Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

ISL8002BDEMO1Z Demonstration Board User Guide

Description

The ISL8002BDEMO1Z kit is intended for use by individuals with requirements for point-of-load applications sourcing from 2.7V to 5.5V. The ISL8002BDEMO1Z board is used to demonstrate the performance of the ISL8002B low quiescent current mode converter.

The ISL8002B is offered in a 8 pin 2mmx2mm TDFN package with 1mm maximum height. The complete converter occupies less than 64mm^2 area.

Specifications

This board has been configured and optimized for the following operating conditions:

- V_{IN} = 2.7V to 5.5V
- V_{OUT} = 1.8V
- VTRACK = 1.8V
- I_{OUT} maximum is 2A
- Switching frequency is 2MHz
- Up to 95% peak efficiency
- Selectable PFM or PWM operation option

Key Features

- Small, compact design
- V_{IN} range of 2.7V to 5.5V
- V_{OUT} adjustable from 0.6V up to 80% of V_{IN}
- I_{OUT} maximum is 2A
- External soft-start programmable
- Output tracking and sequencing
- Overcurrent and short-circuit protection
- Over-temperature/thermal protection

References

ISL8002B Datasheet

Ordering Information

PART NUMBER	DESCRIPTION
ISL8002BDEMO1Z	2A Demonstration Board

FIGURE 1. ISL8002BDEMO1Z TOP SIDE

FIGURE 2. ISL8002BDEMO1Z BOTTOM SIDE

What's Inside

The demonstration kit contains the following:

- The ISL8002BDEM01Z
- ISL8002B Datasheet

Test Steps

If tracking feature is not used, connect SS/TR to VIN for 1ms internal soft-start and follow the test steps below:

1. Ensure that the circuit is correctly connected to the supply and loads prior to applying any power.
2. Connect the bias supply to VIN. Plus terminal to VIN (TP1) and negative return to PGND (TP2).
3. Connect the output load to VO (TP3), and the negative return to PGND (TP4).
4. Turn on the power supply.
5. Verify the output voltage is 1.8V for V_{OUT}.

Functional Description

The ISL8002BDEM01Z provides a simple platform to evaluate performance of the ISL8002B.

The ISL8002B is a highly efficient, monolithic, synchronous step-down DC/DC converter that can deliver up to 2A of continuous output current from a 2.7V to 5.5V input supply. It uses peak current mode control architecture to allow very low duty cycle operation. The ISL8002B operates at a 2MHz switching frequency, thereby providing superior transient response and allowing for the use of small inductor.

The ISL8002B can be configured for either PFM (discontinuous conduction) or PWM (continuous conduction) operation at light load. PFM provides high efficiency by reducing switching losses at light loads and PWM reduces noise susceptibility and RF interference. Tied MODE pin to high for PWM or to Ground for PFM.

The ISL8002B can be programmable for external soft-start or output tracking and sequencing.

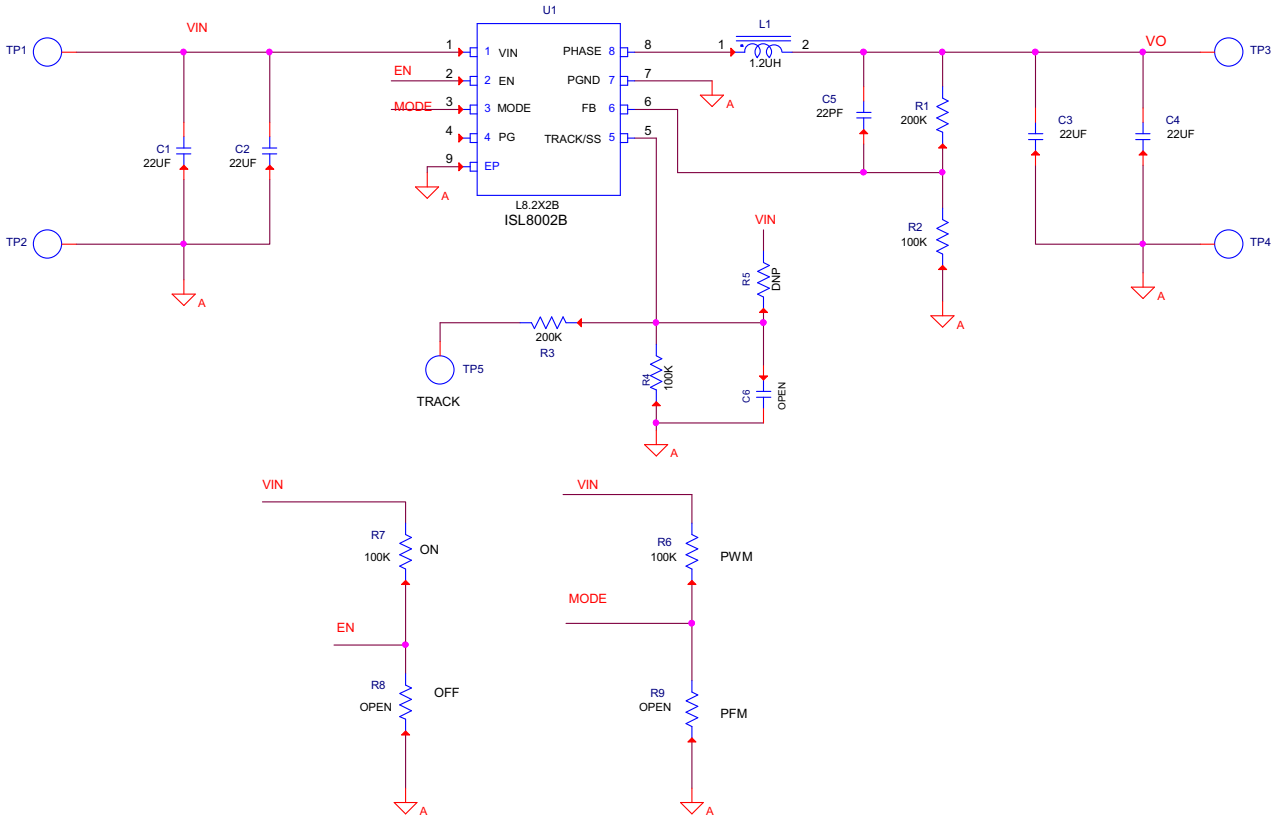
Adding a resistor divider from VIN to SS/TR (R_5; R_4) and a capacitor (C6) from the SS/TR pin to ground determines the output ramp rate, maximum soft-start cap value is 1µF.

Adding a resistor divider across SS/TR can be use for outputs tracking. Populate R_3 and R_4 if Tracking feature is used. Ratio between R_1/R_2 should equal R_3/R_4. Otherwise connect SS/TR to VIN for 1ms internal soft-start.

PCB Layout Guidelines

The PCB layout is a very important converter design step to make sure the designed converter works well. The power loop is composed of the output inductor L's, the output capacitor C_{OUT}, the PHASE's pins, and the PGND pin. It is necessary to make the power loop as small as possible and the connecting traces among them should be direct, short and wide. The switching node of the converter, the PHASE pins, and the traces connected to the node are very noisy, so keep the voltage feedback trace away from these noisy traces. The input capacitor should be placed as closely as possible to the VIN pin and the ground of the input and output capacitors should be connected as closely as possible. The heat of the IC is mainly dissipated through the thermal pad. Maximizing the copper area connected to the thermal pad is preferable. In addition, a solid ground plane is helpful for better EMI performance. It is recommended to add at least 4 vias ground connection within the pad for the best thermal relief.

ISL8002BDEMO1Z Schematic



Bill of Materials

MANUFACTURER PART	QTY	UNITS	REFERENCE DESIGNATOR	DESCRIPTION	MANUFACTURER
C2012X5R0J226M	4	EA	C1-C4	CAP, SMD, 0805, 22µF, 6.3V, 20%, X5R, ROHS	TDK
GRM36C0G220J050AQ	1	EA	C5	CAP, SMD, 0402, 22pF, 50V, 5%, NP0, ROHS	MURATA
	0	EA	C6	CAP, SMD, 0402, DNP-PLACE HOLDER, ROHS	
VLCF4028T-1R2N2R7-2	1	EA	L1	COIL-PWR INDUCTOR, WW, SMD, 4mm, 1.2µH, 30%, 2.7A, ROHS	TDK
5000	2	EA	TP1, TP3	CONN-MINI TEST PT, VERTICAL, RED, ROHS	KEYSTONE
5001	3	EA	TP2, TP4, TP5	CONN-MINI TEST PT, VERTICAL, BLK, ROHS	KEYSTONE
ISL8002BIRZ	1	EA	U1	IC-2A BUCK REGULATOR, 8P, TDFN, 2X2, ROHS	INTERSIL
ERJ2RKF1003	2	EA	R2, R4	RES, SMD, 0402, 100k, 1/16W, 1%, TF, ROHS	PANASONIC
MCR01MZPF2003	2	EA	R1, R3	RES, SMD, 0402, 200k, 1/16W, 1%, TF, ROHS	ROHM
	0	EA	R5	RES, SMD, 0402, DNP, DNP, DNP, TF, ROHS	
CR0603-10W-1003FT	2	EA	R6, R7	RES, SMD, 0603, 100k, 1/10W, 1%, TF, ROHS	VENKEL
	0	EA	R8, R9	RES, SMD, 0603, DNP-PLACE HOLDER, ROHS	

Board Layout

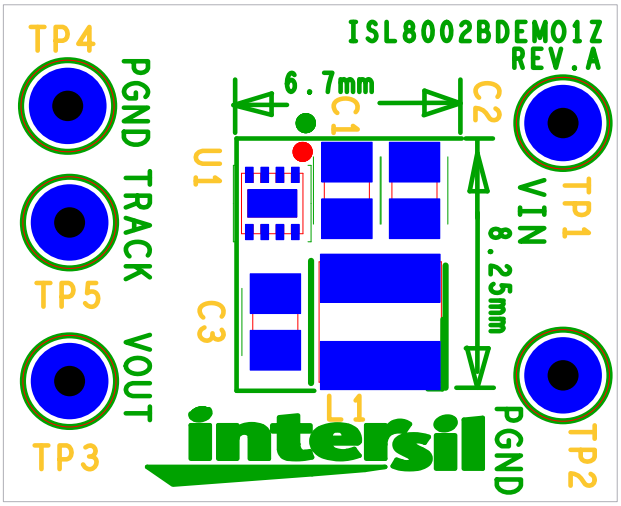


FIGURE 3. SILKSCREEN TOP

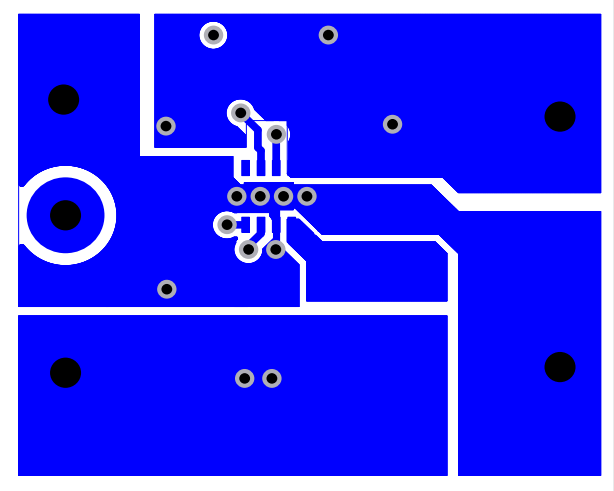


FIGURE 4. LAYER 1

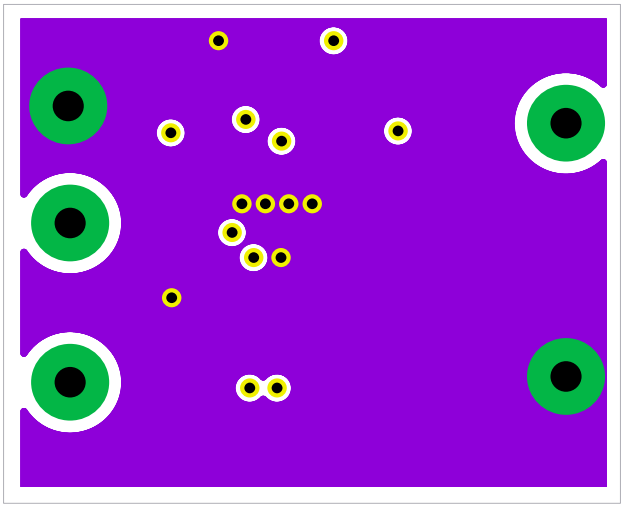


FIGURE 5. LAYER 2

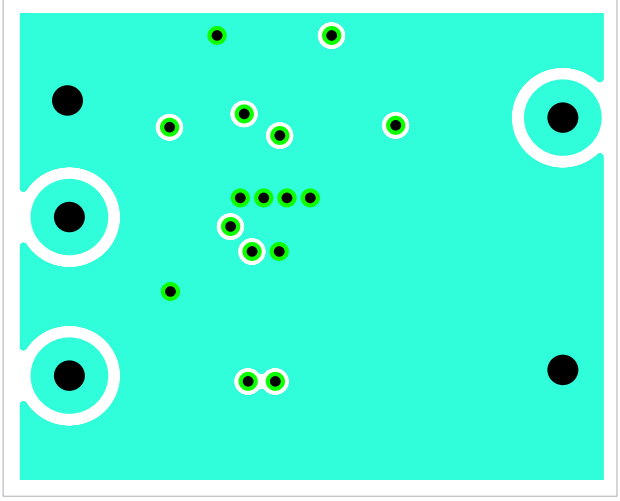


FIGURE 6. LAYER 3

Board Layout (Continued)

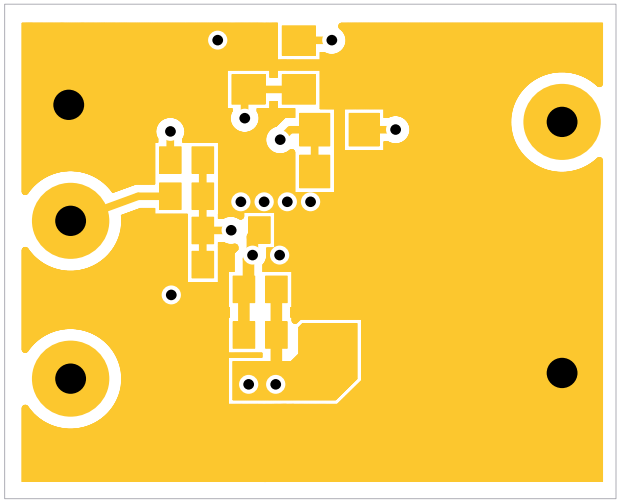


FIGURE 7. LAYER 4

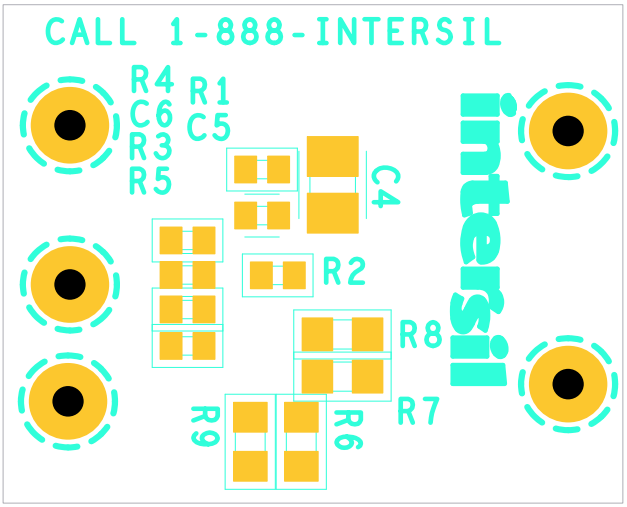


FIGURE 8. SILKSCREEN BOTTOM

Typical Performance Curves

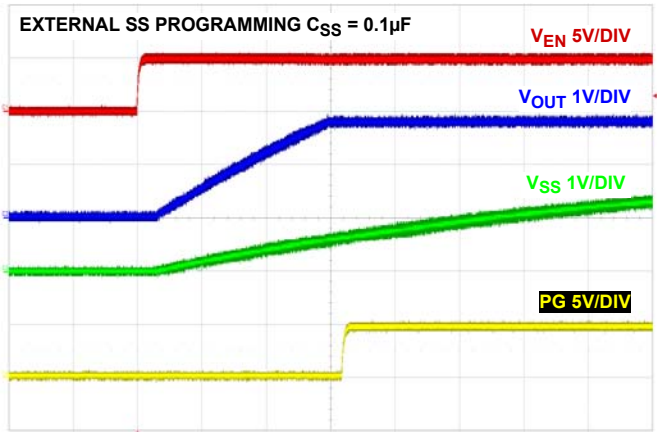


FIGURE 9. START-UP AT 2A LOAD
f_{SW} = 2MHz, V_{IN} = 5V, MODE = PWM, T_A = +25°C

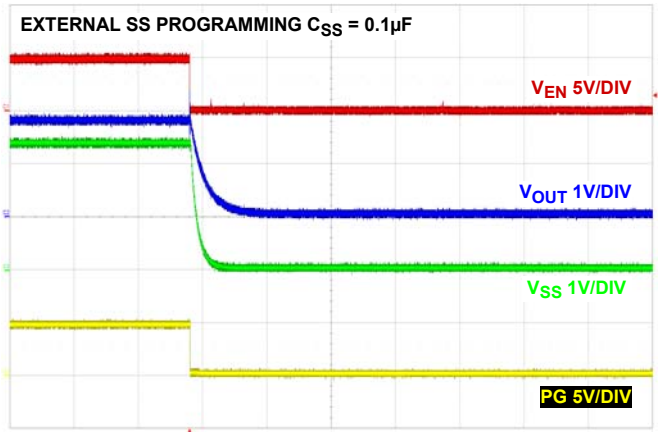


FIGURE 10. SHUTDOWN AT 2A LOAD
f_{SW} = 2MHz, V_{IN} = 5V, MODE = PWM, T_A = +25°C

Typical Performance Curves (Continued)

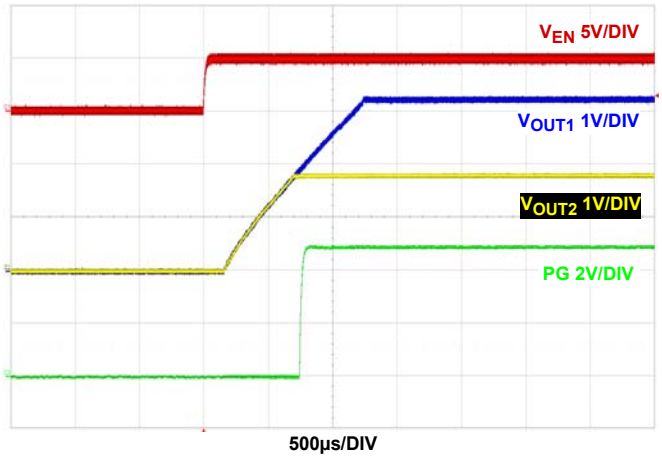


FIGURE 11. COINCIDENTAL VOLTAGE TRACKING START-UP AT FULL LOAD, V_{IN} = 5V, MODE = PWM, T_A = +25°C

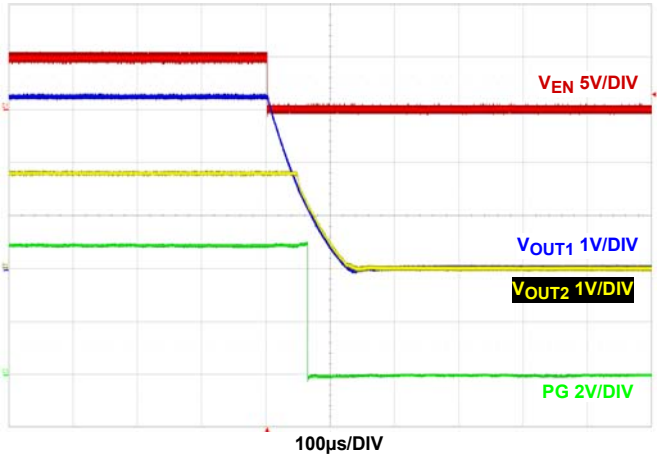


FIGURE 12. COINCIDENTAL VOLTAGE TRACKING SHUTDOWN AT FULL LOAD, V_{IN} = 5V, MODE = PWM, T_A = +25°C

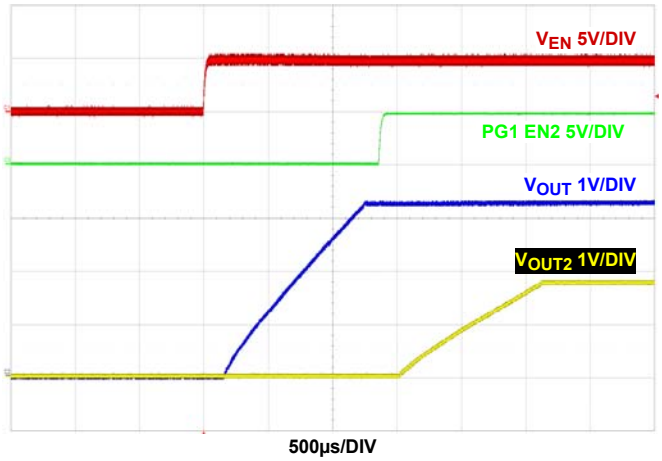


FIGURE 13. SEQUENTIAL START-UP USING EN AND PG AT FULL LOAD, V_{IN} = 5V, MODE = PWM, T_A = +25°C

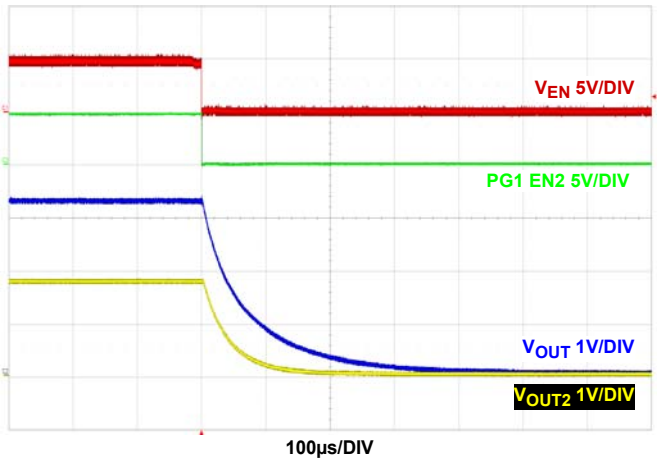


FIGURE 14. SEQUENTIAL SHUTDOWN USING EN AND PG AT FULL LOAD, V_{IN} = 5V, MODE = PWM, T_A = +25°C

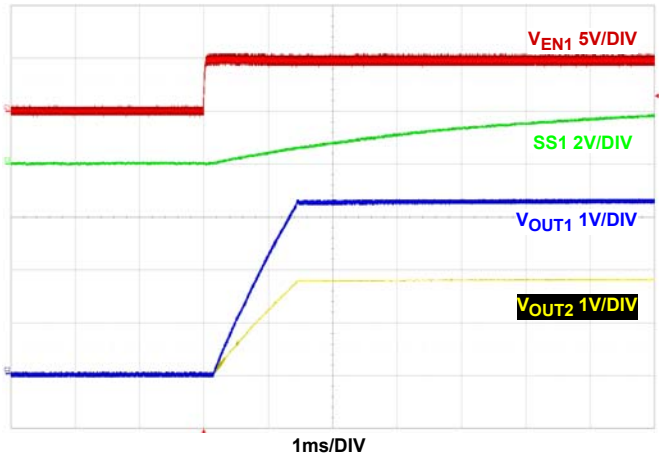


FIGURE 15. RATIOMETRIC START-UP WITH VOUT1 LEADING V_{OUT2} AT FULL LOAD, V_{IN} = 5V, MODE = PWM, T_A = +25°C

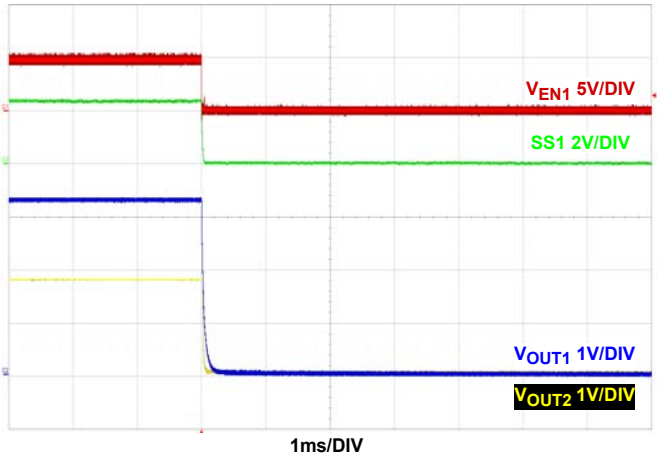


FIGURE 16. RATIOMETRIC SHUTDOWN WITH VOUT1 LEADING V_{OUT2} AT FULL LOAD, V_{IN} = 5V, MODE = PWM, T_A = +25°C