



# TS831

## MICROPOWER VOLTAGE SUPERVISOR RESET ACTIVE LOW

- ULTRA LOW POWER CONSUMPTION :  
12μA maximum
- PRECISION RESET THRESHOLD
- THRESHOLD VOLTAGE:  
4.33V typ. FOR TS831-5  
4.50V typ. FOR TS831-4  
2.71V typ. FOR TS831-3
- GUARANTEED RESET OPERATION FOR  
V<sub>CC</sub> DOWN TO 1V
- OPEN DRAIN OUTPUT COMPARATOR
- FAST RESPONSE TIME : 20μs FOR A 10mV  
OVERDRIVE
- INTERNAL BUILT-IN HYSTERESIS
- PIN TO PIN COMPATIBLE WITH MC33064  
AND MC33164

### DESCRIPTION

The TS831 ultra low power integrated circuit incorporates a high stability band-gap voltage reference and a comparator with open drain output.

The threshold voltage is set at 4.33V for TS831-5, 4.5V for TS831-4 and 2.71V for TS831-3 by internal thermally matched resistances.

The comparator exhibits a 20μs response (with 10mV overdrive) and has an open drain output active when input voltage is lower than the threshold. An internal hysteresis, 100mV for TS831-4/TS831-5 and 60mV for TS831-3, increases the comparator's noise margin and prevents false reset operation.

### APPLICATION

- Power-on reset generator for microcontroller
- Power failure detector

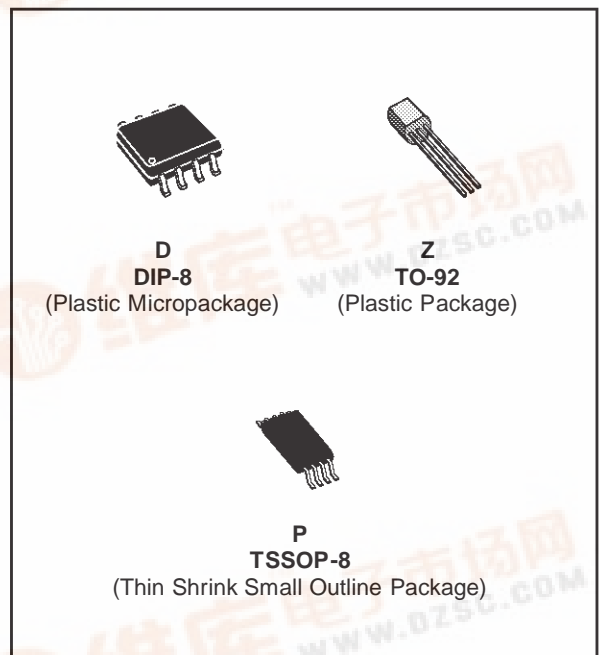
### ORDER CODE

| Part Number | Temperature Range | Package |   |   |
|-------------|-------------------|---------|---|---|
|             |                   | D       | Z | P |
| TS831-5I    | -40, +125°C       | •       | • | • |
| TS831-4I    |                   | •       | • | • |
| TS831-3I    |                   | •       | • | • |

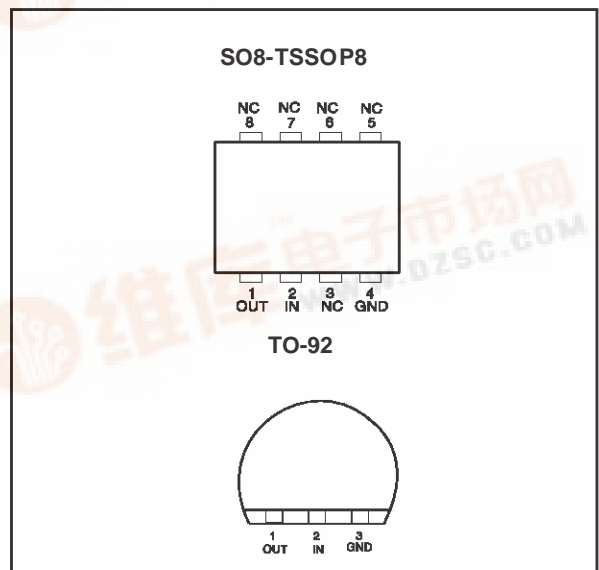
Z= TO92 Plastic package

D = Small Outline Package (SO) - also available in Tape & Reel (DT)

P = Thin Shrink Small Outline Package (TSSOP) - only available in Tape & Reel (PT)



### PIN CONNECTIONS (top view)



**ABSOLUTE MAXIMUM RATINGS**

| Symbol     | Parameter   | Value                  | Unit |
|------------|---|------------------------|------|
| $V_{CC}$   | Supply Voltage <sup>1)</sup>                                | 7                      | V    |
| $V_{out}$  | Output Voltage  | -0.3 to $V_{CC} + 0.3$ | V    |
| $I_{out}$  | Output Sink Current<br>TS831-5 and TS831-4<br>TS831-3       | 20<br>5                | mA   |
| Pd         | Power Dissipation <sup>2)</sup><br>TO-92<br>SO-8<br>TSSOP-8 | 625<br>700<br>625      | mW   |
| $I_F$      | Clamp Diode Forward Current, pin 1 to pin 2 <sup>3)</sup>   | 100                    | mA   |
| $T_{oper}$ | Operating Free Air Temperature Range                        | -40 to +85             | °C   |
| $T_{stg}$  | Storage Temperature   | -65 to +150            | °C   |

1. All voltages values, except differential voltage are with respect to network ground terminal.

2.  $T_j = 150^{\circ}\text{C}$ ,  $T_{amb} = 25^{\circ}\text{C}$  with  $R_{thja} = 200^{\circ}\text{C/W}$  for TO-92 package  
 $R_{thja} = 175^{\circ}\text{C/W}$  for SO8 package  
 $R_{thja} = 200^{\circ}\text{C/W}$  for TSSOP8 package

3. Maximum package power dissipation limits must be observed.

**OPERATING CONDITIONS**

| Symbol   | Parameter      | Value    | Unit |
|----------|----------------|----------|------|
| $V_{CC}$ | Supply Voltage | 1 to 5.5 | V    |

**TS831-5**

**ELECTRICAL CHARACTERISTICS**  $T_{amb} = 25^{\circ}\text{C}$  (unless otherwise specified)

| Symbol    | Parameter  | Min.         | Typ. | Max.                | Unit |
|-----------|--|--------------|------|---------------------|------|
| $V_{thi}$ | Threshold Voltage - $V_{CC}$ Increasing<br>-40°C ≤ $T_{amb}$ ≤ +85°C<br>-40°C ≤ $T_{amb}$ ≤ +125°C                 | 4.10<br>4.10 | 4.33 | 4.46<br>4.50        | V    |
| $V_{thd}$ | Threshold Voltage - $V_{CC}$ Decreasing<br>-40°C ≤ $T_{amb}$ ≤ +85°C<br>-40°C ≤ $T_{amb}$ ≤ +125°C                 | 4.10<br>4.06 | 4.21 | 4.46<br>4.46        | V    |
| $V_{hys}$ | Hysteresis Voltage   | 50           | 100  | 200                 | mV   |
| $I_{CC}$  | Current Consumption<br>$V_{CC} = 5V$   |              |      | 12                  | μA   |
| $V_{OL}$  | Low Level Output Voltage<br>-40°C ≤ $T_{amb}$ ≤ +85°C<br>-40°C ≤ $T_{amb}$ ≤ +125°C<br>$V_{CC} = 4V, I_{OL} = 8mA$ |              | 450  | 800<br>1000<br>1300 | mV   |
| $I_{OH}$  | Low Level Output Voltage<br>-40°C ≤ $T_{amb}$ ≤ +125°C<br>$V_{CC} = 5V$  |              | 2    | 100<br>1000         | nA   |
| tphl      | Response Time High to Low<br>$R_L = 10k\Omega, C_L = 15pF, V_{CC} = V_{thd} - 10mV$                                |              | 20   |                     | μs   |

**Note** : Limits are 100% production tested at 25°C. Limits over temperature are guaranteed through correlation and by design.

## TS831

### TS831-4

#### ELECTRICAL CHARACTERISTICS Tamb = 25°C (unless otherwise specified)

| Symbol    | Parameter  | Min.         | Typ. | Max.                | Unit          |
|-----------|--|--------------|------|---------------------|---------------|
| $V_{thi}$ | Threshold Voltage - $V_{CC}$ Increasing<br>$-40^{\circ}\text{C} \leq T_{amb} \leq +85^{\circ}\text{C}$<br>$-40^{\circ}\text{C} \leq T_{amb} \leq +125^{\circ}\text{C}$ | 4.17<br>4.10 | 4.35 | 4.66<br>4.70        | V             |
| $V_{thd}$ | Threshold Voltage - $V_{CC}$ Decreasing<br>$-40^{\circ}\text{C} \leq T_{amb} \leq +85^{\circ}\text{C}$<br>$-40^{\circ}\text{C} \leq T_{amb} \leq +125^{\circ}\text{C}$ | 4.17<br>4.13 | 4.4  | 4.66<br>4.66        | V             |
| $V_{hys}$ | Hysteresis Voltage   | 50           | 100  | 200                 | mV            |
| $I_{CC}$  | Current Consumption $V_{CC} = 5V$  |              |      | 12                  | $\mu\text{A}$ |
| $V_{OL}$  | Low Level Output Voltage<br>$-40^{\circ}\text{C} \leq T_{amb} \leq +85^{\circ}\text{C}$<br>$-40^{\circ}\text{C} \leq T_{amb} \leq +125^{\circ}\text{C}$                |              | 450  | 800<br>1000<br>1300 | mV            |
| $I_{OH}$  | Low Level Output Voltage<br>$-40^{\circ}\text{C} \leq T_{amb} \leq +125^{\circ}\text{C}$   |              | 2    | 100<br>1000         | nA            |
| tphl      | Response Time High to Low<br>$R_L = 10\text{k}\Omega$ , $C_L = 15\text{pF}$ , $V_{CC} = V_{thd} - 10\text{mV}$   |              | 20   |                     | $\mu\text{s}$ |

Note : Limits are 100% production tested at 25°C. Limits over temperature are guaranteed through correlation and by design.

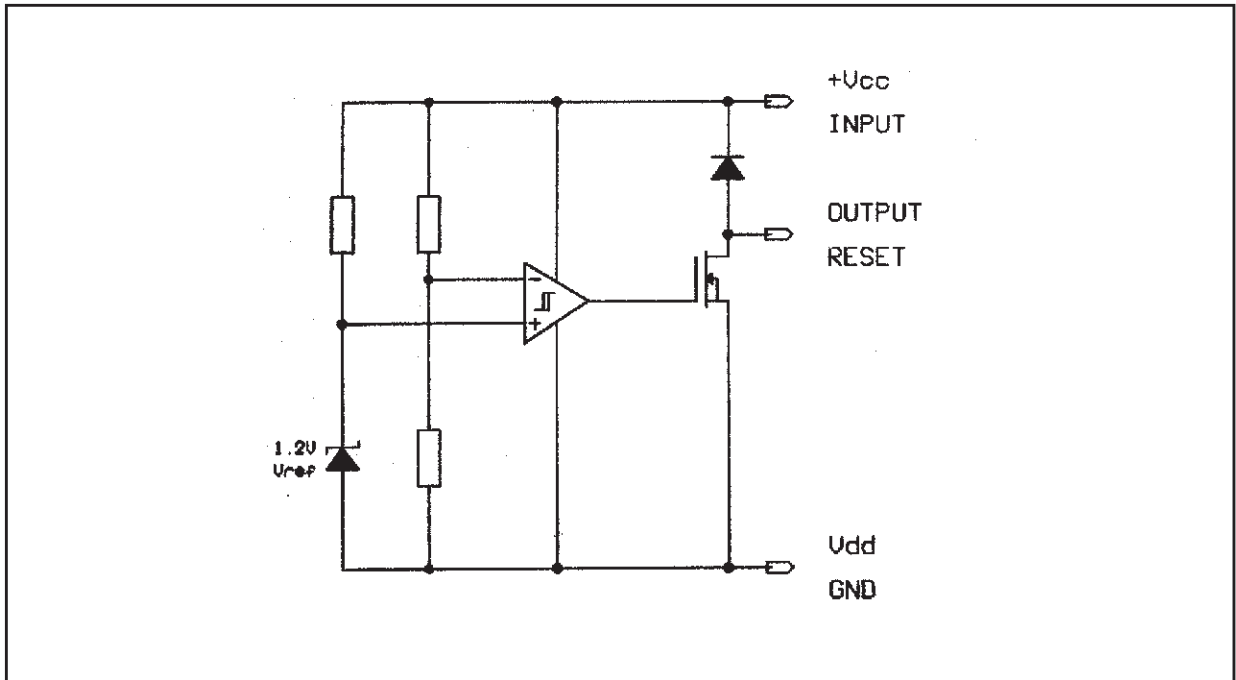
### TS831-3

#### ELECTRICAL CHARACTERISTICS Tamb = 25°C (unless otherwise specified)

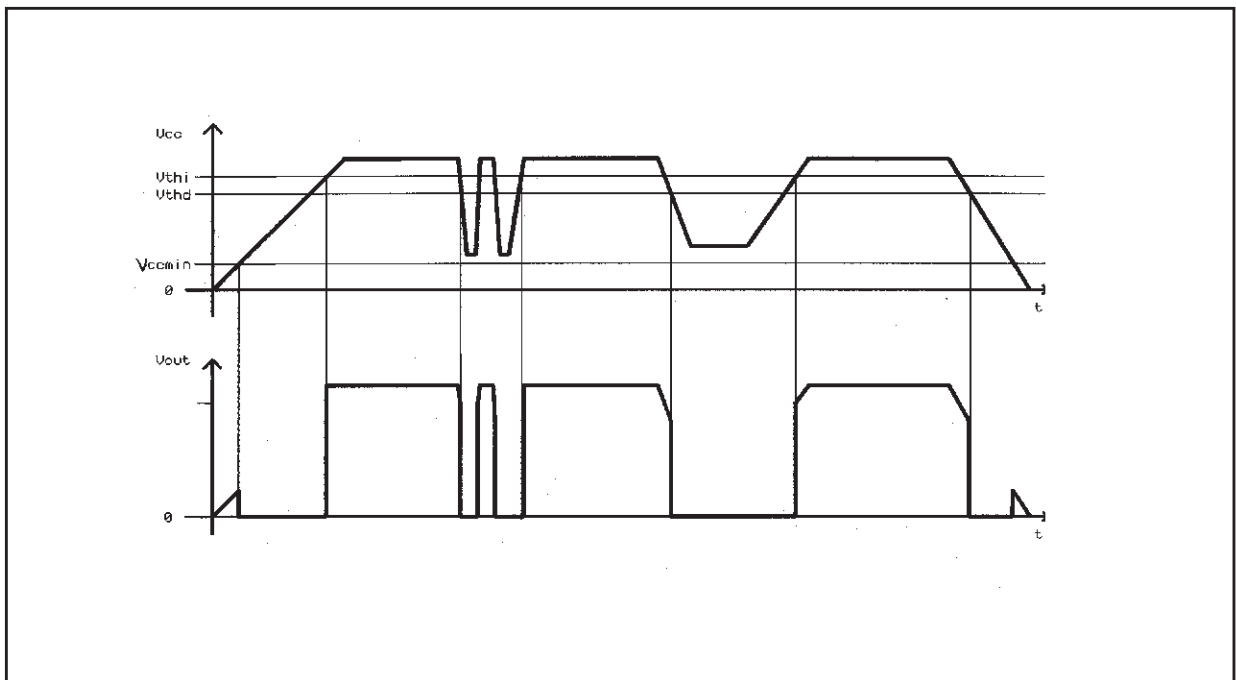
| Symbol    | Parameter  | Min. | Typ. | Max.        | Unit          |
|-----------|--|------|------|-------------|---------------|
| $V_{thi}$ | Threshold Voltage - $V_{CC}$ Increasing<br>$-40^{\circ}\text{C} \leq T_{amb} \leq +125^{\circ}\text{C}$        | 2.55 | 2.71 | 2.8         | V             |
| $V_{thd}$ | Threshold Voltage - $V_{CC}$ Decreasing<br>$-40^{\circ}\text{C} \leq T_{amb} \leq +125^{\circ}\text{C}$        | 2.55 | 2.65 | 2.8         | V             |
| $V_{hys}$ | Hysteresis Voltage   | 30   | 60   | 100         | mV            |
| $I_{CC}$  | Current Consumption $V_{CC} = 3V$  |      |      | 12          | $\mu\text{A}$ |
| $V_{OL}$  | Low Level Output Voltage<br>$-40^{\circ}\text{C} \leq T_{amb} \leq +125^{\circ}\text{C}$                       |      | 140  | 400<br>500  | mV            |
| $I_{OH}$  | Low Level Output Voltage<br>$-40^{\circ}\text{C} \leq T_{amb} \leq +125^{\circ}\text{C}$                       |      | 2    | 100<br>1000 | nA            |
| tphl      | Response Time High to Low<br>$R_L = 10\text{k}\Omega$ , $C_L = 15\text{pF}$ , $V_{CC} = V_{thd} - 10\text{mV}$ |      | 20   |             | $\mu\text{s}$ |

Note : Limits are 100% production tested at 25°C. Limits over temperature are guaranteed through correlation and by design.

EQUIVALENT SCHEMATIC DIAGRAM

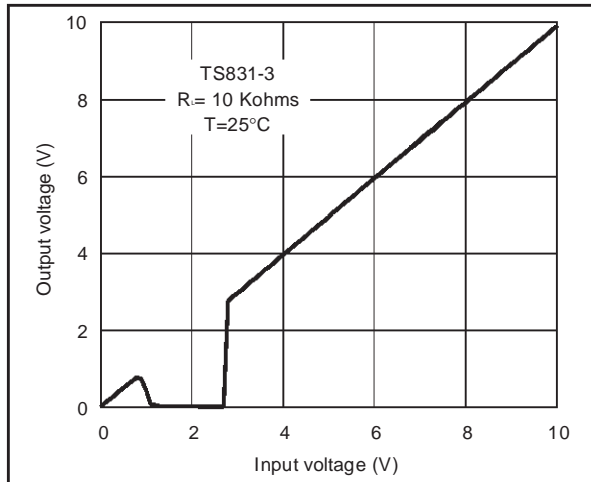


TIMING DIAGRAM

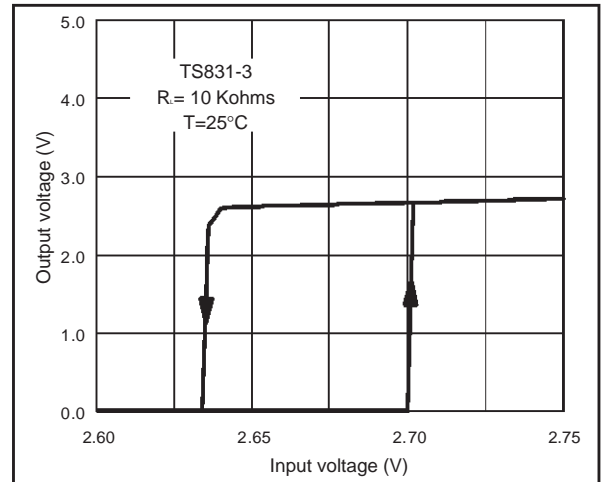


# TS831

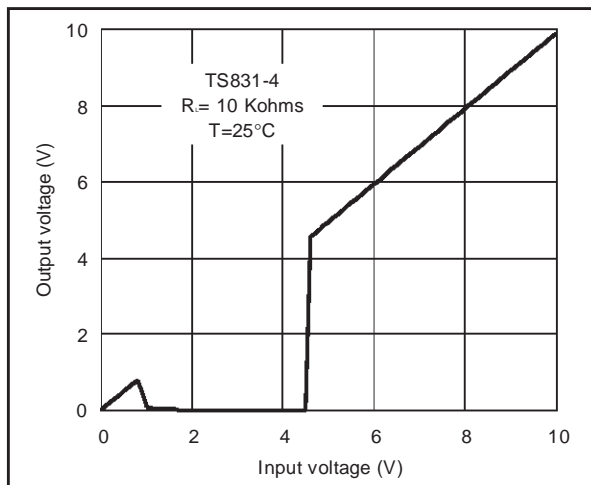
**Output voltage versus input voltage**



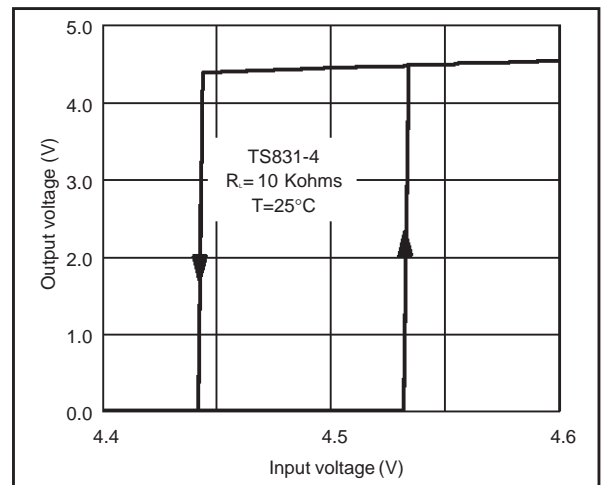
**Reset output voltage versus Input voltage**



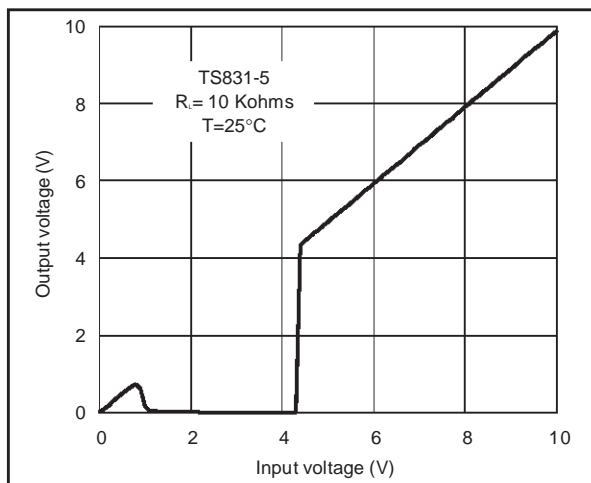
**Output voltage versus input voltage**



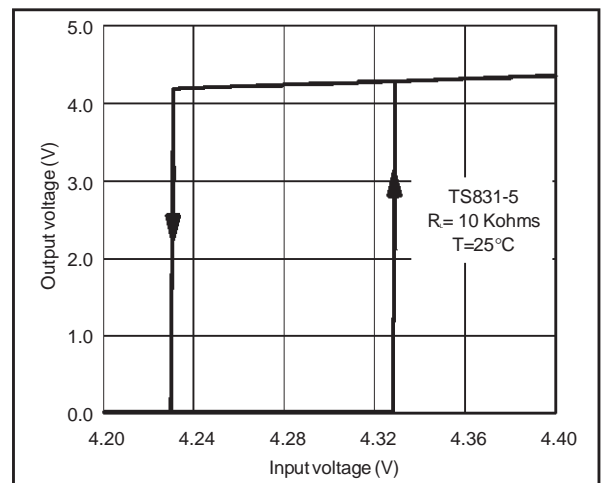
**Reset output voltage versus Input voltage**



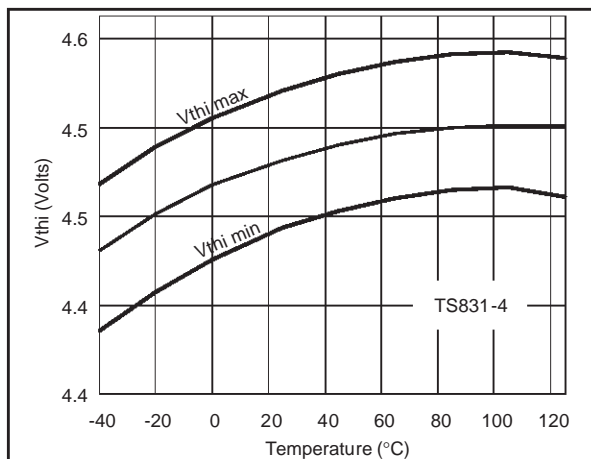
**Output voltage versus input voltage**



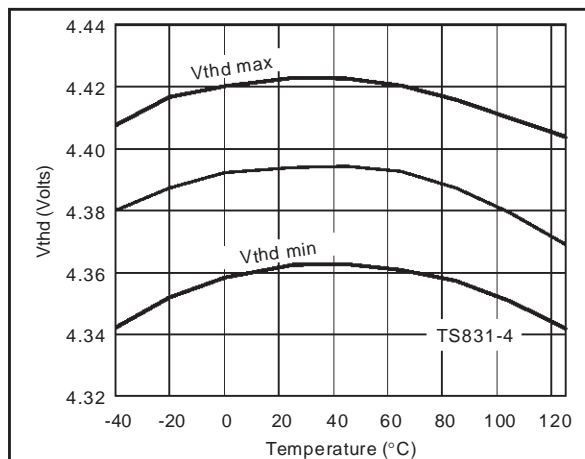
**Reset output voltage versus Input voltage**



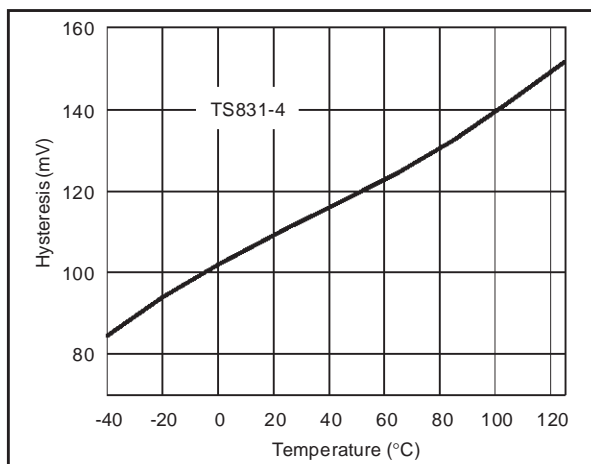
Vth versus temperature while Vcc increasing



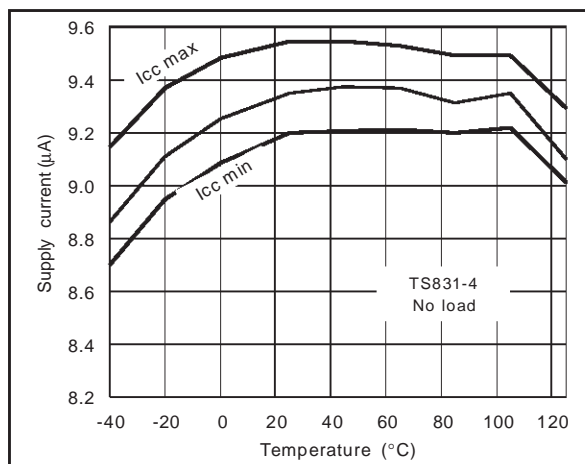
Vth versus temperature while Vcc decreasing



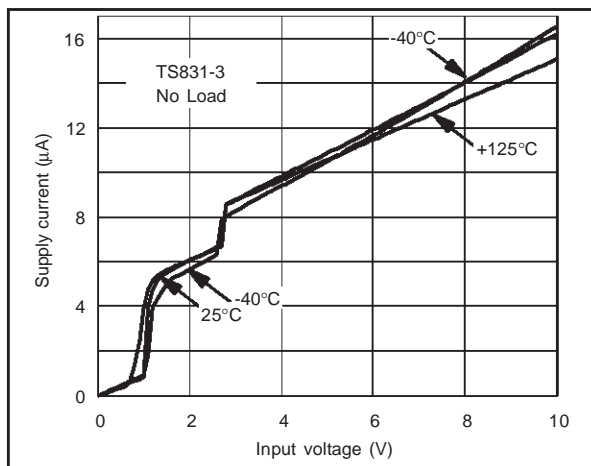
Hysteresis voltage versus temperature



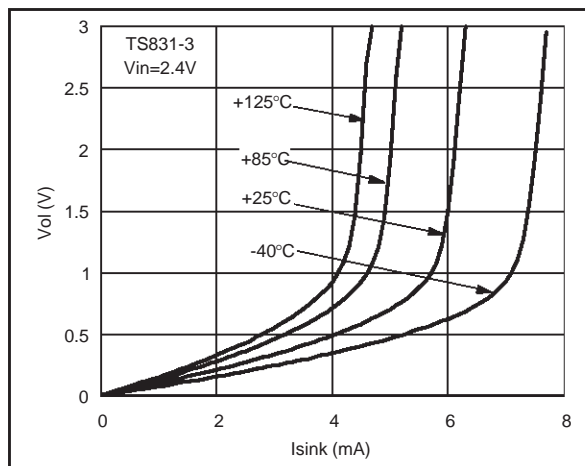
Supply current versus temperature



Supply current vs input voltage & temperature

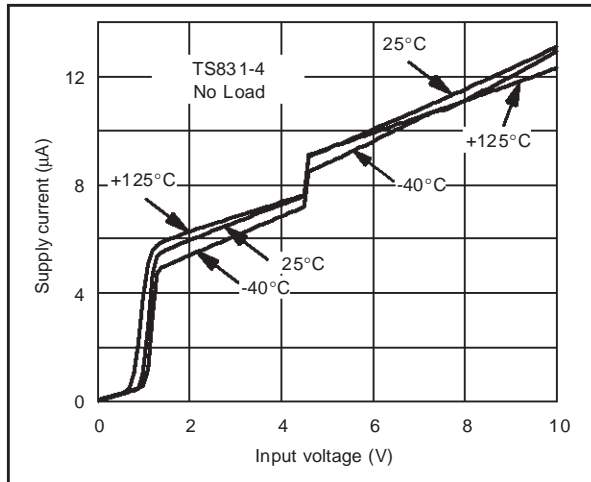


Voltage output low vs Isink & temperature

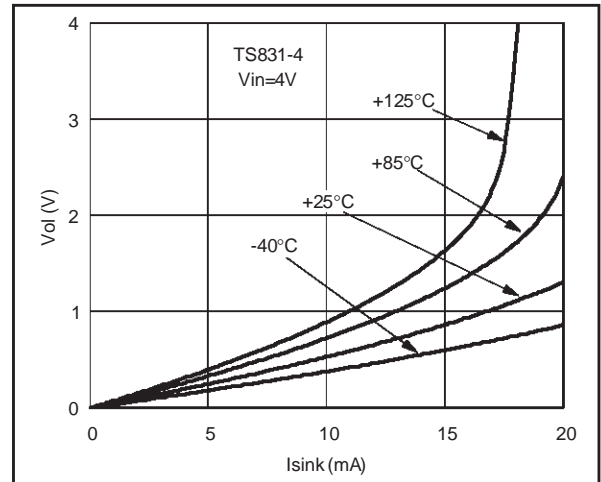


# TS831

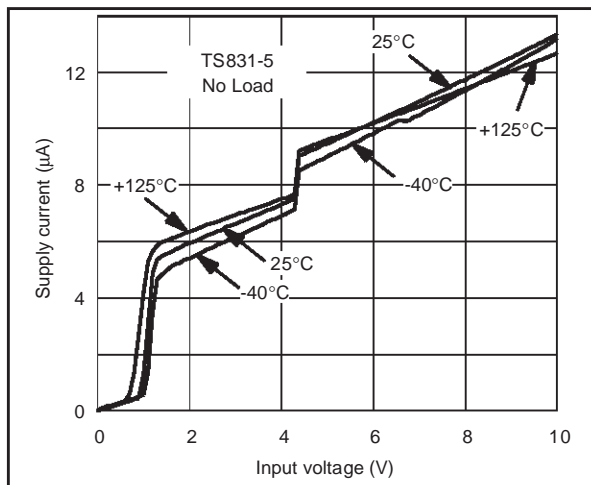
**Supply current vs input voltage & temperature**



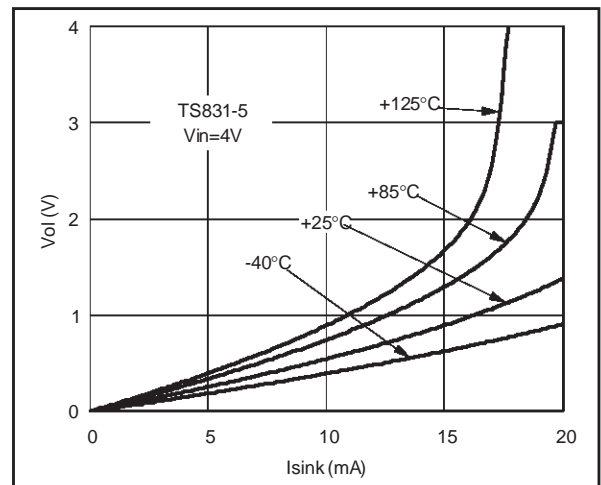
**Voltage output low vs Isink & temperature**



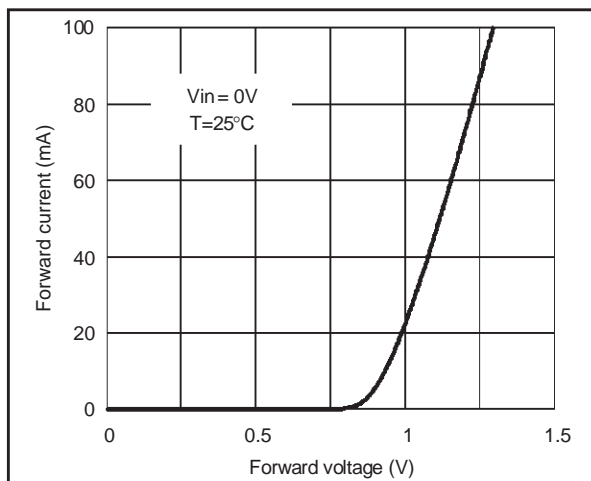
**Supply current vs input voltage & temperature**



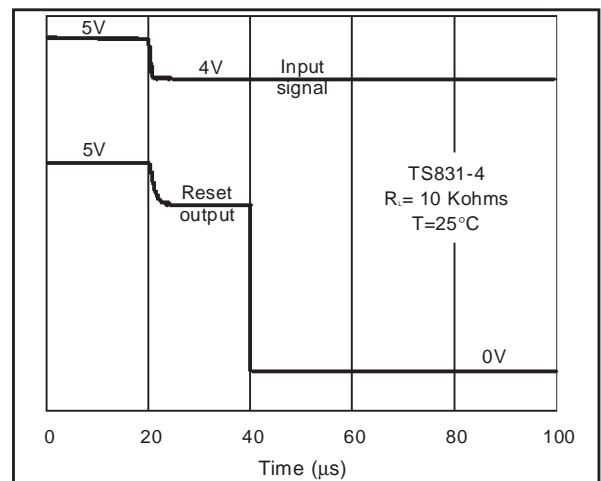
**Voltage output low vs Isink & temperature**



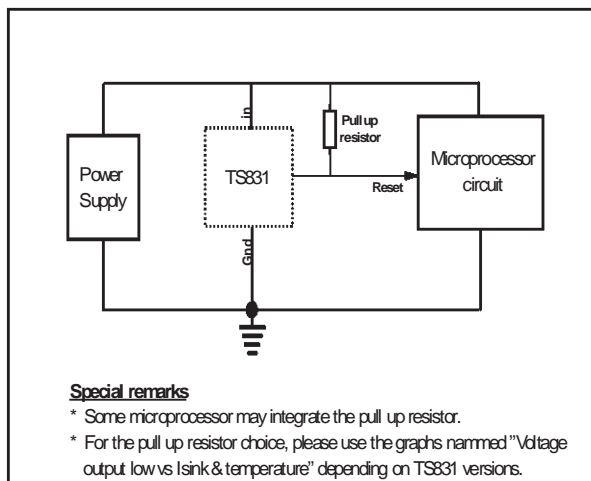
**Clamp diode forward current versus voltage**



**Response time**



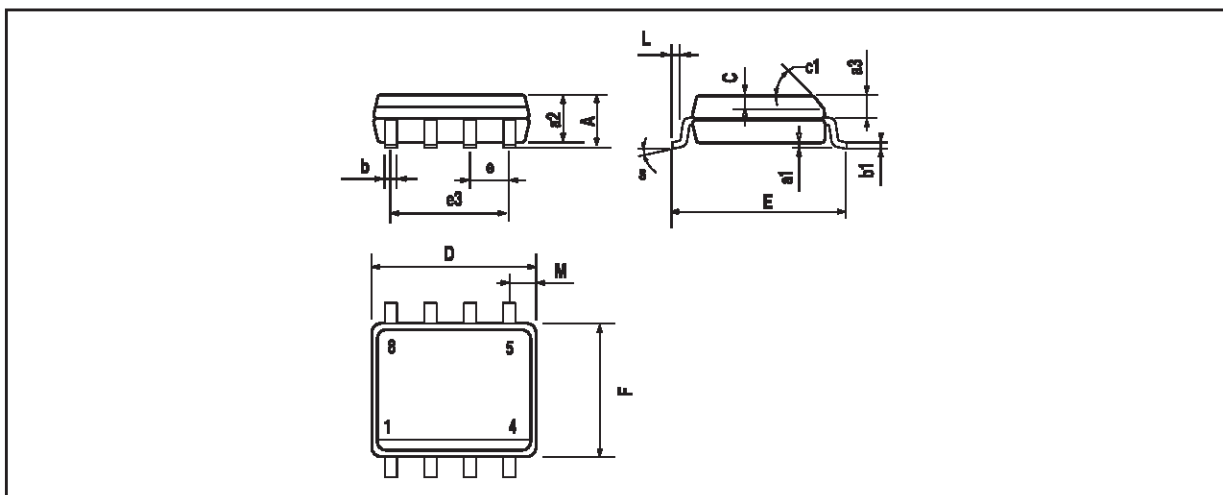
## Basic configuration





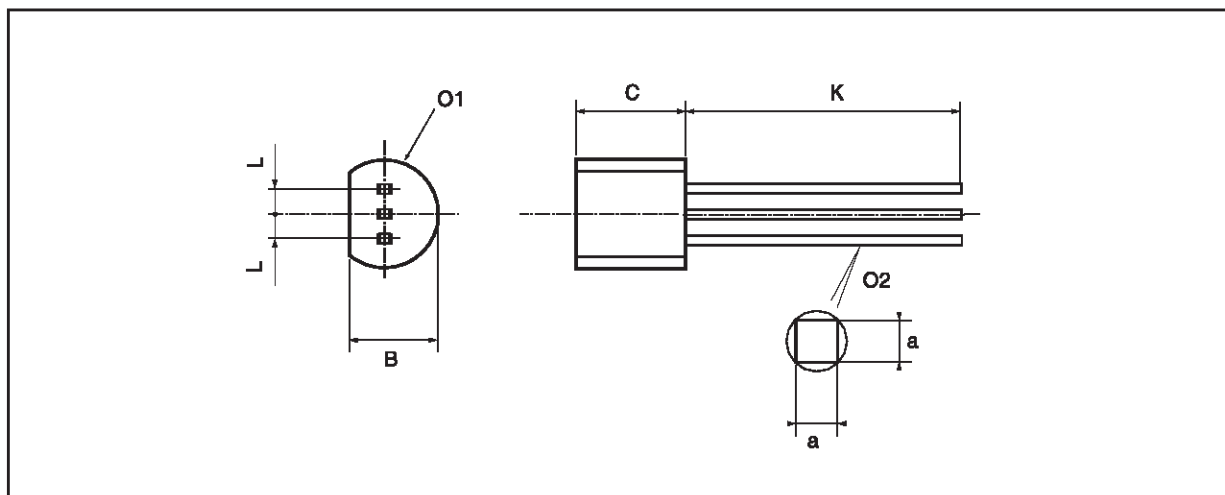
# TS831

## PACKAGE MECHANICAL DATA 8 PINS - PLASTIC MICROPACKAGE (SO)



| Dim. | Millimeters |      |      | Inches |       |       |
|------|-------------|------|------|--------|-------|-------|
|      | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A    |             |      | 1.75 |        |       | 0.069 |
| a1   | 0.1         |      | 0.25 | 0.004  |       | 0.010 |
| a2   |             |      | 1.65 |        |       | 0.065 |
| a3   | 0.65        |      | 0.85 | 0.026  |       | 0.033 |
| b    | 0.35        |      | 0.48 | 0.014  |       | 0.019 |
| b1   | 0.19        |      | 0.25 | 0.007  |       | 0.010 |
| C    | 0.25        |      | 0.5  | 0.010  |       | 0.020 |
| c1   | 45° (typ.)  |      |      |        |       |       |
| D    | 4.8         |      | 5.0  | 0.189  |       | 0.197 |
| E    | 5.8         |      | 6.2  | 0.228  |       | 0.244 |
| e    |             | 1.27 |      |        | 0.050 |       |
| e3   |             | 3.81 |      |        | 0.150 |       |
| F    | 3.8         |      | 4.0  | 0.150  |       | 0.157 |
| L    | 0.4         |      | 1.27 | 0.016  |       | 0.050 |
| M    |             |      | 0.6  |        |       | 0.024 |
| S    | 8° (max.)   |      |      |        |       |       |

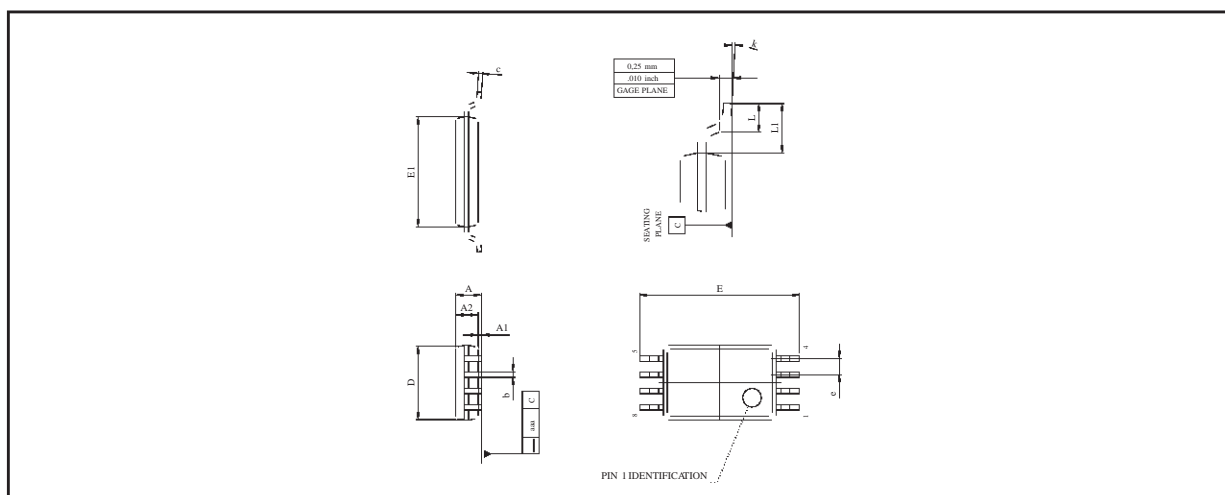
**PACKAGE MECHANICAL DATA**  
3 PINS - PLASTIC PACKAGE TO-92



| Dim. | Millimeters |      |       | Inches |        |        |
|------|-------------|------|-------|--------|--------|--------|
|      | Min         | Typ. | Max.  | Min.   | Typ.   | Max.   |
| L    |             | 1.27 |       |        | 0.05   |        |
| B    | 3.2         | 3.7  | 4.2   | 0.126  | 0.1457 | 0.1654 |
| O1   | 4.45        | 5.00 | 5.2   | 0.1752 | 0.1969 | 0.2047 |
| C    | 4.58        | 5.03 | 5.33  | 0.1803 | 0.198  | 0.2098 |
| K    | 12.7        |      |       | 0.5    |        |        |
| O2   | 0.407       | 0.5  | 0.508 | 0.016  | 0.0197 | 0.02   |
| a    | 0.35        |      |       | 0.0138 |        |        |

## TS831

### PACKAGE MECHANICAL DATA 8 PINS - THIN SHRINK SMALL OUTLINE PACKAGE



| Dim. | Millimeters |      |      | Inches |        |       |
|------|-------------|------|------|--------|--------|-------|
|      | Min.        | Typ. | Max. | Min.   | Typ.   | Max.  |
| A    |             |      | 1.20 |        |        | 0.05  |
| A1   | 0.05        |      | 0.15 | 0.01   |        | 0.006 |
| A2   | 0.80        | 1.00 | 1.05 | 0.031  | 0.039  | 0.041 |
| b    | 0.19        |      | 0.30 | 0.007  |        | 0.15  |
| c    | 0.09        |      | 0.20 | 0.003  |        | 0.012 |
| D    | 2.90        | 3.00 | 3.10 | 0.114  | 0.118  | 0.122 |
| E    |             | 6.40 |      |        | 0.252  |       |
| E1   | 4.30        | 4.40 | 4.50 | 0.169  | 0.173  | 0.177 |
| e    |             | 0.65 |      |        | 0.025  |       |
| k    | 0°          |      | 8°   | 0°     |        | 8°    |
| l    | 0.50        | 0.60 | 0.75 | 0.09   | 0.0236 | 0.030 |

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2000 STMicroelectronics - Printed in Italy - All Rights Reserved  
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - China - Finland - France - Germany - Hong Kong - India - Italy - Japan - Malaysia - Malta - Morocco  
Singapore - Spain - Sweden - Switzerland - United Kingdom

© <http://www.st.com>

