# FR9855

## *18V, 5.5A Synchronous Step-Down DC/DC Converter*

## Description

The FR9855 is a synchronous step-down DC/DC converter with fast constant on time (FCOT) mode control. The device provides 4.5V to 18V input voltage range and 5.5A continuous load current capability. Operation frequency depends on Input and output voltage condition. At light load condition, the FR9855 can operate at power saving mode to support high efficiency and reduce power loss.

The FR9855 fault protection includes cycle-by-cycle current limit, short circuit protection, UVLO and thermal shutdown. The soft-start function prevents inrush current at turn-on. The FR9855 use fast constant on time control that provides fast transient response, the noise immunity and all kinds of very low ESR output capacitor for ensuring performance stabilization.

The FR9855 is offered in SOP-8 (Exposed Pad) and TDFN-10 (3mm x 3mm) packages, which provides good thermal conductance.

## Features

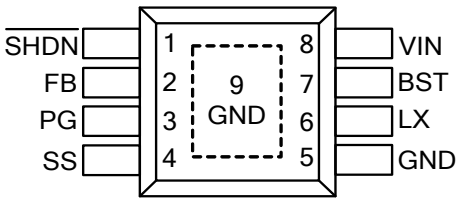
- Low $R_{DS(ON)}$ Integrated Power MOSFET (70mΩ/38mΩ)
- Wide Input Voltage Range: 4.5V to 18V
- Output Voltage Range: 0.765V to 8V
- 5.5A Output Current
- FCOT Mode Enables Fast Transient Response
- Pseudo 630kHz Frequency
- Power Good Function (for SOP8-EP Only)
- Input Under Voltage Lockout
- Adjustable Soft Start Function
- Cycle-by-Cycle Current Limit
- Hiccup Short Circuit Protection
- Over Temperature Protection with Auto Recovery
- SOP-8 Exposed Pad and TDFN-10(3mmx3mm) Packages

## Applications

- STB (Set-Top-Box)
- LCD Display, TV
- Distributed Power System
- Networking, XDSL Modem

## Pin Assignments

**SP Package (SOP-8 Exposed Pad)**




**DA Package (TDFN-10)(3mm x 3mm)**

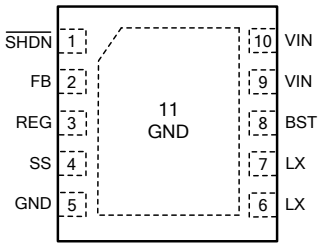



Figure 1. Pin Assignments of FR9855

## Ordering Information

FR9855□

Package Type
SP: SOP-8 (Exposed Pad)
DA: TDFN-10(3mm x 3mm)

## Typical Application Circuit

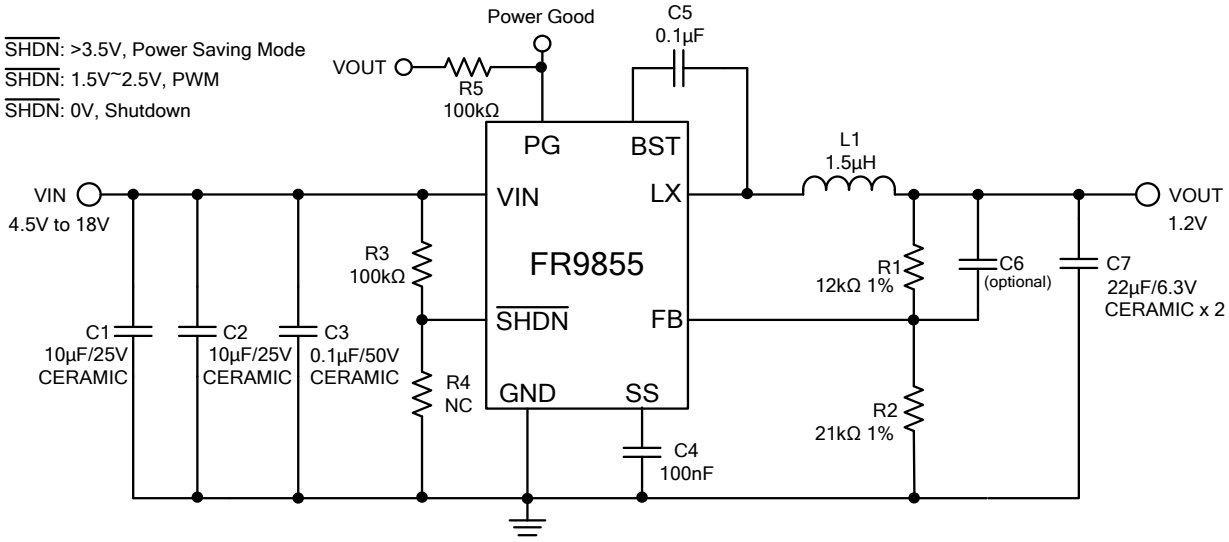



Figure 2. Application Circuit for SOP-8 Exposed Pad Package

$V_{IN}$=12V, the recommended BOM list is as below.

| $V_{OUT}$ | C1 | R1 | R2 | C2 | C6 | L1 | C7 |
|---|---|---|---|---|---|---|---|
| 1.05 | 10µF MLCC | 7.87kΩ | 21kΩ | 10µF MLCC | 5pF~33pF | 1.5µH | 22µF MLCC x2 |
| 1.2 | 10µF MLCC | 12kΩ | 21kΩ | 10µF MLCC | 5pF~33pF | 1.5µH | 22µF MLCC x2 |
| 1.8 | 10µF MLCC | 28kΩ | 21kΩ | 10µF MLCC | 5pF~33pF | 1.5µH | 22µF MLCC x2 |
| 3.3 | 10µF MLCC | 69.8kΩ | 21kΩ | 10µF MLCC | 5pF~33pF | 2.2µH | 22µF MLCC x2 |
| 5 | 10µF MLCC | 118kΩ | 21kΩ | 10µF MLCC | 5pF~33pF | 3.3µH | 22µF MLCC x2 |

Table 1. Recommended Component Values

## Typical Application Circuit (Continued)

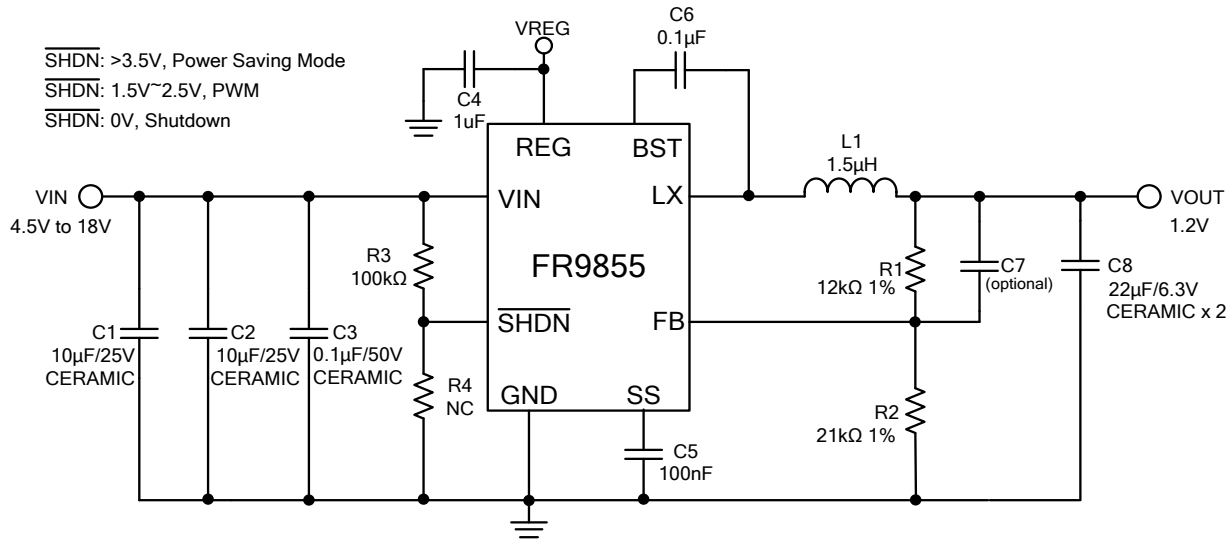



Figure 3. Application Circuit for TDFN-10 Package

$V_{IN}$=12V, the recommended BOM list is as below.

| $V_{OUT}$ | C1 | R1 | R2 | C2 | C7 | L1 | C8 |
|---|---|---|---|---|---|---|---|
| 1.05 | 10µF MLCC | 7.87kΩ | 21kΩ | 10µF MLCC | 5pF~33pF | 1.5µH | 22µF MLCC x2 |
| 1.2 | 10µF MLCC | 12kΩ | 21kΩ | 10µF MLCC | 5pF~33pF | 1.5µH | 22µF MLCC x2 |
| 1.8 | 10µF MLCC | 28kΩ | 21kΩ | 10µF MLCC | 5pF~33pF | 1.5µH | 22µF MLCC x2 |
| 3.3 | 10µF MLCC | 69.8kΩ | 21kΩ | 10µF MLCC | 5pF~33pF | 2.2µH | 22µF MLCC x2 |
| 5 | 10µF MLCC | 118kΩ | 21kΩ | 10µF MLCC | 5pF~33pF | 3.3µH | 22µF MLCC x2 |

Table 2. Recommended Component Values

## Functional Pin Description

| Pin Name | Pin No. (SOP-8EP) | Pin No. (TDFN3x3-10) | Pin Function |
|---|---|---|---|
| $\overline{\text{SHDN}}$ | 1 | 1 | This pin includes enable the converter on/off, and select operation mode (The mode setting, please refer to the following page 11). Connect VIN with a 100kΩ resistor for self-startup and operate in power saving mode. |
| FB | 2 | 2 | Voltage feedback input pin. Connect FB and VOUT with a resistive voltage divider. This IC senses feedback voltage via FB and regulates it at 0.765V. |
| PG | 3 | x | Open drain power good output. |
| SS | 4 | 4 | Soft-start pin. This pin controls the soft-start period. Connect a capacitor from SS to GND to set the soft-start period. |
| GND | 5 | 5 | Ground pin. |
| LX | 6 | 6,7 | Power switching node. Connect an external inductor to this switching node. |
| BST | 7 | 8 | High side gate drive boost pin. A capacitor rating between 10nF~100nF must be connected from this pin to LX. It can boost the gate drive to fully turn on the internal high side NMOS. |
| VIN | 8 | 9,10 | Power supply input pin. Placed input capacitors as close as possible from VIN to GND to avoid noise influence. |
| Exposed Pad | 9 | 11 | Ground pin. The exposed pad must be soldered to a large PCB area and connected to GND for maximum power dissipation. |
| REG | x | 3 | Internal regulator output. Connect a 1uF capacitor to GND to stabilize the internal regulator voltage. |

## Block Diagram

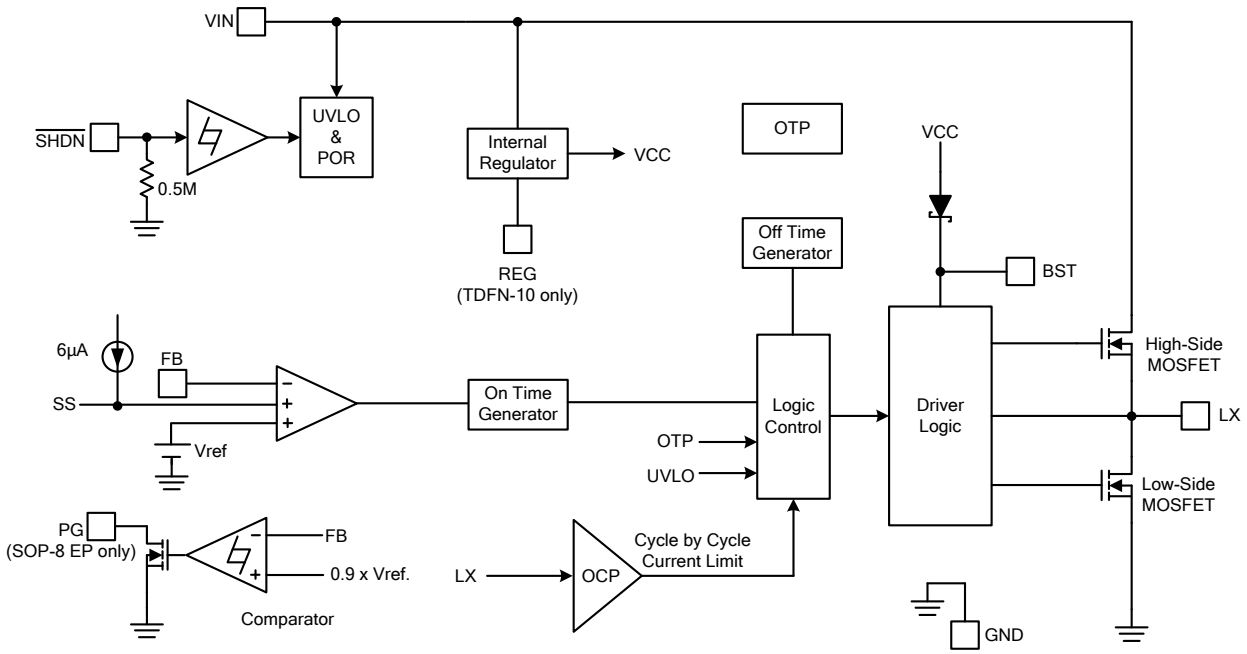



Figure 4. Block Diagram of FR9855