

## 500mA Low IQ Small-Size Low-Dropout Regulator

### Features

- Input Voltage Range: 2.5V to 6.5V
- Output Voltage Range:
  - Fixed Operation: 1.2V, 1.8V, 2.5V, 3.0V, 3.3V
- Maximum output current: 500mA
- Low Dropout Voltage: 275mV at 500mA
- Output Voltage Accuracy: 2%
- Low Quiescent Current
- Excellent Load and Line Transient Responses
- Thermal Shutdown and Over-Current Protection
- Stable with 1 $\mu$ F or Larger Ceramic Capacitor
- Operating Junction Temperature: -40°C to +125°C
- Available package: SOT23-5

### Description

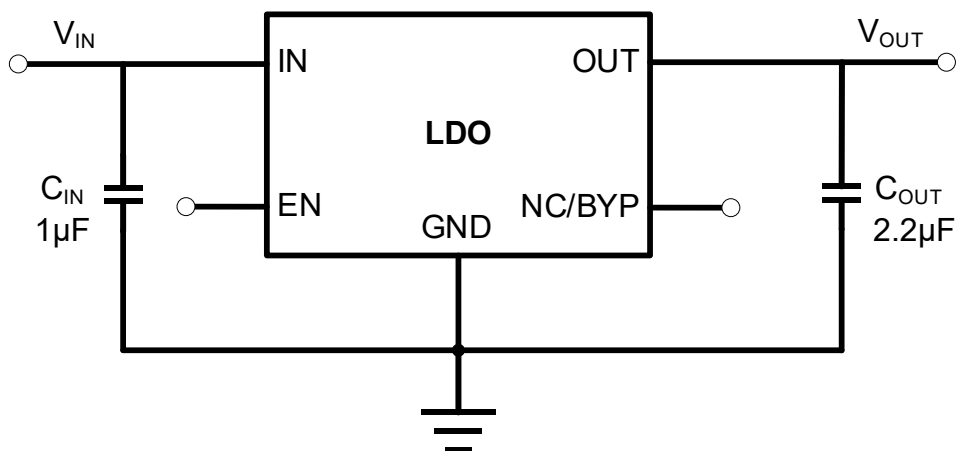
The device is an ultra-small, low quiescent current, low-dropout regulator that sources 500mA with fast line and load transient performance. The output voltage is fixed and spans from 1.2V to 3.3V.

The device also features short-circuit current limit and thermal shutdown protection, as well as automatic discharge function to quickly discharge  $V_{OUT}$  in the disabled states.

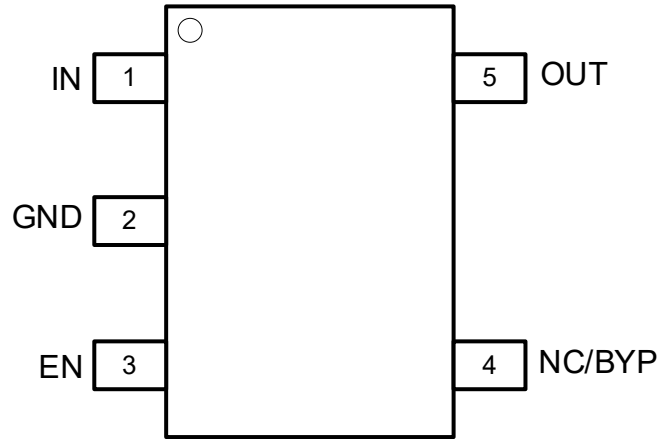
### Applications

- Set-Top Boxes, TV, and Gaming Consoles
- Portable and Battery-Powered Equipment
- Desktops, Notebooks, and Ultrabooks
- Tablets and Remote Controls
- White Goods and Appliances
- Grid Infrastructure and Protection Relays
- Camera Modules and Image Sensors

### Typical Application Circuits



## Pin Configuration and Functions



5-Pin SOT-23 (Top View)

## Pin Descriptions

| PIN Number | PIN Name | I/O | Function                                                                                                                                                |
|------------|----------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1          | IN       | I   | Input supply voltage pin. It is recommended to use a 1 $\mu$ F or larger ceramic capacitor from IN pin to ground to get a good power supply decoupling. |
| 2          | GND      | -   | Ground.                                                                                                                                                 |
| 3          | EN       | I   | Enable Pin. Drive EN high to turn on the regulator. Drive EN low to turn off the regulator.                                                             |
| 4          | NC/BYP   | -   | Do not connect (NC) or Connect a 10nF to ground to reduce output noise (BYP).                                                                           |
| 5          | OUT      | O   | Regulator output voltage pin. A 2.2 $\mu$ F or larger ceramic capacitor from OUT to ground is required to ensure regulator stability.                   |

## Package/Ordering Information

| DEVICE        | PACKAGE TYPE | MARKING | OUTPUT VOLTAGE | PACKING OPTION      |
|---------------|--------------|---------|----------------|---------------------|
| TLV75512PDBVR | SOT23-5      | 1FQF    | 1.2V           | Tape and Reel, 3000 |
| TLV75518PDBVR | SOT23-5      | 1FSF    | 1.8V           | Tape and Reel, 3000 |
| TLV75525PDBVR | SOT23-5      | 1FTF    | 2.5V           | Tape and Reel, 3000 |
| TLV75530PDBVR | SOT23-5      | 1FVF    | 3.0V           | Tape and Reel, 3000 |
| TLV75533PDBVR | SOT23-5      | 1FWF    | 3.3V           | Tape and Reel, 3000 |

## Electrical Specifications

### Absolute Maximum Ratings

| Parameter                 | Symbol           | Value       | Unit |
|---------------------------|------------------|-------------|------|
| IN, OUT and EN Pins       | IN, OUT and EN   | -0.3 to 7   | V    |
| Storage temperature range | T <sub>STG</sub> | -65 to +150 | °C   |
| Output current            | I <sub>OUT</sub> | 500         | mA   |

#### Notes:

1. Exposure of the device under conditions beyond the limits specified by Maximum Ratings for extended periods may cause permanent damage to the device and affect product reliability. These conditions represent a stress rating only, and functional operations of the device at these or any other conditions above the operational limits noted in this specification is not implied.

### ESD Ratings

|                  |                         | Value                     | Unit |
|------------------|-------------------------|---------------------------|------|
| V <sub>ESD</sub> | Electrostatic Discharge | HBM (Human Body Model)    | 3000 |
|                  |                         | CDM (Charge Device Model) | 1000 |

### Recommended Operation Conditions

Over operating temperature range unless otherwise noted

| Parameter                      | Symbol           | Min | Max             | Unit |
|--------------------------------|------------------|-----|-----------------|------|
| Input Supply Voltage           | V <sub>IN</sub>  | 2.5 | 6.5             | V    |
| Enable Input Voltage           | EN               | 0   | V <sub>IN</sub> | V    |
| Output Voltage                 | V <sub>OUT</sub> | 1.2 | 5.0             | V    |
| Output Capacitance             | C <sub>OUT</sub> | 1   | 47              | μF   |
| Output Current                 | I <sub>OUT</sub> | 0   | 300             | mA   |
| Operating Junction Temperature | T <sub>J</sub>   | -40 | 125             | °C   |

### Thermal Information

| Package | R <sub>θJA</sub> | Unit |
|---------|------------------|------|
| SOT23-5 | 205              | °C/W |

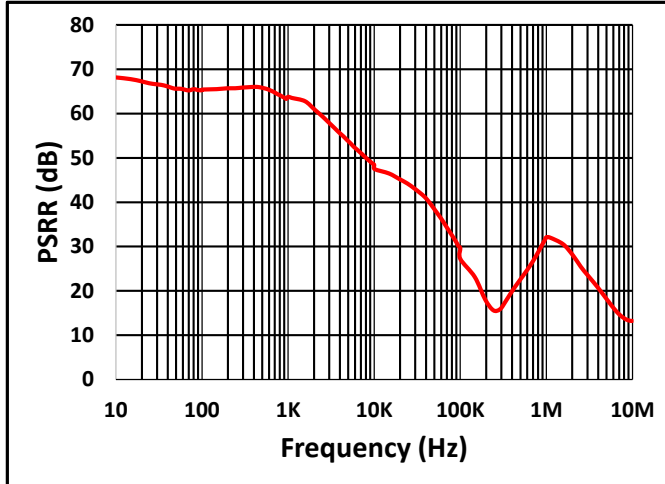
## Electrical Characteristics

$V_{IN} = 2.5V$  or  $V_{IN} = V_{OUT} + 1V$  (whichever is greater),  $I_{OUT} = 1mA$ ,  $C_{OUT} = 2.2\mu F$ , typical values are at  $T_A = 25^\circ C$  unless otherwise noted

| Parameter                                        | Symbol                                            | Conditions                                        | Rating |      |     | Unit       |
|--------------------------------------------------|---------------------------------------------------|---------------------------------------------------|--------|------|-----|------------|
|                                                  |                                                   |                                                   | Min    | Typ  | Max |            |
| Input Voltage                                    | $V_{IN}$                                          |                                                   | 2.5    | -    | 6.5 | V          |
| Output Voltage Accuracy                          |                                                   | $0.1mA \leq I_{OUT} \leq 500mA$                   | -2.0   | 0    | 2.0 | %          |
| GND Pin Current                                  | $I_{GND}$                                         | $V_{IN} = 2.5V$ , No Load                         |        | 82   |     | $\mu A$    |
|                                                  |                                                   | $V_{IN} = 2.5V$ , $I_{OUT} = 500mA$               |        | 158  |     | $\mu A$    |
| Shutdown Current                                 | $I_{SHDN}$                                        | $V_{IN} = 2.5V$ , $V_{EN} = 0V$                   |        | 2.3  |     | $\mu A$    |
| Dropout Voltage                                  | $V_{DO}$                                          | $V_{OUT} = 3.3V$ , $I_{OUT} = 500mA$              |        | 152  |     | mV         |
| Output Current Limit                             | $I_{LIM}$                                         | $V_{OUT} = 0V$                                    | 500    |      |     | mA         |
| Line Regulation                                  | $\frac{\Delta V_{OUT}}{(V_{OUT} \Delta V_{IN})}$  | $V_{IN} = V_{OUT} + 1V$ to 6.5V                   |        | 0.02 |     | %/V        |
| Load Regulation                                  | $\frac{\Delta V_{OUT}}{(V_{OUT} \Delta I_{OUT})}$ | $V_{IN} = 6V$ , $I_{OUT} = 1mA$ to 500mA          |        | 0.3  |     | %/A        |
| EN pin low-level input voltage (device disabled) | $V_{IL(EN)}$                                      |                                                   |        |      | 0.5 | V          |
| EN pin high-level input voltage (device enabled) | $V_{IH(EN)}$                                      |                                                   | 1.6    |      |     | V          |
| EN PIN Leakage Current                           | $I_{EN}$                                          | $V_{EN} = 6.5V$                                   |        | 0.8  |     | $\mu A$    |
| Power Supply Ripple Rejection                    | PSRR                                              | $f = 1kHz$ , $V_{OUT} = 3.3V$ , $I_{OUT} = 500mA$ |        | 64   |     | dB         |
| Thermal Shutdown Temperature                     | TSD                                               |                                                   |        | 160  |     | $^\circ C$ |
| Thermal Shutdown Hysteresis                      | $T_{HYS}$                                         |                                                   |        | 20   |     | $^\circ C$ |

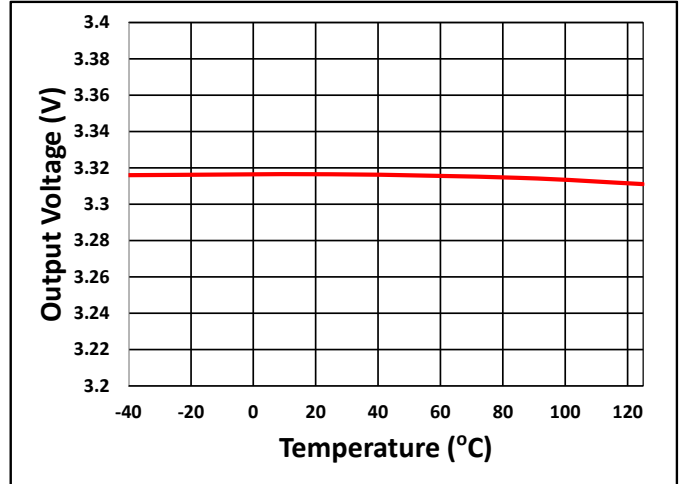
## Typical Characteristics

$C_{IN} = 1\mu F$ ,  $C_{OUT} = 2.2\mu F$ ,  $I_{OUT} = 500mA$ ,  $T_A = 25^\circ C$  unless otherwise noted



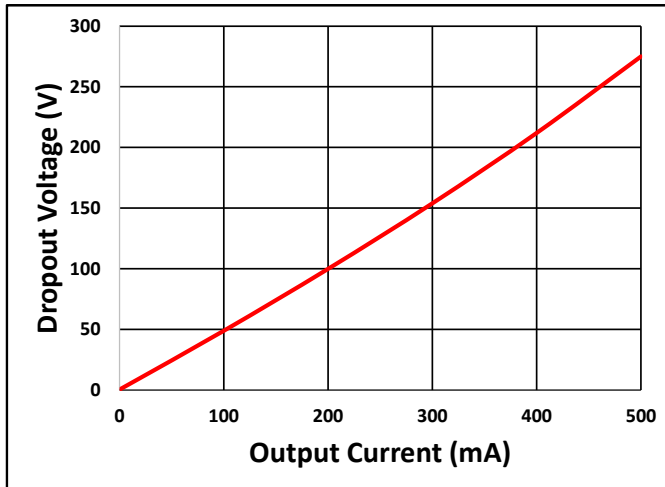
$V_{IN} = 6V$ ,  $V_{OUT} = 3.3V$ ,  $I_{OUT} = 500mA$ ,  $C_{OUT} = 2.2\mu F$

Fig. 1 PSRR



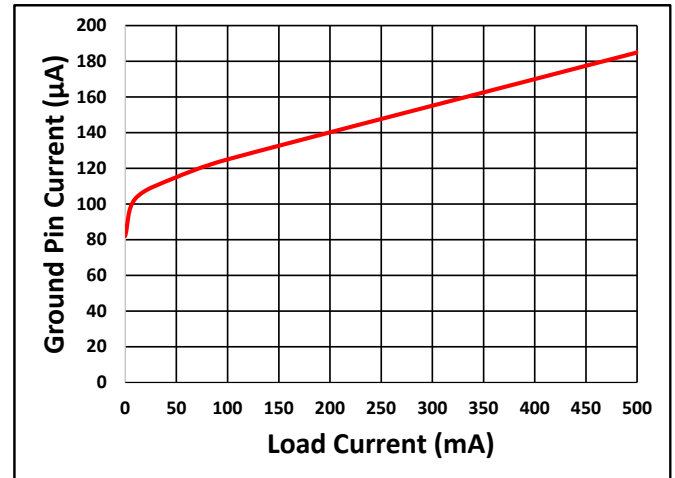
$V_{IN} = 6V$ ,  $V_{OUT} = 3.3V$ ,  $I_{OUT} = 0.1mA$

Fig. 2 Output Voltage vs Temperature



$V_{IN} = 6V$

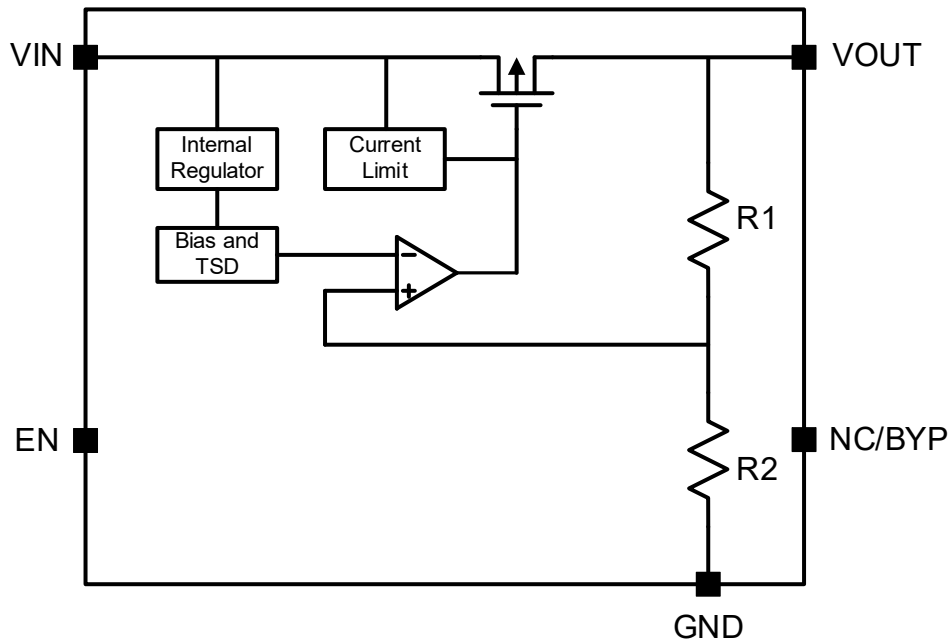
Fig. 3 Dropout Voltage



$V_{IN} = 2.5V$

Fig. 4 Ground Current vs Load Current

## Functional Block Diagram



## Feature Description

### **Enable**

The enable pin for the LDO is active high. The device is enabled when the enable pin voltage is greater than  $V_{IH(EN)}$  and disabled with the enable pin voltage less than  $V_{IL(EN)}$ . If independent control of chip enable is not needed, then connect the enable pin to the input. The LDO has an internal pulldown MOSFET that connects a discharge resistor from  $V_{OUT}$  to ground when the device is disabled to actively discharge the output voltage.

### **Output Current Limit**

When overload events happen, the output current is internally limited.

### **Undervoltage Lockout (UVLO)**

The LDO uses an undervoltage lockout circuit to keep the output shut off until the internal circuitry is operating properly.

### **Thermal Protection**

The LDO contains a thermal shutdown protection circuit to turn off the output current when excessive heat is dissipated in the LDO.

## PACKAGE OUTLINE DIMENSIONS

SOT23-5

| 尺寸<br>标注 | 最小(mm)     | 最大(mm) | 尺寸<br>标注 | 最小(mm) | 最大(mm) |
|----------|------------|--------|----------|--------|--------|
| A        | 2.82       | 3.02   | C        | 1.05   | 1.15   |
| e        | 0.95 (BSC) |        | C1       | 0.03   | 0.15   |
| b        | 0.28       | 0.45   | C2       | 0.12   | 0.23   |
| B        | 1.50       | 1.70   | L        | 0.35   | 0.55   |
| B1       | 2.60       | 3.00   | $\theta$ | 0°     | 8°     |

