



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_{CC} 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

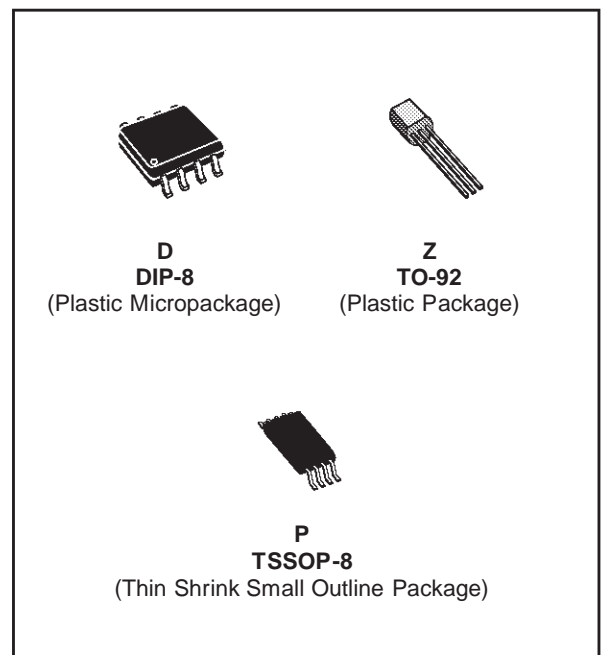
ORDER CODE

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

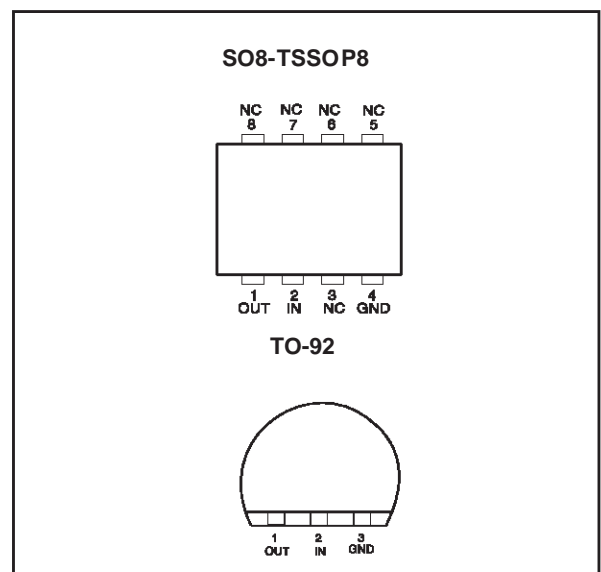
Z= TO92 Plastic package

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 ¹⁾ | 7 | V |
| V_{out} | Output Voltage | -0.3 to $V_{CC} + 0.3$ | V |
| I_{out} | Output Sink Current TS831-5 and TS831-4 TS831-3 | 20 5 | mA |
| P_d | Power Dissipation ²⁾ TO-92 SO-8 TSSOP-8 | 625 700 625 | mW |
| I_F | Clamp Diode Forward Current, pin 1 to pin 2 ³⁾ | 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 -40°C ≤ T_{amb} ≤ +85°C -40°C ≤ T_{amb} ≤ +125°C | 4.10 4.10 | 4.33 | 4.46 4.50 | V |
| V_{thd} | Threshold Voltage - V_{CC} Decreasing -40°C ≤ T_{amb} ≤ +85°C -40°C ≤ T_{amb} ≤ +125°C | 4.10 4.06 | 4.21 | 4.46 4.46 | V |
| V_{hys} | Hysteresis Voltage | 50 | 100 | 200 | mV |
| I_{CC} | Current Consumption $V_{CC} = 5V$ | | | 12 | μA |
| V_{OL} | Low Level Output Voltage -40°C ≤ T_{amb} ≤ +85°C -40°C ≤ T_{amb} ≤ +125°C $V_{CC} = 4V$, $I_{OL} = 8mA$ | | 450 | 800 1000 1300 | mV |
| I_{OH} | Low Level Output Voltage -40°C ≤ T_{amb} ≤ +125°C $V_{CC} = 5V$ | | 2 | 100 1000 | nA |
| t_{phl} | Response Time High to Low $R_L = 10k\Omega$, $C_L = 15pF$, $V_{CC} = V_{thd} - 10mV$ | | 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 -40°C ≤ Tamb ≤ +85°C -40°C ≤ Tamb ≤ +125°C | 4.17 4.10 | 4.35 | 4.66 4.70 | V |
| V_{thd} | Threshold Voltage - V_{CC} Decreasing -40°C ≤ Tamb ≤ +85°C -40°C ≤ Tamb ≤ +125°C | 4.17 4.13 | 4.4 | 4.66 4.66 | V |
| V_{hys} | Hysteresis Voltage | 50 | 100 | 200 | mV |
| I_{CC} | Current Consumption $V_{CC} = 5V$ | | | 12 | μA |
| V_{OL} | Low Level Output Voltage $V_{CC} = 4V, I_{OL} = 8mA$ -40°C ≤ Tamb ≤ +85°C -40°C ≤ Tamb ≤ +125°C | | 450 | 800 1000 1300 | mV |
| I_{OH} | Low Level Output Voltage $V_{CC} = 5V$ -40°C ≤ Tamb ≤ +125°C | | 2 | 100 1000 | nA |
| tphl | Response Time High to Low $R_L = 10k\Omega, C_L = 15pF, V_{CC} = V_{thd} - 10mV$ | | 20 | | μs |

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

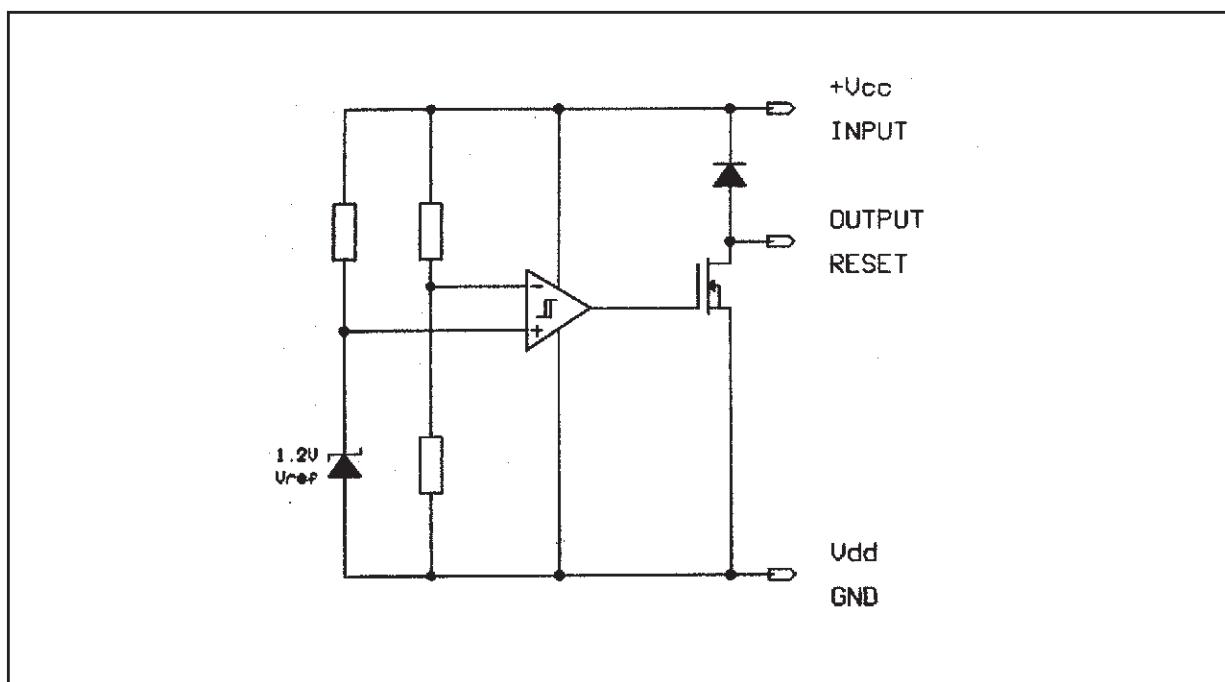
TS831-3

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

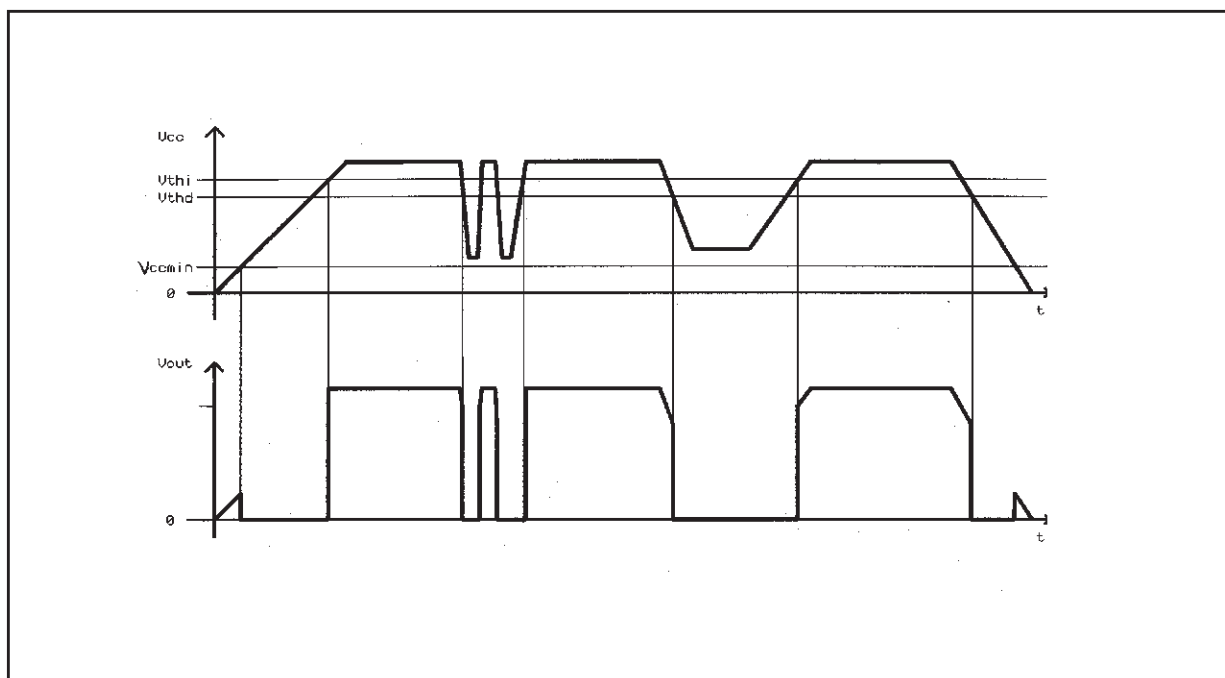
| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|-----------|---|------|------|-------------|------|
| V_{thi} | Threshold Voltage - V_{CC} Increasing -40°C ≤ Tamb ≤ +125°C | 2.55 | 2.71 | 2.8 | V |
| V_{thd} | Threshold Voltage - V_{CC} Decreasing -40°C ≤ Tamb ≤ +125°C | 2.55 | 2.65 | 2.8 | V |
| V_{hys} | Hysteresis Voltage | 30 | 60 | 100 | mV |
| I_{CC} | Current Consumption $V_{CC} = 3V$ | | | 12 | μA |
| V_{OL} | Low Level Output Voltage $V_{CC} = 2.4V, I_{OL} = 1mA$ -40°C ≤ Tamb ≤ +125°C | | 140 | 400 500 | mV |
| I_{OH} | Low Level Output Voltage $V_{CC} = 3V$ -40°C ≤ Tamb ≤ +125°C | | 2 | 100 1000 | nA |
| tphl | Response Time High to Low $R_L = 10k\Omega, C_L = 15pF, V_{CC} = V_{thd} - 10mV$ | | 20 | | μs |

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

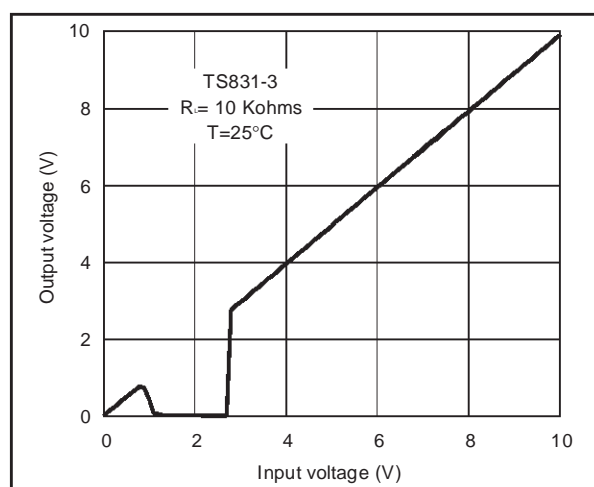
EQUIVALENT SCHEMATIC DIAGRAM



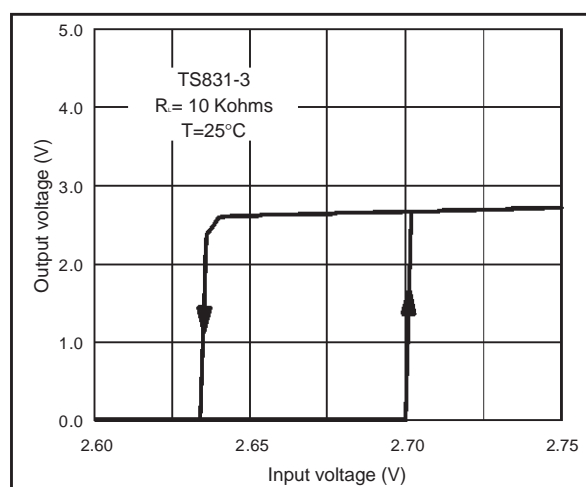
TIMING DIAGRAM



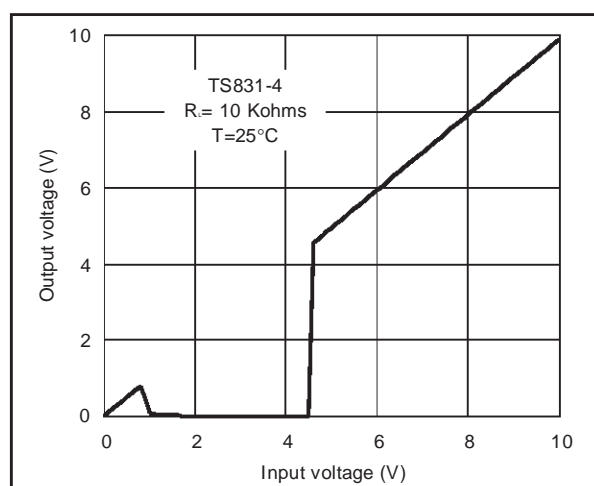
Output voltage versus input voltage



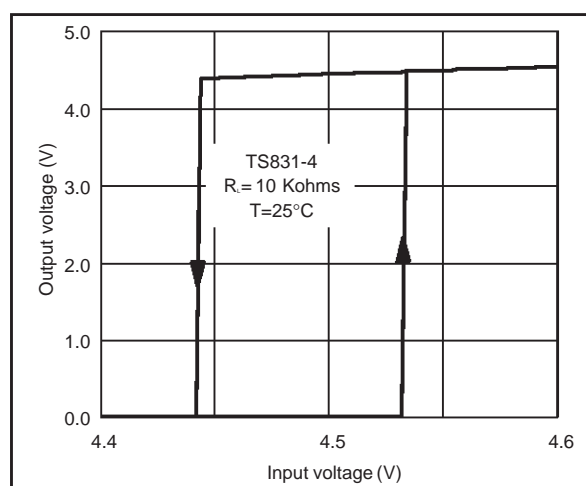
Reset output voltage versus Input voltage



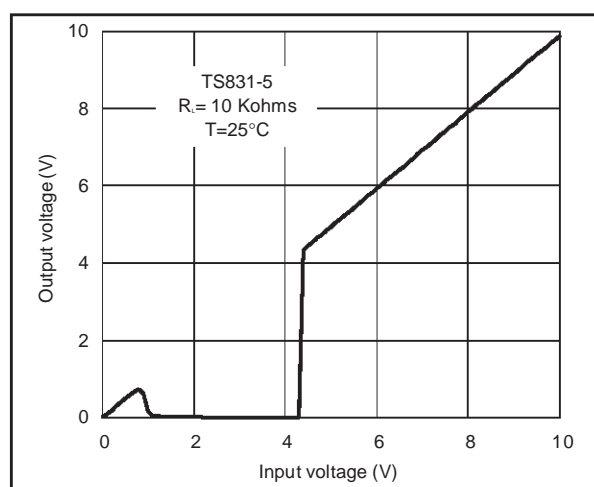
Output voltage versus input voltage



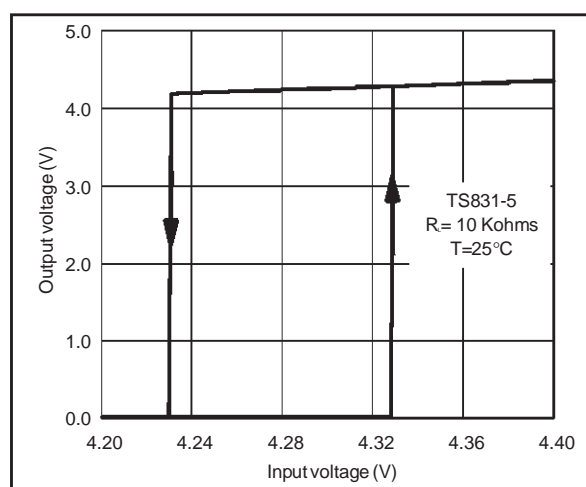
Reset output voltage versus Input voltage



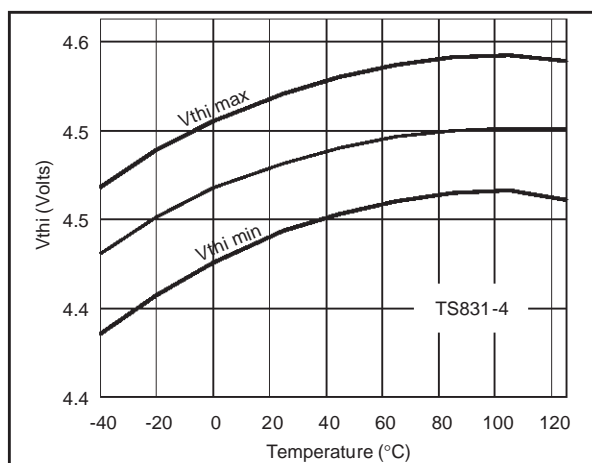
Output voltage versus input voltage



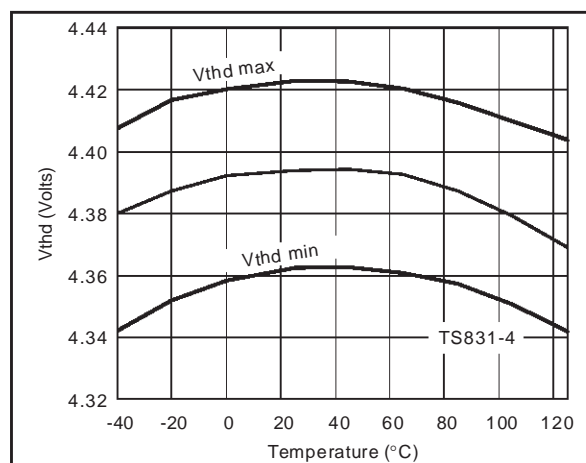
Reset output voltage versus Input voltage



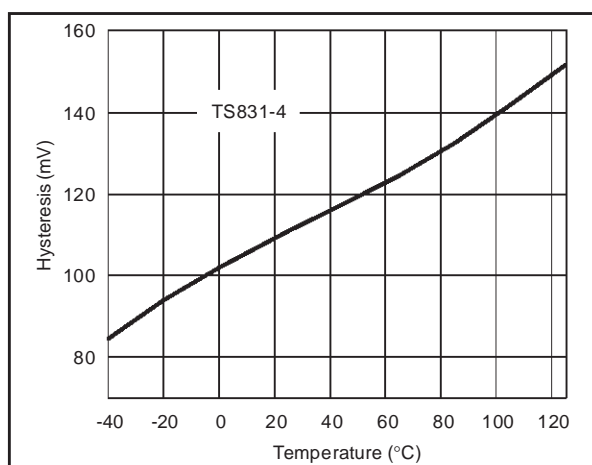
Vth versus temperature while Vcc increasing



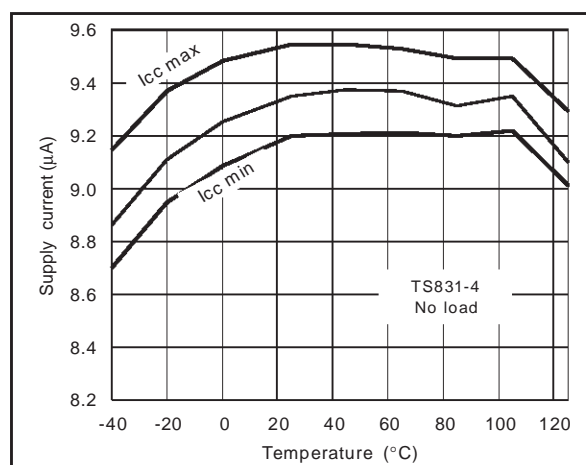
Vth versus temperature while Vcc decreasing



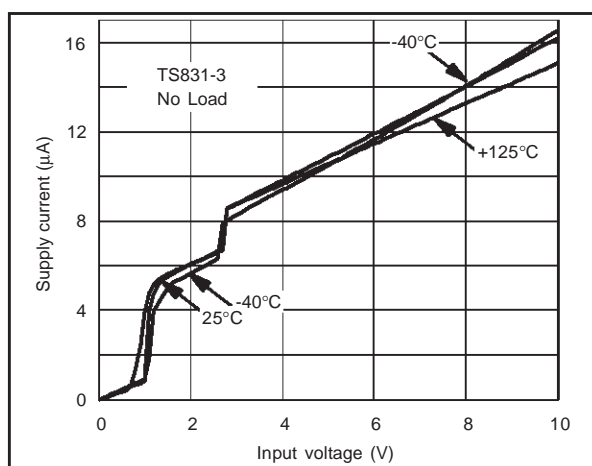
Hysteresis voltage versus temperature



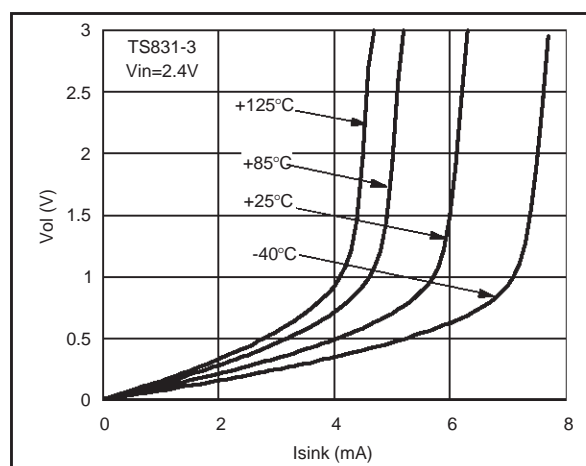
Supply current versus temperature



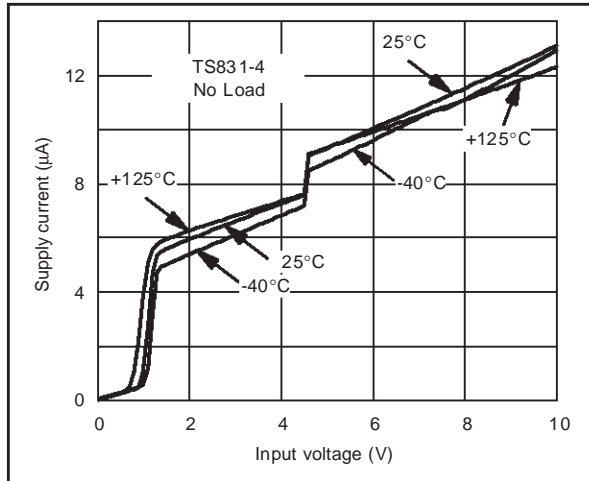
Supply current vs input voltage & temperature



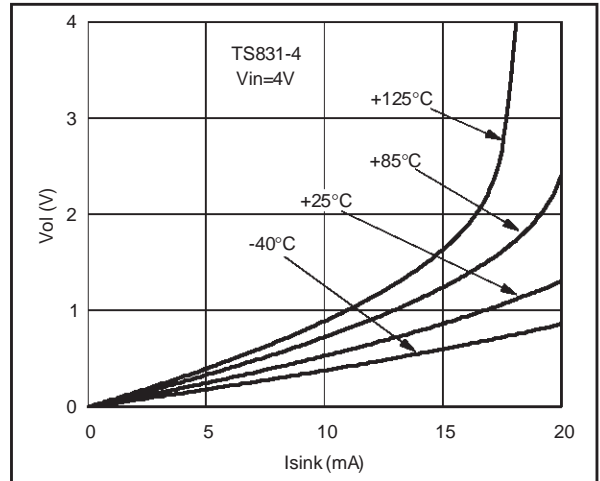
Voltage output low vs Isink & temperature



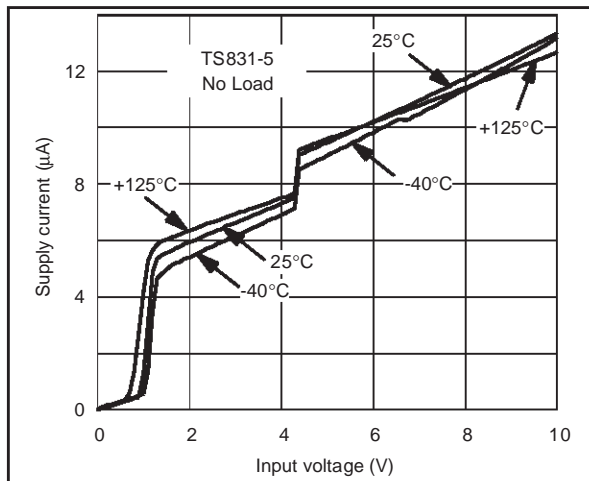
Supply current vs input voltage & temperature



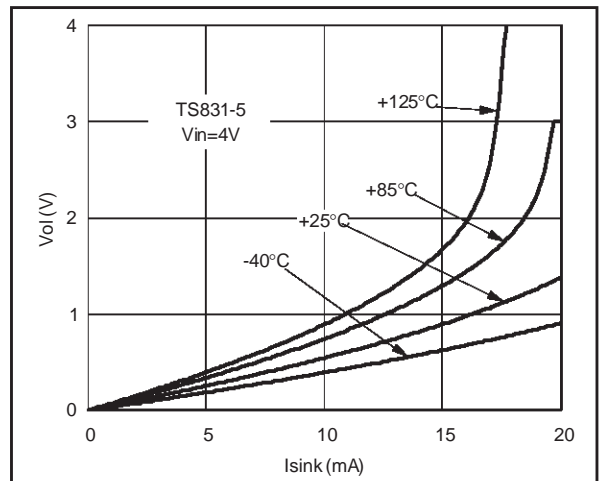
Voltage output low vs Isink & temperature



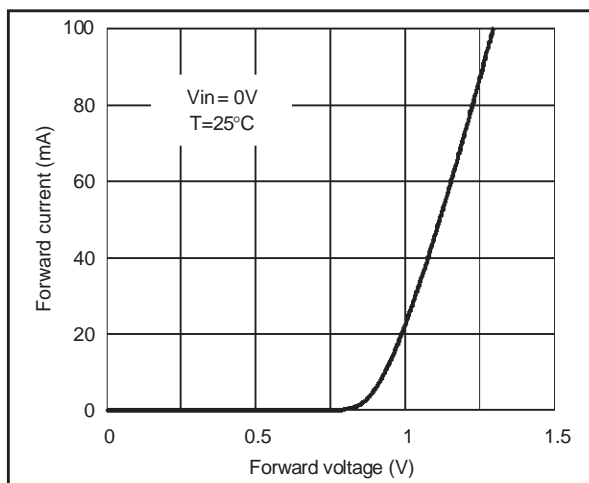
Supply current vs input voltage & temperature



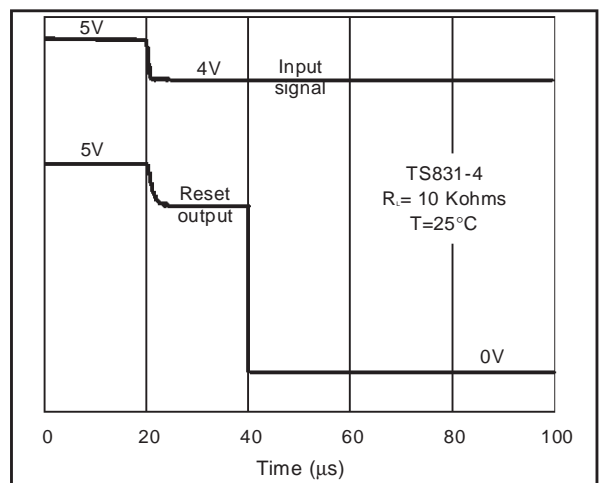
Voltage output low vs Isink & temperature



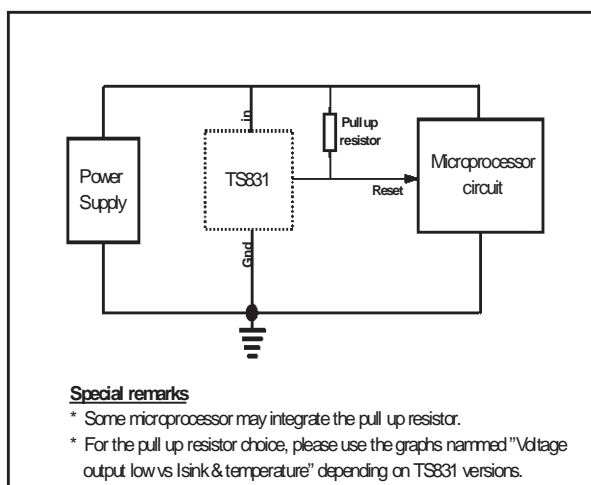
Clamp diode forward current versus voltage



Response time

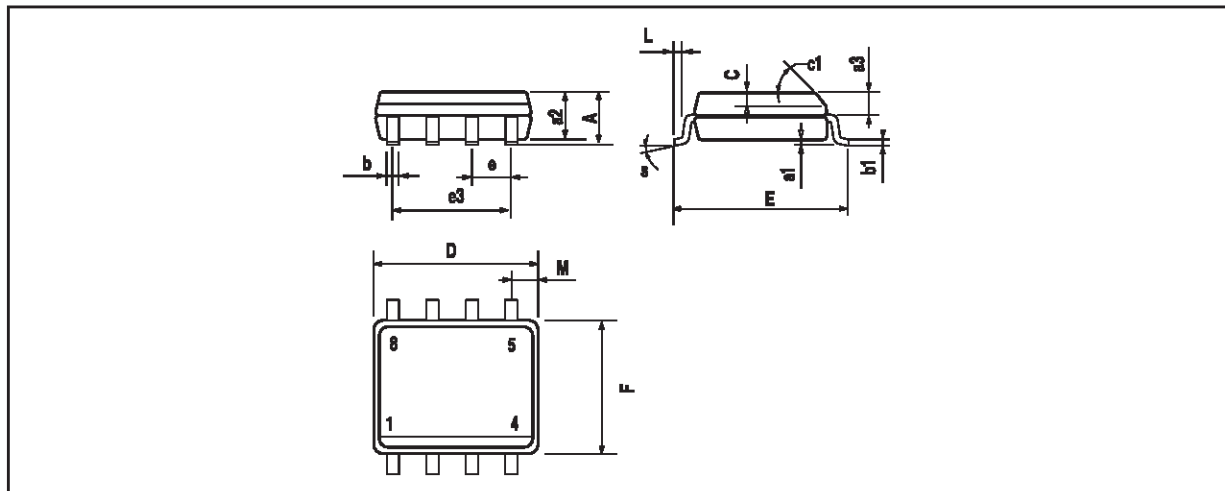


Basic configuration



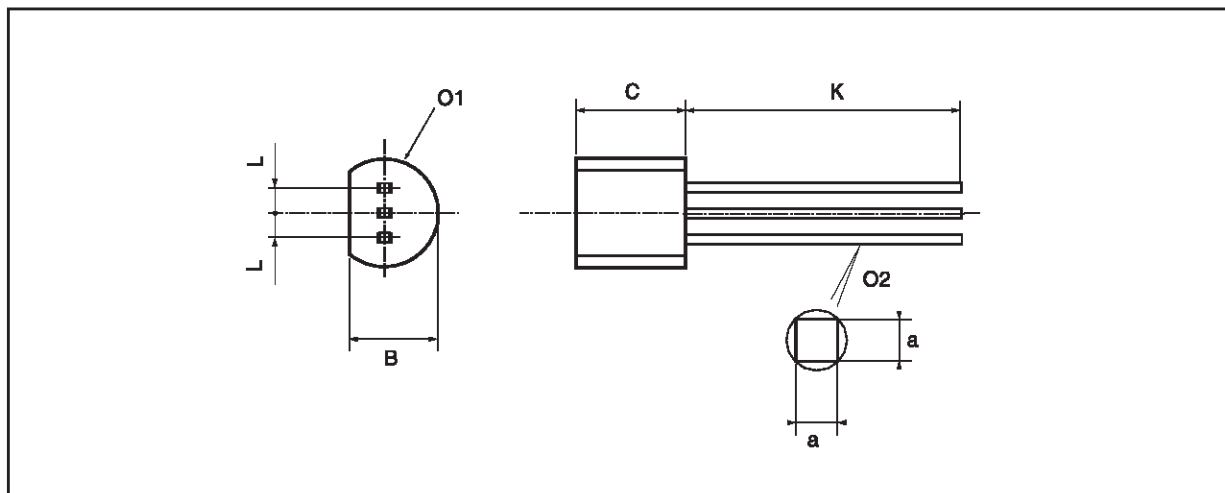
PACKAGE MECHANICAL DATA

8 PINS - PLASTIC MICROPACKAGE (SO)

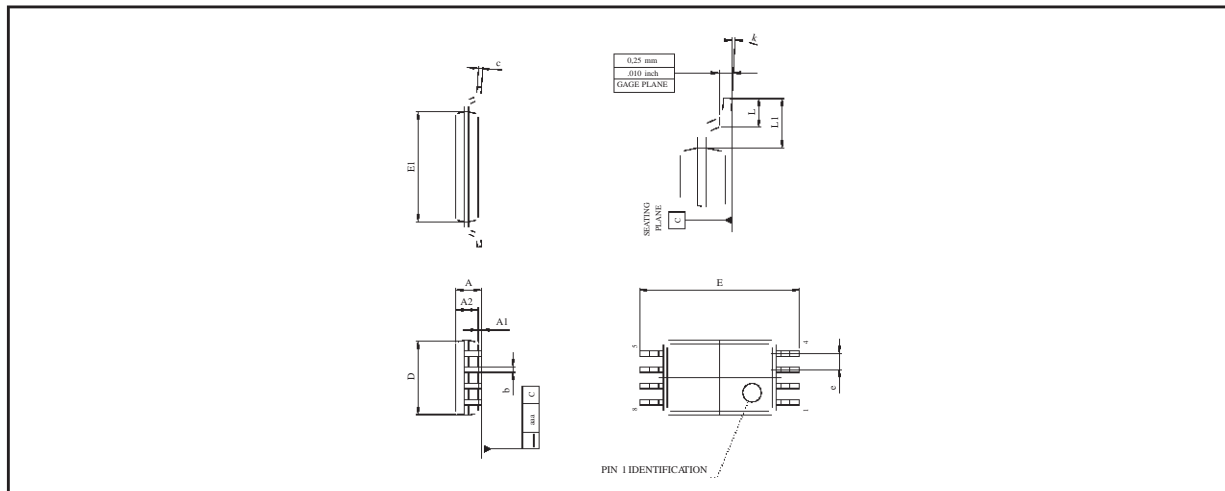


| Dim. | Millimeters | | | Inches | | |
|------|-------------|------|------|--------|-------|-------|
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | | 1.75 | | | 0.069 |
| a1 | 0.1 | | 0.25 | 0.004 | | 0.010 |
| a2 | | | 1.65 | | | 0.065 |
| a3 | 0.65 | | 0.85 | 0.026 | | 0.033 |
| b | 0.35 | | 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 | | |

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 |

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