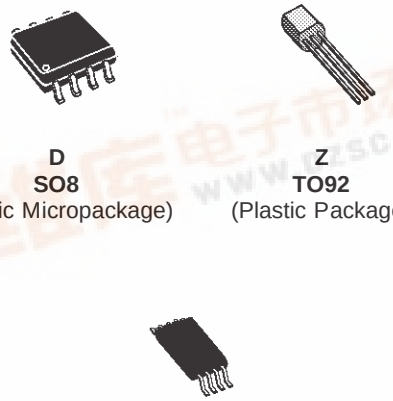
TS831

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 Vcc 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



D
SO8
(Plastic Micropackage)

Z
TO92
(Plastic Package)

P
TSSOP8
(Thin Shrink Small Outline Package)

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

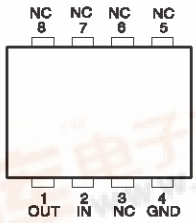
ORDER CODE

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

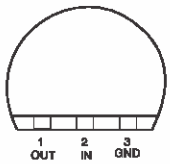
Z= TO92 Plastic package
D = Small Outline Package (SO) - also available in Tape & Reel (DT)
P = Thin Shrink Small Outline Package (TSSOP) - only available in Tape & Reel (PT)

PIN CONNECTIONS (top view)

SO8-TSSOP8



TO92



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
Pd	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_{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°C, T_{amb} = 25°C with Rthja = 200°C/W for TO-92 package
   Rthja = 175°C/W for SO8 package
   Rthja = 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

TS831-5

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		 4.10 4.10	4.33	 4.46 4.50	V
V_{thd}	Threshold Voltage - V_{CC} Decreasing -40°C ≤ Tamb ≤ +85°C -40°C ≤ Tamb ≤ +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 ≤ Tamb ≤ +85°C -40°C ≤ Tamb ≤ +125°C	V_{CC} = 4V, I_{OL} = 8mA		450	800 1000 1300	mV
I_{OH}	Low Level Output Voltage -40°C ≤ Tamb ≤ +125°C	V_{CC} = 5V		2	100 1000	nA
tphl	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 - V_{CC} Increasing -40°C ≤ Tamb ≤ +85°C -40°C ≤ Tamb ≤ +125°C	 4.17 4.10	4.50	 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	4.40	 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 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 = 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.

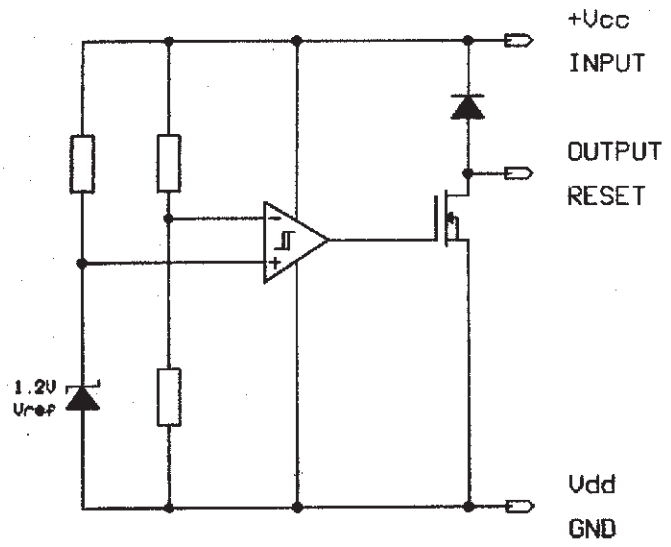
TS831-3

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

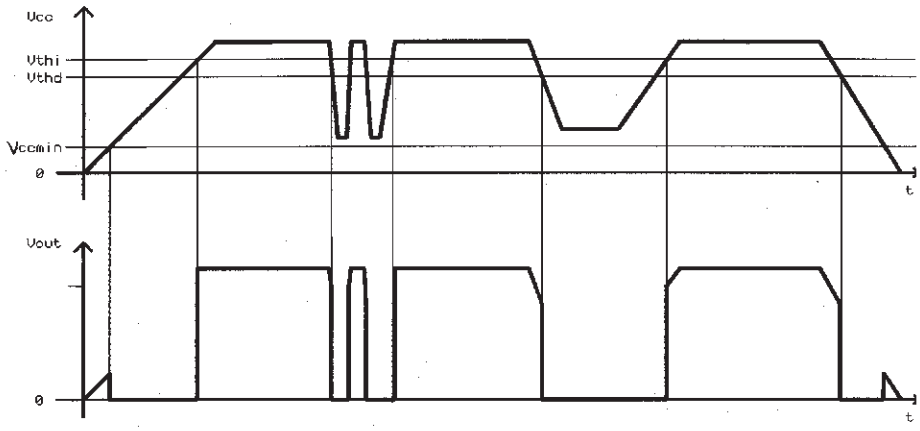
Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{thi}	Threshold Voltage - V_{CC} Increasing -40°C ≤ Tamb ≤ +125°C	 2.55	2.71	 2.8	V
V_{thd}	Threshold Voltage - V_{CC} Decreasing -40°C ≤ Tamb ≤ +125°C	 2.55	2.65	 2.8	V
V_{hys}	Hysteresis Voltage	30	60	100	mV
I_{CC}	Current Consumption V_{CC} = 3V			12	µA
V_{OL}	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 = 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.

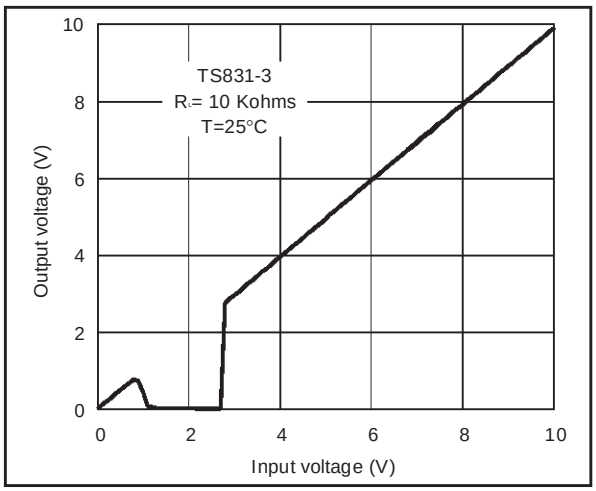
EQUIVALENT SCHEMATIC DIAGRAM



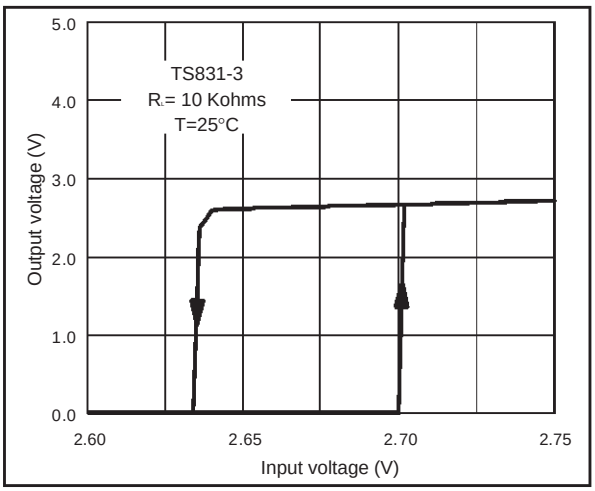
TIMING DIAGRAM



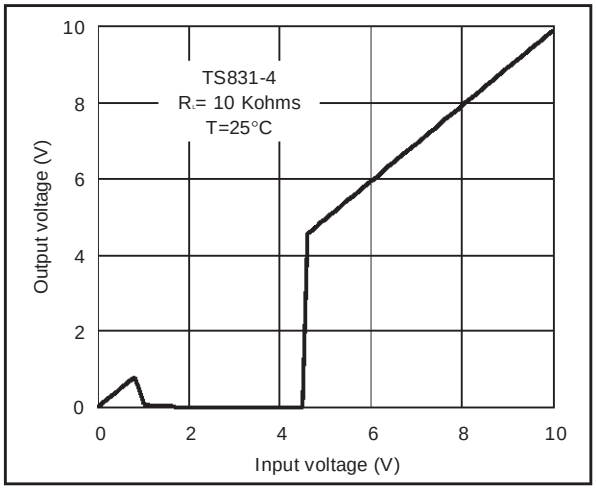
Output voltage versus input voltage



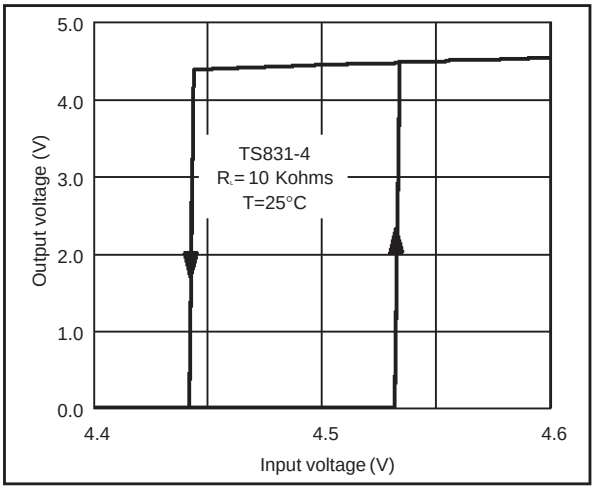
Reset output voltage versus Input voltage



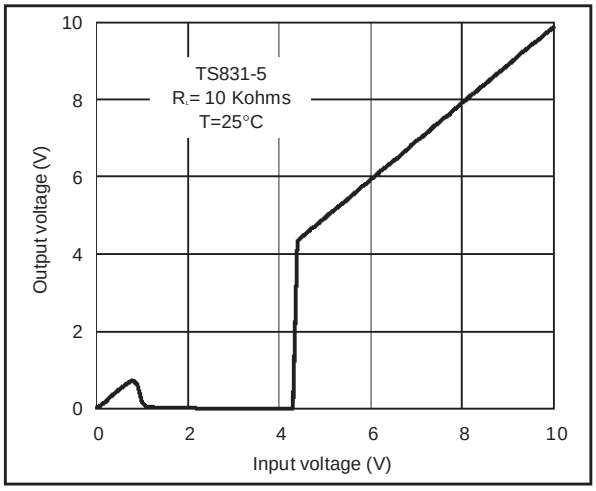
Output voltage versus input voltage



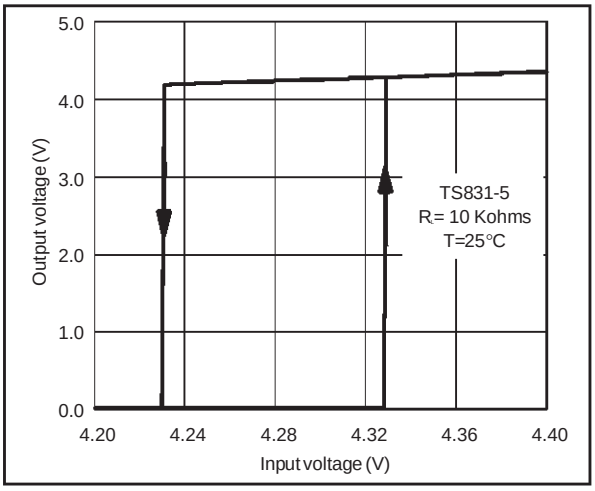
Reset output voltage versus Input voltage



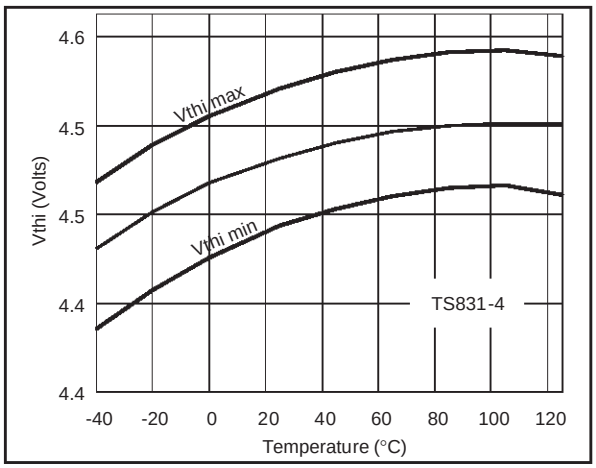
Output voltage versus input voltage



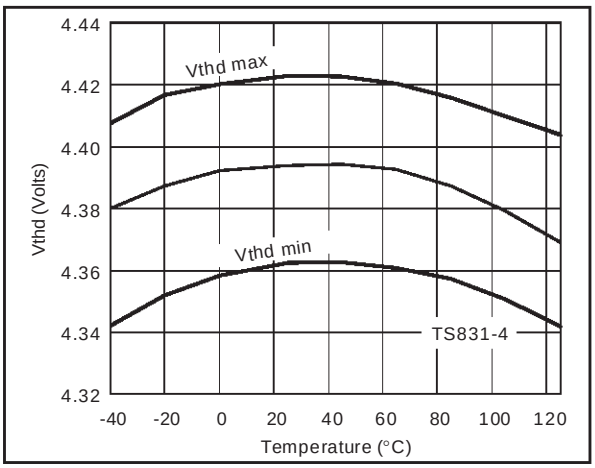
Reset output voltage versus Input voltage



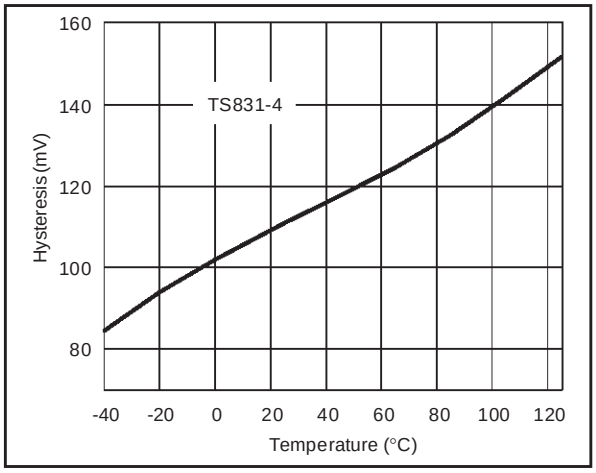
Vth versus temperature while Vcc increasing



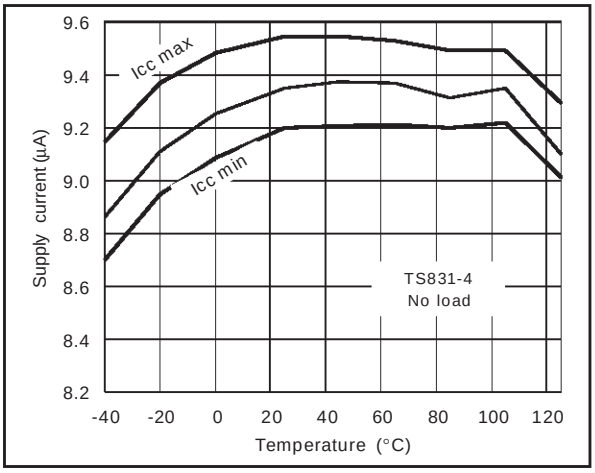
Vth versus temperature while Vcc decreasing



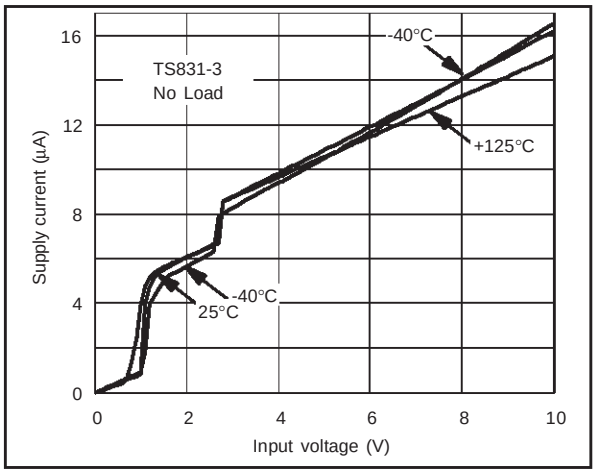
Hysteresis voltage versus temperature



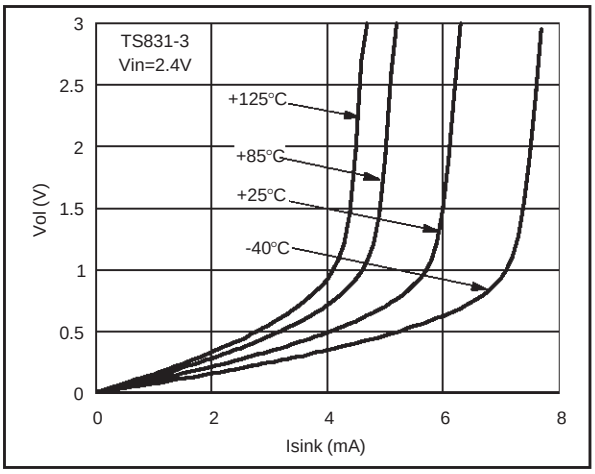
Supply current versus temperature



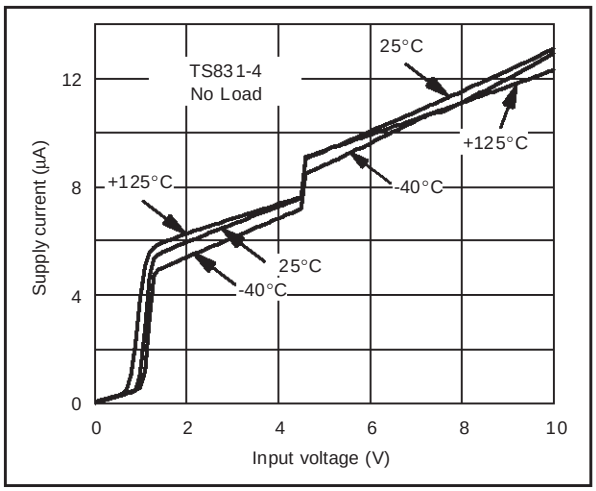
Supply current vs input voltage & temperature



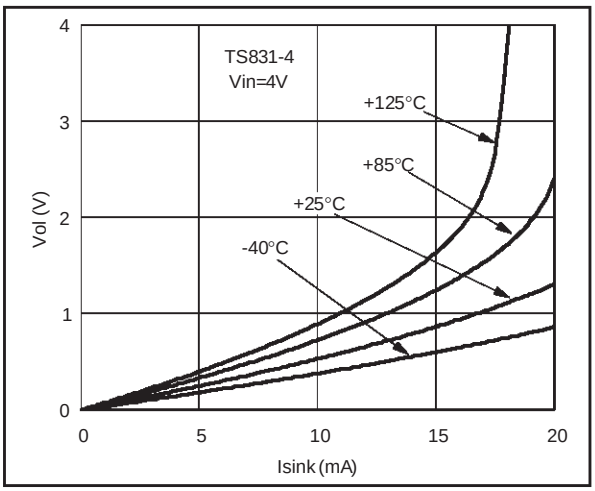
Voltage output low vs Isink & temperature



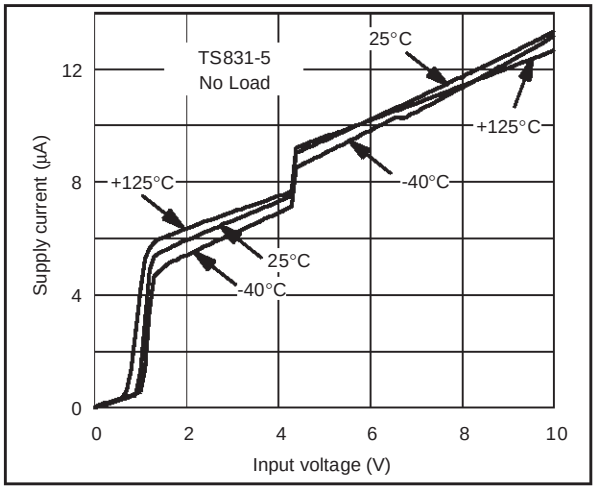
Supply current vs input voltage & temperature



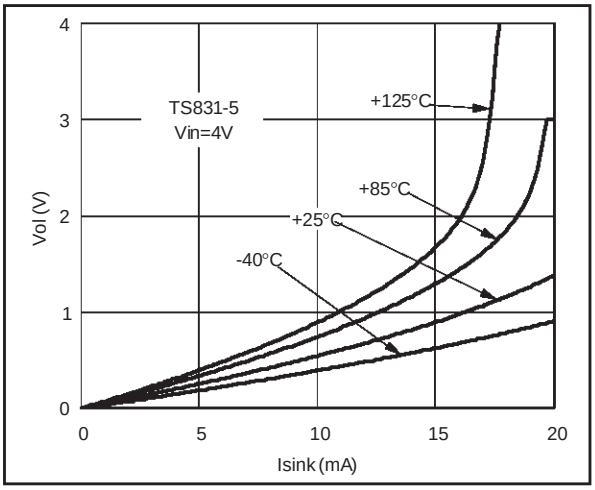
Voltage output low vs Isink & temperature



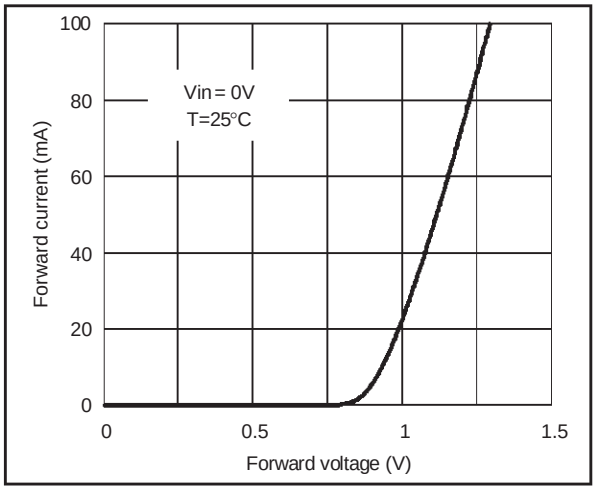
Supply current vs input voltage & temperature



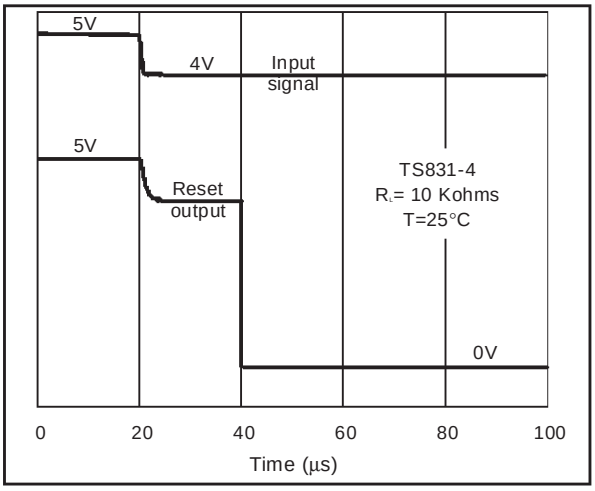
Voltage output low vs Isink & temperature



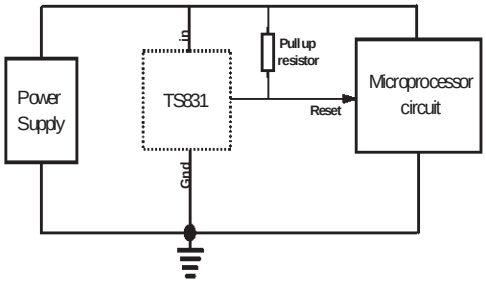
Clamp diode forward current versus voltage



Response time



Basic configuration

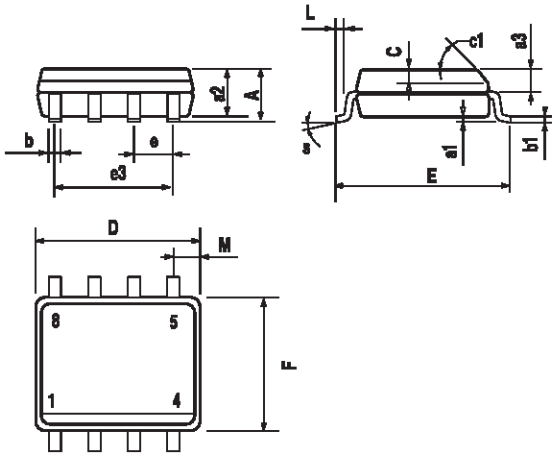


Special remarks

* Some microprocessor may integrate the pull up resistor.
* For the pull up resistor choice, please use the graphs nammed "Voltage output low vs Isink & temperature" depending on TS831 versions.

PACKAGE MECHANICAL DATA

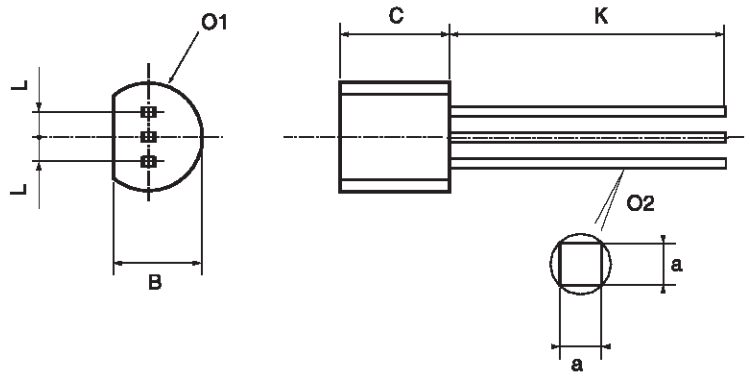
8 PINS - PLASTIC MICROPACKAGE (SO)



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

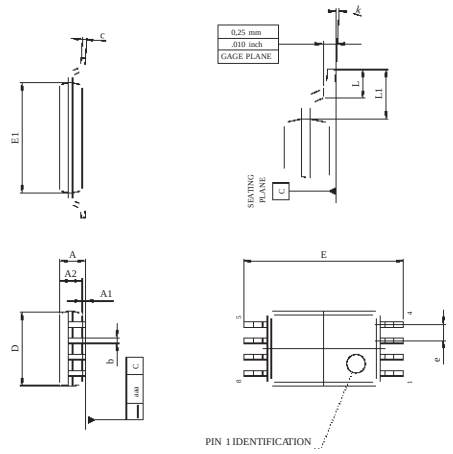
3 PINS - PLASTIC PACKAGE TO92



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