

## General Description

LTP3570 is a high voltage (up to 40 V) ultra-low quiescent current low dropout voltage regulator (LDO) manufactured in CMOS processes. It can deliver up to 500 mA of current while consuming only 2.5  $\mu$ A of quiescent current. It consists of a reference voltage generator, an error amplifier, a current foldback circuit, and a phase compensation circuit plus a driver transistor. The LTP3570 is designed specifically for applications where very-low IQ is a critical parameter. This device maintains low quiescent current consumption even in dropout mode to further increase the battery life.

## Features

- Wide Input Voltage Range: up to 40V
- Ultra – low Quiescent Current: 2.5  $\mu$ A
- Output Voltage Accuracy:  $\pm 2\%$
- Max Output Current: 500mA
- Dropout Voltage: 300mV@ $I_{OUT}=100$ mA
- Temperature Stability:  $\pm 50$  ppm/  $^{\circ}$ C
- Fixed Output Voltage: 12V
- Protection Circuits: Current Limit, Thermal shutdown
- Output Capacitor: Low ESR Ceramic Capacitor Compatible
- Available Packages: SOT89-3

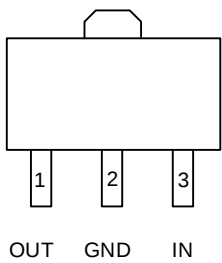
## Applications

- Mobile device
- Cameras
- Wireless communication equipment
- Battery-powered device

## Order Information

| Model   | Package | Ordering Number <sup>Note1</sup> | Packing Option      |
|---------|---------|----------------------------------|---------------------|
| LTP3570 | SOT89-3 | LTP3570-12RXT4                   | Tape and Reel, 1000 |

Pin Configuration (Top View)



SOT89-3

Pin Function

| Pin | Symbol | Description             |
|-----|--------|-------------------------|
| 1   | OUT    | Output pin.             |
| 2   | GND    | Ground.                 |
| 3   | IN     | Power supply input pin. |

RECOMMENDED OPERATING CONDITION

| Parameter                     | Symbol         | Rating     | Unit |
|-------------------------------|----------------|------------|------|
| Operating Ambient Temperature | T <sub>A</sub> | -40 to 125 | °C   |

ABSOLUTE MAXIMUM RATINGS

| Parameter        | Rating                                                             | Value                       | Unit |
|------------------|--------------------------------------------------------------------|-----------------------------|------|
| V <sub>IN</sub>  | Input Voltage <sup>(1)</sup>                                       | -0.3 to 45                  | V    |
| V <sub>OUT</sub> | Output Voltage                                                     | -0.3 ~ V <sub>IN</sub> +0.3 | V    |
| P <sub>D</sub>   | Power Dissipation                                                  | 1000                        | mW   |
| T <sub>STG</sub> | Storage Temperature                                                | -65 to 150                  | °C   |
| θ <sub>JA</sub>  | Thermal Resistance (Junction to Ambient)<br>SOT89-3 <sup>(2)</sup> | 135                         | °C/W |
| ESD (HBM mode)   | ESD Protection                                                     | 5000                        | V    |

NOTES:

Stresses beyond those listed under “ABSOLUTE MAXIMUM RATINGS” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

- (1) Refer to ELECTRICAL CHARACTERISTICS and APPLICATION INFORMATION for Safe Operating Area.
- (2) This particular frame decreases the total thermal resistance of the package and increases its ability to dissipate power when an appropriate area of copper on the printed circuit board is available for heat-sinking.

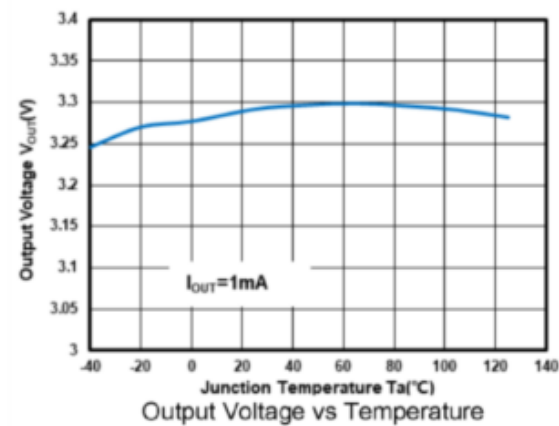
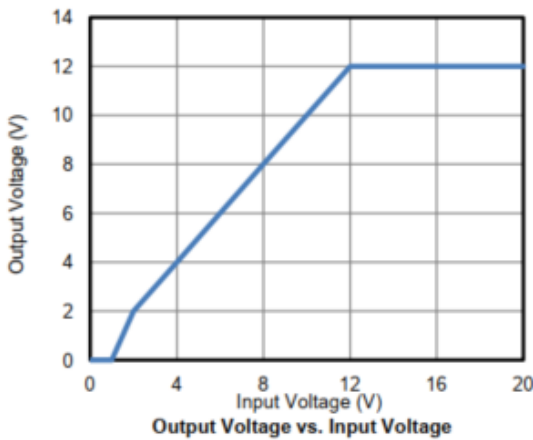
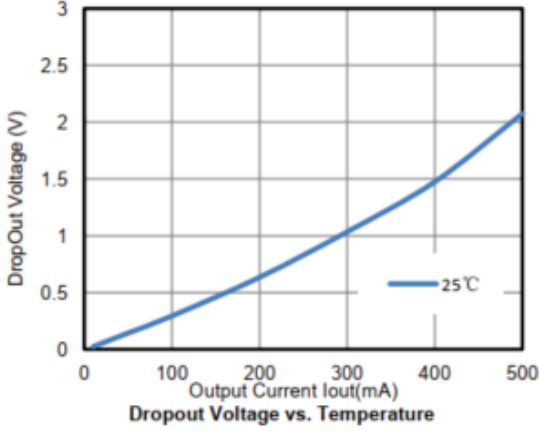
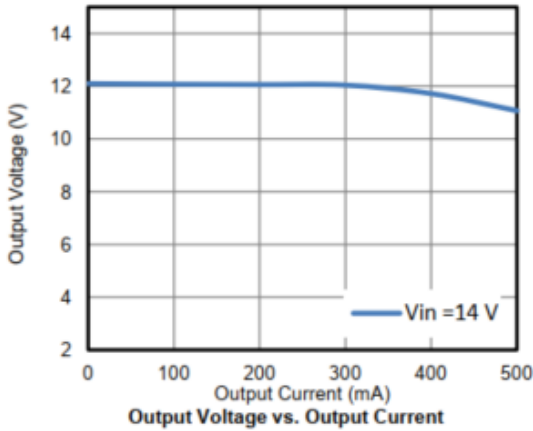
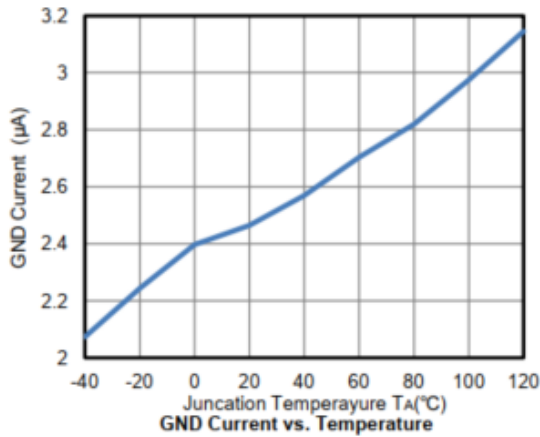
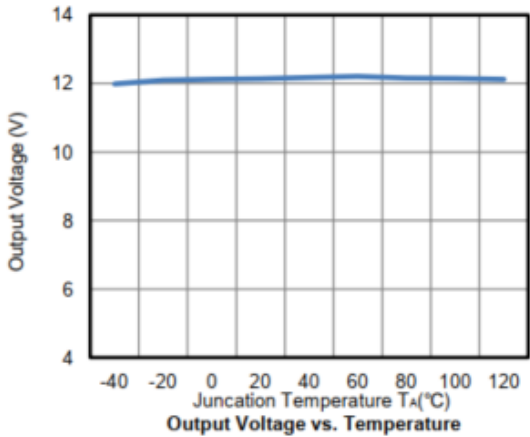
### Electrical Characteristics

(Typical values are tested at  $T_a = 25^\circ\text{C}$ )

| SYMBOL       | PARAMETER                    | TEST CONDITIONS                                           | MIN | TYP  | MAX  | UNIT       |
|--------------|------------------------------|-----------------------------------------------------------|-----|------|------|------------|
| $V_{IN}$     | Input Voltage                |                                                           | 12  |      | 40   | V          |
| $V_{OUT}$    | Output Voltage               | $V_{IN} = V_{OUT} + 2V, I_{OUT} = 1mA$                    | -2% |      | +2%  | V          |
| $Reg_{LINE}$ | Line Regulation              | $V_{OUT} + 2V \leq V_{IN} \leq 35V, I_{OUT} = 1mA$        |     | 0.01 | 0.02 | %V         |
| $V_{DROP}$   | Dropout Voltage              | $I_{OUT} = 1mA$                                           |     | 4    | 8    | mV         |
|              |                              | $I_{OUT} = 300mA$                                         |     | 1200 | 1800 |            |
| $Reg_{LOAD}$ | Load Regulation              | $1mA \leq I_{OUT} \leq 400mA,$<br>$V_{IN} = V_{OUT} + 2V$ |     | 50   | 80   | mV         |
| $I_q$        | Quiescent Current            | $V_{IN} \leq 40V, I_{OUT} = 0mA$                          |     | 2.5  | 3.5  | $\mu A$    |
| $I_{OUTMAX}$ | Maximum Output Current       |                                                           |     | 500  |      | mA         |
| $I_{LMT}$    | Current Limit                | $V_{IN} = V_{OUT} + 2V, V_{OUT} = 0.95V_{OUT}$            |     | 550  |      | mA         |
| PSRR         | Power Supply Rejection Ratio | $f = 1kHz$                                                |     | 62   |      | dB         |
|              |                              | $f = 100kHz$                                              |     | 48   |      |            |
|              |                              | $f = 1MHz$                                                |     | 40   |      |            |
| OTP          | Over Temperature Protection  |                                                           |     | 170  |      | $^\circ C$ |

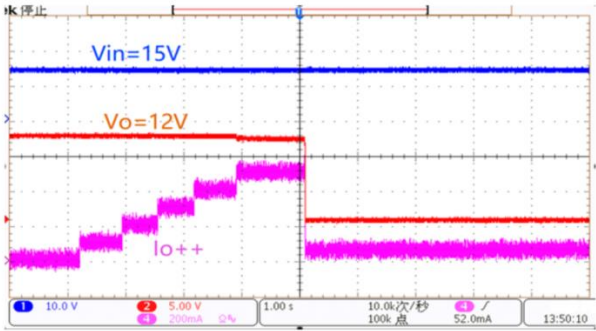
# TYPICAL PERFORMANCE CHARACTERISTICS

Note: Voltage set 12V ( $V_{IN} = V_{OUT} + 2V$ ,  $C_{IN} = 2.2\mu F$ ,  $C_{OUT} = 2.2\mu F$ ,  $T_A = +25^\circ C$ )

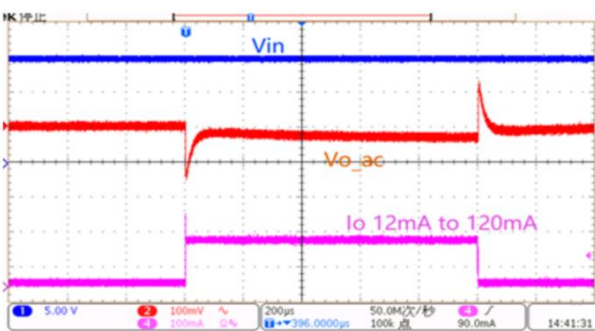


TYPICAL PERFORMANCE CHARACTERISTICS

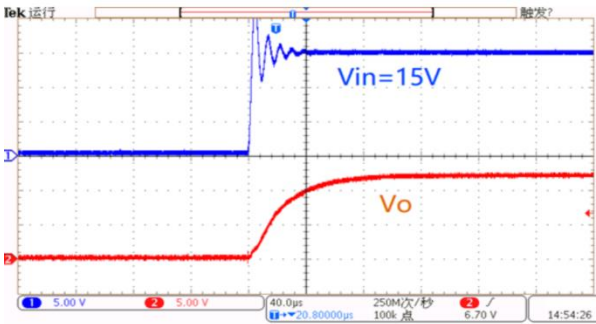
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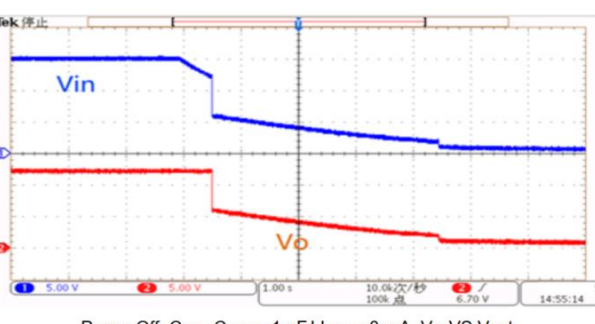
Output Voltage VS Output Current,  $C_{IN} = C_{OUT} = 1\mu F$ ,  $I_{LIMIT} = 550\text{ mA}$



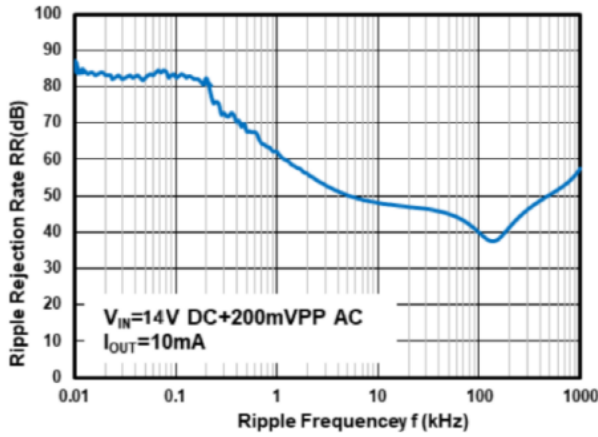
Load Transient,  $C_{IN} = C_{OUT} = 1\mu F$ ,  $I_{OUT} = 12\text{ mA} \sim 120\text{ mA}$



Power On,  $C_{IN} = C_{OUT} = 1\mu F$ ,  $I_{OUT} = 0\text{ mA}$ ,  $V_{IN}$  VS  $V_{out}$

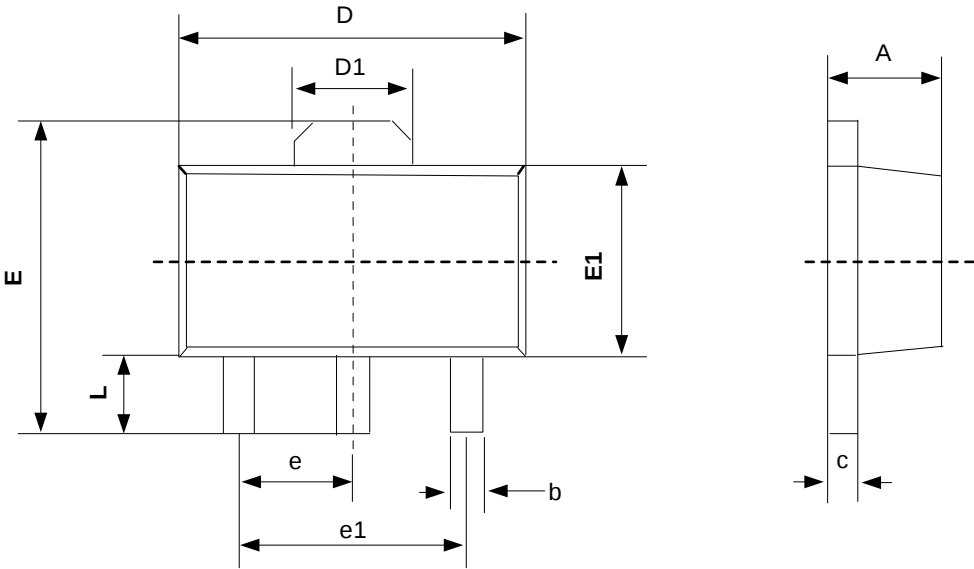


Power Off,  $C_{IN} = C_{OUT} = 1\mu F$ ,  $I_{OUT} = 0\text{ mA}$ ,  $V_{IN}$  VS  $V_{out}$



Power Supply Rejection Ratio at  $V_{OUT}=12\text{ V}$

SOT89-3



Unit: mm

| Symbol | Dimensions In Millimeters |       |
|--------|---------------------------|-------|
|        | Min                       | Max   |
| A      | 1.400                     | 1.600 |
| b      | 0.320                     | 0.520 |
| c      | 0.350                     | 0.440 |
| D      | 4.400                     | 4.600 |
| D1     | 1.550REF                  |       |
| E      | 3.940                     | 4.250 |
| E1     | 2.300                     | 2.600 |
| e      | 1.500BSC                  |       |
| e1     | 3.000BSC                  |       |
| L      | 0.900                     | 1.200 |