



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 is an ultra low power integrated circuit incorporating a high stability band-gap voltage reference and a comparator with an 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 resistors.

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

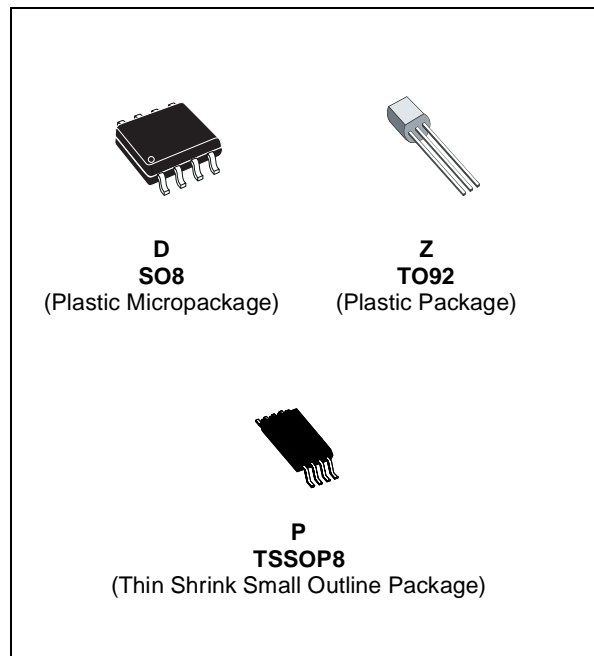
- Power-on reset generator for microcontroller
- Power failure detector

ORDER CODE

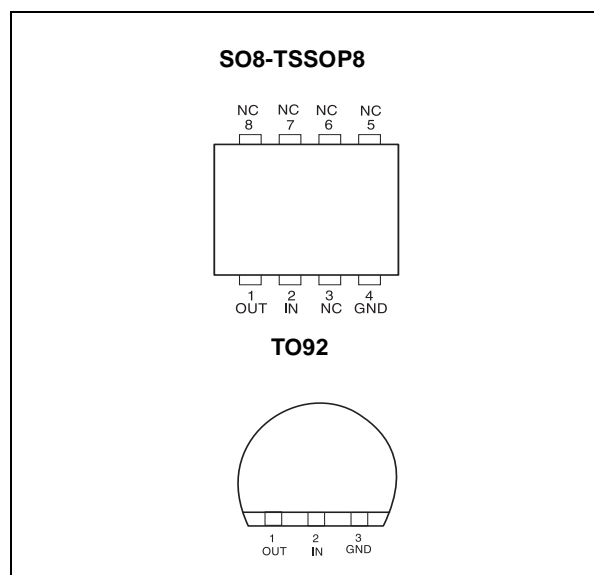
| Part Number | Temperature Range | Package | | |
|-------------|-------------------|---------|---|---|
| | | D | Z | P |
| TS831-5I | -40, +125°C | • | • | • |
| TS831-4I | | • | • | • |
| TS831-3I | | • | • | • |

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⁾ TO92 SO8 TSSOP8 | 625 700 625 | mW |
| I _F | Clamp Diode Forward Current, pin 1 to pin 2 ³⁾ | 100 | mA |
| 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°C, T_{amb} = 25°C with R_{thja} = 200°C/W for TO-92 package
 R_{thja} = 175°C/W for SO8 package
 R_{thja} = 200°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 |
| T _{OPER} | Operating Free Air Temperature Range | -40 to +125 | °C |

TS831-5

ELECTRICAL CHARACTERISTICS T_{amb} = 25°C (unless otherwise specified)

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|------------------|--|--------------|------|---------------------|------|
| V _{THI} | Threshold Voltage with V _{CC} Increasing -40°C ≤ T _{amb} ≤ +85°C -40°C ≤ T _{amb} ≤ +125°C | 4.11 4.11 | 4.33 | 4.46 4.50 | V |
| V _{THD} | Threshold Voltage with 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} | High Level Output Current -40°C ≤ T _{amb} ≤ +125°C V _{CC} = 5V | | 2 | 100 1000 | nA |
| T _{PHL} | Response Time High to Low R _L = 10kΩ, 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.

TS831-4

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

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|-----------|--|--------------|------|---------------------|------|
| V_{THI} | Threshold Voltage with V_{CC} Increasing -40°C ≤ Tamb ≤ +85°C -40°C ≤ Tamb ≤ +125°C | 4.18 4.18 | 4.50 | 4.66 4.70 | V |
| V_{THD} | Threshold Voltage with V_{CC} Decreasing -40°C ≤ Tamb ≤ +85°C -40°C ≤ Tamb ≤ +125°C | 4.17 4.13 | 4.40 | 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 -40°C ≤ Tamb ≤ +85°C -40°C ≤ Tamb ≤ +125°C $V_{CC} = 4V, I_{OL} = 8mA$ | | 450 | 800 1000 1300 | mV |
| I_{OH} | High Level Output Current -40°C ≤ Tamb ≤ +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.

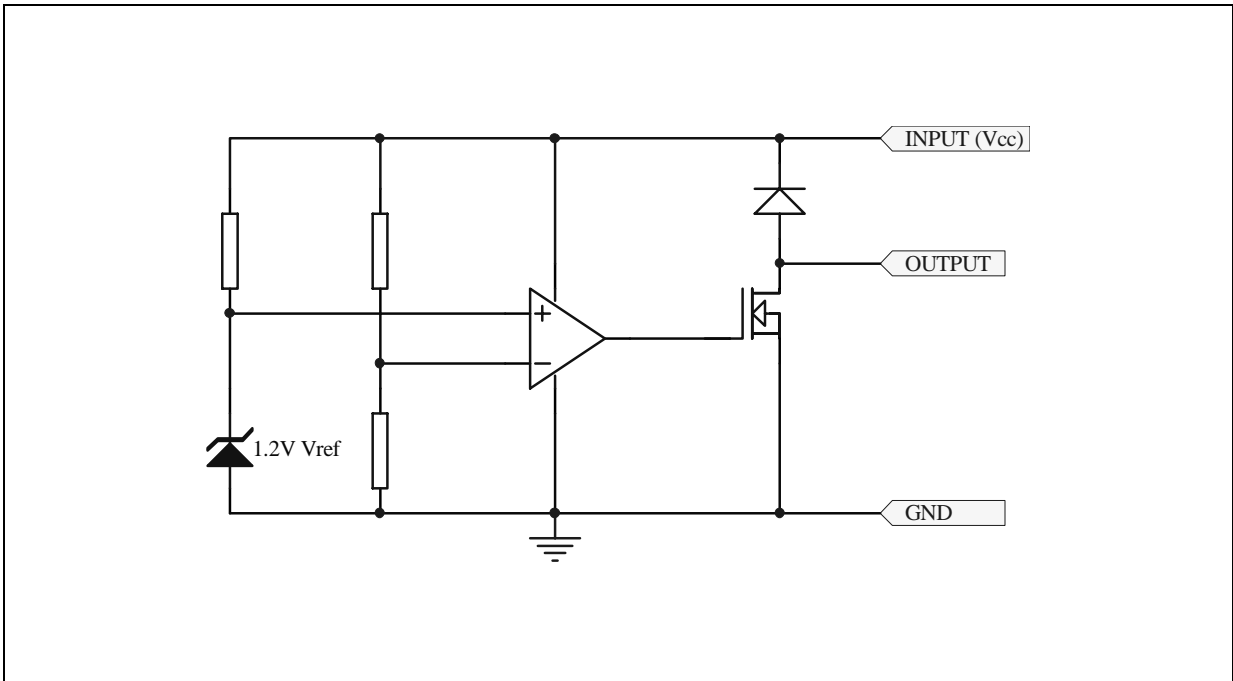
TS831-3

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

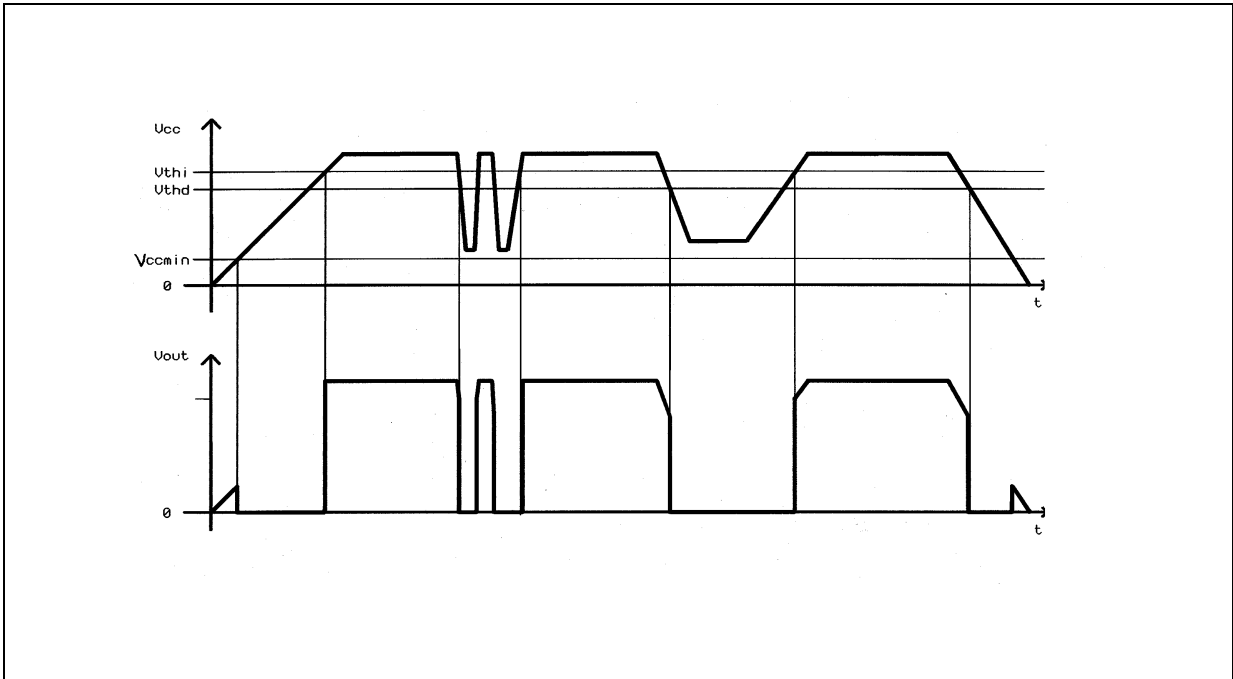
| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|-----------|---|------|------|-------------|------|
| V_{THI} | Threshold Voltage with V_{CC} Increasing -40°C ≤ Tamb ≤ +125°C | 2.55 | 2.71 | 2.8 | V |
| V_{THD} | Threshold Voltage with V_{CC} Decreasing -40°C ≤ Tamb ≤ +125°C | 2.55 | 2.65 | 2.8 | V |
| V_{HYS} | Hysteresis Voltage | 30 | 60 | 100 | mV |
| I_{CC} | Current Consumption $V_{CC} = 3V$ | | | 12 | μA |
| V_{OL} | Low Level Output Voltage -40°C ≤ Tamb ≤ +125°C $V_{CC} = 2.4V, I_{OL} = 1mA$ | | 140 | 400 500 | mV |
| I_{OH} | High Level Output Current -40°C ≤ Tamb ≤ +125°C $V_{CC} = 3V$ | | 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.

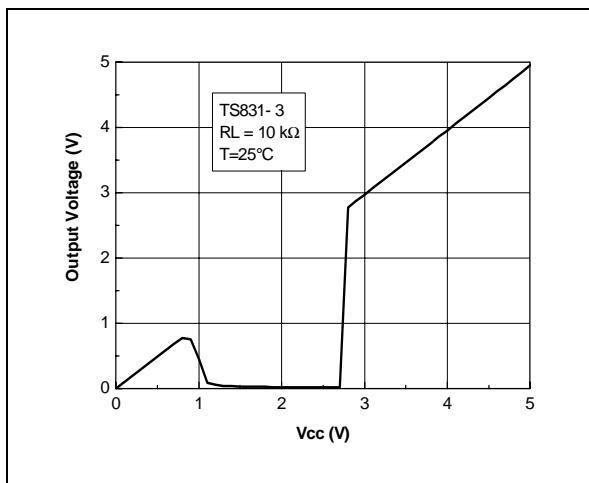
EQUIVALENT SCHEMATIC DIAGRAM



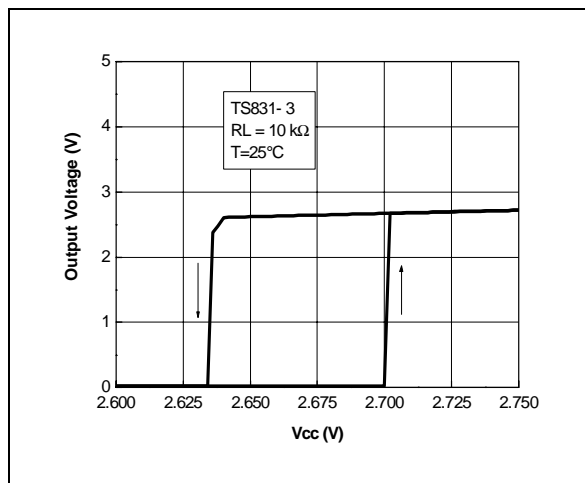
TIMING DIAGRAM



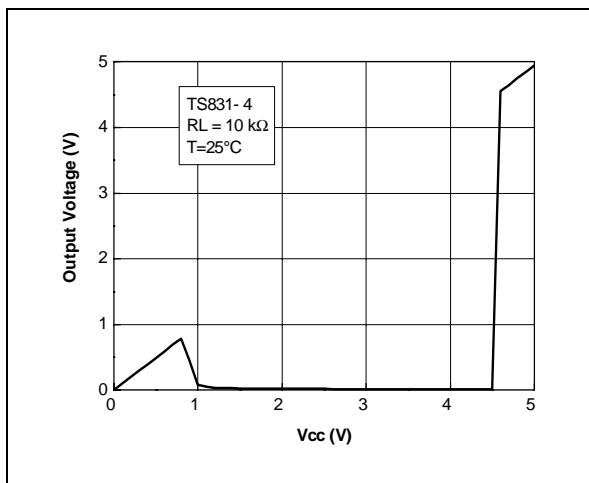
Output voltage versus Vcc



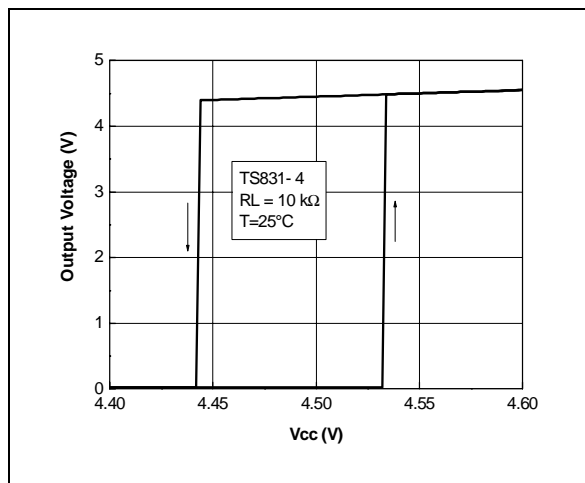
Reset output voltage versus Vcc



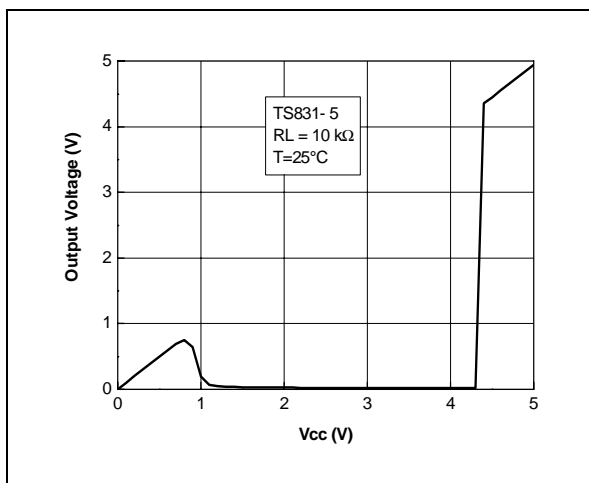
Output voltage versus Vcc



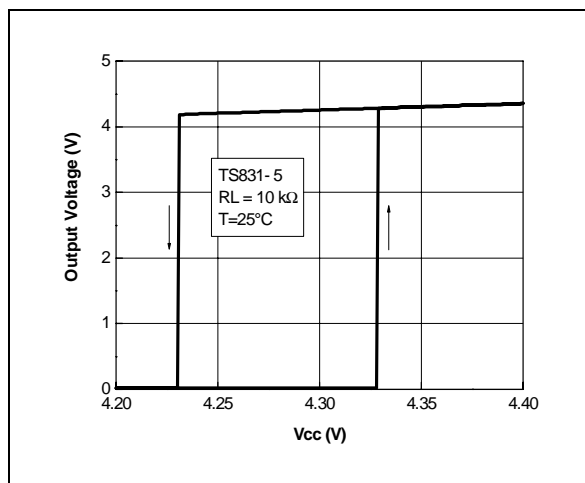
Reset output voltage versus Vcc



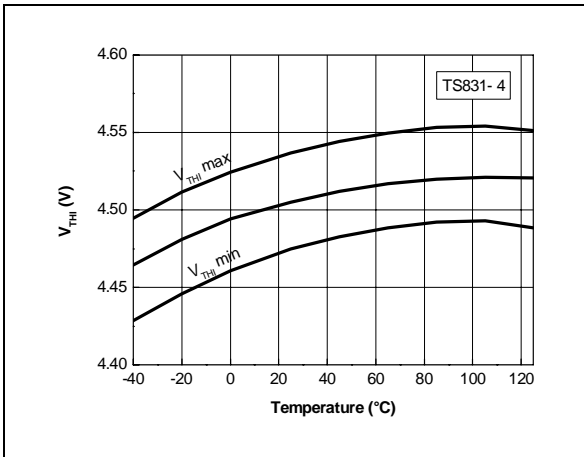
Output voltage versus Vcc



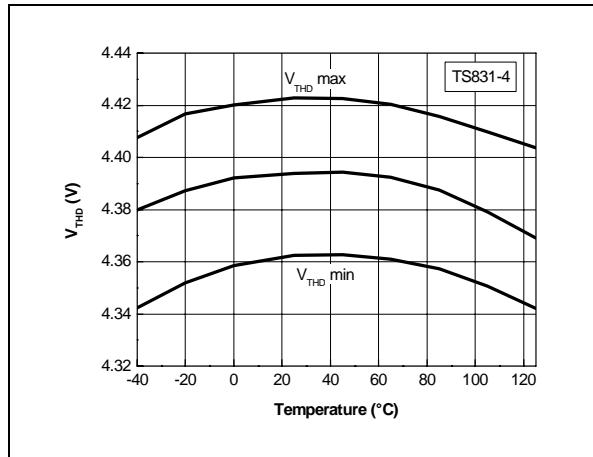
Reset output voltage versus Vcc



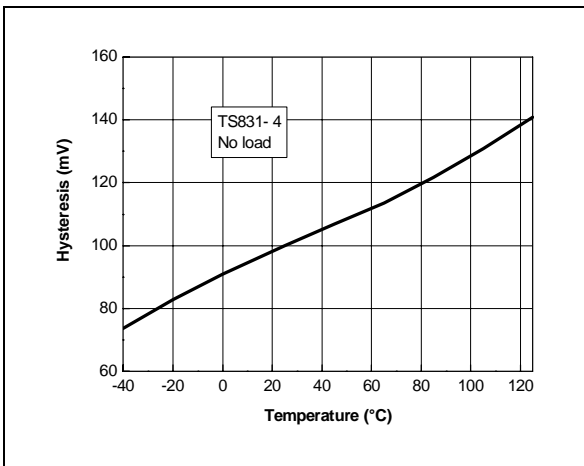
V_{THI} versus temperature



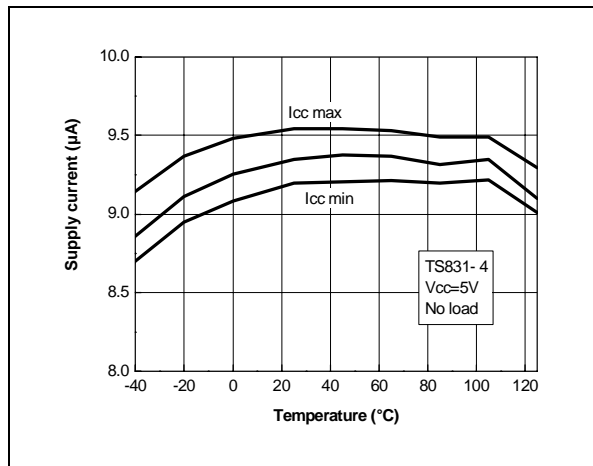
V_{THD} versus temperature



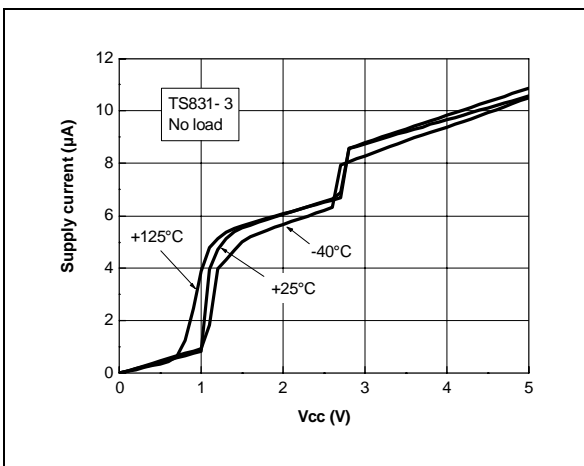
Hysteresis voltage versus temperature



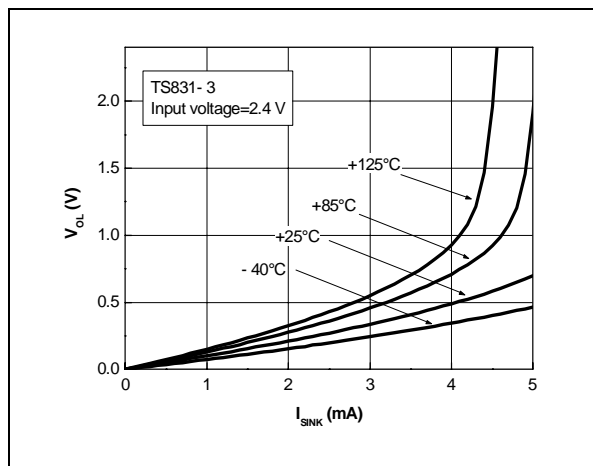
Supply current versus temperature



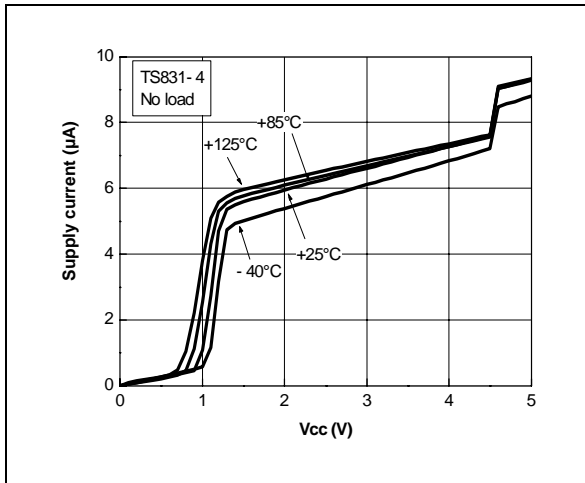
Supply current vs Vcc & temperature



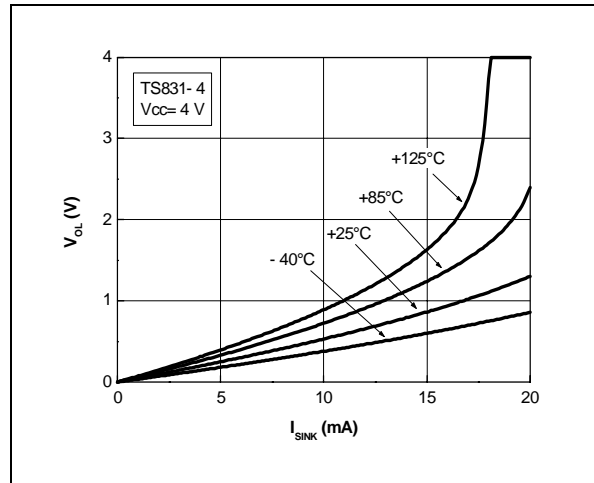
Voltage output low vs I_sink & temperature



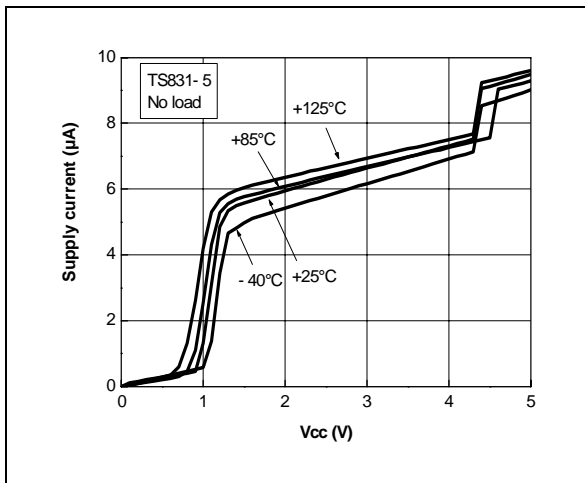
Supply current vs Vcc & temperature



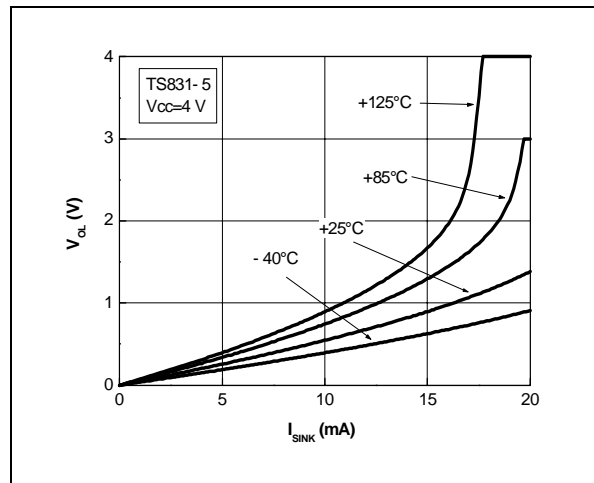
Voltage output low vs Isink & temperature



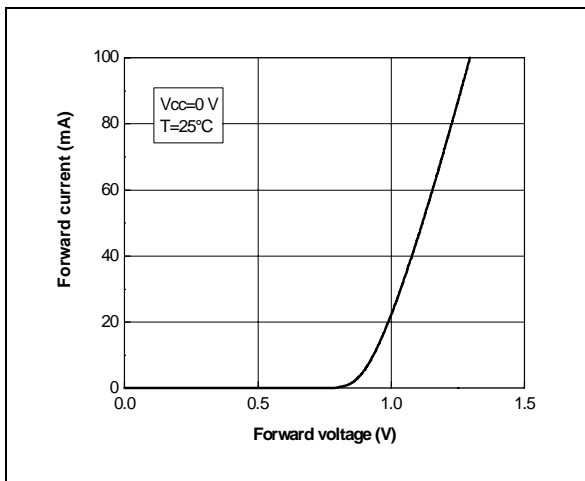
Supply current vs Vcc & temperature



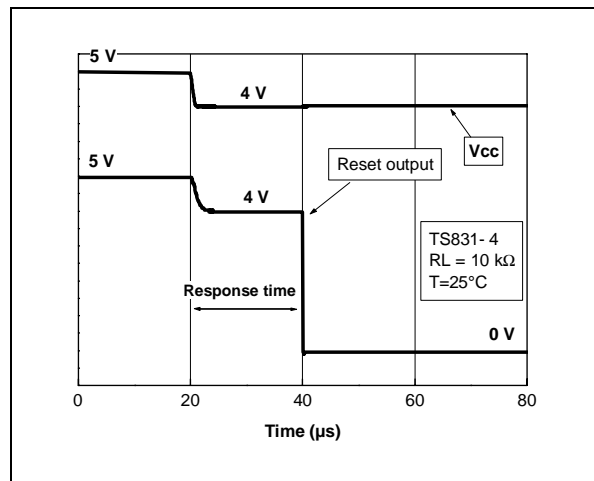
Voltage output low vs Isink & temperature



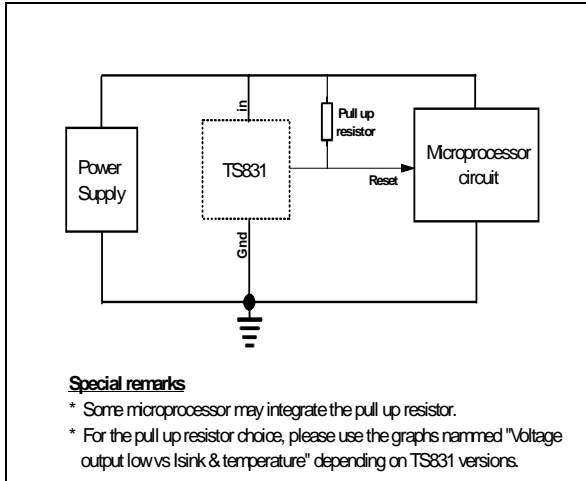
Clamp diode forward current versus voltage



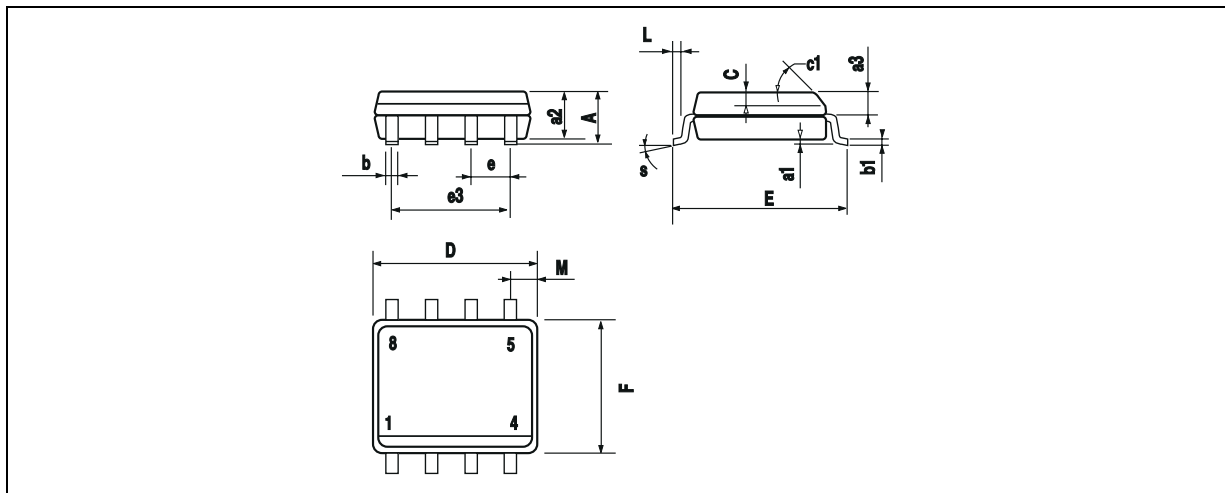
Response time



Basic configuration

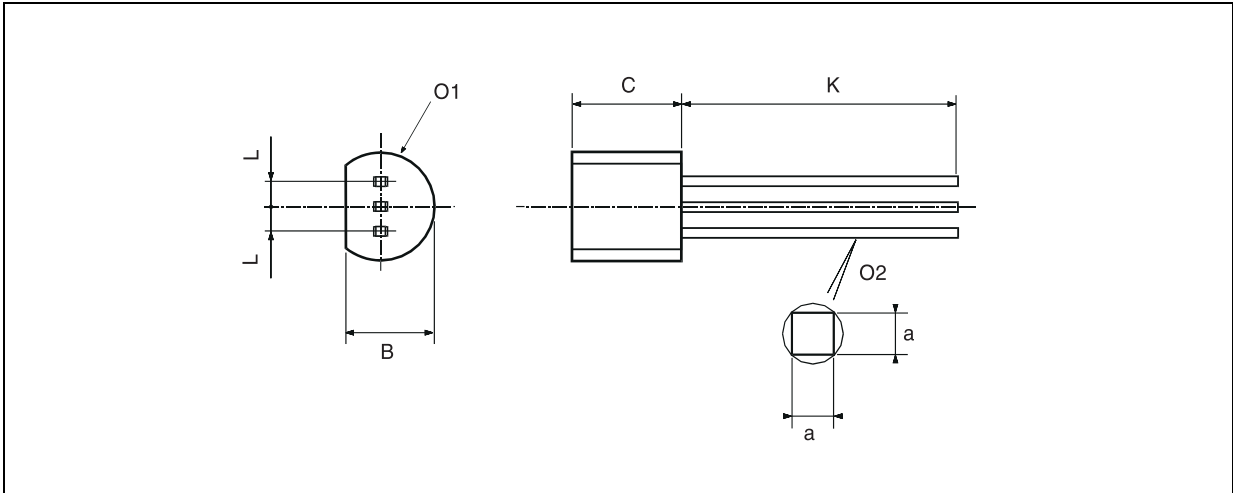


PACKAGE MECHANICAL DATA
8 PINS - PLASTIC MICROPACKAGE (SO)



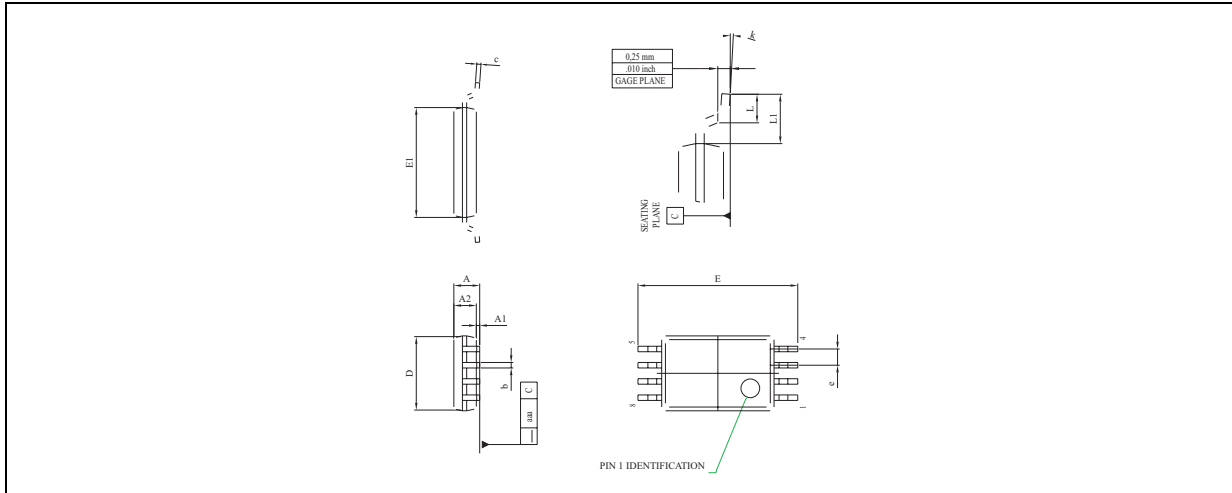
| Dim. | Millimeters | | | Inches | | |
|------|-------------|------|------|--------|-------|-------|
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | | 1.75 | | | 0.069 |
| a1 | 0.1 | | 0.25 | 0.004 | | 0.010 |
| a2 | | | 1.65 | | | 0.065 |
| a3 | 0.65 | | 0.85 | 0.026 | | 0.033 |
| b | 0.35 | | 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 TO92



| 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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