

## ARG81800 Evaluation Board User Guide

### DESCRIPTION

The ARG81800 evaluation board is designed to aid system designers in evaluating the operation and performance of the ARG81800 synchronous buck regulator. The ARG81800 has many features that make it well suited for a wide array of applications. To fully understand these features the ARG81800 datasheet should be used in conjunction with this user guide.

### FEATURES

- ARG81800 synchronous buck converter
- User-selectable PWM vs. Low Power mode
- Jumper to optionally connect VOUT to BIAS pin for improved efficiency
- Input to optionally synchronize power converter switching
- Jumpers to configure SYNCIN and CLKOUT pins for desired switch dither and clock output behavior
- VFL input terminal for optional additional input filter on VIN

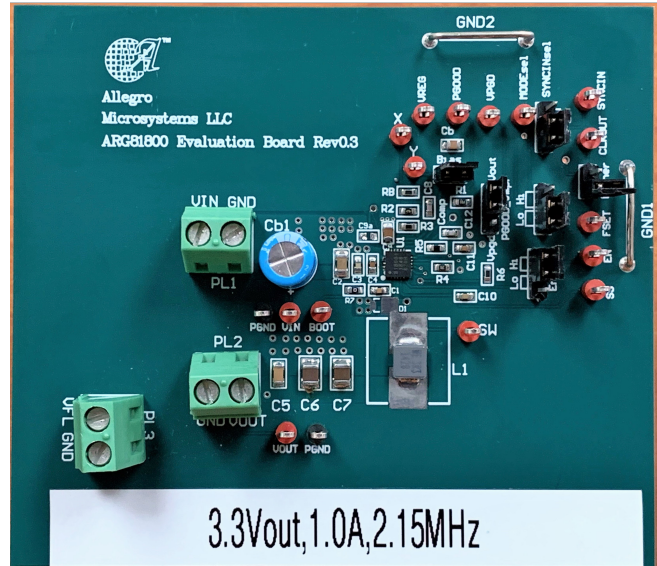


Figure 1: ARG81800 Evaluation Board

### Table of Contents

Description .....	1
Features .....	1
Evaluation Board Contents .....	1
Using the Evaluation Board .....	2
Performance Data .....	3
Schematic .....	9
Layout .....	10
Bill of Materials .....	13
Related Links .....	14
Revision History .....	15

Table 1: General Specifications

Specification	Min	Nom	Max	Units
Absolute Maximum Input Voltage	-0.3	-	40	V
Operating Input Voltage Range	3.5	12	36	V
V <sub>IN</sub> START Threshold, V <sub>IN</sub> rising	3.35	3.55	3.80	V
V <sub>IN</sub> STOP Threshold, V <sub>IN</sub> falling	3.10	3.30	3.50	V
Output Voltage (FB: 301 kΩ / 95.3 kΩ, ±1%)	3.24	3.32	3.41	V
Steady-State Output Current (12 V <sub>IN</sub> )	-	1.0	1.2	A
Pulse-by-Pulse Current Limit @ t <sub>ON(MIN)</sub>	1.7	2.0	2.3	A

---

## USING THE EVALUATION BOARD

### Input Power Connection:

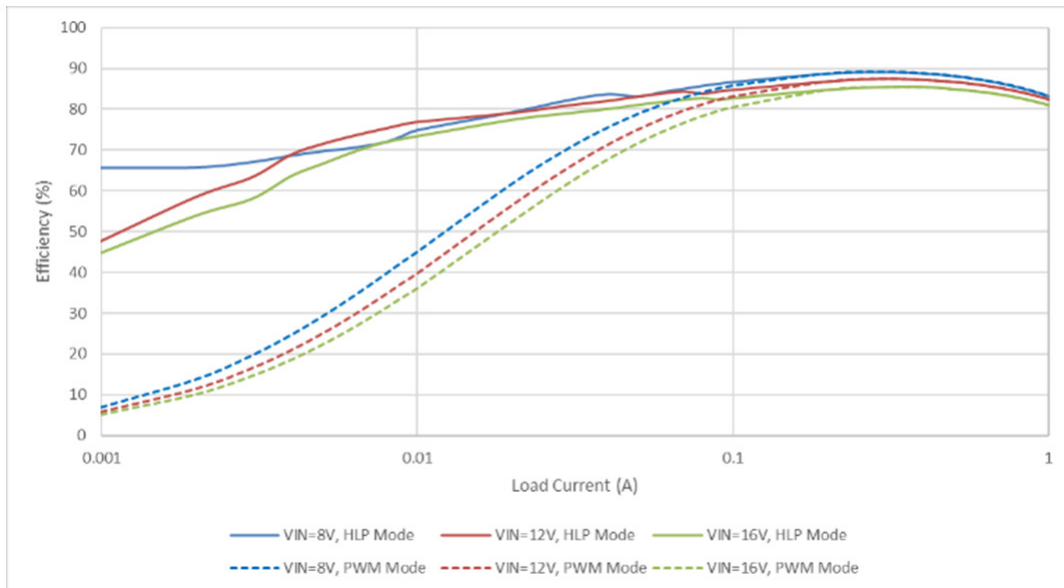
Connect a 12 V power supply from VIN to GND that is capable of at least 1 A. Once operational,  $V_{IN}$  can fall as low as  $3.55 V_{TYP}$  ( $3.8 V_{MAX}$ ) before the ARG81800-1 is reset.

### Output Load Connections:

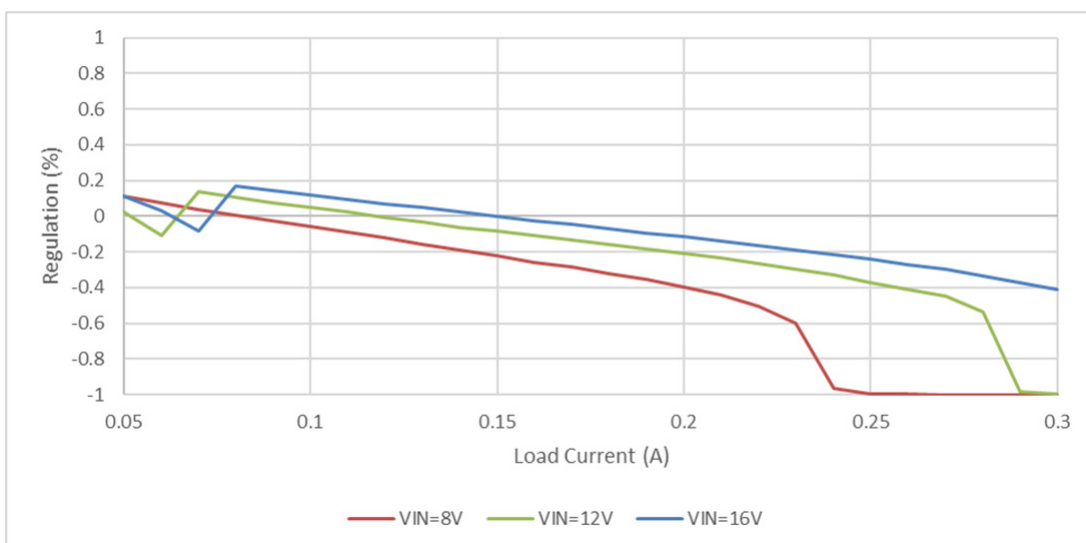
Connect a load from VOUT to GND. The steady-state load current can be as high as 0.5 A. Pulse-by-pulse current limit and/or thermal shutdown will occur if the load is greater than 0.6 A.

## EVALUATION BOARD PERFORMANCE DATA

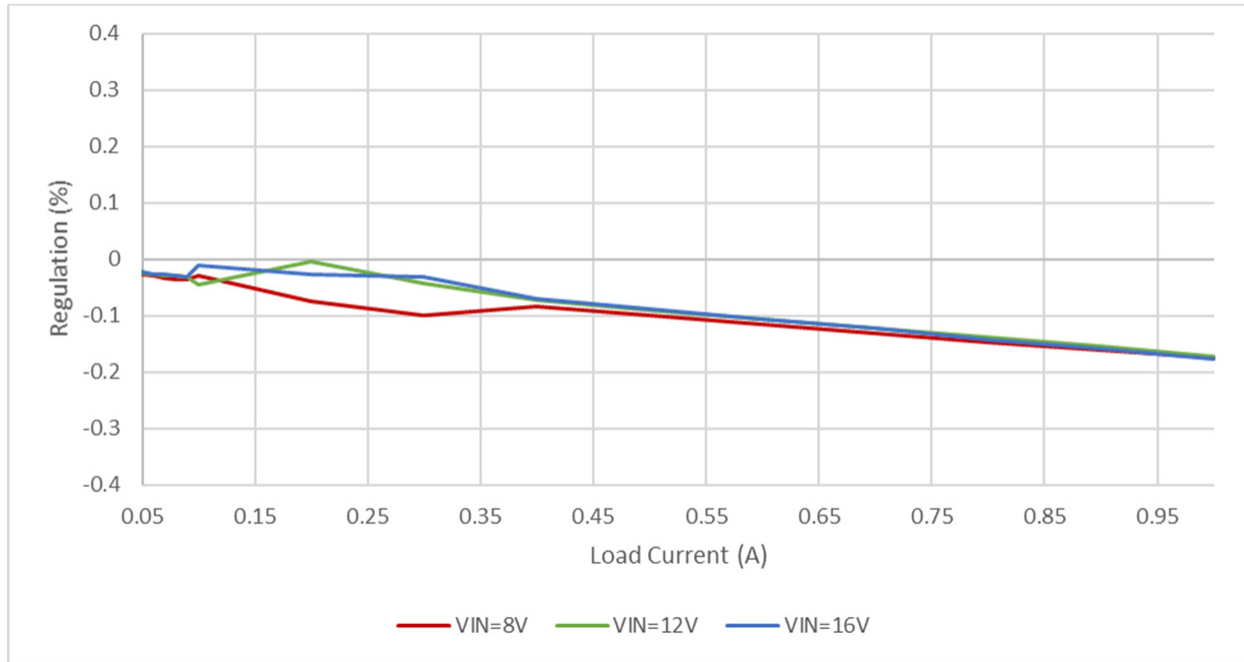
### Efficiency



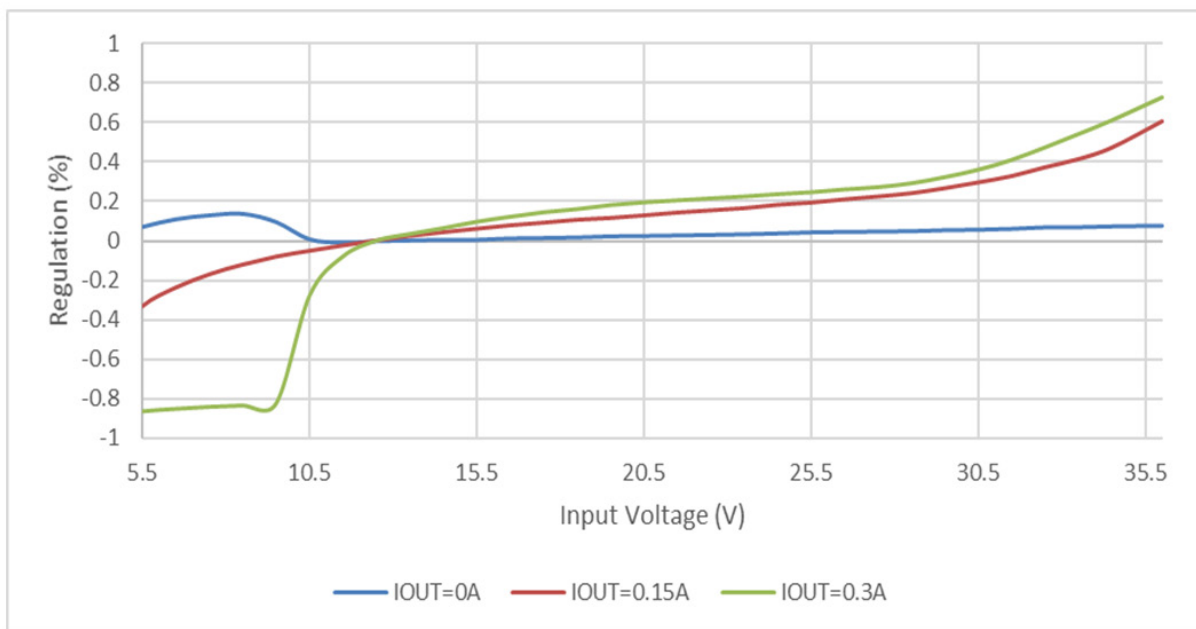
### Load Regulation in LP Mode



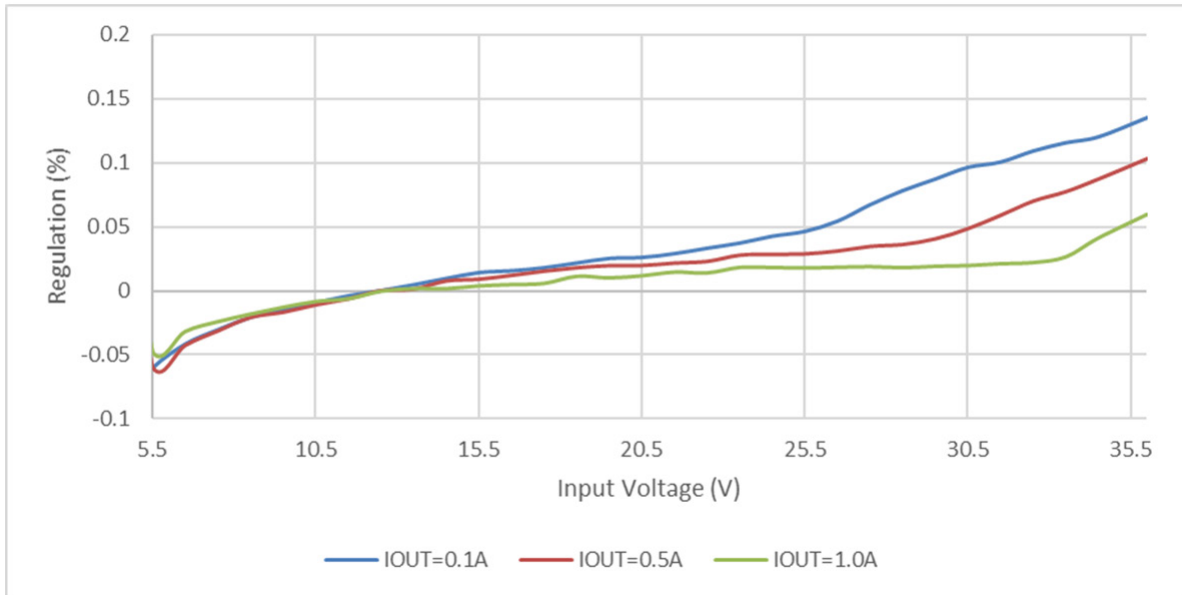
### Load Regulation in PWM Mode

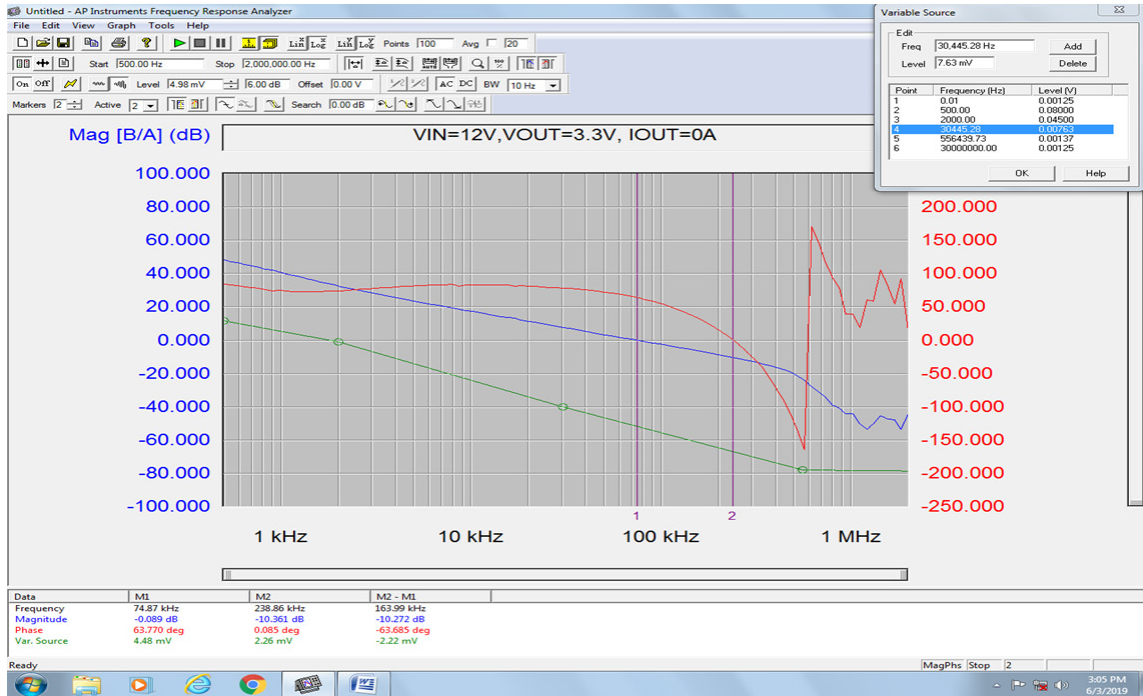


### Line Regulation in LP Mode

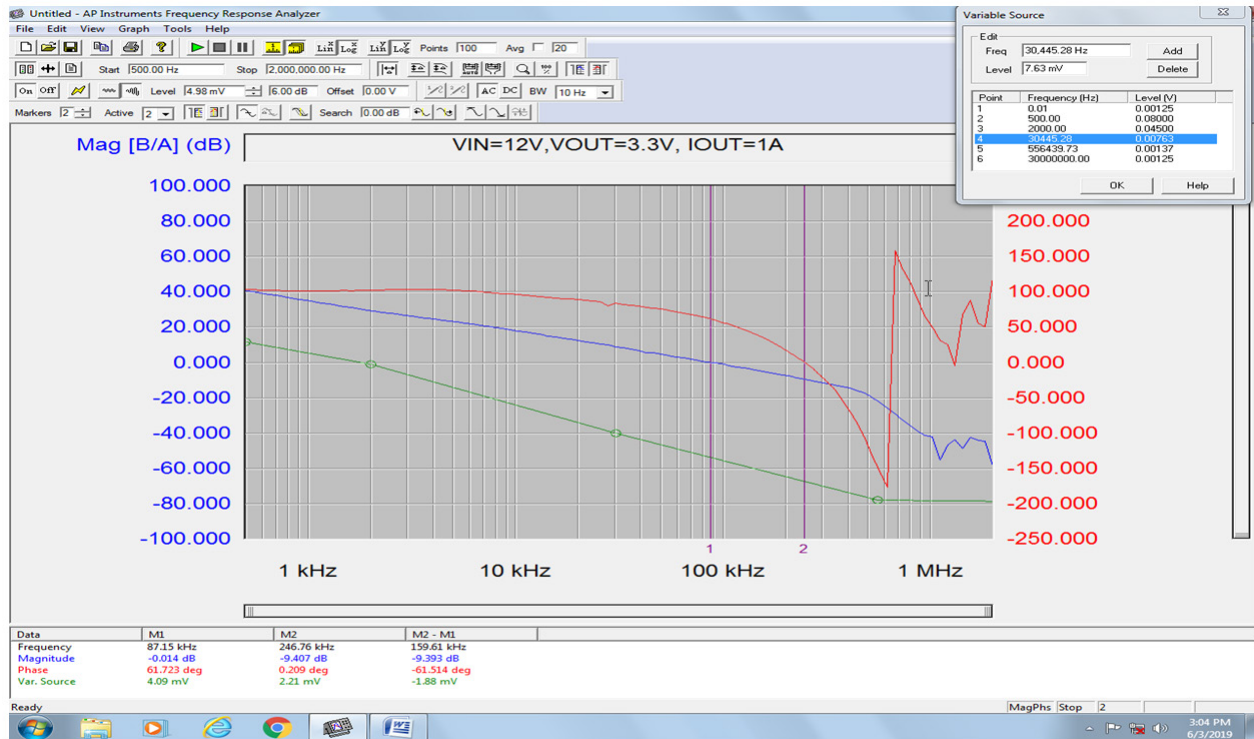


## Line Regulation in PWM Mode

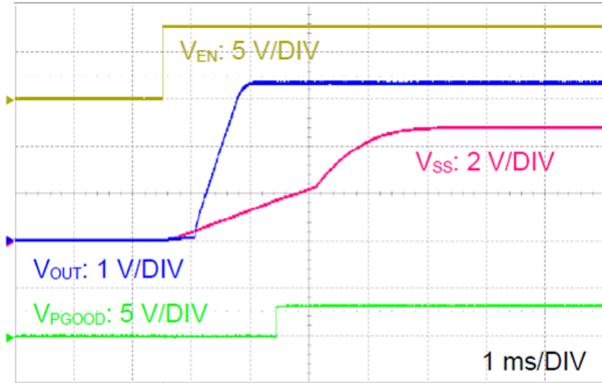




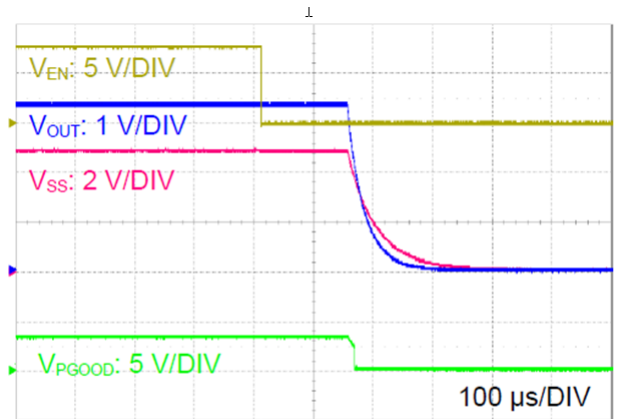
0 dB at 74.87 kHz, PM = 63.7 degrees, GM = 10.36 dB



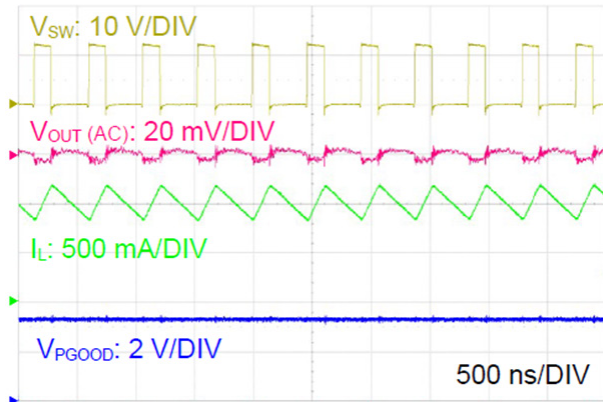
0 dB at 87.15 kHz, PM = 61.7 degrees, GM = 9.4 dB



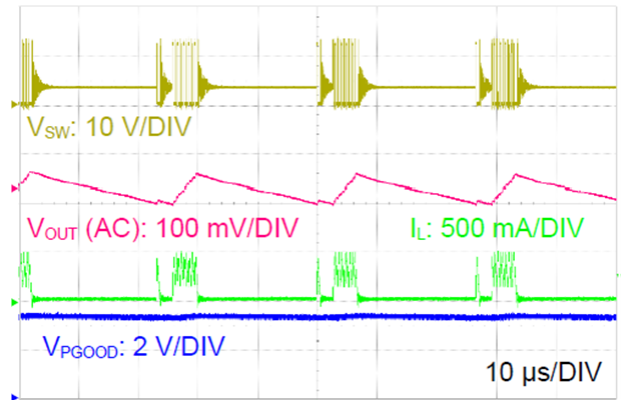
**Startup with EN Rising**  
 $V_{OUT} = 3.3\text{ V}$ ,  $I_{OUT} = 1.0\text{ A}$ , PWM Mode



**Shutdown with EN Falling**  
 $V_{OUT} = 3.3\text{ V}$ ,  $I_{OUT} = 1.0\text{ A}$ , PWM Mode

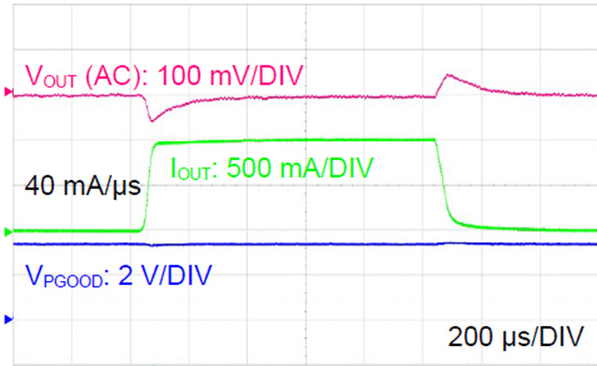


**Steady State Performance**  
 $V_{OUT} = 3.3\text{ V}$ ,  $I_{OUT} = 1.0\text{ A}$ , PWM Mode

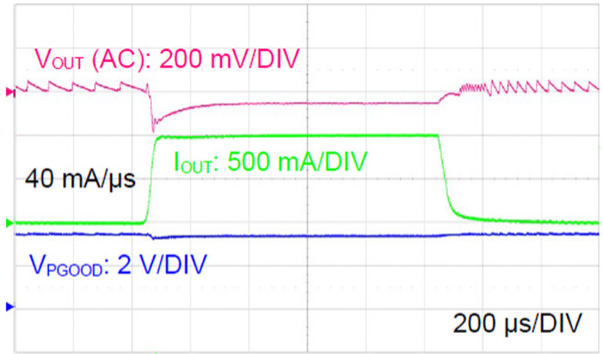


**Steady State Performance**  
 $V_{OUT} = 3.3\text{ V}$ ,  $I_{OUT} = 10\text{ mA}$ , LP Mode

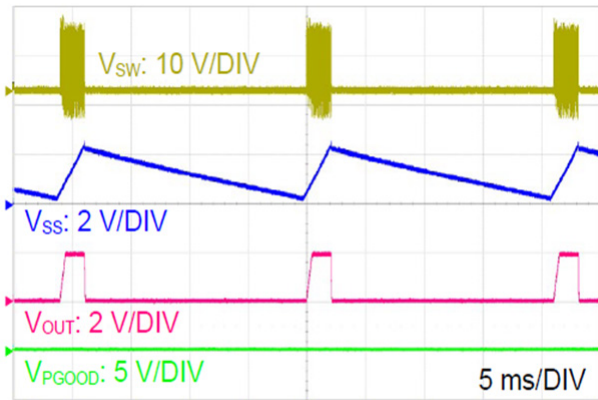




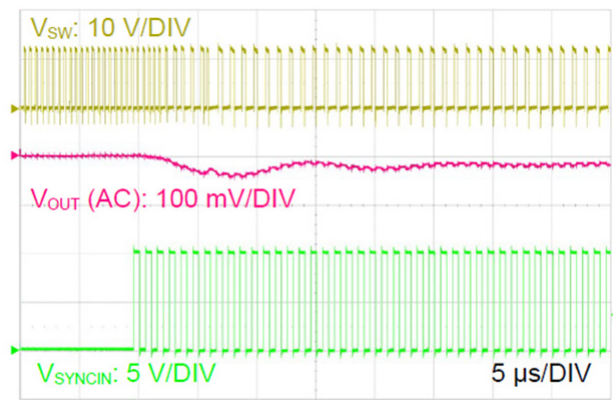
**Transient Response at 12 V<sub>IN</sub>**  
 V<sub>OUT</sub> = 3.3 V, PWM Mode



**Transient Response at 12 V<sub>IN</sub>**  
 V<sub>OUT</sub> = 3.3 V, LP Mode



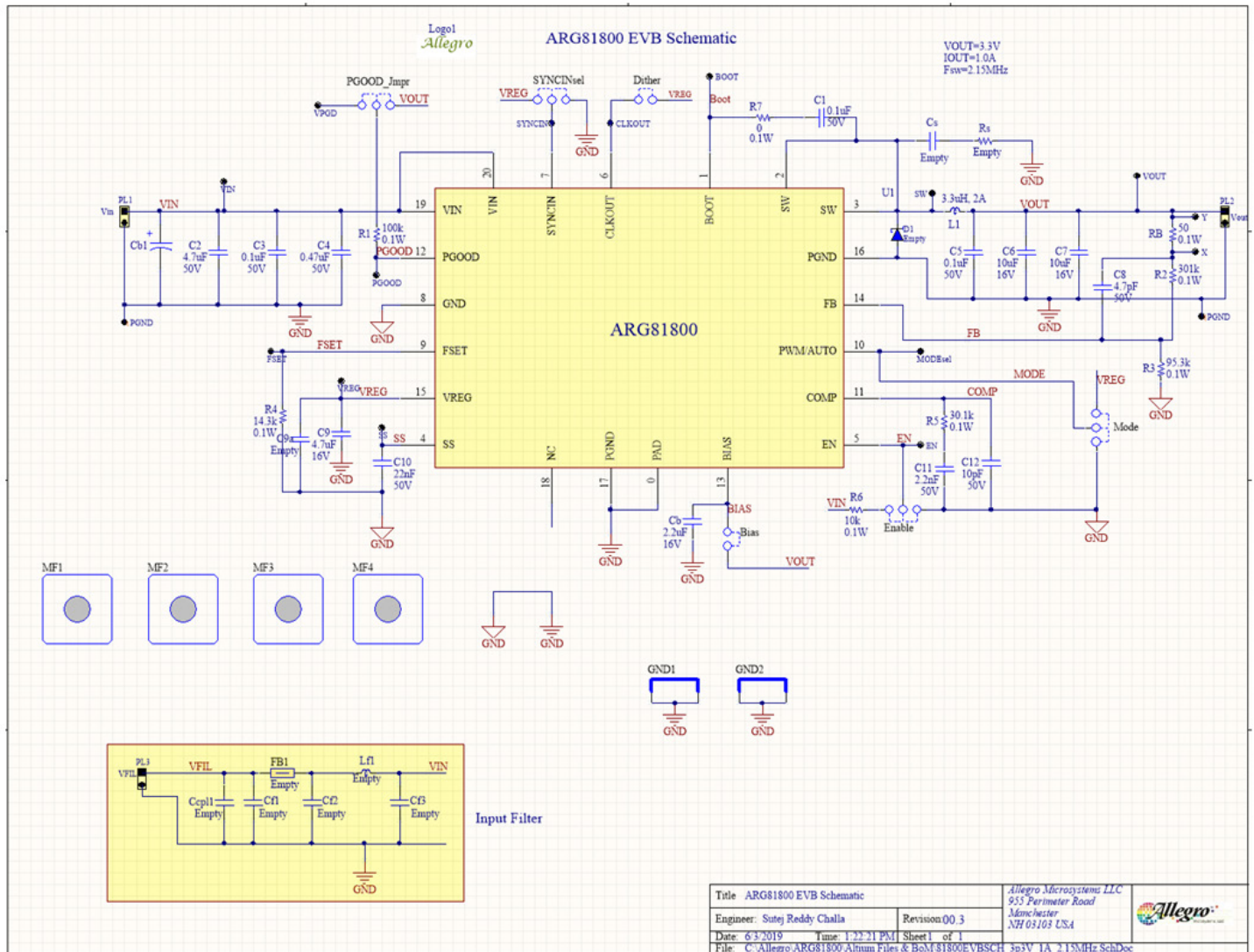
**Output Short Protection**  
 V<sub>OUT</sub> = 3.3 V, PWM Mode



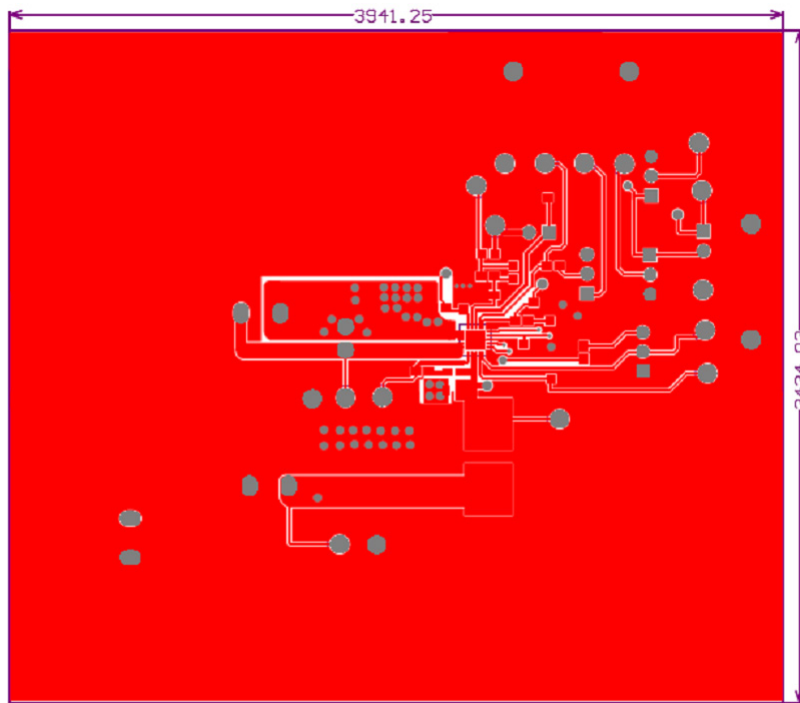
**External Clock Synchronization**



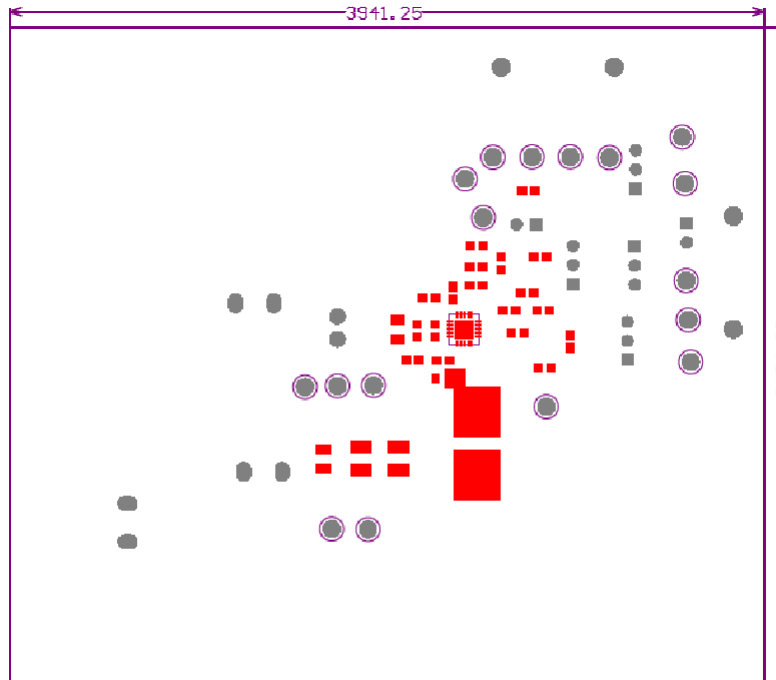
# SCHEMATIC



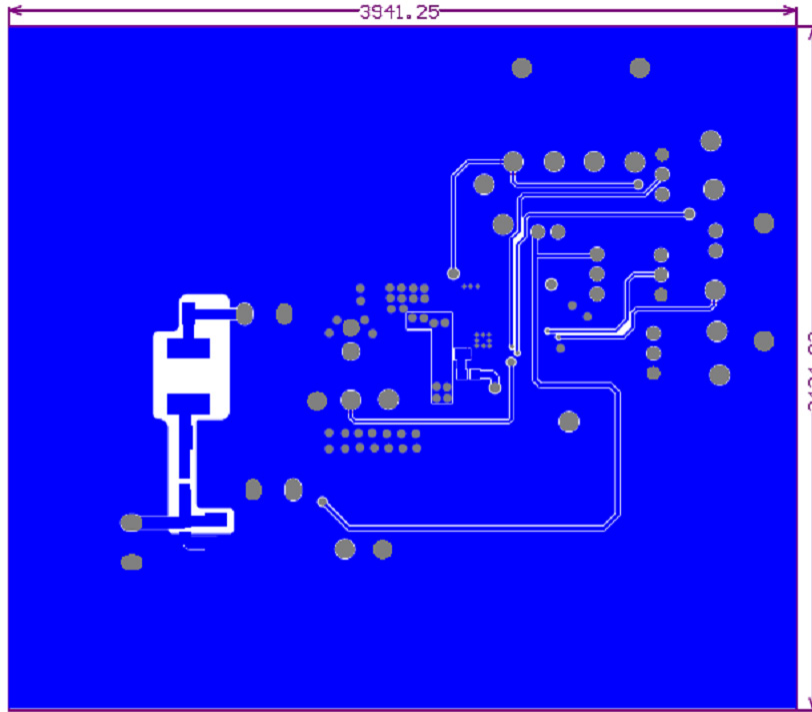
# LAYOUT



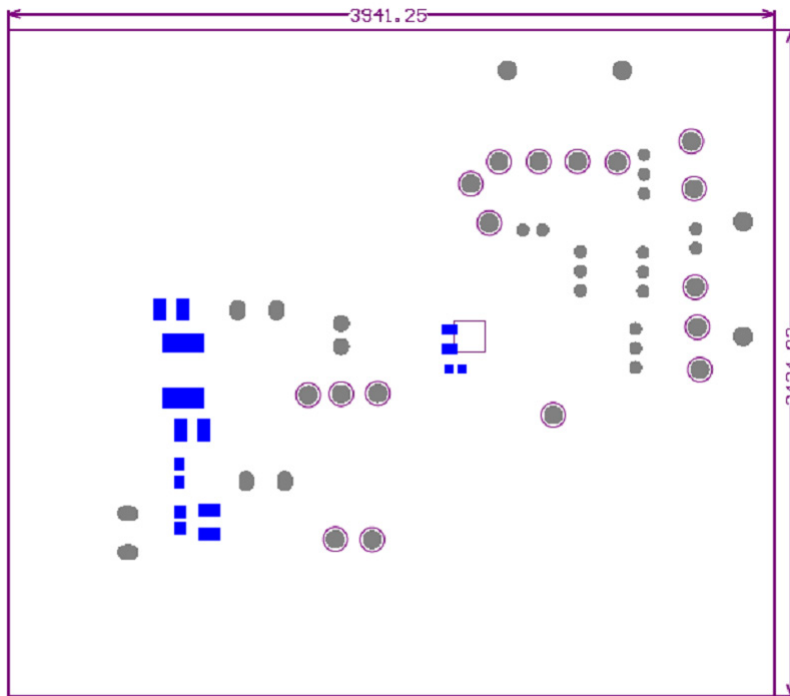
Top Layer



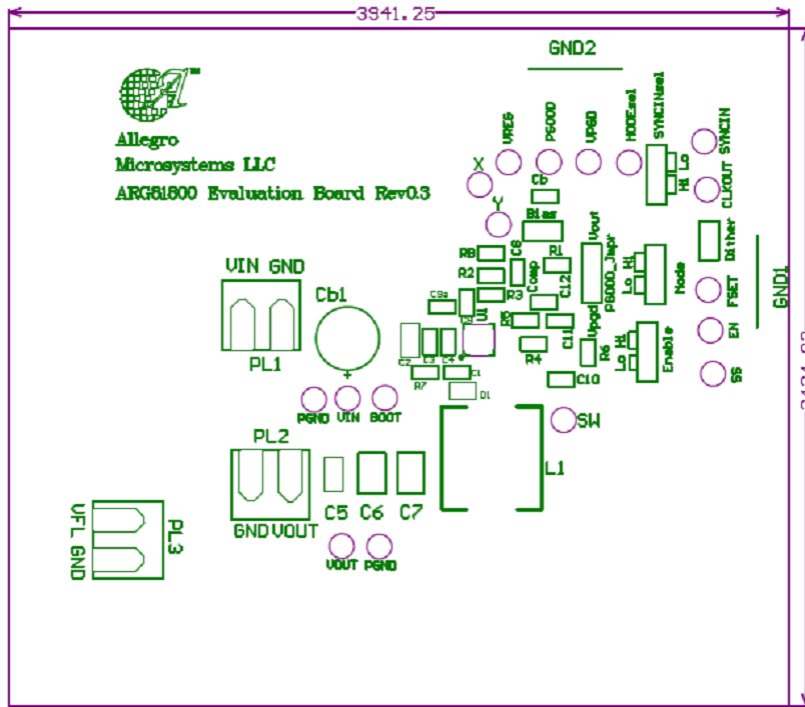
Top Silk



**Bottom Layer**



**Bottom Copper**



# BILL OF MATERIALS

**Table 2: ARG81800 Evaluation Board Bill of Materials**

ELECTRICAL COMPONENTS				
Designator	Quantity	Description	Manufacturer	Manufacturer Part Number
C1	1	Capacitor, X7R	Murata	GCM188R71H104KA57D
C2	1	Capacitor, X7R	Murata	GRJ31CR71H475KE11L
C3	1	Capacitor, X7R	Murata	GCM188R71H104KA57D
Cs	0	Capacitor, C0G (NP0)		
Cb	1	Capacitor, X7R	Taiyo Yuden	EMK107BB7225KA-T
C4	1	Capacitor, X7R	Taiyo Yuden	UMK107B7474KA-TR
C5	1	Capacitor, X7R	Murata	GCM319R71H104KA37J
C6	1	Capacitor, X7R	Murata	GRM32DR71C106KA01L
C7	1	Capacitor, X7R	Murata	GRM32DR71C106KA01L
Cf2, Cf3	0	Capacitor, X7R		
C8	1	Capacitor, C0G (NP0)	Murata	GCM1885C1H4R7BA16D
C9	1	Capacitor, X7R	Murata	GCJ21BR71C475KA01L
C9a	0	Capacitor, X7R		
C10	1	Capacitor, X7R	Murata	GRM188R71H223KA01D
C11	1	Capacitor, X7R	Murata	GCM188R71H222KA37D
C12	1	Capacitor, C0G (NP0)	Kemet	C0603C100J5GACTU
Cb1	1	Capacitor: Alu Electrolytics SMT	Nichicon	UBT1H470MPD1TD
Ccpl1	0	Capacitor, X7R		
Cf1	0	Capacitor, X7R		
Bias, Dither, Enable	3	Jumper Header: Male 2-pin	Omron	XJ8B-0211
Mode, PGOOD_ Jmpr, SYNCInsel	3	Jumper Header: Male 3-pin	Molex	22-28-5030
Bias, Dither, Enable, Mode, PGOOD_ Jmpr, SYNCInsel	6	Jumper Shunt: 2 positions	TE Connectivity	382811-6
BOOT, CLKOUT, EN, FSET, MODEsel, PGOOD, SS, SW, SYNCIN, VIN, VOUT, VPGD, VREG, X, Y	15	Test Points - Red	Keystone Electronics	5010
PGND	2	Test Points - Black	Keystone Electronics	5011
FB1	0	Ferrite Bead: Chip Impeder		
GND1, GND2	2	Ground Bar: Tinned Copper Wire		
L1	1	Inductor	Würth Electronics	74437334033
Lf1	0	Inductor		
MF1, MF2, MF3, MF4	4	Mount Foot: Adhesive Rubber	3M	SJ-5303 (CLEAR)
PL1, PL2, PL3	3	Terminal Block	Phoenix Contact	1715721
R1	1	Resistor, 1%, 1/10 W	Panasonic	ERJ-3EKF
R2	1	Resistor, 1%, 1/10 W	Panasonic	ERJ-3EKF
R3	1	Resistor, 1%, 1/10 W	Panasonic	ERJ-3EKF
R4	1	Resistor, 1%, 1/10 W	Panasonic	ERJ-3EKF
R5	1	Resistor, 1%, 1/10 W	Panasonic	ERJ-3EK3012V
R6	1	Resistor, 1%, 1/10 W	Panasonic	ERJ-3EKF1002V
R7	1	Resistor, 1%, 1/10 W	Panasonic	ERJ-3GEY0R00V
RB	1	Resistor, 1%, 1/10 W	Panasonic	ERJ-3EKF49R9V
Rs	0	Resistor, 1%, 0.25 W		
U1	1	Allegro IC	Allegro	ARG81800KESJSR
Label:		3.3 V <sub>OUT</sub> , 1 A, 2.15 MHz		

---

## RELATED LINKS

<https://www.allegromicro.com/en/products/regulate/regulators/single-output-regulators/arg81800>

---

## Revision History

Number	Date	Description
–	December 16, 2019	Initial release
1	December 2, 2022	Minor editorial updates
2	March 20, 2023	Updated to new template
3	March 30, 2023	Corrected table of contents and minor editorial updates

Copyright 2023, Allegro MicroSystems.

Allegro MicroSystems reserves the right to make, from time to time, such departures from the detail specifications as may be required to permit improvements in the performance, reliability, or manufacturability of its products. Before placing an order, the user is cautioned to verify that the information being relied upon is current.

Allegro's products are not to be used in any devices or systems, including but not limited to life support devices or systems, in which a failure of Allegro's product can reasonably be expected to cause bodily harm.

The information included herein is believed to be accurate and reliable. However, Allegro MicroSystems assumes no responsibility for its use; nor for any infringement of patents or other rights of third parties which may result from its use.

Copies of this document are considered uncontrolled documents.