



# THE DATASHEET OF TS831-4IDT





## 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 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

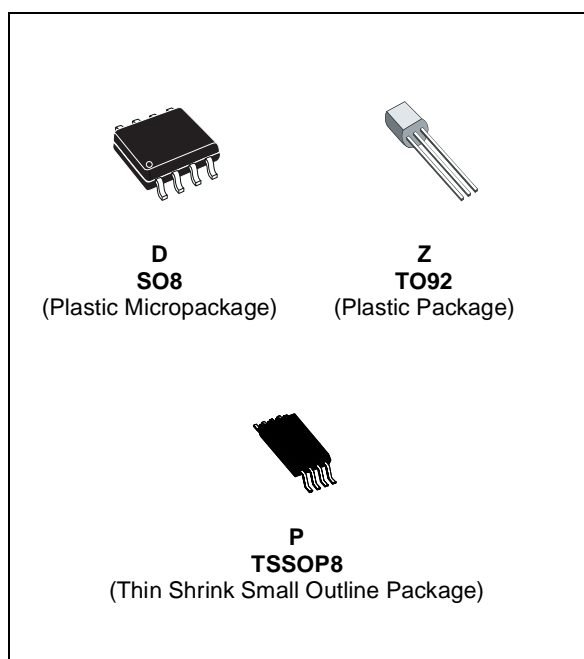
- Power-on reset generator for microcontroller
- Power failure detector

### ORDER CODE

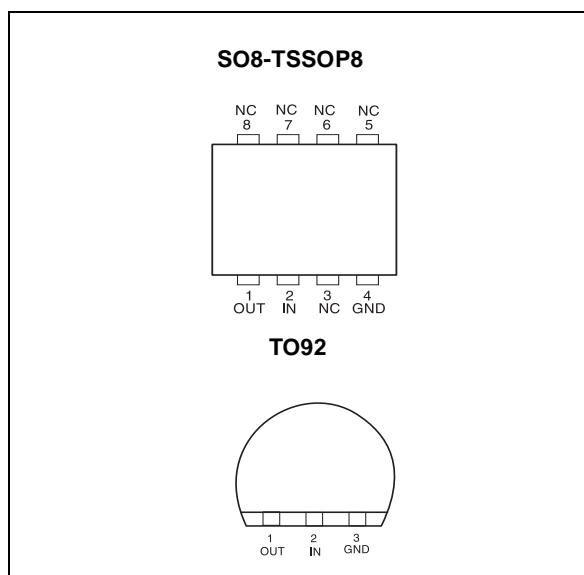
Part Number	Temperature Range	Package		
		D	Z	P
TS831-5I	-40, +125°C	•	•	•
TS831-4I		•	•	•
TS831-3I		•	•	•

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 <sub>CC</sub>	Supply Voltage <sup>1)</sup>	7	V
V <sub>OUT</sub>	Output Voltage	-0.3 to V <sub>CC</sub> + 0.3	V
I <sub>OUT</sub>	Output Sink Current TS831-5 and TS831-4 TS831-3	20 5	mA
P <sub>D</sub>	Power Dissipation <sup>2)</sup> TO92 SO8 TSSOP8	625 700 625	mW
I <sub>F</sub>	Clamp Diode Forward Current, pin 1 to pin 2 <sup>3)</sup>	100	mA
T <sub>STG</sub>	Storage Temperature	-65 to +150	°C

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

2. T<sub>j</sub> = 150°C, T<sub>amb</sub> = 25°C with R<sub>thja</sub> = 200°C/W for TO-92 package  
R<sub>thja</sub> = 175°C/W for SO8 package  
R<sub>thja</sub> = 200°C/W for TSSOP8 package

3. Maximum package power dissipation limits must be observed.

**OPERATING CONDITIONS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	1 to 5.5	V
T <sub>OPER</sub>	Operating Free Air Temperature Range	-40 to +125	°C

**TS831-5**

**ELECTRICAL CHARACTERISTICS** T<sub>amb</sub> = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V <sub>THI</sub>	Threshold Voltage with V <sub>CC</sub> Increasing -40°C ≤ T <sub>amb</sub> ≤ +85°C -40°C ≤ T <sub>amb</sub> ≤ +125°C	4.11 4.11	4.33	4.46 4.50	V
V <sub>THD</sub>	Threshold Voltage with V <sub>CC</sub> Decreasing -40°C ≤ T <sub>amb</sub> ≤ +85°C -40°C ≤ T <sub>amb</sub> ≤ +125°C	4.10 4.06	4.21	4.46 4.46	V
V <sub>HYS</sub>	Hysteresis Voltage	50	100	200	mV
I <sub>CC</sub>	Current Consumption V <sub>CC</sub> = 5V			12	µA
V <sub>OL</sub>	Low Level Output Voltage -40°C ≤ T <sub>amb</sub> ≤ +85°C -40°C ≤ T <sub>amb</sub> ≤ +125°C V <sub>CC</sub> = 4V, I <sub>OL</sub> = 8mA		450	800 1000 1300	mV
I <sub>OH</sub>	High Level Output Current -40°C ≤ T <sub>amb</sub> ≤ +125°C V <sub>CC</sub> = 5V		2	100 1000	nA
T <sub>PHL</sub>	Response Time High to Low R <sub>L</sub> = 10kΩ, C <sub>L</sub> = 15pF, V <sub>CC</sub> = V <sub>THD</sub> -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.

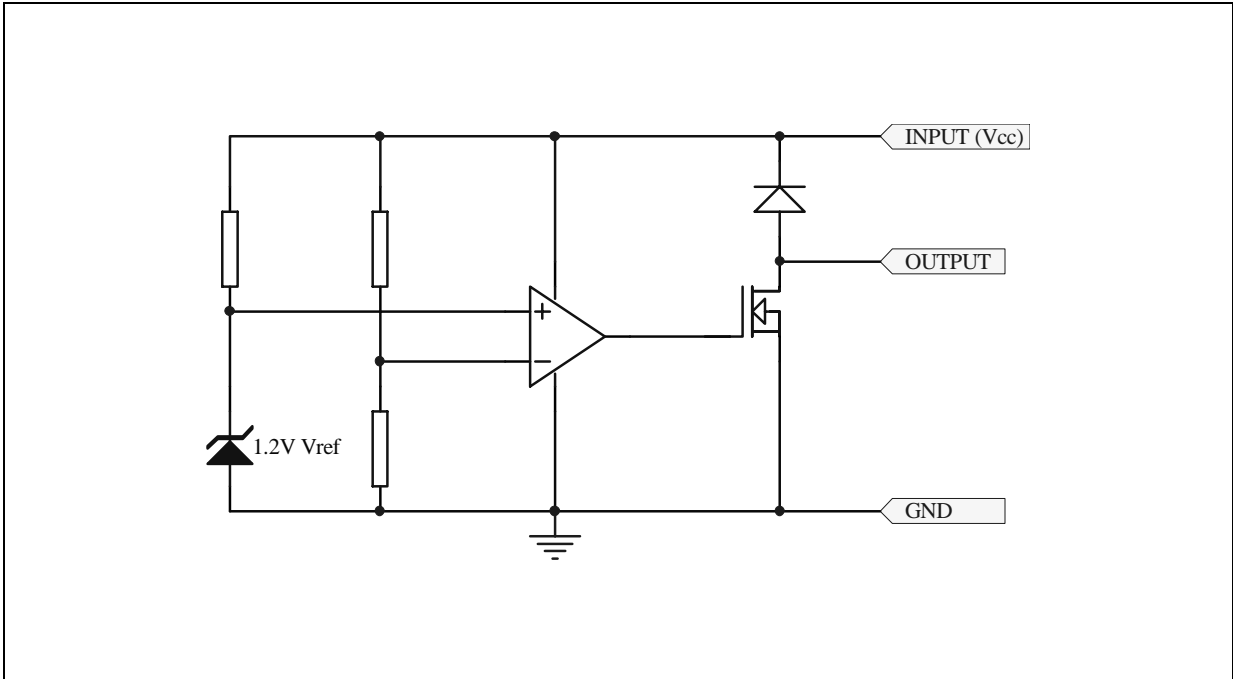
## TS831-3

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

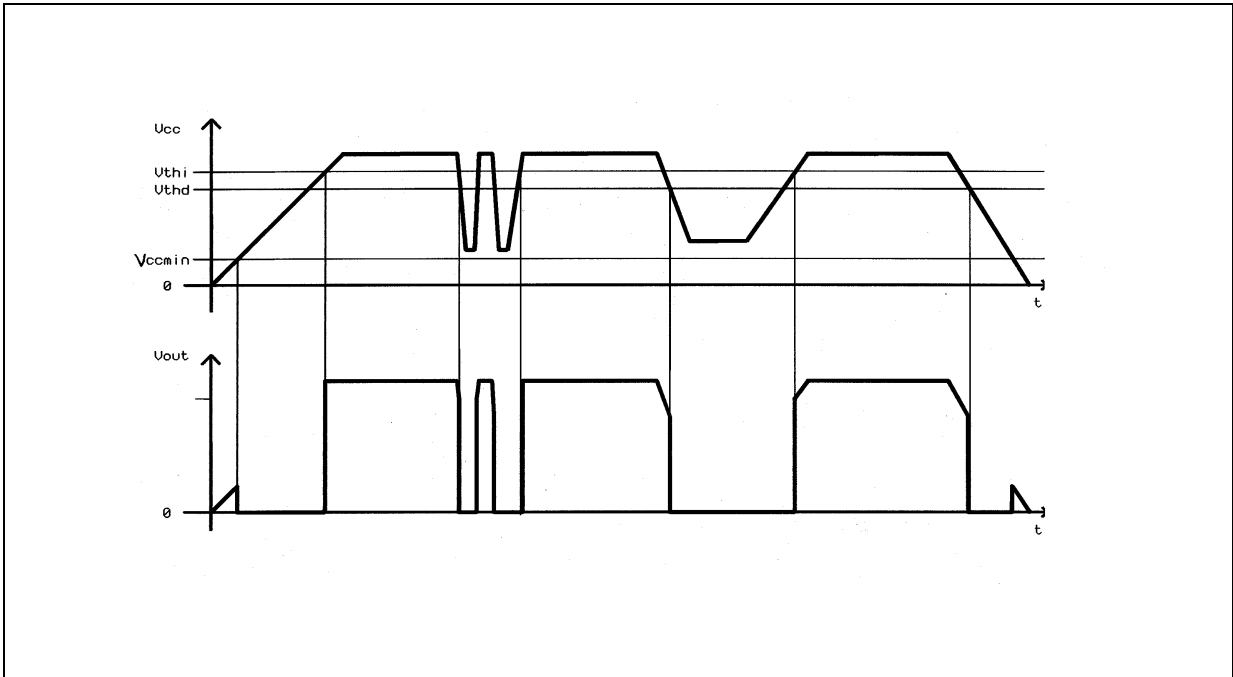
Symbol	Parameter	Min.	Typ.	Max.	Unit
$V_{THI}$	Threshold Voltage with $V_{CC}$ Increasing -40°C ≤ Tamb ≤ +125°C	2.55	2.71	2.8	V
$V_{THD}$	Threshold Voltage with $V_{CC}$ Decreasing -40°C ≤ Tamb ≤ +125°C	2.55	2.65	2.8	V
$V_{HYS}$	Hysteresis Voltage	30	60	100	mV
$I_{CC}$	Current Consumption $V_{CC} = 3V$			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.

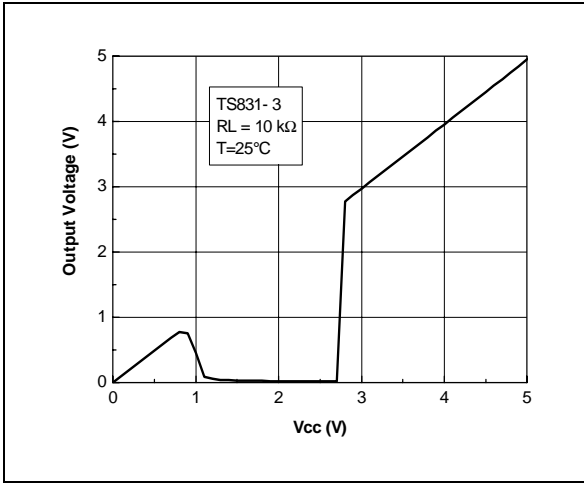
EQUIVALENT SCHEMATIC DIAGRAM



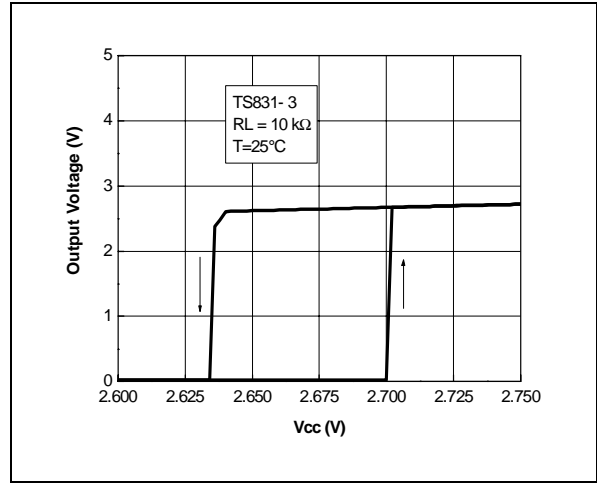
TIMING DIAGRAM



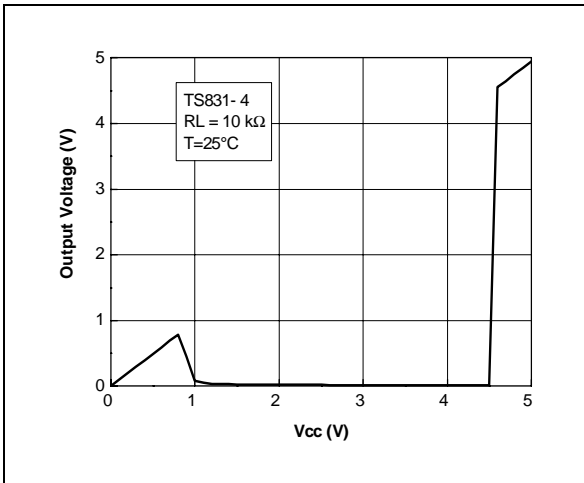
Output voltage versus Vcc



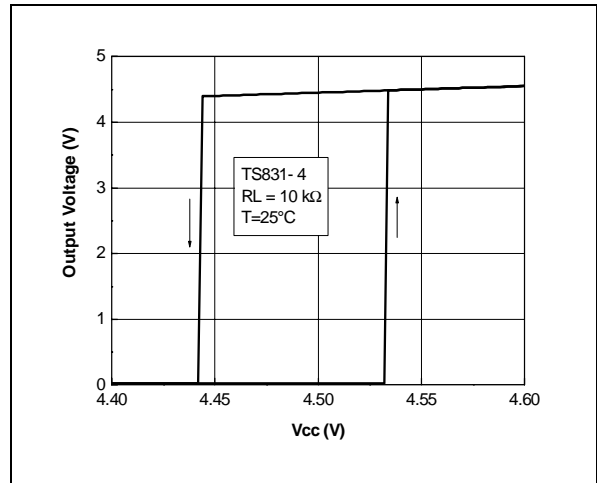
Reset output voltage versus Vcc



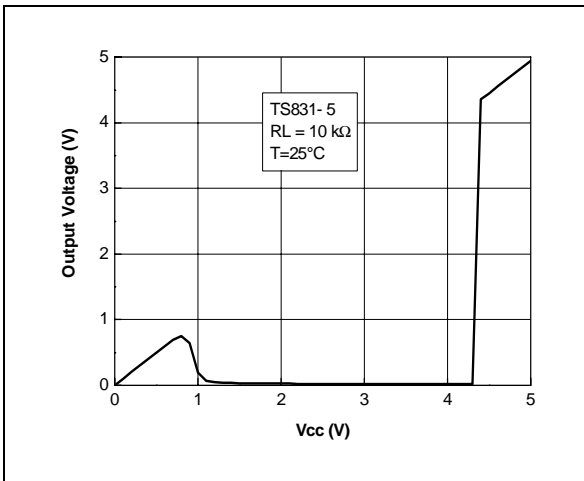
Output voltage versus Vcc



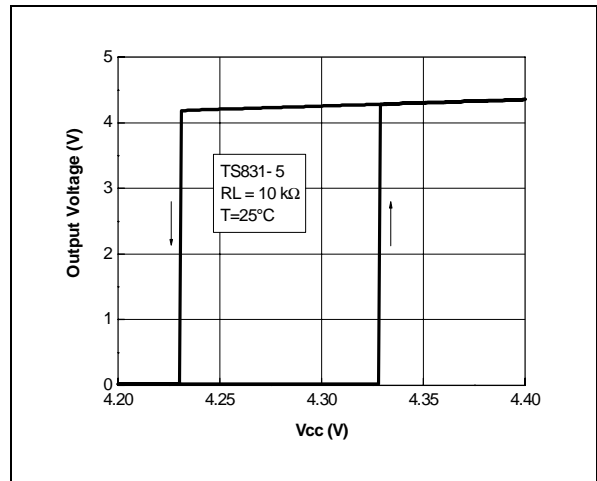
Reset output voltage versus Vcc



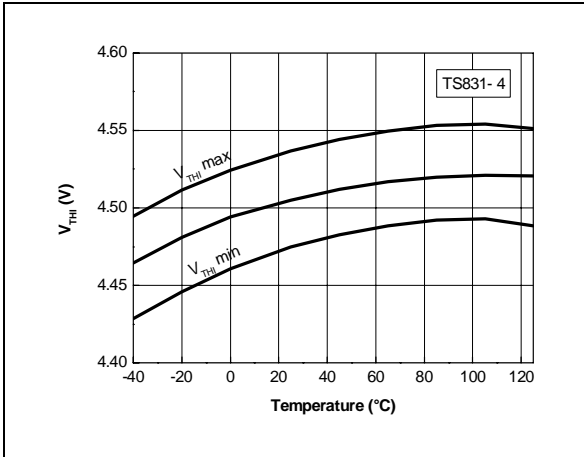
Output voltage versus Vcc



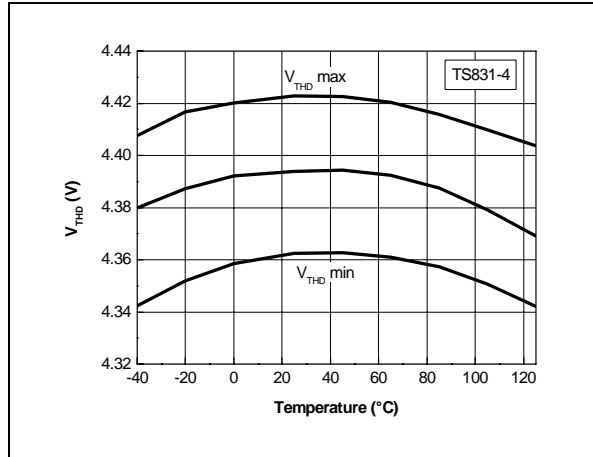
Reset output voltage versus Vcc



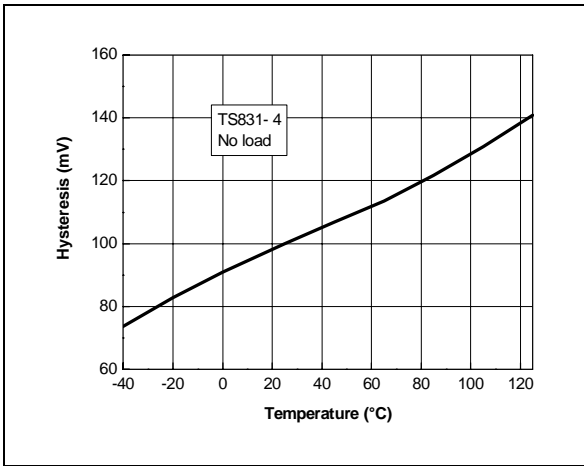
$V_{THI}$  versus temperature



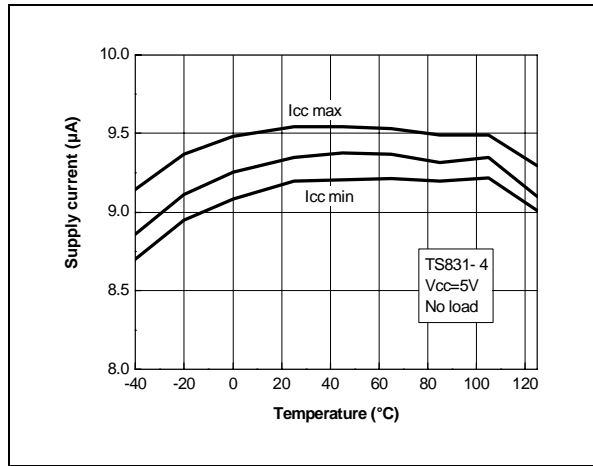
$V_{THD}$  versus temperature



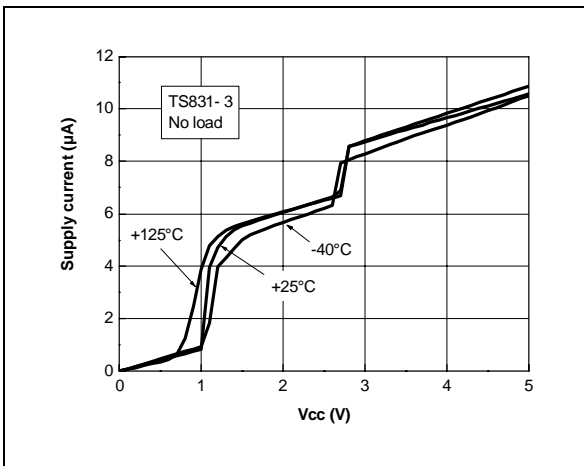
Hysteresis voltage versus temperature



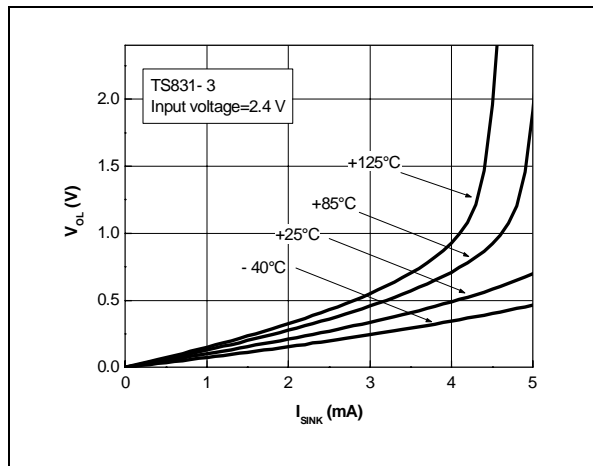
Supply current versus temperature



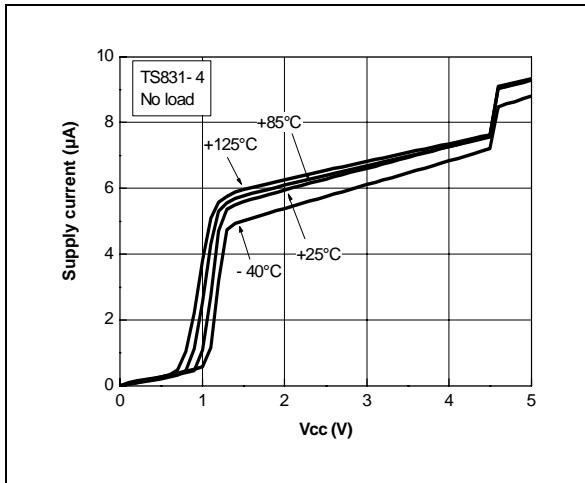
Supply current vs  $V_{CC}$  & temperature



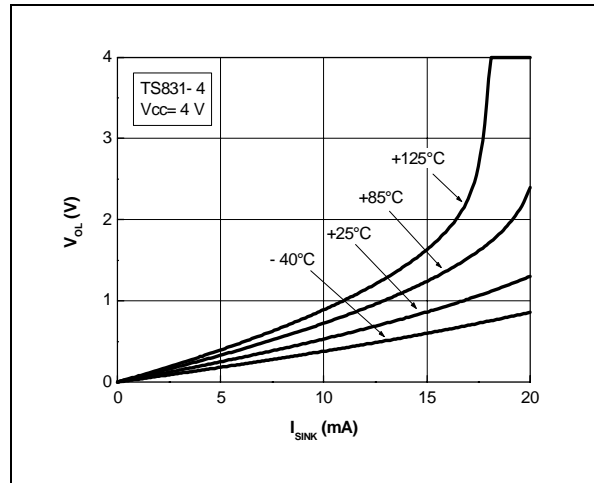
Voltage output low vs  $I_{sink}$  & temperature



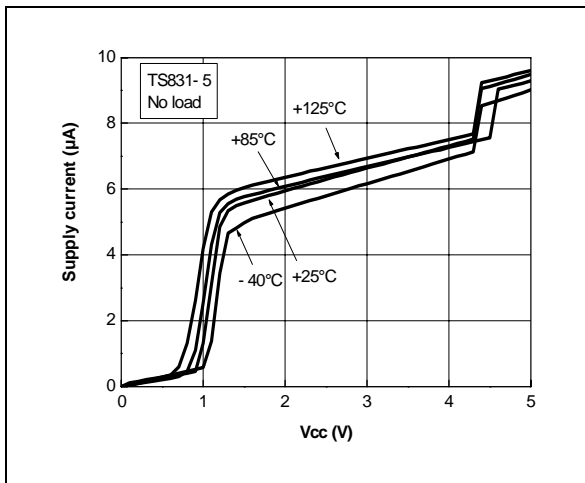
Supply current vs Vcc & temperature



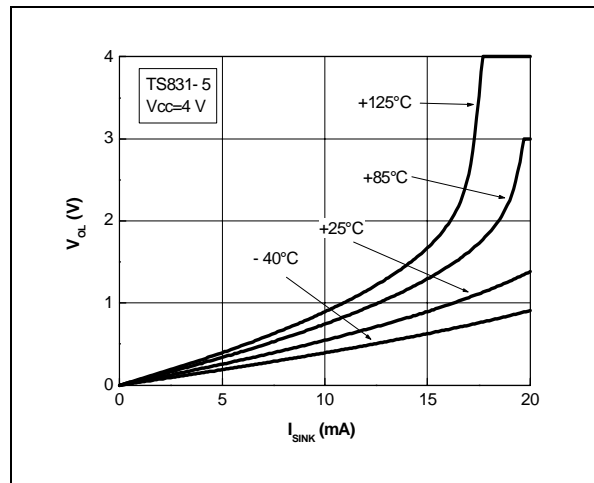
Voltage output low vs Isink & temperature



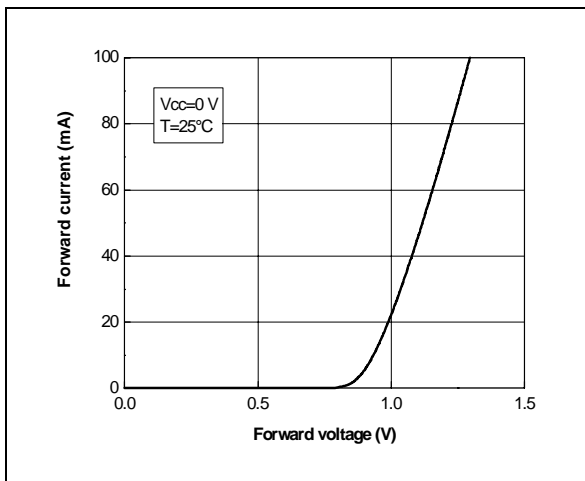
Supply current vs Vcc & temperature



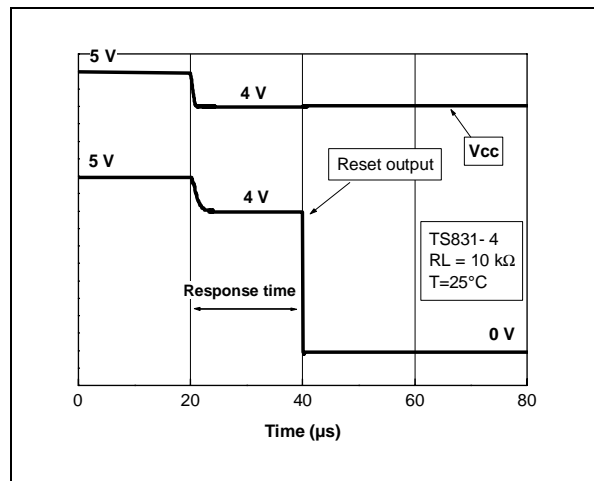
Voltage output low vs Isink & temperature



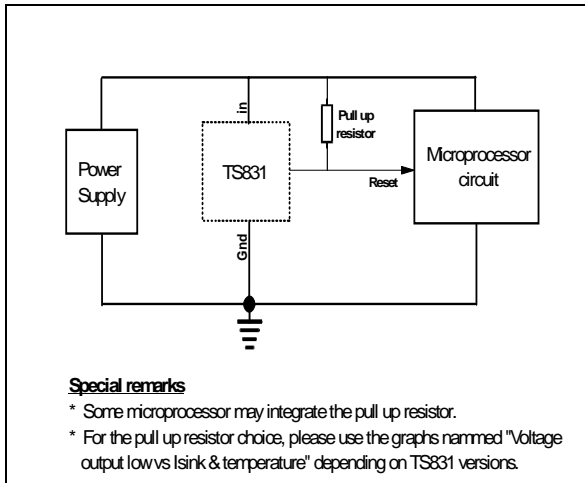
Clamp diode forward current versus voltage



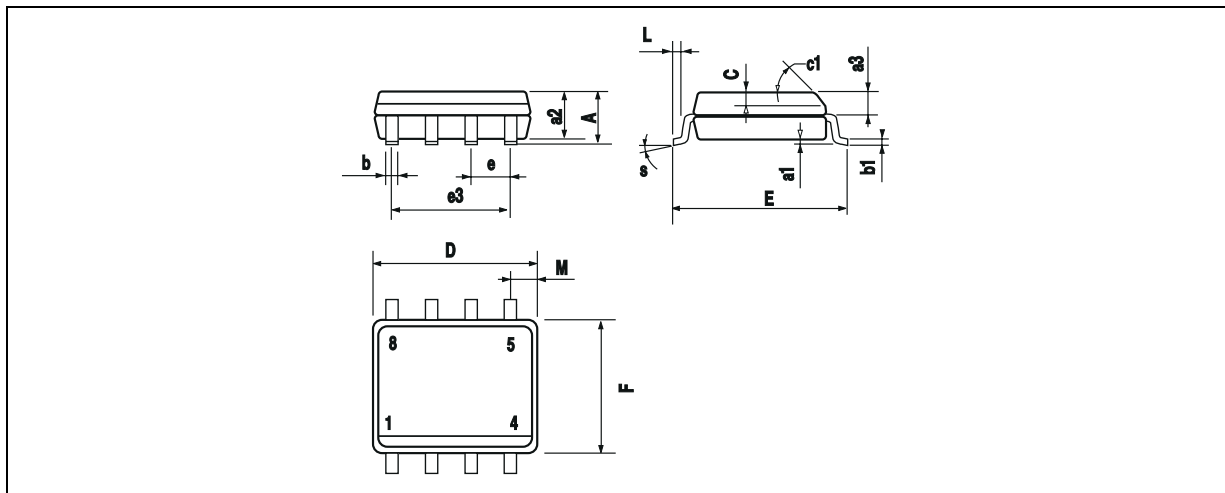
Response time



Basic configuration

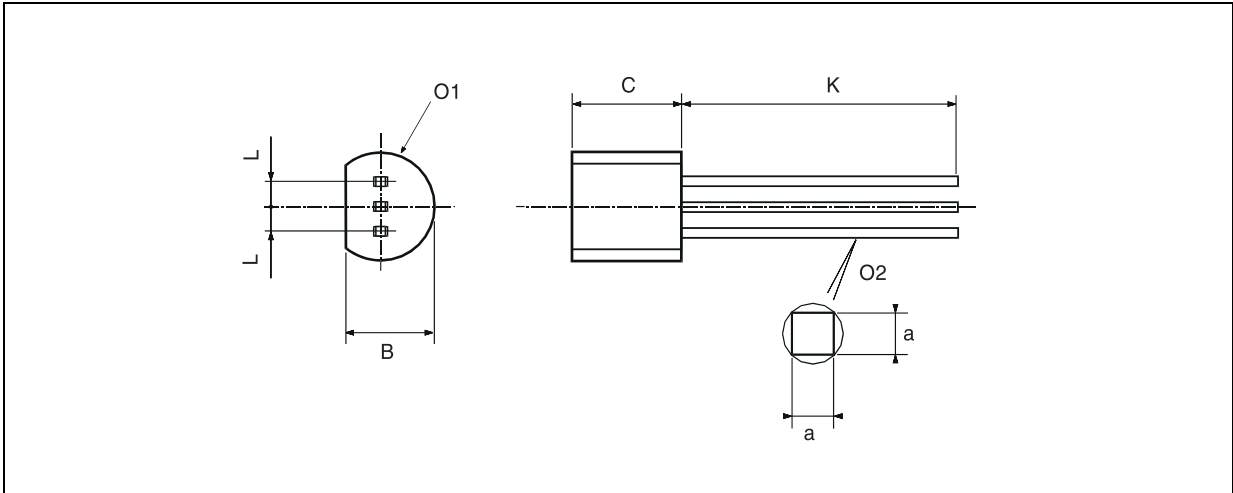


**PACKAGE MECHANICAL DATA**  
**8 PINS - PLASTIC MICROPACKAGE (SO)**



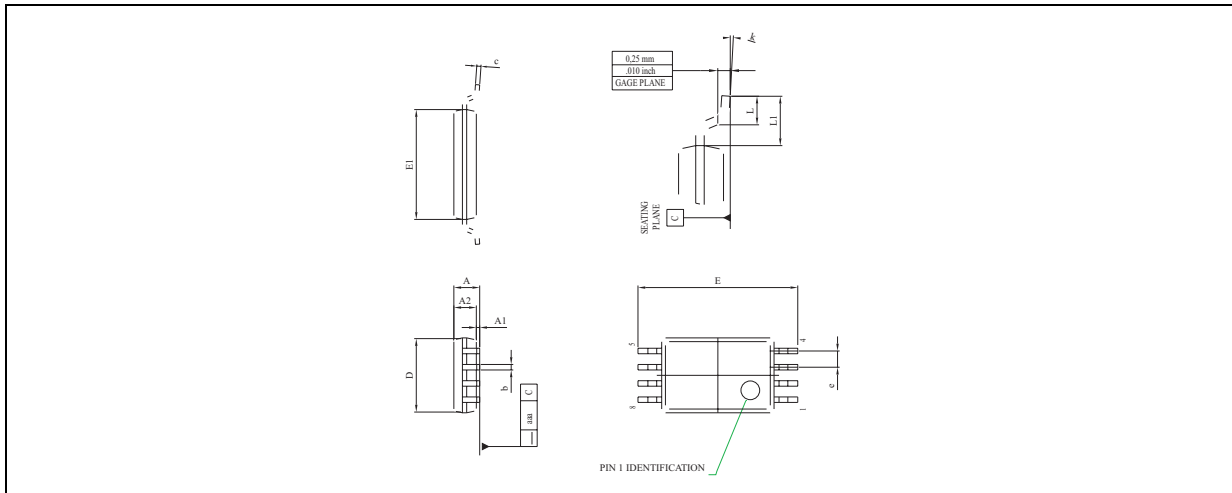
Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			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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