

# AT73HL Series

40V, 250mA, Low Quiescent Current, CMOS LDO

## Description

The AT73HL series is a high accuracy, high input voltage low quiescent current, high speed, and low dropout linear regulator with high ripple rejection.

The input voltage up to 40V and load current up to 250mA at  $V_{OUT} = 5V$  &  $V_{IN} = 15V$ . The device is manufactured with CMOS process. The AT73HL offers over-current limit and over temperature protection to ensure the device working in well conditions.

The AT73HL regulators are available in standard SOT89-3L and SOT23-5L、SOT23-3L packages. Standard products are Pb-free and Halogen-free.

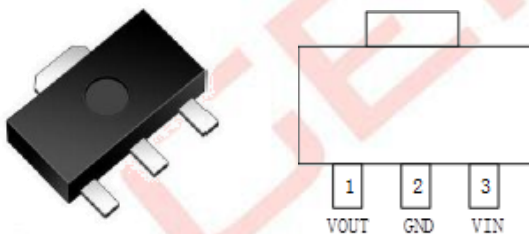
## Features

- Input voltage: 4.75V~40V
- Output voltage: 1.8V~5.7V
- Output accuracy:  $< \pm 2\%$
- Output current: 250mA @  $V_{IN} = 12V$ ,  $V_{OUT} = 5V$
- PSRR: 60dB @ 100Hz
- Dropout voltage: 600mV @  $I_{OUT} = 100mA$
- Quiescent current: 5 $\mu$ A @  $V_{IN} = 12V$ (Typ.)
- Recommend capacitor: 10 $\mu$ F

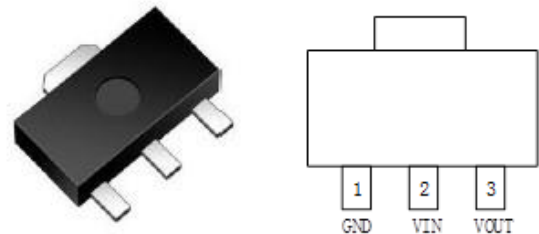
## Applications

- Smart electric meter
- In-car entertainment
- Electric bicycle

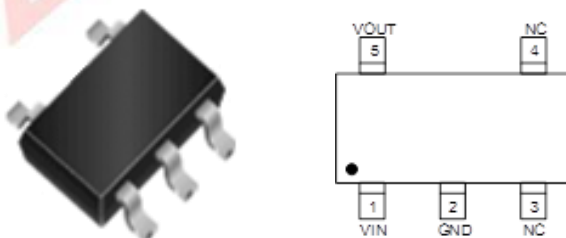
## Pin Assignment



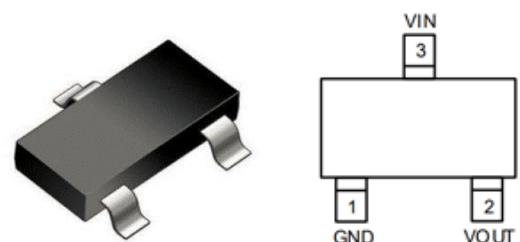
AT73HL XX SQ(SOT89-3L)



AT73HL XX SQB(SOT89-3L)



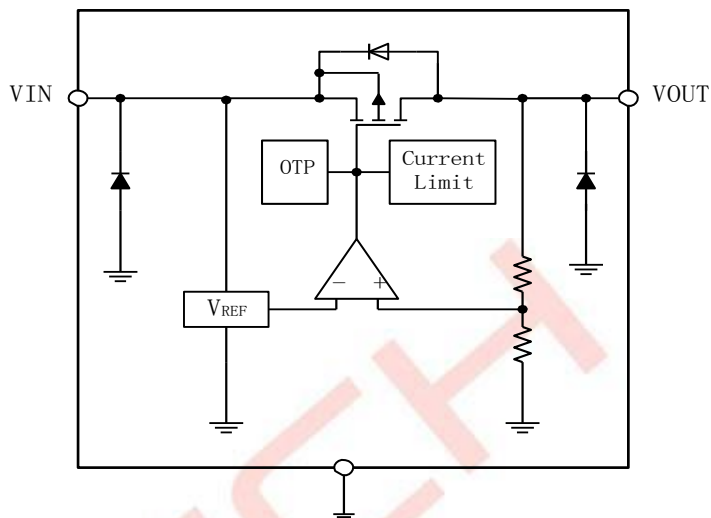
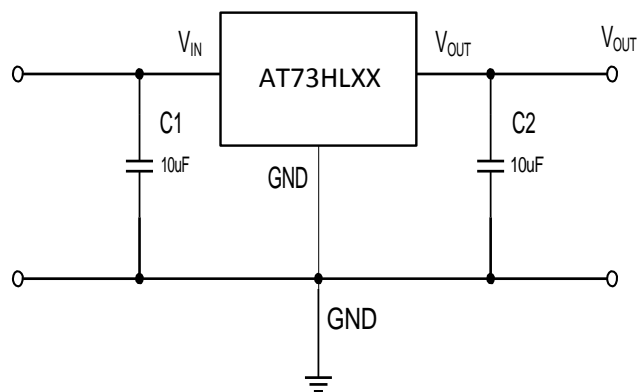
AT73HL XX SE(SOT23-5L)



AT73HL XX SC(SOT-23-3L)

## Simplified Block Diagram

### Typical Application



### Order Information

| Part No       | Package  | Temperature  | Tape & Reel |
|---------------|----------|--------------|-------------|
| AT73HL XX SQ  | SOT89-3L | -40 ~ +85 °C | 1000/REEL   |
| AT73HL XX SQB | SOT89-3L | -40 ~ +85 °C | 1000/REEL   |
| AT73HL XX SE  | SOT23-5L | -40 ~ +85 °C | 3000/REEL   |
| AT73HL XX SC  | SOT23-3L | -40 ~ +85 °C | 3000/REEL   |

Note: \*\* several fixed output voltages ranging from 1.8V to 5.7V

### Part number rules

AT73HL①②③

| Designator | Description   |
|------------|---|
| ①          | Output Voltage<br>3.3V=33<br>5.0V=50                      |
| ②          | Package:<br>SE: SOT-23-5L<br>SQ: SOT89-3L<br>SC: SOT23-3L |
| ③          | Different Pin Definition<br>B:                            |

### Pin Description

| Pin No      |          |          | Symbol | I/O    | Description   |
|-------------|----------|----------|--------|--------|---------------|
| SOT89-3L(B) | SOT89-3L | SOT23-5L |        |        |               |
| 3           | 2        | 1        | VIN    | Power  | Input         |
| 2           | 1        | 2        | GND    | Ground | Ground        |
| -           | -        | 3        | NC     | -      | Not connected |
| -           | -        | 4        | NC     | -      | Not connected |
| 1           | 3        | 5        | VOUT   | O      | Output        |

## Absolute Maximum Ratings(Note)

| Symbol       | Items                                    | Value      | Unit |   |
|--------------|--|------------|------|---|
| $V_{IN}$     | Input Voltage                            | -0.3~45    | V    |   |
| $V_{OUT}$    | Output Voltage                           | -0.3~6.5   | V    |   |
| $P_{DMAX}$   | Power Dissipation                        | SOT89-3L   | 0.7  | W |
|              |  | SOT23-5L   | 0.3  | W |
|              |  | SOT23-3L   | 0.25 | W |
| $T_J$        | Junction Temperature                     | -40~150    | °C   |   |
| $T_{stg}$    | Storage Temperature                      | -55 to 150 | °C   |   |
| $T_{solder}$ | Package Lead Soldering Temperature (10s) | 260        | °C   |   |
| ESD MM       | Machine Mode                             | 200        | V    |   |
| ESD HBM      | Human Body Mode                          | 8000       | V    |   |

**Note:** Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect device reliability.

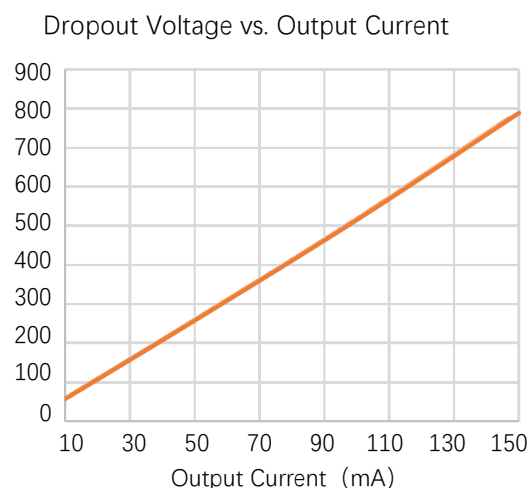
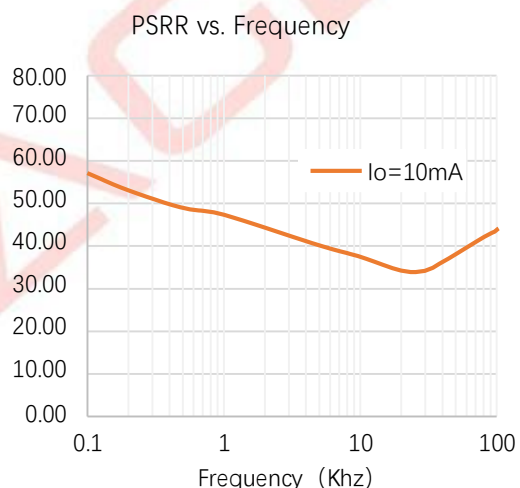
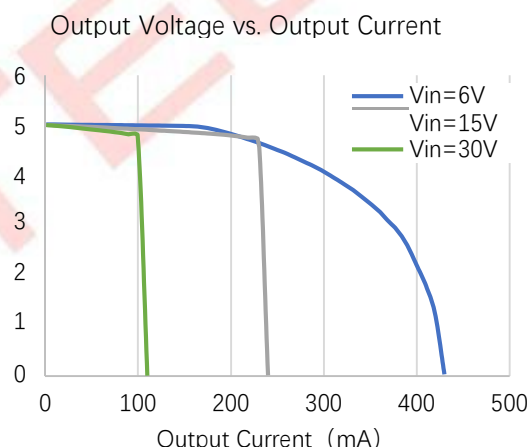
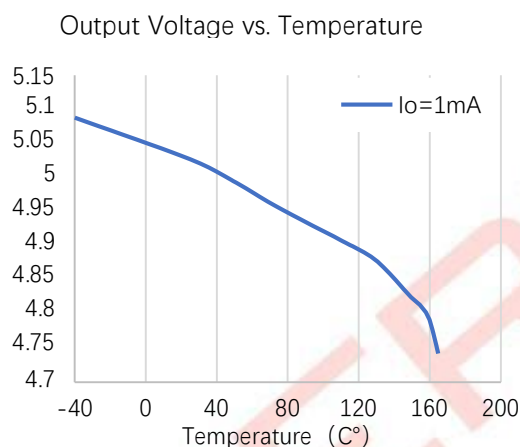
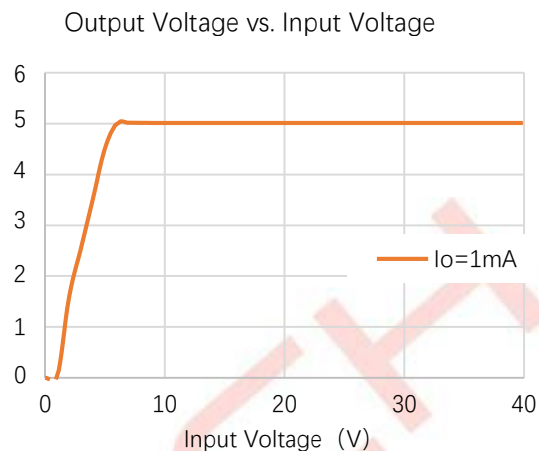
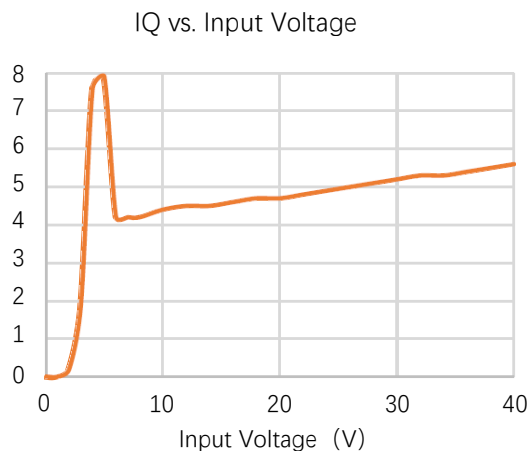
## Recommended Operating Range

| Symbol          | Items                     | Value      | Unit |
|-----------------|---------------------------|------------|------|
| $V_{IN}$        | $V_{IN}$ Supply Voltage   | 4.75 to 40 | V    |
| $R_{\theta JA}$ | Thermal Resistance on PCB | 45         | °C/W |
| $T_{OPT}$       | Operating Temperature     | -40 to +85 | °C   |

**Electrical Characteristics**(The following specifications apply for  $V_{IN} = 12V$ ,  $T_A = 25^\circ C$ ,  $C_{IN} = C_{OUT} = 10\mu F$ , unless specified otherwise)

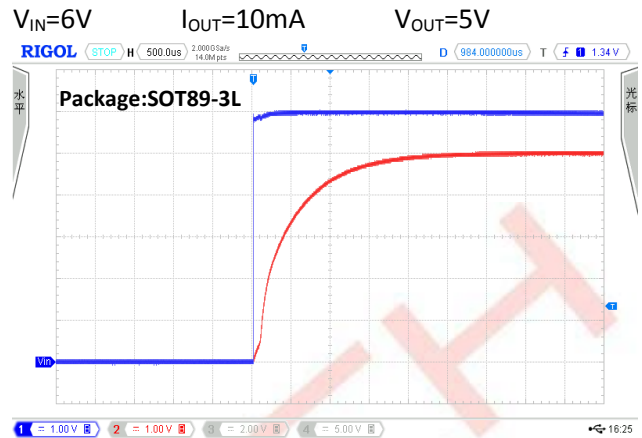
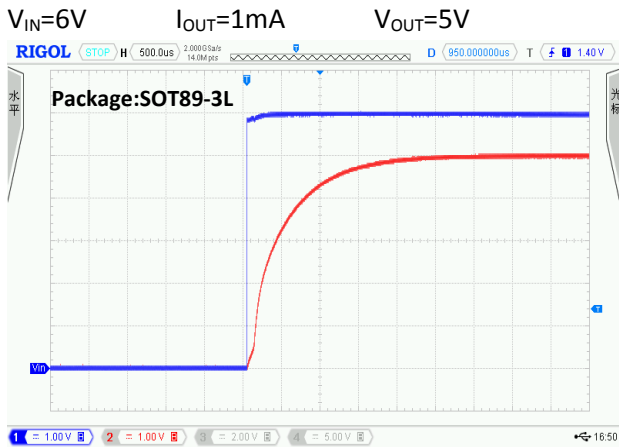
| Symbol                | Items                        | Conditions  | Min.        | Typ.      | Max.  | Unit          |
|-----------------------|------------------------------|---|-------------|-----------|-------|---------------|
| $V_{IN}$              | Input Range                  | $I_{OUT} = 10mA$  | 4.75        |           | 40    | V             |
| $V_{OUT}$             | Output Range                 | $I_{OUT} = 10mA$  | -2          | $V_{OUT}$ | 2     | %             |
| $I_{OUT}$             | Maximum Output Current       | $V_{IN}-V_{OUT}=4V, R_L=1\Omega$                          |             | 500       | 550   | mA            |
| $\Delta V_{OUT}$      | Output Voltage               | $V_{IN} = 12V, I_{OUT} = 10mA$                            | 4.9         | 5         | 5.1   | V             |
|                       |                              |   | 3.234       | 3.3       | 3.366 |               |
|                       |                              |   | 2.94        | 3.0       | 3.06  |               |
|                       |                              |   | 2.45        | 2.5       | 2.55  |               |
| $I_Q$                 | Quiescent Current            | $V_{IN} = 7V, I_{OUT} = 0$                                |             | 4         | 6     | $\mu A$       |
|                       |                              | $V_{IN} = 24V, I_{OUT} = 0$                               |             | 4.6       | 6.7   |               |
|                       |                              | $V_{IN} = 40V, I_{OUT} = 0$                               |             | 5.4       | 8.2   |               |
| $I_{OTP}$             | Current at OTP               | $V_{IN} = 12V, V_{OUT} = 1.5V$                            |             | 130       |       | mA            |
| $V_{DROP}$            | Dropout Voltage              | $I_{OUT} = 10mA$  |             | 60        |       | mV            |
|                       |                              | $I_{OUT} = 100mA$   |             | 600       |       |               |
| $\Delta V_{LINE}$     | Line Regulation              | $V_{IN}=7 \sim 24V, V_{OUT} = 5V, I_{OUT} = 1mA$          |             | 0.001     |       | %V            |
|                       |                              | $V_{IN} = 7 \sim 40V, V_{OUT} = 5V, I_{OUT} = 1mA$        |             | 0.002     |       |               |
| $\Delta V_{LOAD}$     | Load Regulation              | $V_{OUT} = 5V, I_{OUT} = 1 \sim 100mA, V_{IN} = 7V$       |             | 19        |       | mV            |
| $I_{SHORT}$           | Short Current                | $V_{OUT}$ Short to GND with 1Ω(1ms pulse), $V_{IN} = 40V$ |             | 280       |       | mA            |
| PSRR                  | Power Supply Rejection Ratio | $V_{IN} = 10V, V_{PP} = 0.5V, I_{OUT} = 1mA$              | $F = 100Hz$ | 60        |       | dB            |
|                       |                              |   | $F = 1kHz$  | 50        |       |               |
|                       |                              |   | $F = 10kHz$ | 40        |       |               |
| $e_{NO}$              | Output Noise Voltage         | 10Hz to 100kHz, $C_{OUT} = 10\mu F$                       |             | ±100      |       | $\mu V_{RMS}$ |
| $T_{SD}$              | Thermal Shutdown             | $V_{IN} = 12V, I_{OUT} = 1mA$                             |             | 150       |       | °C            |
| $\Delta V_O/\Delta T$ | Temperature Coefficient      |   |             | ±0.5      |       | mV/°C         |

**Typical Performance Characteristics**( $C_{IN} = 10\mu F$ ,  $C_{OUT} = 10\mu F$ ,  $TOPT = 25^{\circ}C$ ,  $V_{IN} = 6V$ ,  $V_{OUT} = 5V$ , unless specified otherwise)



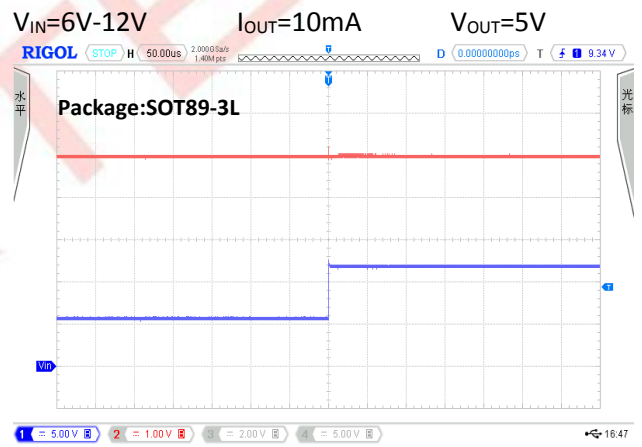
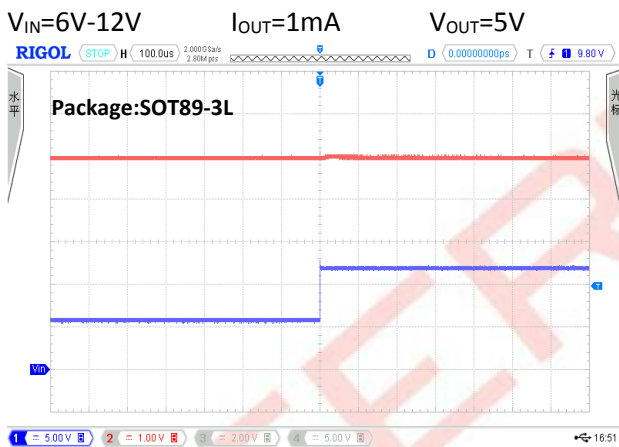
## Power ON

CH1 :  $V_{IN}$  CH2 :  $V_{OUT}$  CH4 :  $I_{IN}$



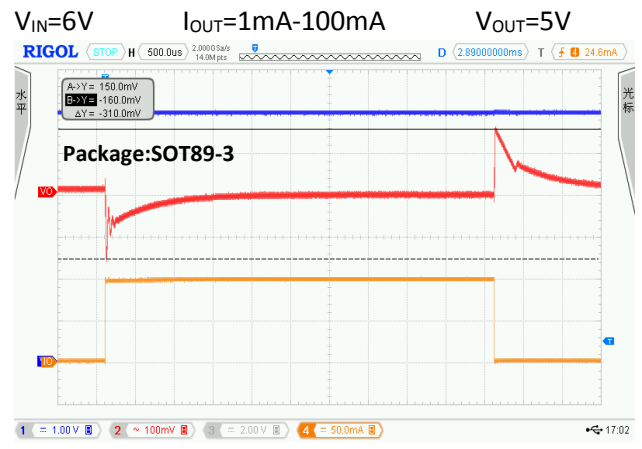
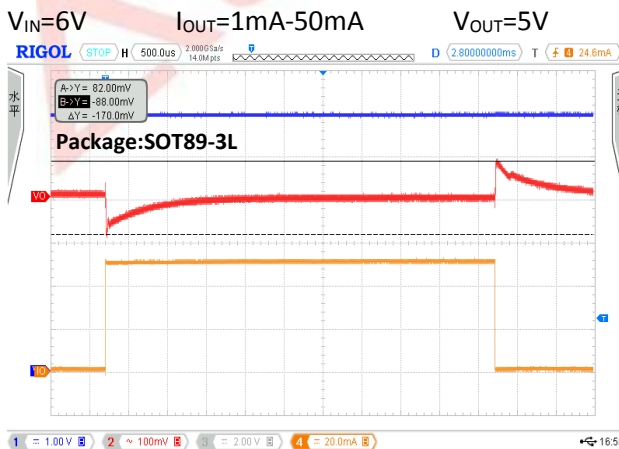
## Line Transient

CH1 :  $V_{IN}$  CH2 :  $V_{OUT}$

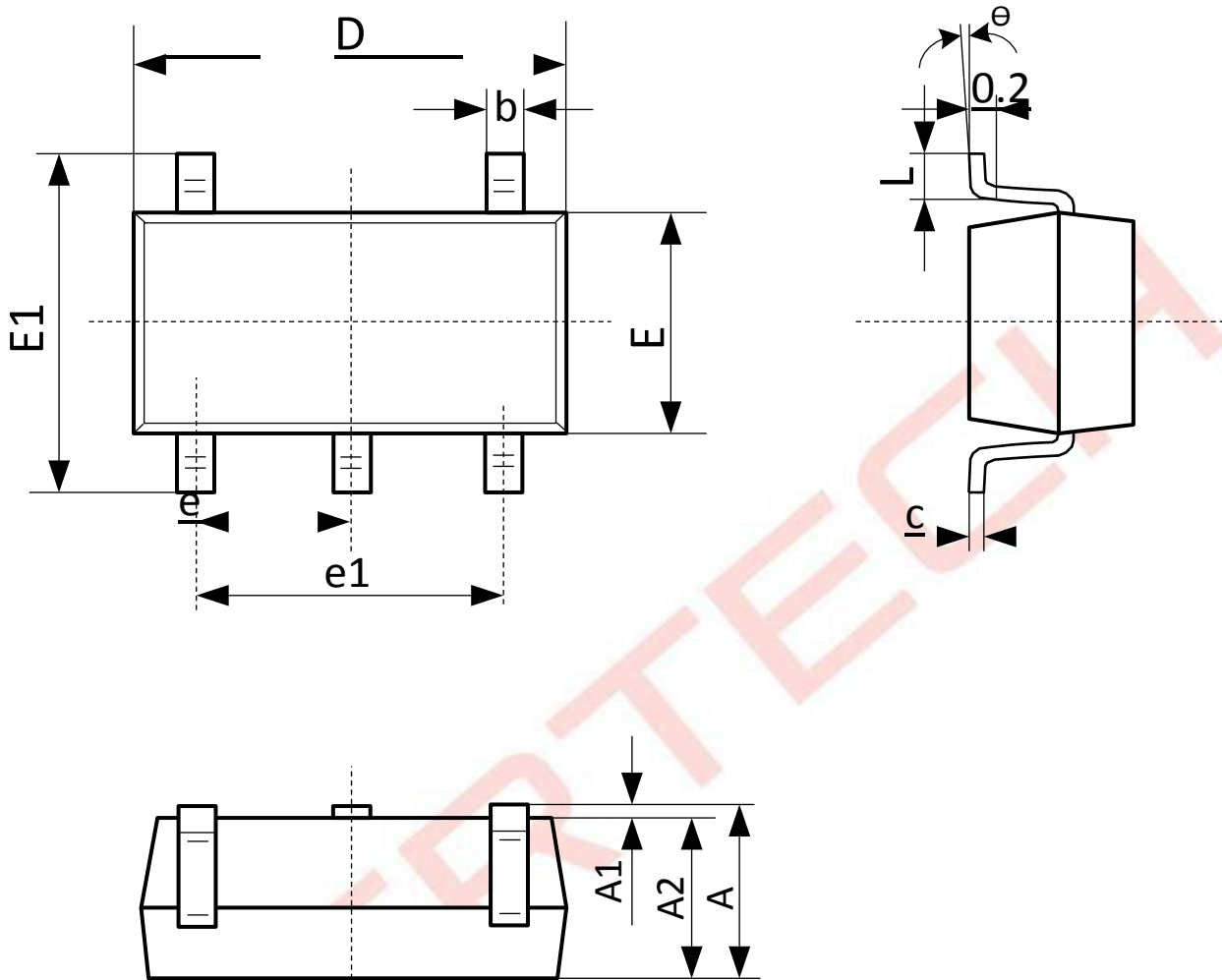


## Load Transient

CH1 :  $V_{IN}$  CH2 :  $V_{OUT}$  CH4 :  $I_{OUT}$

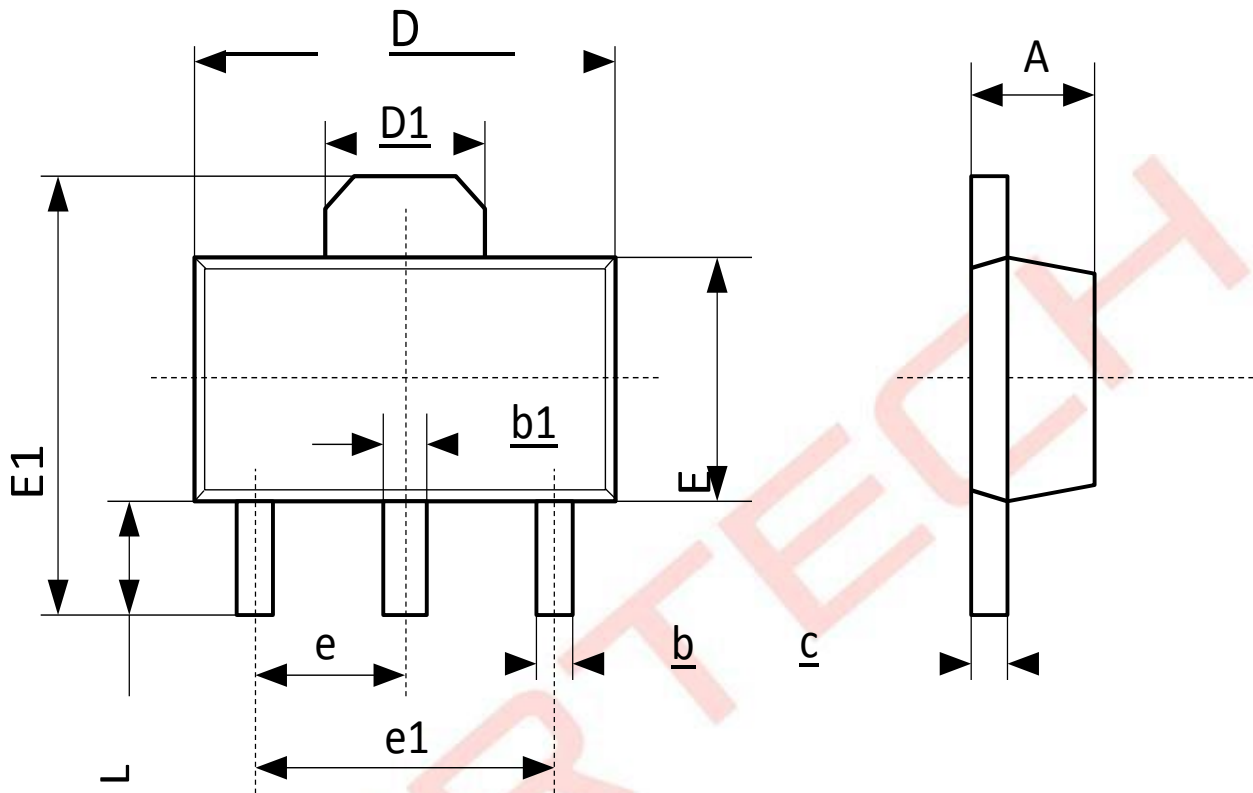


## SOT23-5L Package Outline



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.050                     | 1.250 | 0.041                | 0.049 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 1.050                     | 1.150 | 0.041                | 0.045 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.100                     | 0.200 | 0.004                | 0.008 |
| D      | 2.820                     | 3.020 | 0.111                | 0.119 |
| E      | 1.500                     | 1.700 | 0.059                | 0.067 |
| E1     | 2.650                     | 2.950 | 0.104                | 0.116 |
| e      | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.300                     | 0.600 | 0.012                | 0.024 |
| θ      | 0°C                       | 8°C   | 0°C                  | 8°C   |

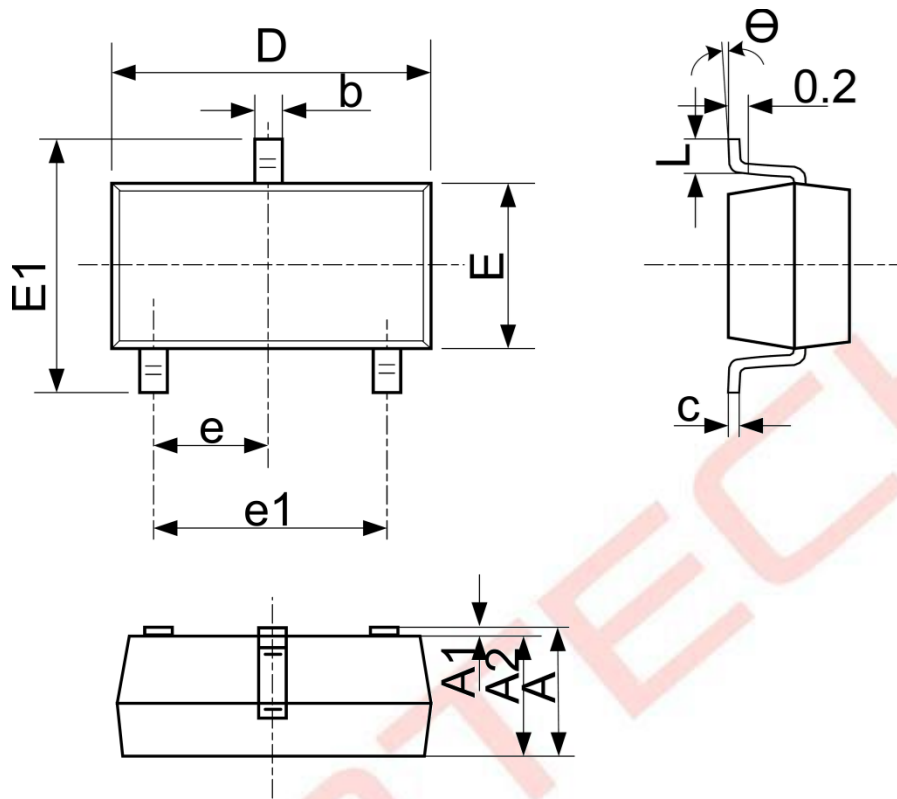
## SOT89-3L Package Outline



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.400                     | 1.600 | 0.055                | 0.063 |
| b      | 0.320                     | 0.520 | 0.013                | 0.020 |
| b1     | 0.400                     | 0.580 | 0.016                | 0.023 |
| c      | 0.350                     | 0.440 | 0.014                | 0.017 |
| D      | 4.400                     | 4.600 | 0.173                | 0.181 |
| D1     | 1.550 REF                 |       | 0.061 REF            |       |
| E      | 2.300                     | 2.600 | 0.091                | 0.102 |
| E1     | 3.940                     | 4.250 | 0.155                | 0.167 |
| e      | 1.500 TYP                 |       | 0.060 TYP            |       |
| e1     | 3.000 TYP                 |       | 0.118 TYP            |       |
| L      | 0.900                     | 1.200 | 0.035                | 0.047 |



## SOT-23-3L Package Outline



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.050                     | 1.250 | 0.041                | 0.049 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 1.050                     | 1.150 | 0.041                | 0.045 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.100                     | 0.200 | 0.004                | 0.008 |
| D      | 2.820                     | 3.020 | 0.111                | 0.119 |
| E      | 1.500                     | 1.700 | 0.059                | 0.067 |
| E1     | 2.650                     | 2.950 | 0.104                | 0.116 |
| e      | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.300                     | 0.600 | 0.012                | 0.024 |
| θ      | 0°C                       | 8°C   | 0°C                  | 8°C   |