# Over Voltage and Over Current Protection IC

## General Description

The LP5300 is an Over-Voltage-Protection (OVP) and Over-Current-Protection (OCP) device. The device will switch off internal MOSFET to disconnect VIN to VOUT to protect load when any of input voltage, input current over the threshold. The Over temperature protection (OTP) function monitors chip temperature to protect the device.

The LP5300 is available in SOT-23-6L and SOT89 package. Standard products are Pb-free and Halogen-free.

## Features

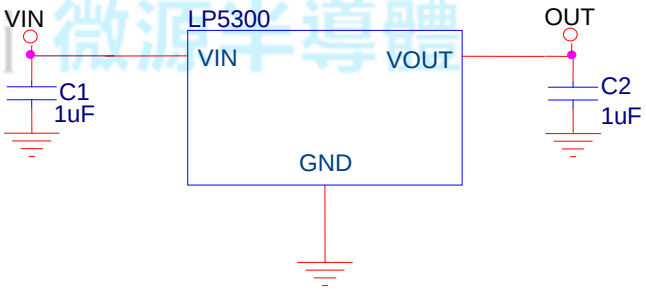
- Input Voltage Range: 3.5V to 36V
- Typical Output Power on Time: 9ms
- OVP Threshold: 6.1V
- OVP Threshold Time Less Than 1μs
- Over Current Protection: 2.1A(MIN)
- Low $R_{DS(ON)}$ Internal Switches:130mΩ @ 5V /1A
- Output Discharge
- Thermal Fault Protection
- SOT23-6/SOT89 Package
- RoHS Compliant and 100% Lead (Pb)-Free

## Order Information

LP5300 □ □ □

- F: Pb-Free
- Package Type
  - B6:SOT23-6
  - X3:SOT89

## Typical Application Circuit




## Applications

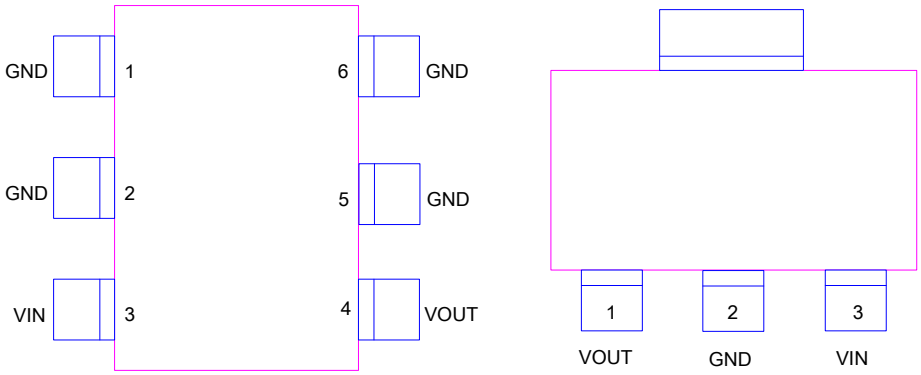
- GPS
- PMP
- PAD
- MID
- Digital cameras, Digital Videos

## Marking Information

| Device | Marking | Package | Shipping |
|---|---|---|---|
| LP5300B6F | LP5300<br>8WYWX | SOT23-6 | 3K/REEL |
| LP5300X3F | LPS<br>LP5300<br>YWX | SOT89 | 1K/REEL |
| Marking indication:<br>Y:Production year W:Production week X:Production batch | | | |

## Functional Pin Description

Top View

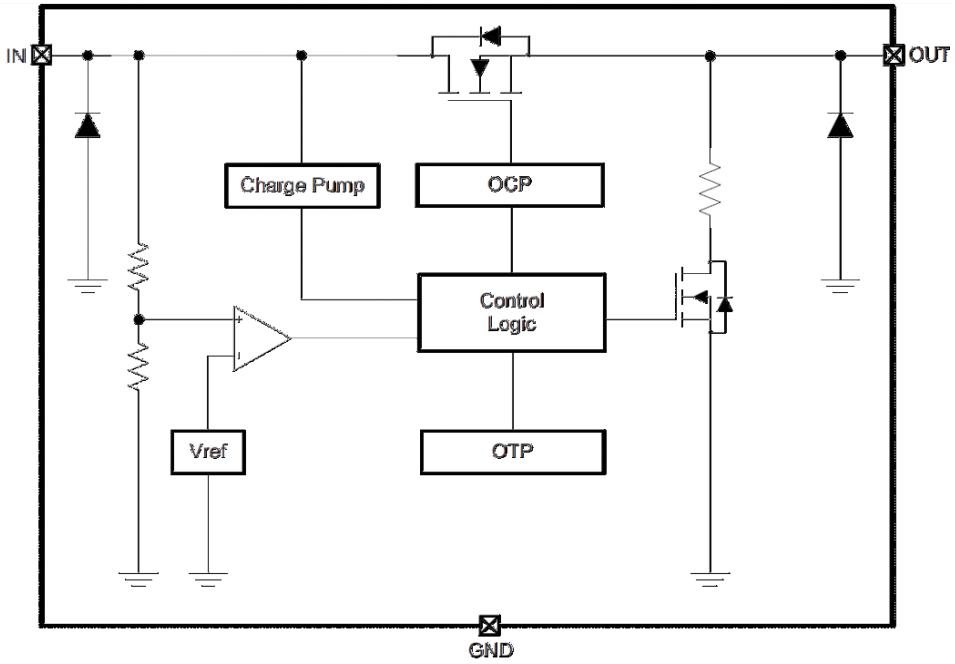



SOT23-6 SOT89

## Pin Description

| Pin | | Name | Description |
|---|---|---|---|
| SOT23-6 | SOT89 | | |
| 1,2,5,6 | 2 | GND | Ground. |
| 3 | 3 | VIN | Input pin. A 1uF low ESR ceramic capacitor or larger must be connected as close as to this pin. It is recommended to use 50V capacitor or according to application. |
| 4 | 1 | VOUT | Output pin. |

## Function Diagram




## Absolute Maximum Ratings Note 1

- ✧ Input Voltage to GND ---------- 36V
- ✧ Output Voltage to GND ---------- 6.5V
- ✧ Maximum Junction Temperature ---------- 150℃
- ✧ Maximum Soldering Temperature (at leads, 10 sec) ---------- 260℃

**Note 1.** 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.

## Thermal Information

- ✧ Maximum Power Dissipation (SOT23-6, $P_D$,$T_A$=25℃) ---------- 0.45W
- ✧ Thermal Resistance (SOT23-6, $\theta_{JA}$) ---------- 250℃/W
- ✧ Maximum Power Dissipation (SOT89, $P_D$,$T_A$=25℃) ---------- 0.7W
- ✧ Thermal Resistance (SOT89, $\theta_{JA}$) ---------- 165℃/W

## ESD Susceptibility

- ✧ HBM(Human Body Mode) ---------- 2KV
- ✧ MM(Machine Mode) ---------- 200V

## Recommended Operating Conditions

- ✧ Operating Ambient Temperature Range ($T_A$) ---------- -40℃ to 85℃
- ✧ Operation Junction Temperature Range ---------- −40°C to 125°C

## Electrical Characteristics

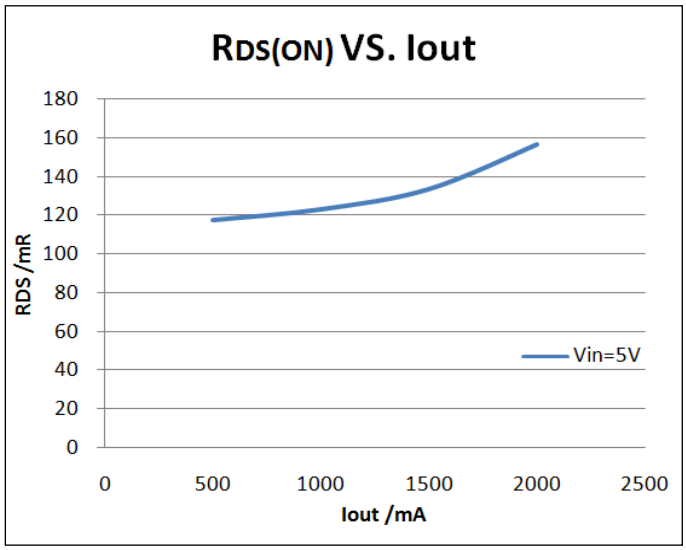
$T_A$=25℃, unless otherwise noted

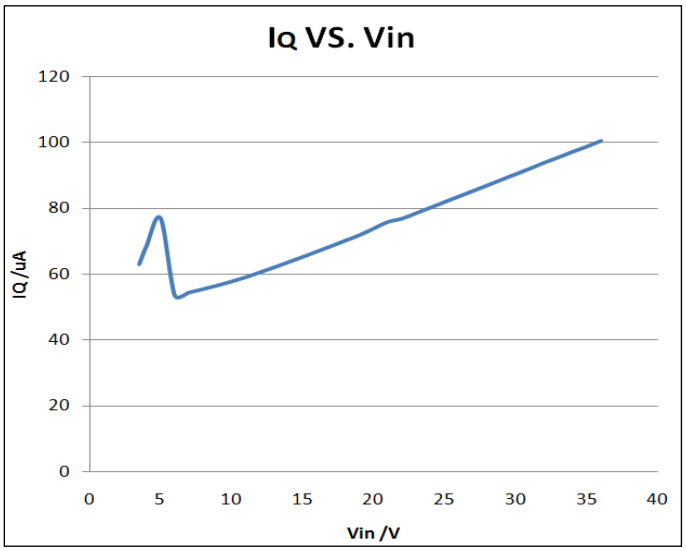
| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **DC characteristics and Power-ON-Reset** | | | | | | |
| $V_{IN}$ | Input Voltage | | 3.5 | | 36 | V |
| $I_Q$ | Input quiescent current | $V_{IN}$=5V, $I_{OUT}$=0A | | 80 | | μA |
| $R_{ON}$ | VIN-to-VOUT ON resistance | $V_{IN}$=5V, $I_{OUT}$=1A | | 130 | 145 | mΩ |
| $R_{DISCHARGE}$ | Output discharge resistance | | | 3.6 | | KΩ |
| UVLO | Under voltage lock out threshold | $V_{IN}$ increasing from 0~3V | 2.6 | 2.8 | 3 | V |
| $V_{HYS-UVLO}$ | Under voltage lock out hysteresis | $V_{IN}$ decreasing from 3~0V | | 150 | | mV |
| $T_{ON}$ | Output power-on time | $V_{IN}$=0→5V to output ON | | 9 | | ms |
| **Input Over-Voltage-Protection (OVP)** | | | | | | |
| $V_{OVP}$ | OVP threshold | $V_{IN}$ increasing from 5~7V | 5.8 | 6.1 | 6.4 | V |
| $V_{HYS-OVP}$ | OVP hysteresis | $V_{IN}$ decreasing from 7~5V | | 300 | | mV |
| $T_{OVP}$ | OVP active time | $V_{IN}$=5→10V | | | 1 | μs |
| $T_{ON(OVP)}$ | OVP recovery time | $V_{IN}$=10→5V to output ON | | 9 | | ms |
| **Input Over-Current-Protection (OCP)** | | | | | | |
| $I_{OCP}$ | OCP threshold | | 2.1 | 2.5 | | A |
| $t_{OCP}$ | OCP active time | | | 30 | | ms |
| $t_{ON(OCP)}$ | OCP recovery time | | | 1 | | s |
| **Over-Temperature-Protection (OTP)** | | | | | | |
| $T_{OTP}$ | OTP threshold | | | 150 | | ℃ |
| $T_{OTP\_HYS}$ | OTP hysteresis | | | 20 | | ℃ |

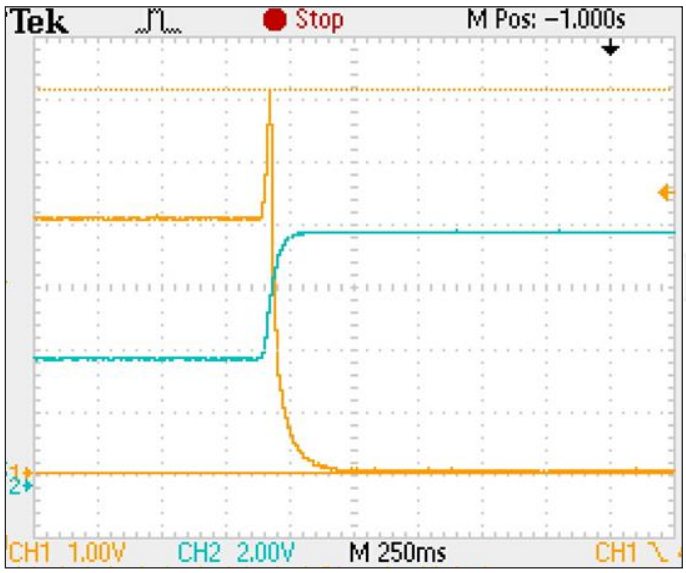


## Typical Operating Characteristics



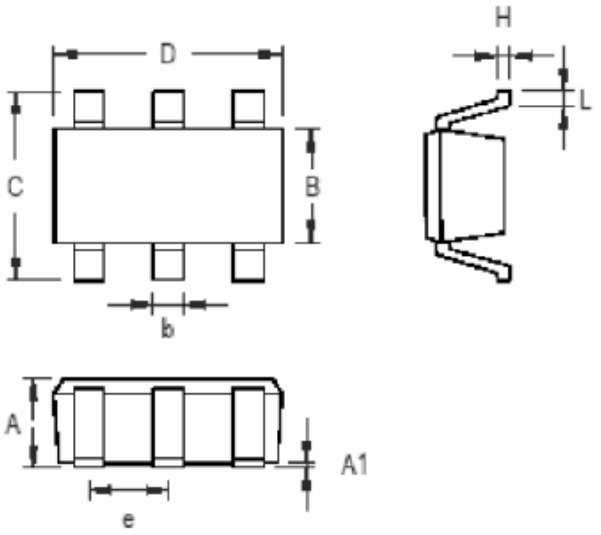




OVP waveform


VIN falling waveform

## Packaging Information

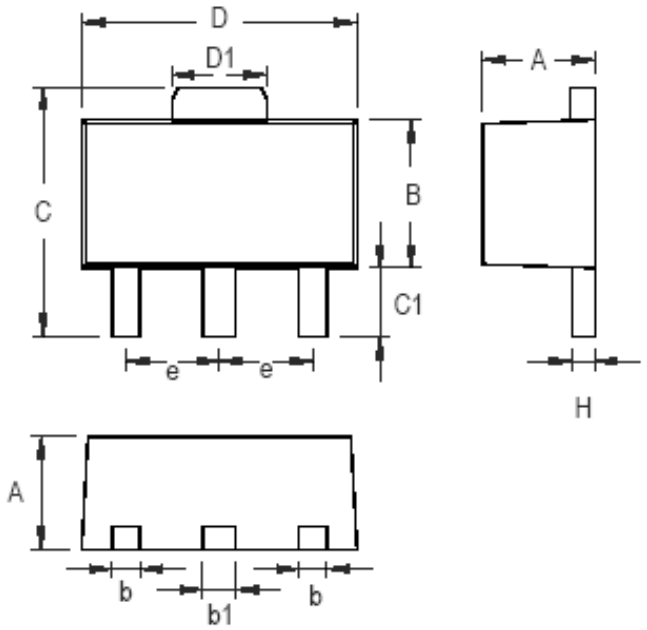
SOT23-6




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 0.889 | 1.295 | 0.031 | 0.051 |
| A1 | 0.000 | 0.152 | 0.000 | 0.006 |
| B | 1.397 | 1.803 | 0.055 | 0.071 |
| b | 0.250 | 0.560 | 0.010 | 0.022 |
| C | 2.591 | 2.997 | 0.102 | 0.118 |
| D | 2.692 | 3.099 | 0.106 | 0.122 |
| e | 0.838 | 1.041 | 0.033 | 0.041 |
| H | 0.080 | 0.254 | 0.003 | 0.010 |
| L | 0.300 | 0.610 | 0.012 | 0.024 |

SOT-23-6 Surface Mount Package

SOT89




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.397 | 1.600 | 0.055 | 0.063 |
| b | 0.356 | 0.483 | 0.014 | 0.019 |
| B | 2.388 | 2.591 | 0.094 | 0.102 |
| b1 | 0.406 | 0.533 | 0.016 | 0.021 |
| C | 3.937 | 4.242 | 0.155 | 0.167 |
| C1 | 0.787 | 1.194 | 0.031 | 0.047 |
| D | 4.394 | 4.597 | 0.173 | 0.181 |
| D1 | 1.397 | 1.753 | 0.055 | 0.069 |
| e | 1.448 | 1.549 | 0.057 | 0.061 |
| H | 0.356 | 0.432 | 0.014 | 0.017 |

3-Lead SOT-89 Surface Mount Package