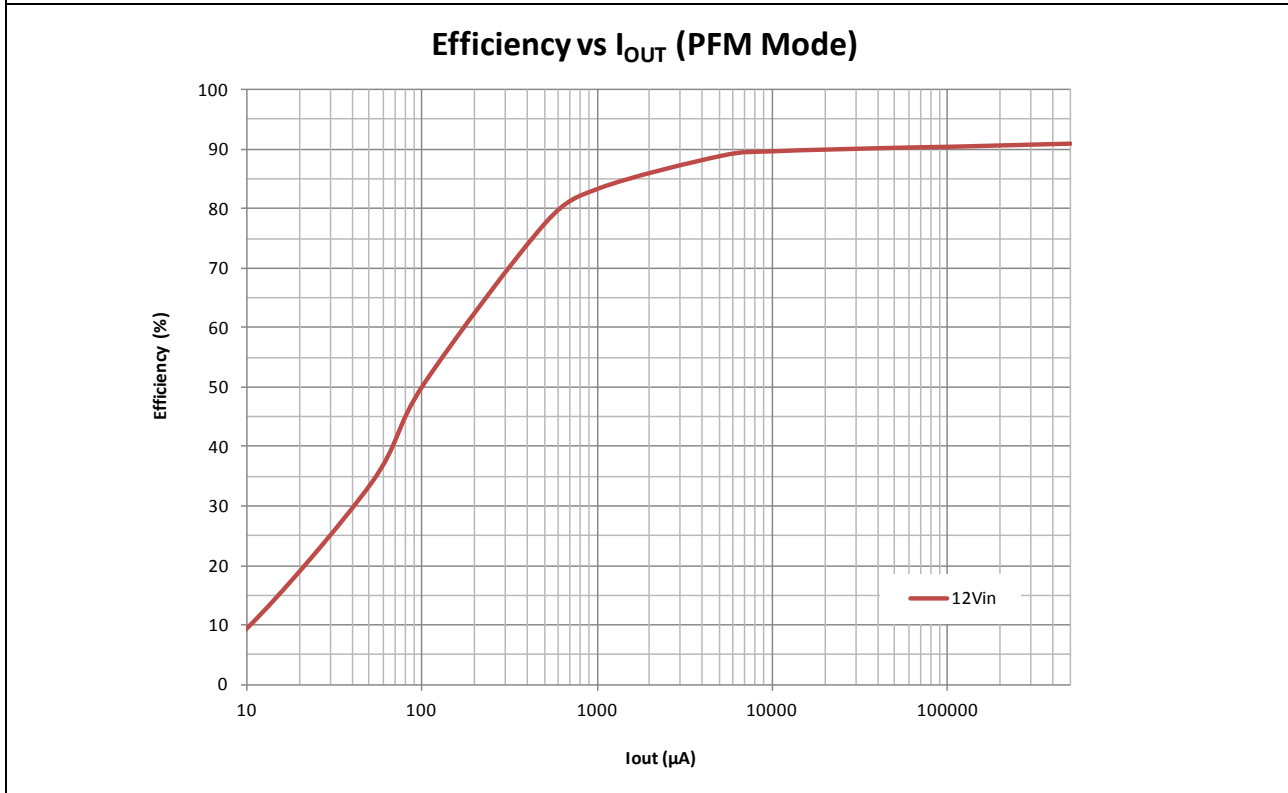
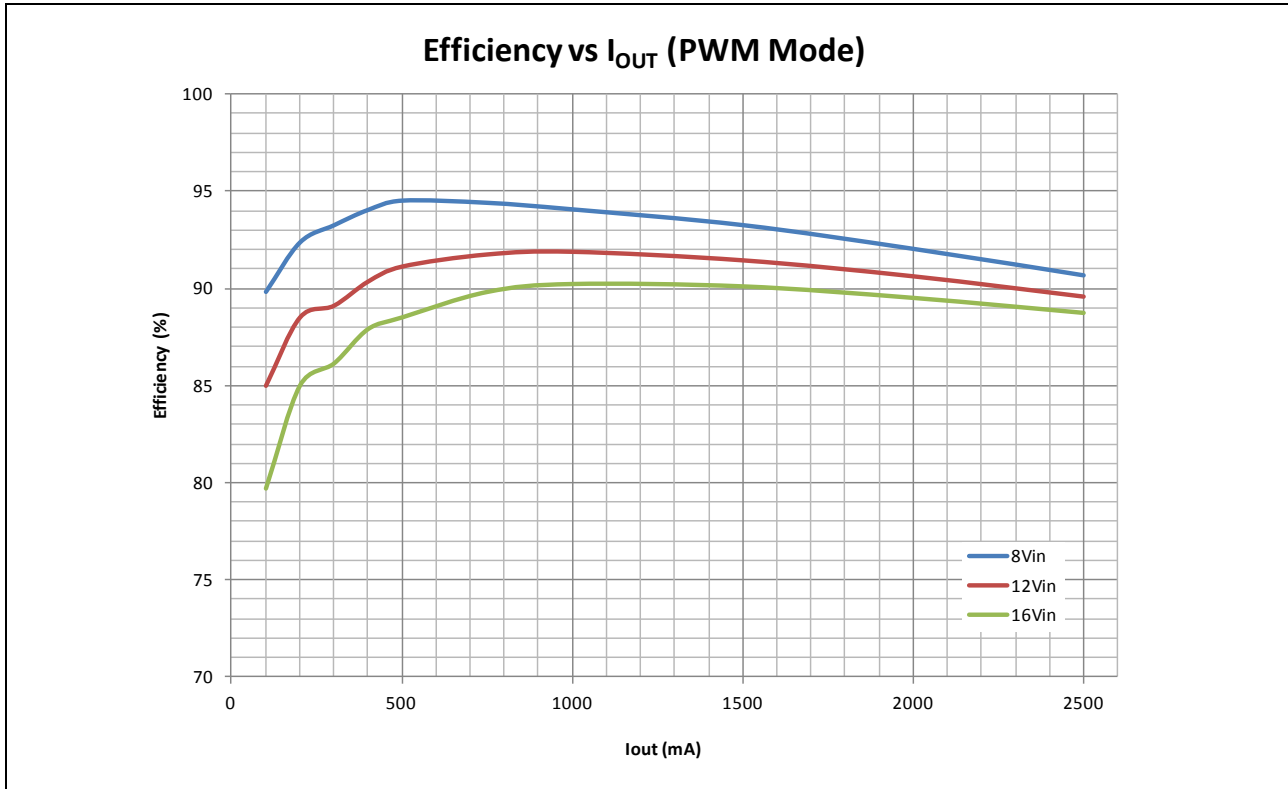


Note: CB is an optional, bulk, electrolytic capacitor for general supply filtering

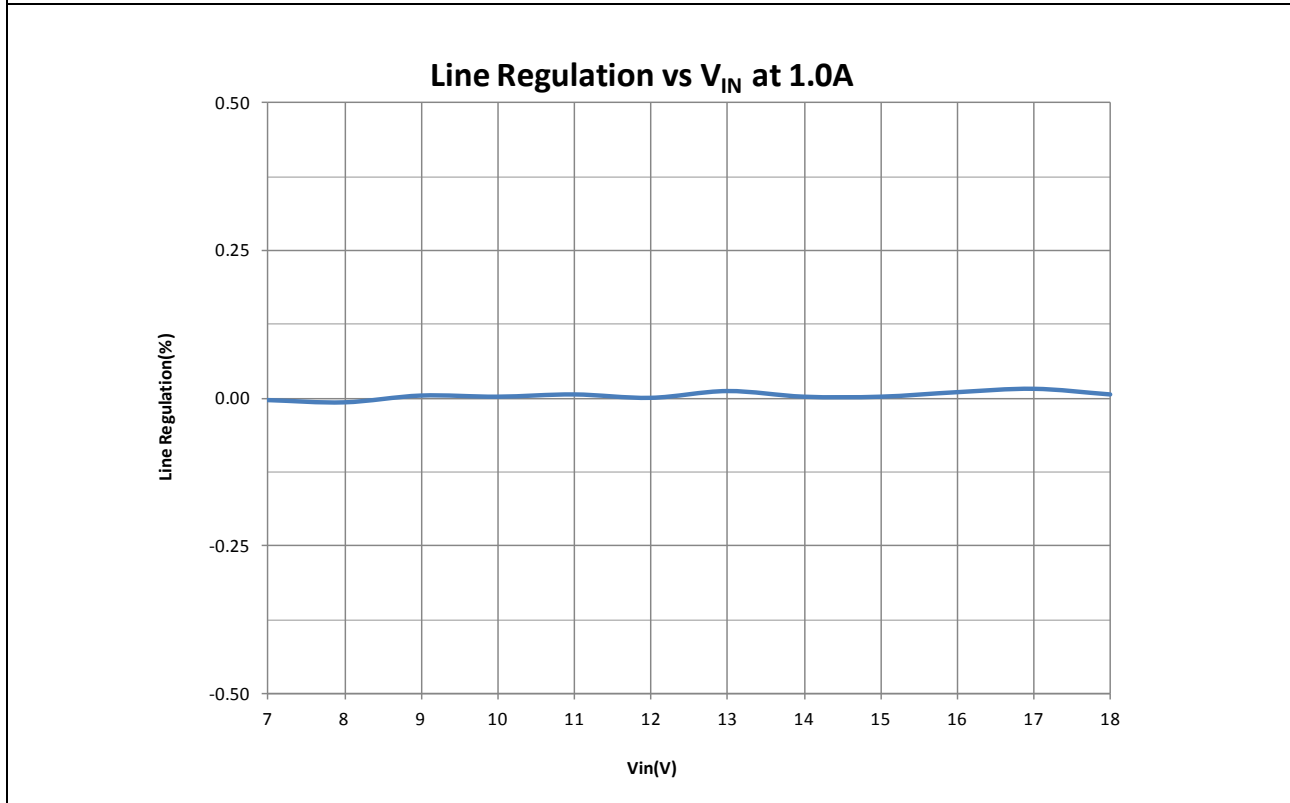
# DEMO BOARD BILL-OF-MATERIALS

REFERENCE DESIGNATORS	DESCRIPTION	FOOTPRINT	QTY.	MANUFACTURER	MANUFACTURER P/N	SOURCE	PURCHASE P/N
PCB	A8580 PCB for eTSSOP16, Rev 0.1	N/A	1	Allegro MicroSystems		4pcb.com	
U1	A8580, 2A Buck Regulator	eTSSOP-16	1	Allegro MicroSystems	A8580		
U2	Regulator, LDO, 3.3V/250mA	SOT23-5	1	National Semi	LP2992IM5-3.3	Digikey	LP2992IM5-3.3CT-ND
R4	Resistor, 4.99MΩ, 1/10W, 1%	0603	1				
R6, RPU	Resistor, 10KΩ, 1/10W, 1%	0603	2				
RFB1	Resistor, 226KΩ, 1/10W, 1%	0603	1				
RFB2	Resistor, 42.2KΩ, 1/10W, 1%	0603	1				
RFSET	Resistor, 60.4KΩ, 1/10W, 1%	0603	1				
Rsnub	Resistor, 6.81Ω, 1/4W, 1%	1206	1				
RZ	Resistor, 59KΩ, 1/10W, 1%	0603	1				
BEAD1	Resistor, 0Ω, 0805	0805	1				
C1, C2, C3	Capacitor, Ceramic, 4.7μF, 16V, X7R	1206	3				
C53	Capacitor, Ceramic, 100nF, 25V, X7R	0603	1				
CB	Capacitor, Electrolytic, 33μF or 47μF, 50V, -0.5V, -40°C to 125°C	Thru Hole 8mm x 11.5mm	1	Nichicon Nichicon Nichicon	UBW1H330MPD UBT1H330MPD UBT1H470MPD	DigiKey Mouser Mouser	UBW1H330MPD-ND 647-UBT1H330MPD 647-UBT1H470MPD
CIN1, CIN5b, CO4a, CBOOT	Capacitor, Ceramic, 47nF, 50V, 10%, X7R	0603	4	Murata	GRM188R71H473KA61D	Digikey	490-3287-1-ND
CIN2, CIN5a, CO4	Capacitor, Ceramic, 0.47μF, 100V, 10%, X7R	0805	3	Murata	GRM21BR72A474KA73L	Digikey	490-3326-1-ND
CIN3, CIN4, CIN5	Capacitor, Ceramic, 4.7μF, 50V, X7R	1210	3	TDK	C3225X7R1H475K C3225X7R1H475M	Digikey	445-7726-1-ND 445-7727-1-ND
CFB, CP	Capacitor, Ceramic, 8.0pF, 50V, COG	0603	2				
CO1, CO2, CO3	Capacitor, Ceramic, 22μF, 16V, X7R	1210	3	TDK	C3225X7R1C226K	Digikey	445-3945-2-ND
Csnub	Capacitor, Ceramic, 330pF, 50V, X7R	0603	1				
CSS	Capacitor, Ceramic, 22nF, 50V, X7R	0603	1				
CVREG	Capacitor, Ceramic, 1μF, 50V, X7R	0603	1				
CZ	Capacitor, Ceramic, 220pF, 50V, X7R	0603	1				
Cx	Capacitor, Ceramic, 10nF, 50V, X7R	0603	1				
BODE, C4, C52, CIN4, CO4, CO5, CO6, CO7, CO8	Empty	Various	0				
D1	Schottky Diode, 40V, 2A	SMP	1	Vishay	SS2P4-M3/84A	Digikey Mouser	SS2P4-M3/84AGICT-ND 625-SS2P4-M3/84A
D2	Schottky Diode, 40V, 1A, SOD123	SOD123	1	Diodes, Inc Diodes, Inc	B140HW-7 B140HW-7	Digikey Mouser	B140HWDICT-ND 621-B140HW-7
LO	Inductor, 10μH, 2.97A <sub>sat</sub> @ 25C, 43mΩ	7.6mm x 7.6mm x 4.35mm	1	Cooper Bussman	DRA74-100-R	Digikey Mouser	283-3623-1-ND 704-DRA74-100-R
3.3V, BIAS, COMP, FSET, NPOR, PWM/PPM, SLEEP, SS, SW, VIN, VOUT, VREG,	Test Points, Red, 0.063" diameter	0.063"	12	Keystone	5010	Digikey	5010K-ND
GND	Test Points, Black, 0.063" diameter	0.063"	5	Keystone	5011	Digikey	5011K-ND
J1	Header, 3-pins, 0.1" spacing (Note: P/N is for a 36-pin strip)		1	Sullins	PEC36SAAN	Digikey	S1012E-36-ND
SW1	DIP Switch, 1 position	SMT	1	C & K Components	SDA01H0SBR	Digikey	CKN9490CT-ND
Rubber Feet	Self stick rubber feet	Clear	4	3M	SJ-5303 (CLEAR)	Digikey	SJ5303-7-ND

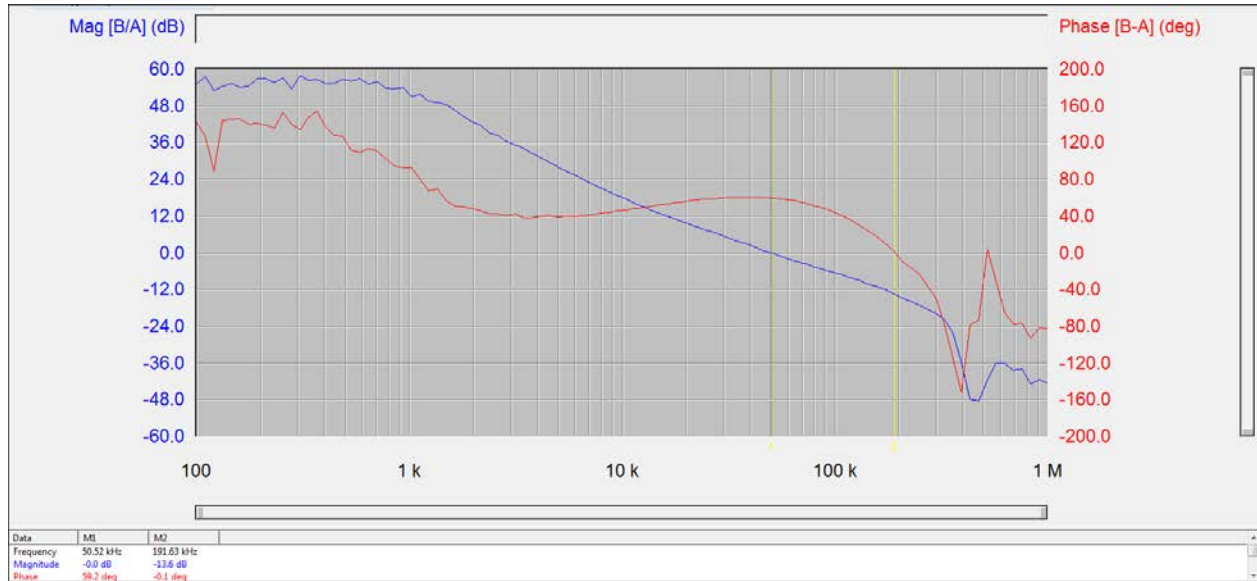
## DEMO BOARD PERFORMANCE



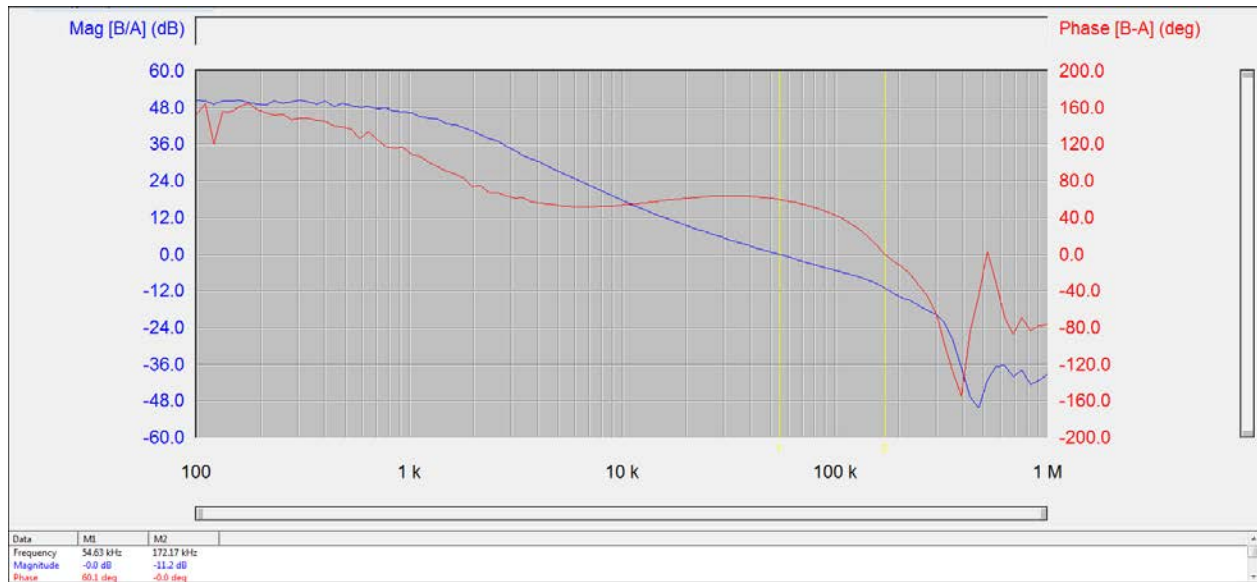
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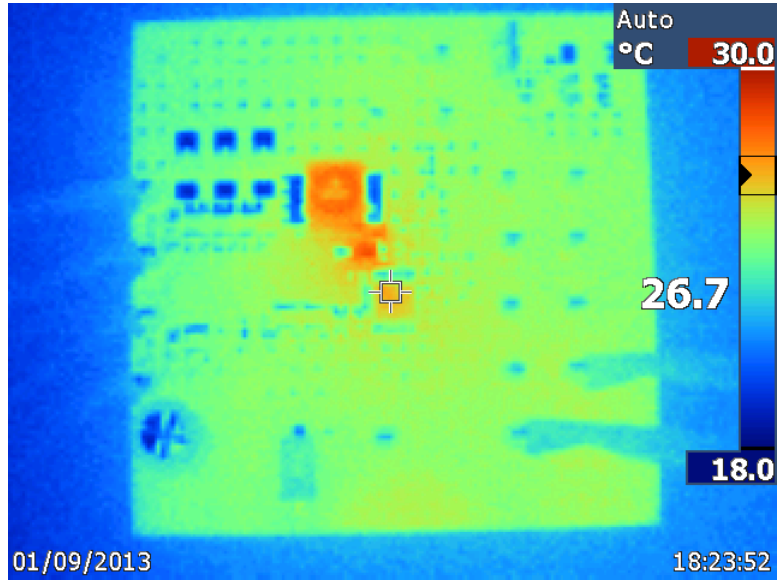


**Bode Plot: 12Vin, 500mA Load: 0dB at 50.52kHz, PM=59.2deg, GM=13.6dB**

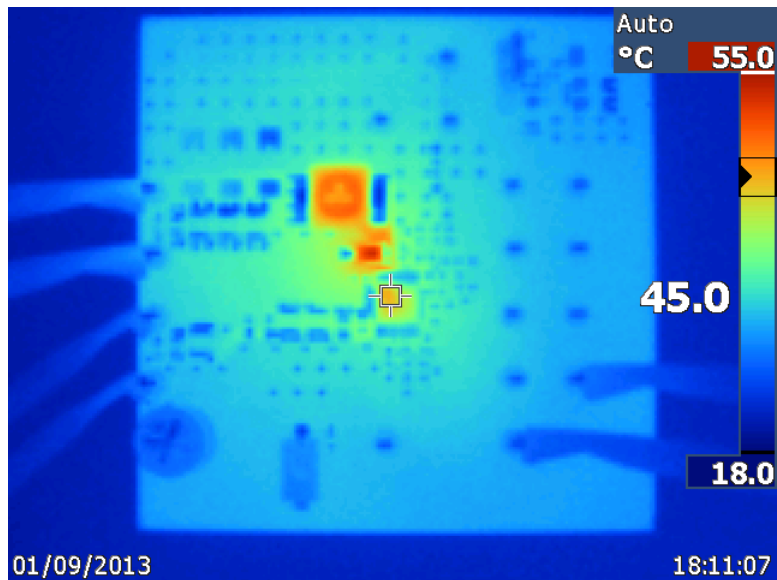


**Bode Plot: 12Vin, 2.0A Load: 0dB at 54.63kHz, PM=60.1deg, GM=11.2dB**

## DEMO BOARD PERFORMANCE



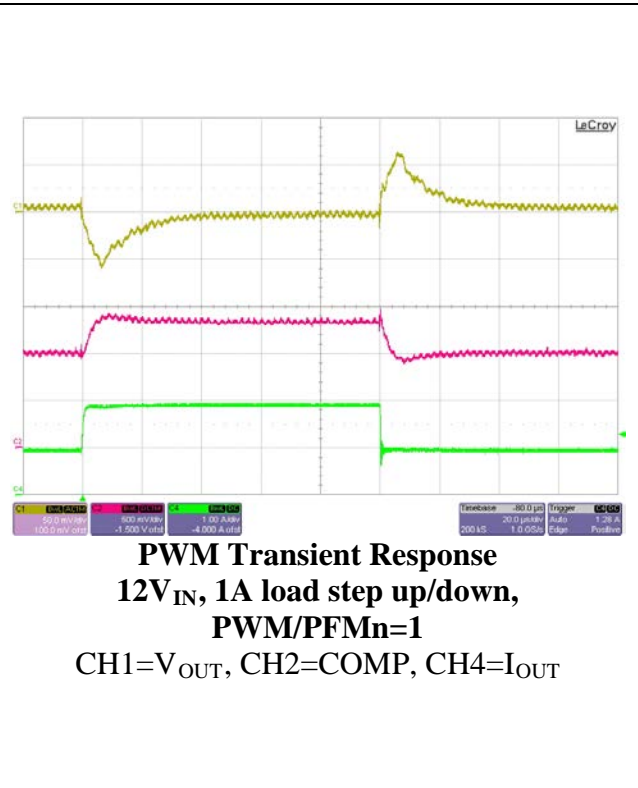
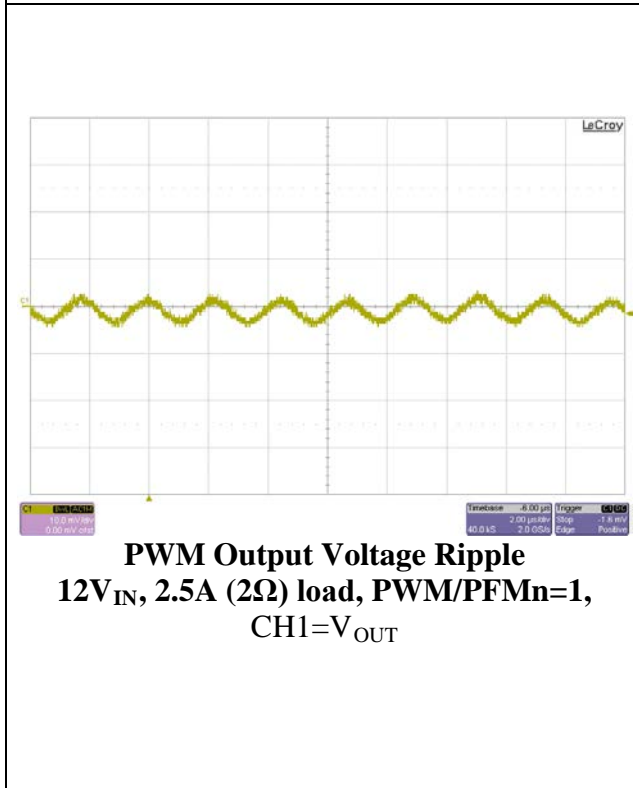
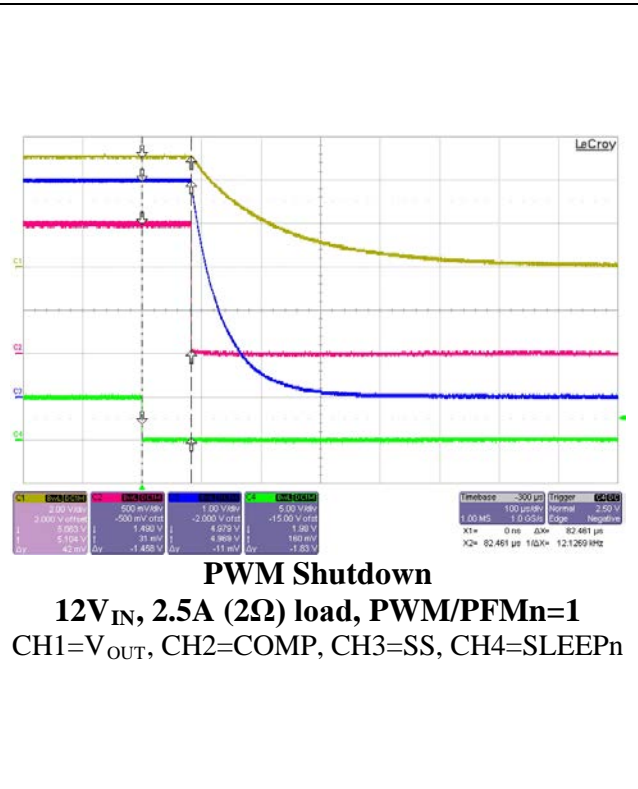
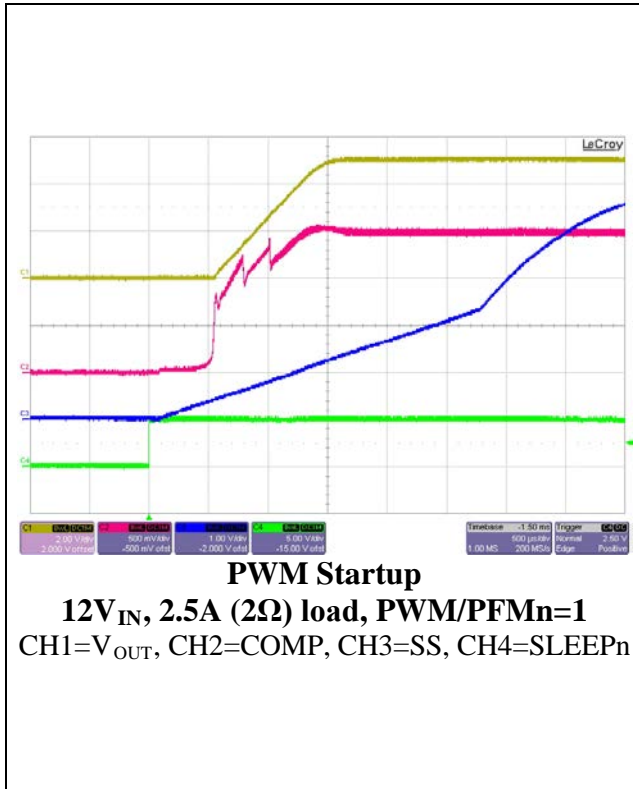
**Component Temperatures: 12V<sub>IN</sub>, 5V<sub>OUT</sub>, 500mA Load, T<sub>AMB</sub>=25°C**  
No Airflow (still air)



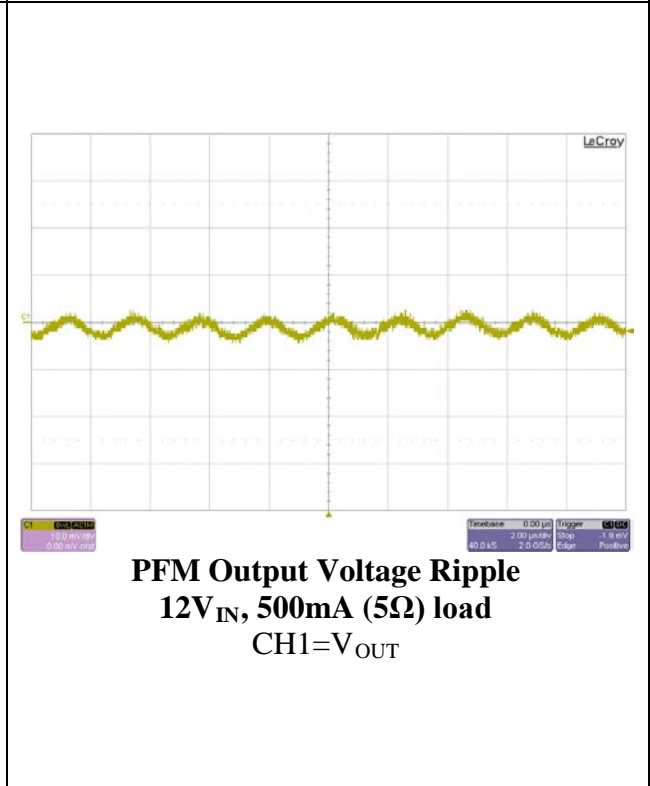
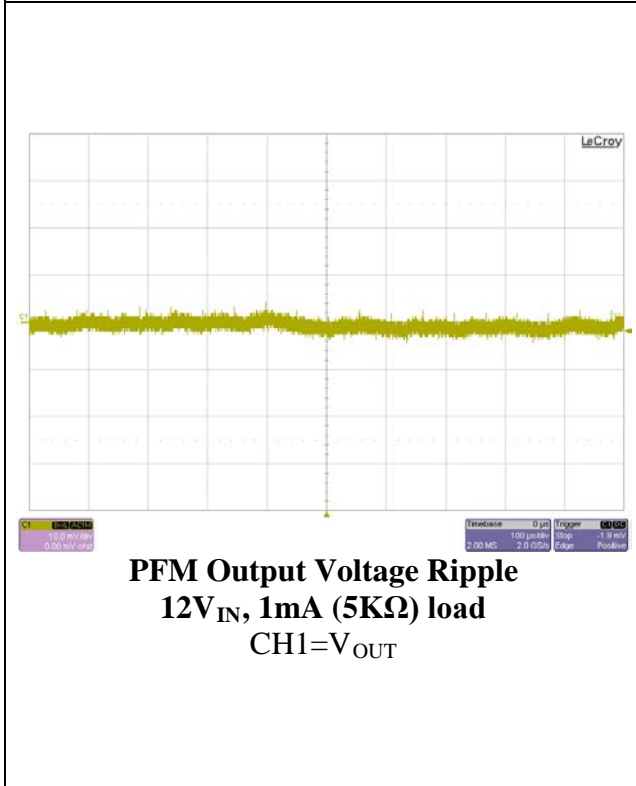
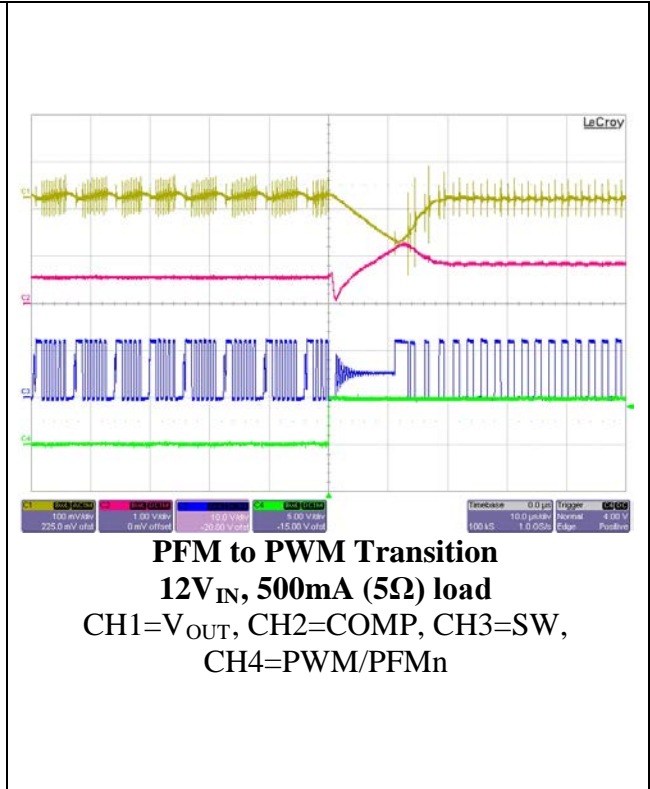
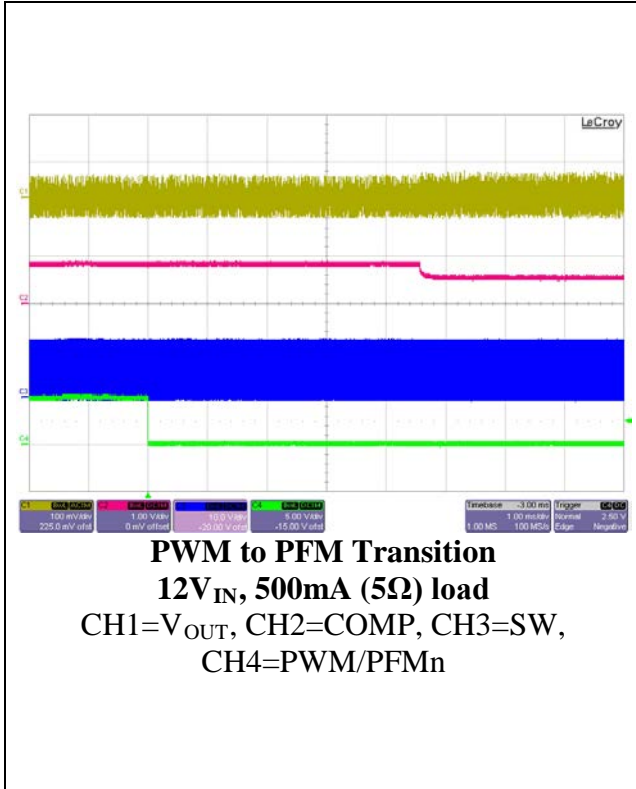
**Component Temperatures: 12V<sub>IN</sub>, 5V<sub>OUT</sub>, 2.5A Load, T<sub>AMB</sub>=25°C**  
No Airflow (still air)



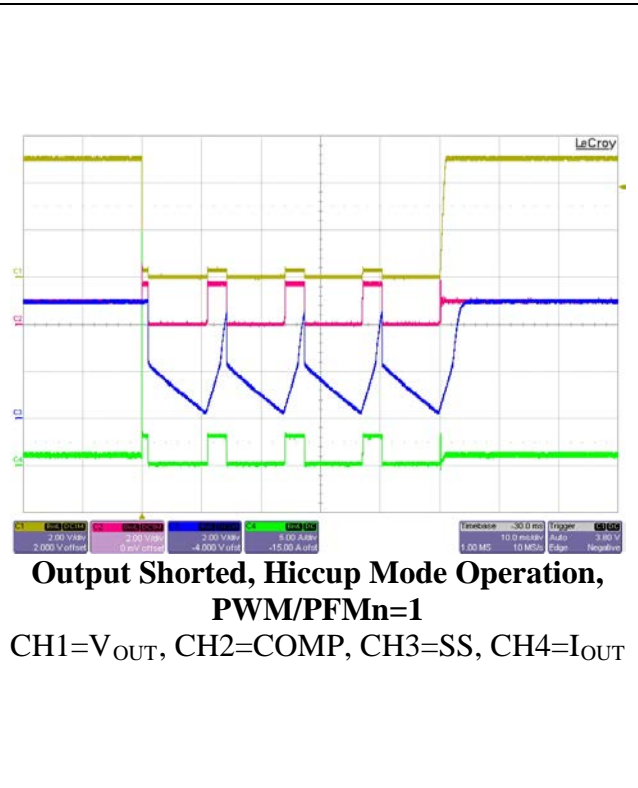
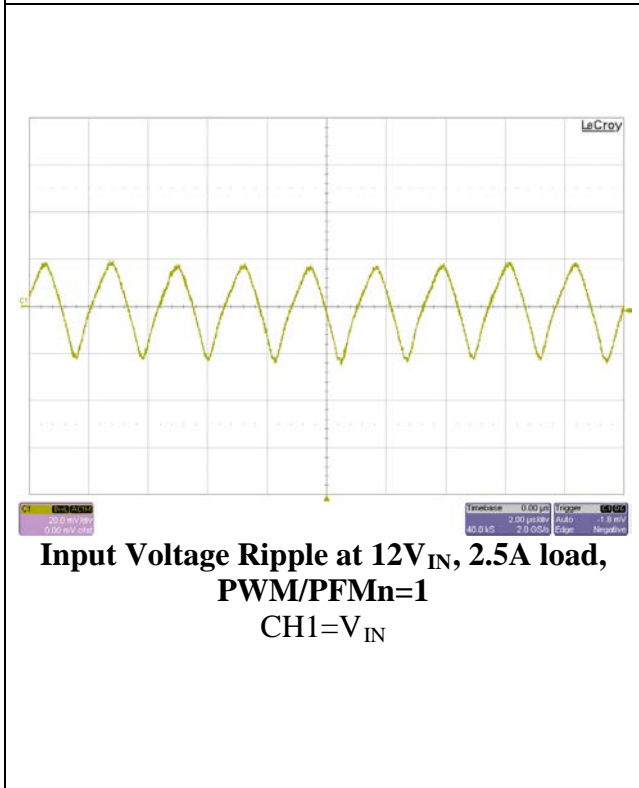
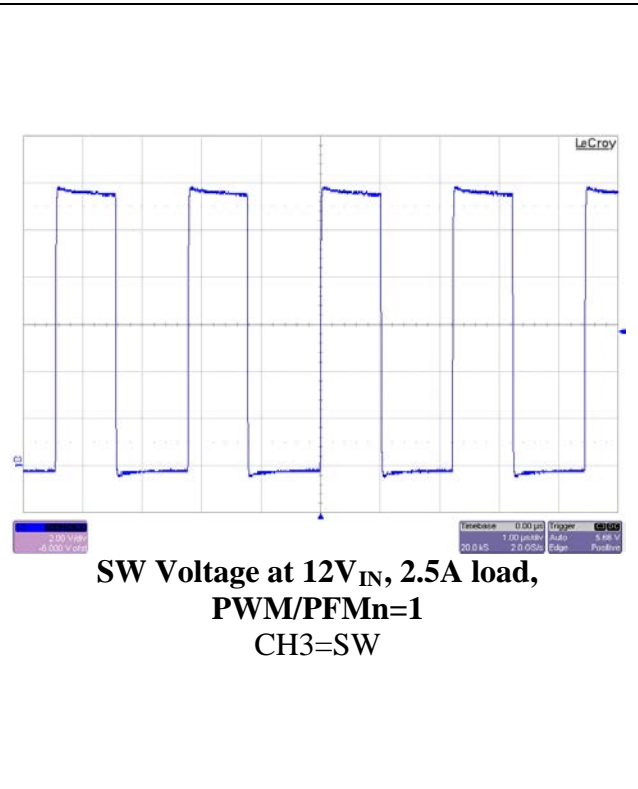
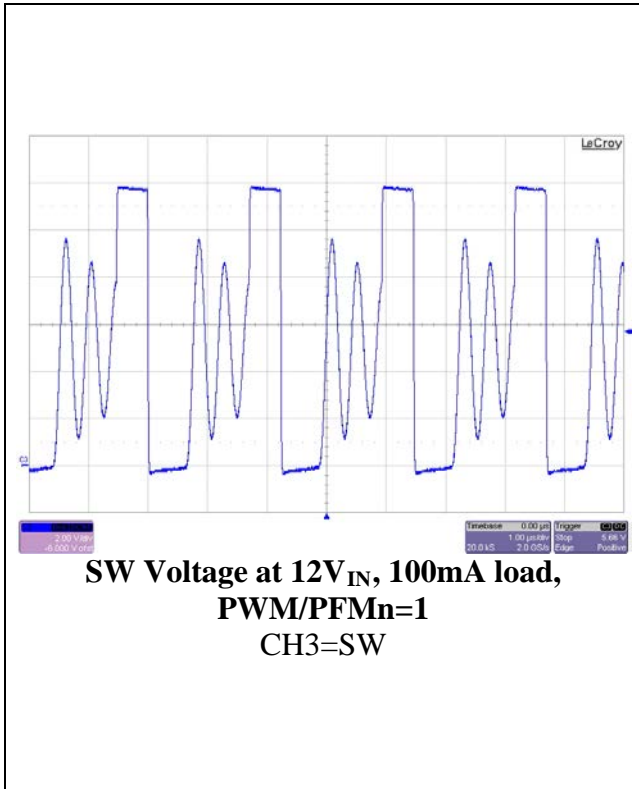
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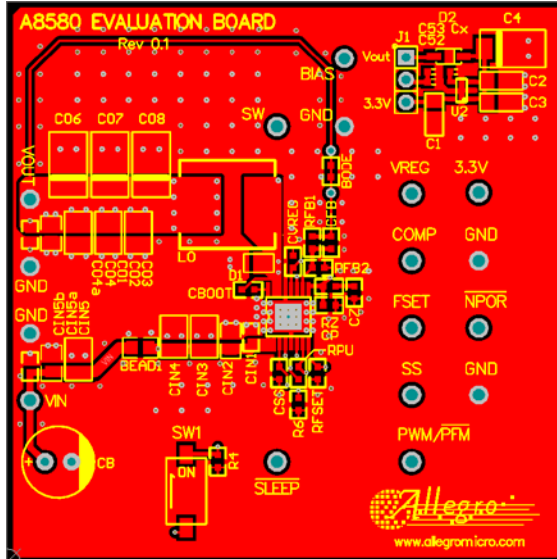
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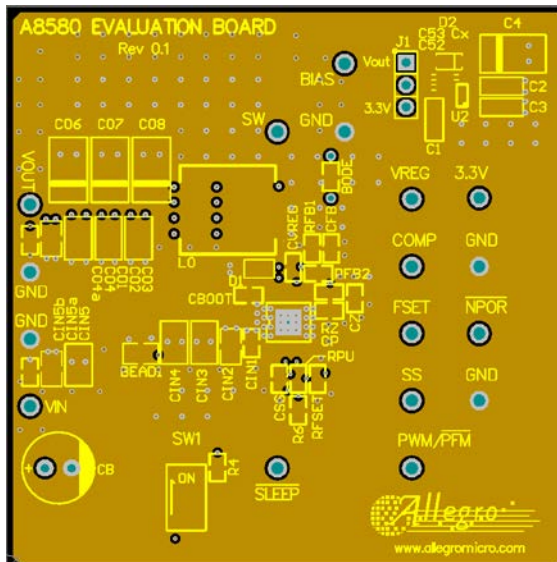
## DEMO BOARD PERFORMANCE



## DEMO PCB LAYOUT

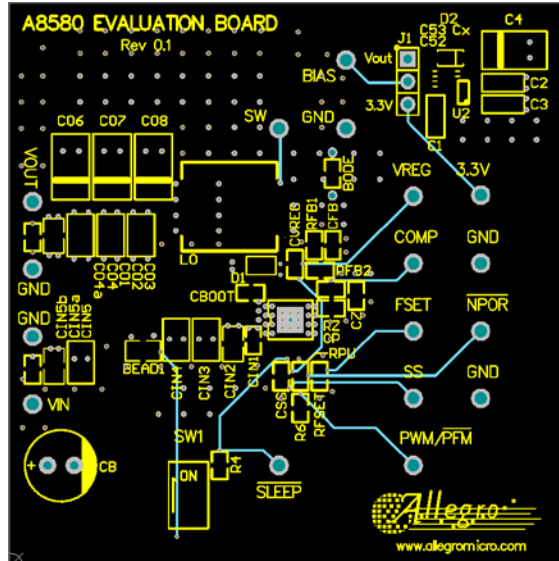


Top Layer and Top Silk

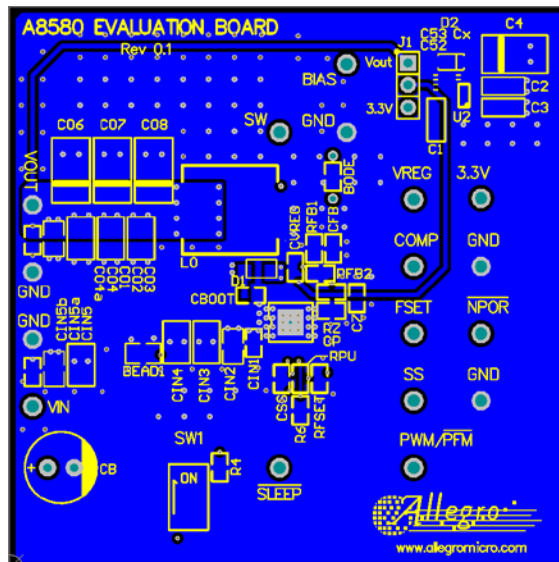


Layer 2 and Top Silk

## DEMO PCB LAYOUT



Layer 3 and Top Silk



Bottom Layer and Bottom Silk