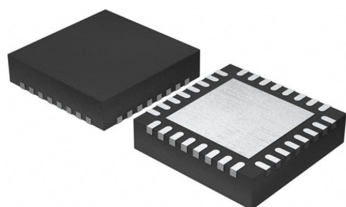


PMIC with buck and precise voltage reference for MCU applications



VFQFPN 5x5x0.9 32L PITCH 0.5


Product status link

[SPSA068](#)

Product summary

| | |
|------------|---------------|
| Order code | SPSA068-TR |
| Package | QFN32L |
| Packing | Tape and reel |

Features

- AEC-Q100 qualification ongoing 
- Pre SMPS BUCK regulator, adjustable via NVM to 5.0 V, 3.3 V, 1.2 V @ 0.5 A and 1.0 A load current, 0.4 / 2.4 MHz. Via external resistive divider, it can regulate a voltage between 3.3 V and 1.2 V
- Precise voltage reference (1%), adjustable via NVM to 5.0 V, 3.3 V, 1.2 V @ 20 mA load current
- Standby mode $I_q < 5 \mu A$
- Low quiescent current, 50 μA , in low power active mode
- SPI interface with CRC
- Programmable soft start
- Voltage supervisors
- Spread frequency spectrum
- Reset output
- Adjustable window watchdog
- Vref tracking of Vbuck in power-up phase
- Short-circuit protected outputs
- Fault detection pin to microcontroller
- Low external components number
- Thermal warning and thermal shutdown

Description

The **SPSA068** is a buck voltage regulator with a precise voltage reference for MCU applications. All the regulators have internal power switches.

The LPM allows the operation under light-load conditions reducing the quiescent current down to 50 μA typ.

An internal programmable memory allows selecting the main device parameters like output voltages and switching frequencies.

An SPI interface can be used for diagnostics, programming, monitoring and external window watchdog.

The device offers a set of features to support applications that need to fulfill functional safety requirements as defined by the automotive safety integrity level.

1 Overview

The **SPSA068** is a PMIC composed by a synchronous current mode buck voltage regulator, with integrated LS and HS power-MOS, and a precise voltage reference. It offers flexibility and ease to use, together with a set of features that make it compliant to the commonly used microcontrollers in car passenger applications that require functional safety. The product includes input and output monitors, independent bandgaps, ground loss monitors, digital and analog BIST, fault pin.

The device provides two different regulated voltages: there is a battery-compatible regulator with integrated MOS for loads up to 1 A and 1% accurate reference voltage.

A window watchdog and a reset output complete the product.

The output voltages can be selected via non-volatile memory cells that can be programmed before using the PMIC. This guarantees precision and safety, since output voltages are not susceptible to variations due to the external environment. It also contributes to reducing the number of external components. Through NVM cells it is also possible to decide the switching frequency and the current limitation of the Buck and program other parameters.

The device must be programmed at the customer's production line at first power-up.

The low power mode allows to supply components at a very optimized quiescent current, down to 50 μ A. LPM can be activated by an SPI command and, if not required, it can be disabled by NVM configuration.

An SPI bus is used to program the PMIC and to communicate with the microcontroller. Through the SPI it is possible to set buck slew rate, disable the spread spectrum (enabled by default), provide a watchdog signal and communicate the status of the regulators in case of fault, overtemperature or other events.

2 Pins description

Figure 1. Pinout (bottom view)

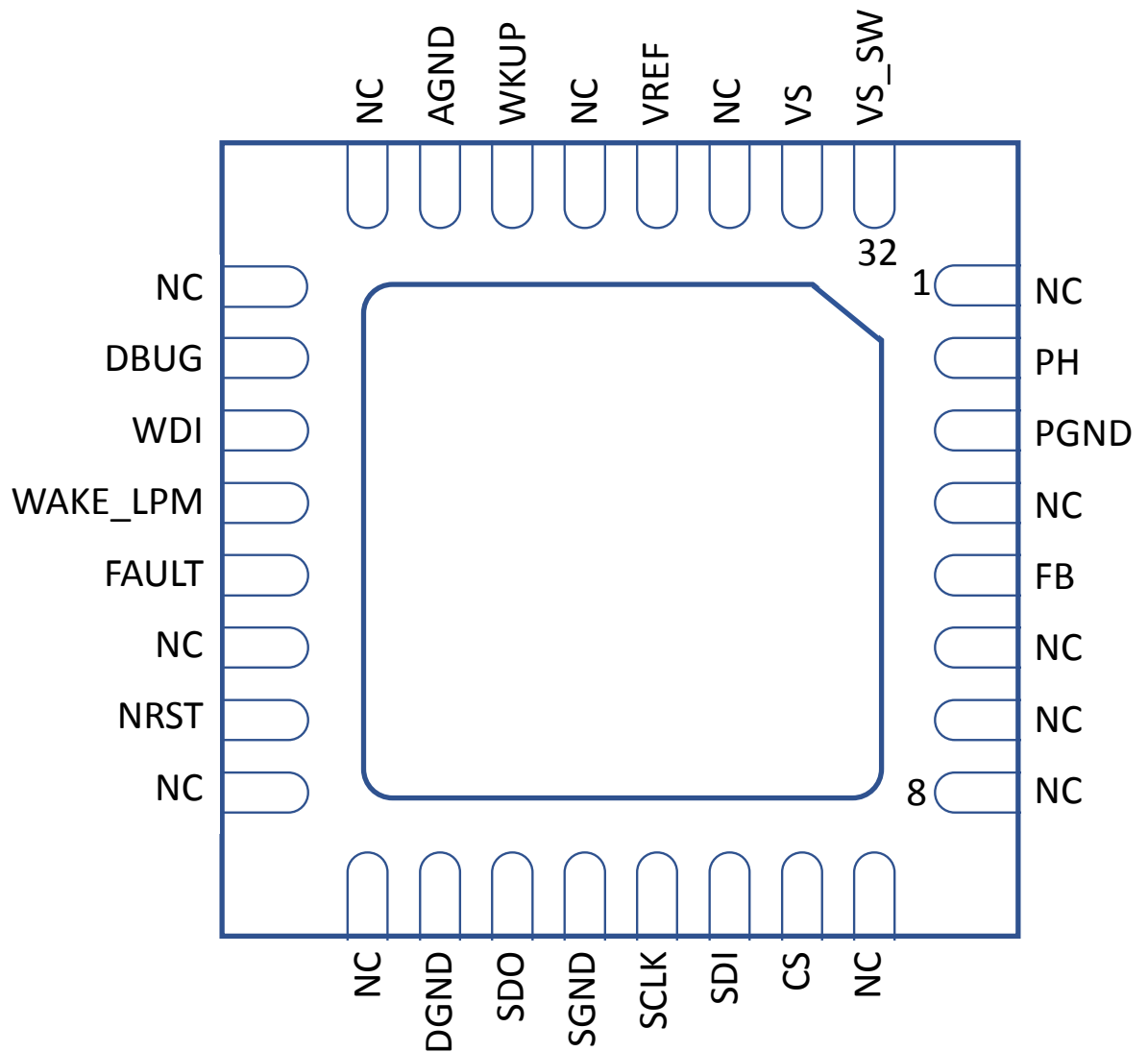
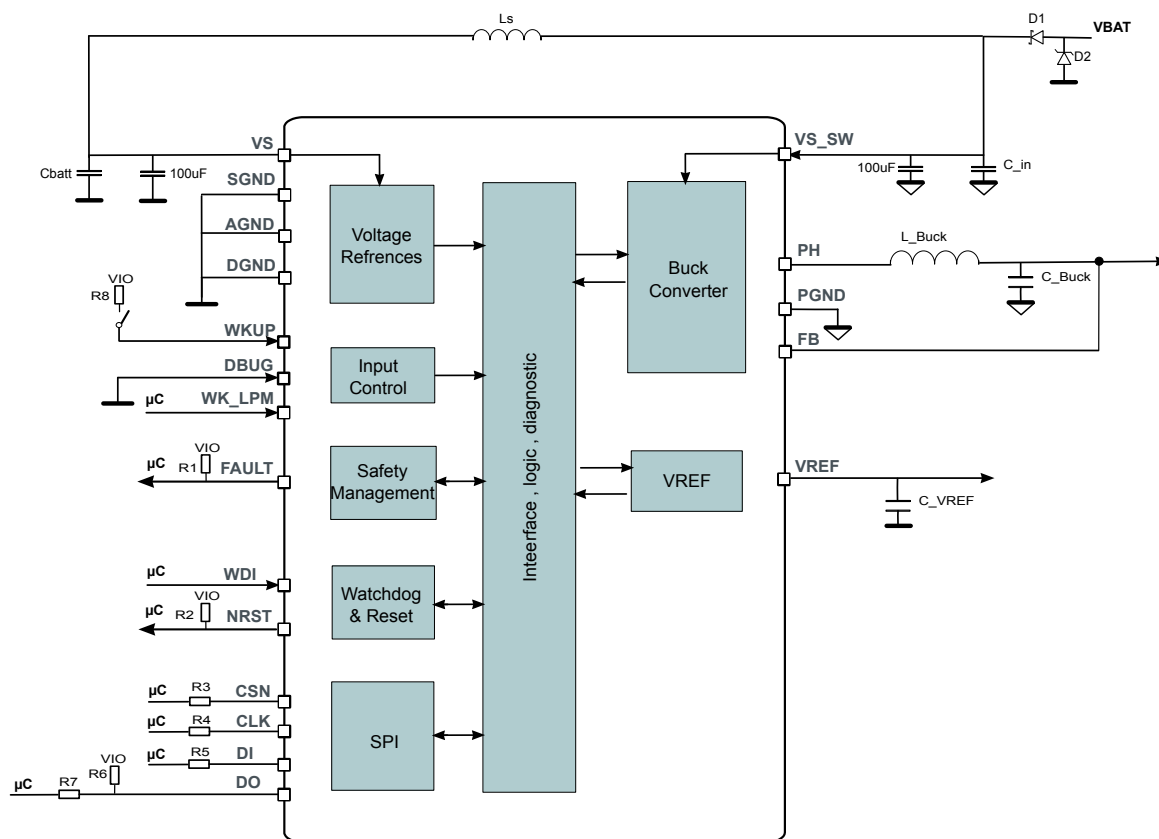


Table 1. Pins description

| No. | Pin name | Description |
|-----|----------|---|
| 1 | NC | Not connected |
| 2 | PH | Switching node BUCK |
| 3 | PGND | BUCK power ground |
| 4 | NC | Not connected |
| 5 | FB | BUCK regulated voltage output (feedback to internal voltage monitors) |
| 6 | NC | Not connected |
| 7 | NC | Not connected |
| 8 | NC | Not connected |
| 9 | NC | Not connected |
| 10 | CS | SPI: chip select input. Internal current pull-up |
| 11 | SDI | SPI: serial data input. Internal current pull-down |
| 12 | SCLK | SPI: serial clock input. Internal current pull-down |
| 13 | SGND | Signal ground for low noise circuitry |
| 14 | SDO | SPI: serial data output |
| 15 | DGND | Digital ground |
| 16 | NC | Not connected |
| 17 | NC | Not connected |
| 18 | NRST | Reset, negate |
| 19 | NC | Not connected |
| 20 | FAULT | Fault pin detection to MCU |
| 21 | WAKE_LPM | LPM Wake pin |
| 22 | WDI | Watchdog input. WDI is trigger input from MCU. Internal current pull-down |
| 23 | DEBUG | Device debug. Connect to ground when not used |
| 24 | NC | Not connected |
| 25 | NC | Not connected |
| 26 | AGND | Analog GND |
| 27 | WKUP | Wake up input. Internal 200 kΩ pull-down |
| 28 | NC | Not connected |
| 29 | VREF | Accurate reference voltage output |
| 30 | NC | Not connected |
| 31 | VS | Input voltage, battery voltage |
| 32 | VS_SW | Input voltage for switching regulator (BUCK) |

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Figure 2. Typical application circuit



Revision history

Table 2. Document revision history

| Date | Revision | Changes |
|-------------|----------|------------------|
| 28-Sep-2023 | 1 | Initial release. |

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