

Evaluation Board Manual

DESCRIPTION

SiP32419 and SiP32429 are a load switch that integrates multiple control features that simplify the design and increase the reliability of the circuitry connected to the switch. The SiP32419 and SiP32429 are a 56 mΩ switch designed to operate in the 6 V to 28 V range. An internally generated gate drive voltage ensures good R_{ON} linearity over the input voltage operating range.

The SiP32419 and SiP32429 have a slew rate control circuit that controls the switch turn-on time to the value set by an external capacitor.

After soft start, an over-current protection circuit (OCP) continuously monitors the current through the load switch, and controls the switch impedance to limit the current to the level programmed by an external resistor. If the over-current condition persists for more than 7 ms, the switch shuts off automatically. The SiP32419 and SiP32429 have an over temperature protection circuit (OTP) which will shut the switch off if the junction temperature exceeds about 145 °C. The OTP circuit will release the switch when the temperature has decreased by about 20 °C of hysteresis.

When the device is at OCP fault condition for over 8 ms the power switch will turn off, and the FLG pin will be pulled low. In case of OT fault condition, the power switch will be off immediately. The FLG pin will be pulled low. For the SiP32429, the fault flag will release 150 ms after the fault condition is cleared, and the switch will turn on at the programmed slew rate. For the SiP32419, the switch will remain off and the fault flag will remain on. The power switch can be reset by toggling EN or input power recycle if over temperature fault is removed.

This device features a low voltage control logic interface which can be controlled without the need for level shifting.

These devices also include a power good flag. The SiP32419 and SiP32429 are available in a space efficient DFN10 3 mm x 3 mm package.

SiP32419, SiP32429 EVALUATION BOARD

SiP32419 and SiP32429 demo board is designed to evaluate the over current protection and programmable soft start function of the device.

POWER INPUT AND OUTPUT TERMINALS

These power header terminals are designed for easily hood up to the power supply and the load for the evaluation (see fig. 1). The input voltage range for this evaluation is from 6 V to 24 V.

CONNECTION AND SIGNAL TEST POINTS

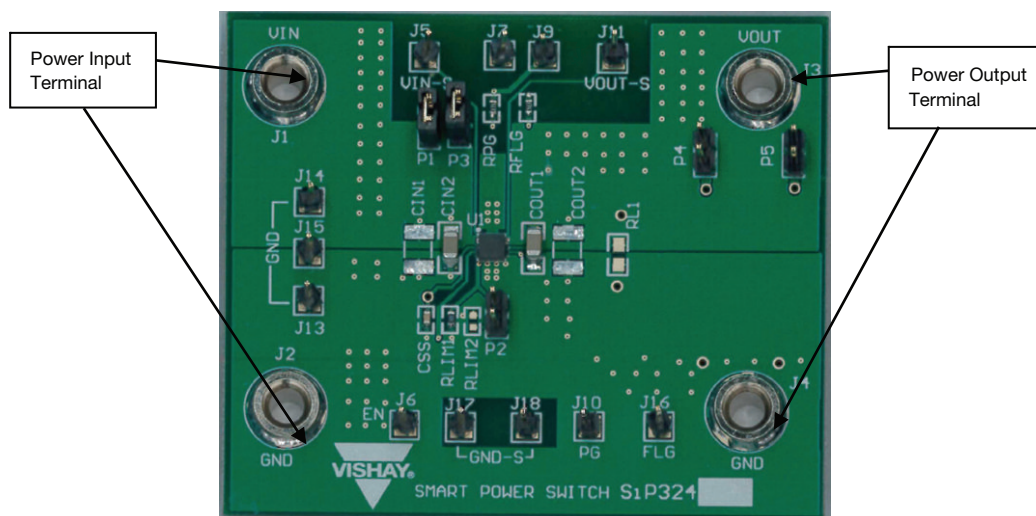


Fig. 1 - SiP32419, SiP32429 Evaluation Board

INPUT CAPACITOR AND OUTPUT CAPACITOR

The input capacitor C_{IN2} and output capacitors C_{OUT1} are mounted right next the device to ensure stable voltage right before and after the SiP32419 and SiP32429 load switch (see fig. 2). The capacitances of these capacitors are 10 μ F. The voltage rating for input and output capacitor is 50 V. SiP32419 and SiP32429 devices can operate normally up to 24 V. It is importance to use the 35 V or higher rated capacitor for the input and output capacitors.

ENABLE TERMINAL

The header J6 is directly connected to the EN pin for the enable function of the device (see fig. 2). The voltage rating of EN pin is 6 V only. To have the design margin, never apply voltage higher than 5 V to this enable pin. The enable threshold voltage is 2.4 V and the disable threshold voltage is 0.4 V or lower.

FAULT FLAG AND POWER GOOD FLAG

SiP32419 and SiP32429 devices have the fault flag and power good flag to indicate the operation status of the device. The header J16 is connected to fault flag of the device. The header J10 is connected power good of the device (see fig. 2). Both flags are open drain pin of the device. An external 5 V bias voltage is required to header J7 and J9 to ensure proper operation of these flag. This external bias voltage can be provided by the input voltage by shorting jumpers P3 and P1 because the voltage rating of the power good and fault flag are 28 V maximum.

OVER CURRENT LIMIT SETTING

The major function of the SiP32419 and SiP32429 is to provide over current limit protection. Resistor R_{LIM1} can be calculated by the following formula to set the current of the device:

$$I_{LIM} = \frac{1.24 \text{ V} \times 5000}{R_{SET}}$$

Where:

R_{SET} is R_{LIM1} on the board.

I_{LIM} is the target current limit setting.

PROGRAMMABLE SOFT POWER UP

Soft power up is another feature of SiP32419 and SiP32429 devices. The soft power time is not only the function of I_{SS} and C_{SS} but it also is the function load current and current limiting setting.

The soft power time can be calculated by the following formula:

$$\frac{\Delta V_{OUT}}{\Delta t} = \frac{I_{SS}}{C_{SS}} \times \frac{R_{OUT} \times 5000}{R_{SET}}$$

Where:

Δt is the soft power up time

ΔV_{OUT} is the output voltage power up range

I_{SS} is the built-in current to charge up C_{SS} . The value is 5 μ A

C_{SS} is the soft power setting capacitor

R_{SET} is the current limit resistor, which is R_{LIM1} on the board

R_{OUT} is the output resistor

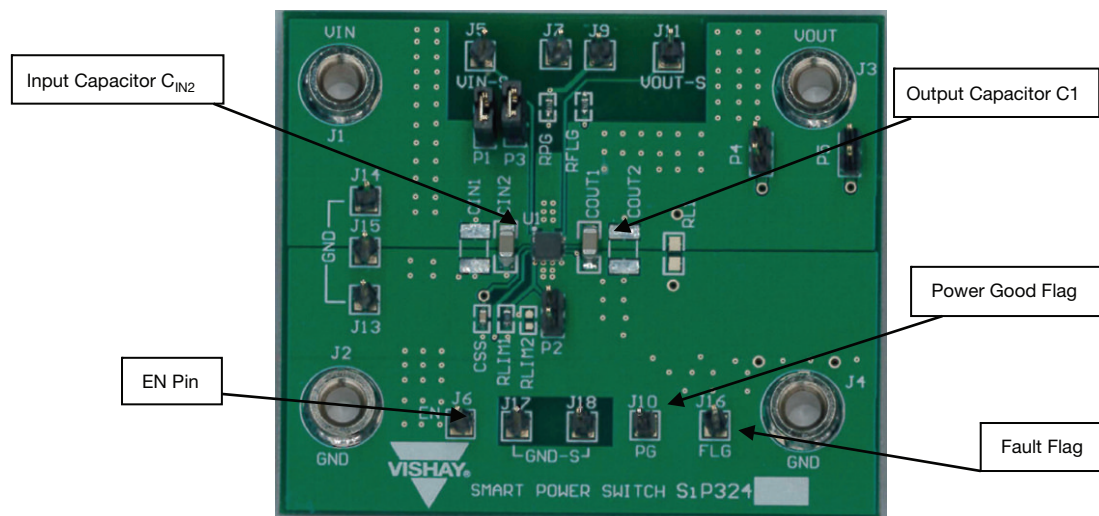


Fig. 2 - SiP32419, SiP32429 Evaluation Board

SiP32419, SiP32429 EVALUATION BOARD SCHEMATIC

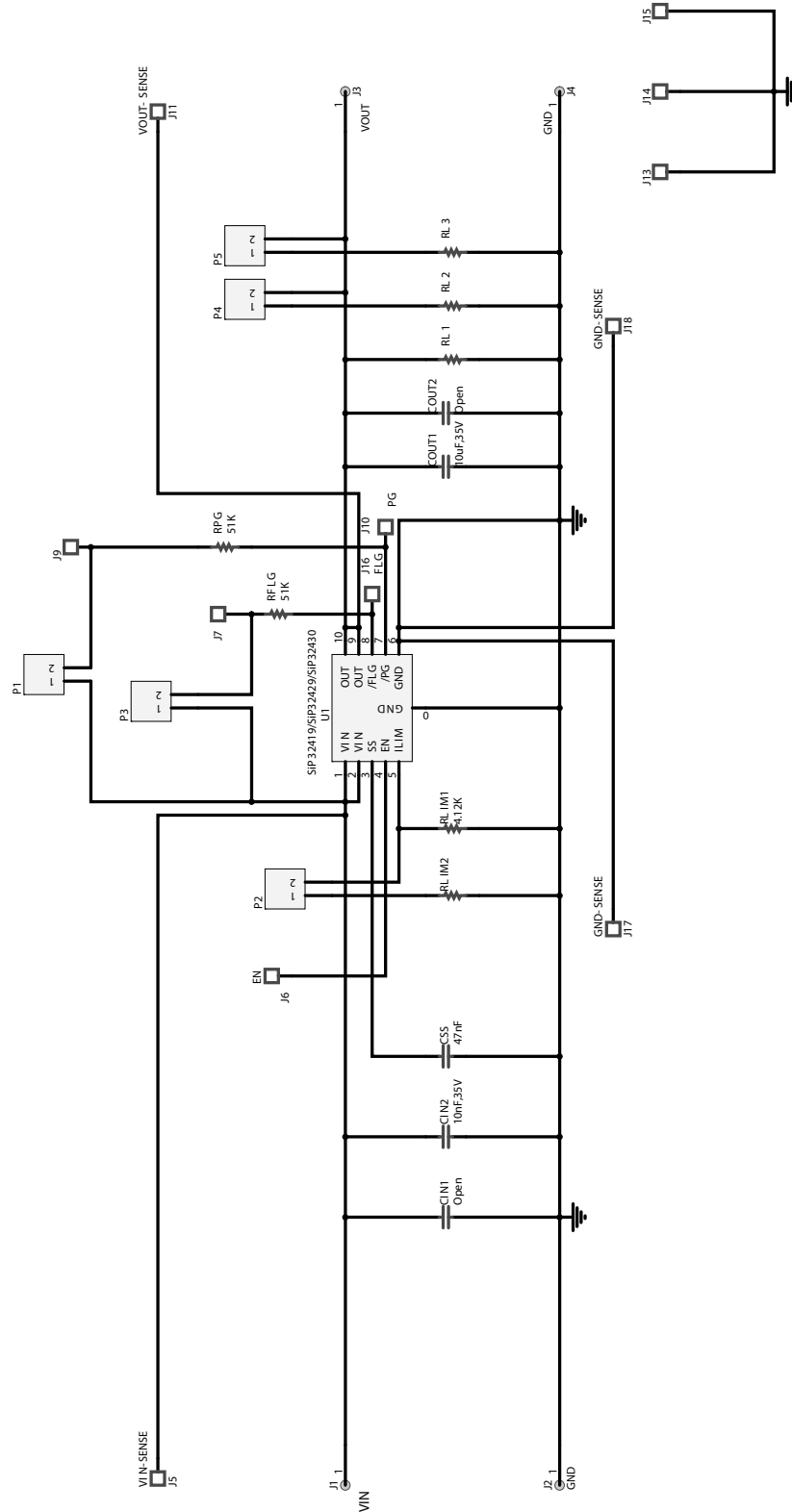
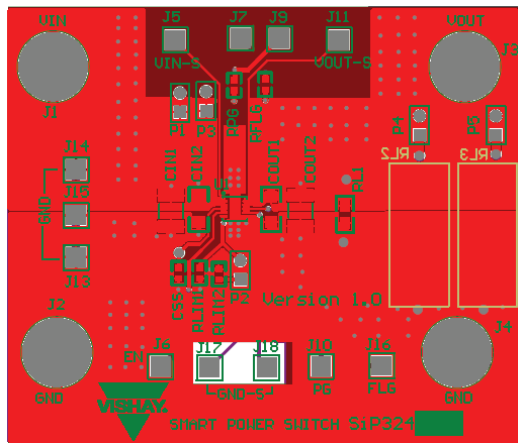


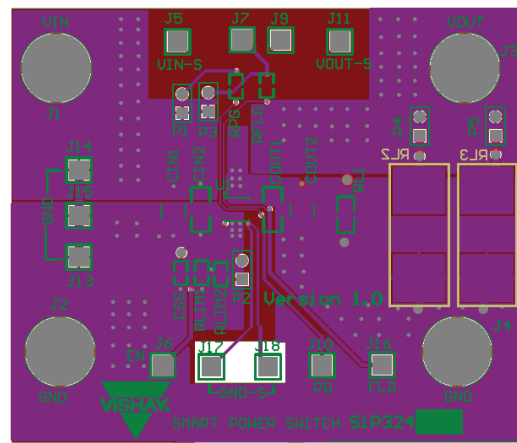
Fig. 3 - SiP32419, SiP32429 Evaluation Board Schematic



EVALUATION BOARD LAYOUT



Top View

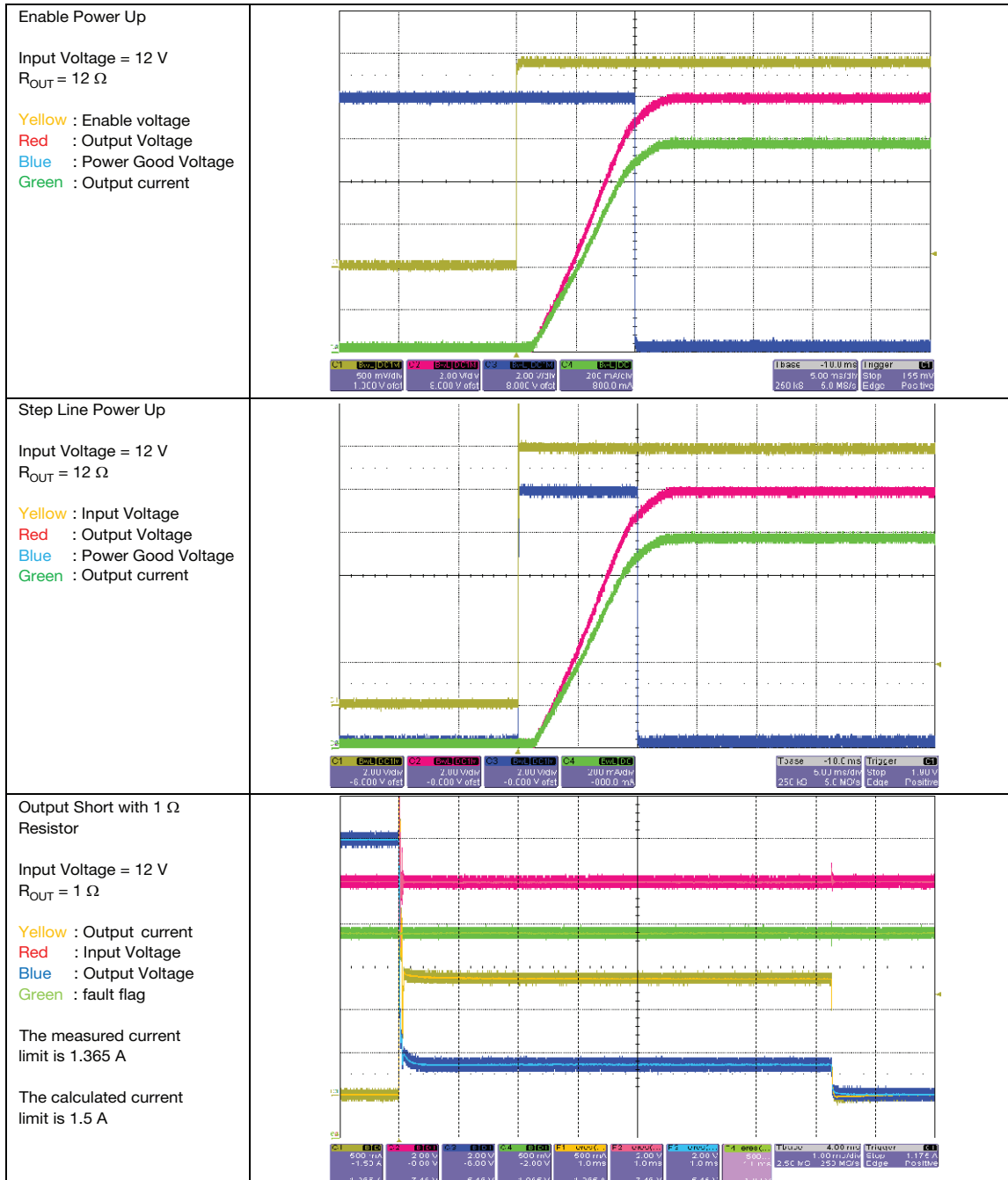


Bottom View

BILL OF MATERIAL					
LOCATION	VALUE / PART NUMBER	SIZE	TYPE	DIGIKEY PART NUMBER	MOUSER PART NUMBER
C _{IN2}	10 μF 35 V X7R ± 20 %	1206	MLCC	Generic part	-
C _{OUT1}	10 μF 35 V X7R ± 20 %	1206	MLCC	Generic part	-
C _{SS}	47 nF 10 V X7R ± 10 %	0603	MLCC	Generic part	-
R _{LIM1}	4.12 kΩ ± 1 %	0603	-	Generic part	-
R _{FLG}	51.1 kΩ ± 1 %	0603	-	Generic part	-
R _{PG}	51.1 kΩ ± 1 %	0603	-	Generic part	-
U1	SiP32419, SiP32429	DFN-10L	-	-	-
J1, J2, J3, J4	Test plugs and test Jacks. 0.265 non-insul Jack	-	-	-	534-575-6
J5, J6, J7, J9, J10, J11, J13, J14, J15, J16, J17, J18	Circuit pin prntd 0.070 "D 0.125"	-	-	6821-000010000080-ND	-
P1, P3	2 mm pitch / 2 pins	-	-	-	-



LAB EXPERIMENT RESULT



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