

3-PIN μ P RESET MONITORS

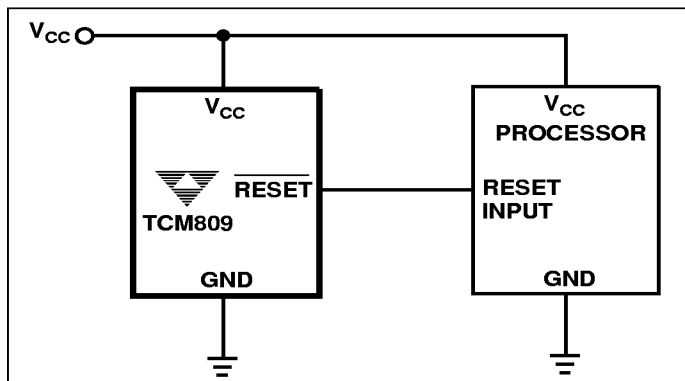
FEATURES

- Precision V_{CC} Monitor for 3.0V, 3.3V, 5.0V Nominal System V Supplies
- 140msec Guaranteed Minimum $\overline{\text{RESET}}$, RESET Output Duration
- $\overline{\text{RESET}}$ Output Guaranteed to $V_{CC} = 1.0\text{V}$ (TCM809)
- Low 17 μA Supply Current
- V_{CC} Transient Immunity
- Small SOT-23B-3 Package
- No External Components

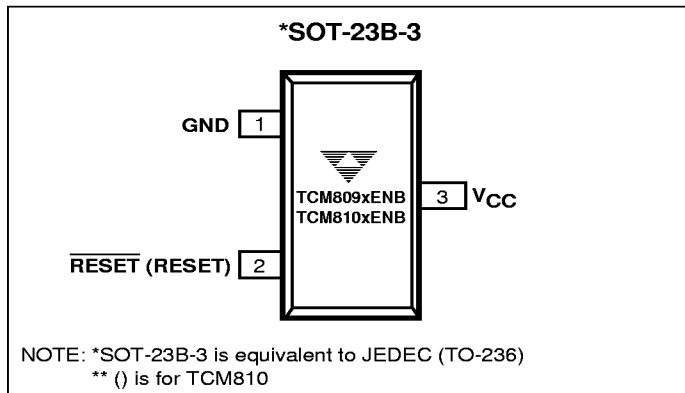
TYPICAL APPLICATIONS

- Computers
- Embedded Systems
- Battery Powered Equipment
- Critical μ P Power Supply Monitoring

TYPICAL OPERATING CIRCUIT



PIN CONFIGURATION



GENERAL DESCRIPTION

The TCM809 and TCM810 are cost-effective system supervisor circuits designed to monitor V_{CC} in digital systems and provide a reset signal to the host processor when necessary. No external components are required.

The reset output is driven active within 20 μsec of V_{CC} falling through the reset voltage threshold. Reset is maintained active for a minimum of 140msec after V_{CC} rises above the reset threshold. The TCM810 has an active-high RESET output while the TCM809 has an active-low RESET output. The output of the TCM809 is guaranteed valid down to $V_{CC} = 1\text{V}$. Both devices are available in a SOT-23B-3 package.

The TCM809/810 are optimized to reject fast transient glitches on the V_{CC} line. Low supply current of 17 μA ($V_{CC} = 3.3\text{V}$) makes these devices suitable for battery powered applications.

ORDERING INFORMATION

Part No.	Package	Temp. Range
TCM809xENB	SOT-23B-3	-40°C to +85°C
TCM810xENB	SOT-23B-3	-40°C to +85°C

NOTE: The "X" denotes a suffix for V_{CC} threshold - see table below.

Suffix	Reset V_{CC} Threshold (V)
L	4.63
M	4.38
T	3.08
S	2.93
R	2.63

3-PIN μ P RESET MONITORS

TCM809 TCM810

ABSOLUTE MAXIMUM RATINGS*

Supply Voltage (V_{CC} to GND)	+6.0V
$\overline{\text{RESET}}$, RESET	– 0.3V to ($V_{CC} + 0.3$ V)
Input Current, V_{CC}	20mA
Output Current, $\overline{\text{RESET}}$, RESET	20mA
dV/dt (V_{CC})	100V/ μ sec
Operating Temperature Range	– 40°C to +85°C

Power Dissipation ($T_A \leq 70^\circ\text{C}$)

SOT-23B-3 (derate 4mW/ $^\circ\text{C}$ above +70°C)	...230mW
Storage Temperature Range	– 65°C to +150°C
Lead Temperature (Soldering, 10 sec)	+260°C

*This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to Absolute Maximum Rating Conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS: V_{CC} = Full Range, T_A = Operating Temperature Range unless otherwise noted. Typical values are at $T_A = +25^\circ\text{C}$, $V_{CC} = 5\text{V}$ for L/M, 3.3V for T/S, 3.0V for R (Note 1).

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
	V_{CC} Range	$T_A = 0^\circ\text{C}$ to +70°C $T_A = -40^\circ\text{C}$ to +85°C	1.0 1.2	—	5.5 5.5	V
I_{CC}	Supply Current	TCM8xxL/M: $V_{CC} < 5.5\text{V}$ TCM8xxR/S/T: $V_{CC} < 3.6\text{V}$	— —	24 17	60 50	μA
V_{TH}	Reset Threshold	(Note 2) TCM8xxL: $T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to +85°C TCM8xxM: $T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to +85°C TCM8xxT: $T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to +85°C TCM8xxS: $T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to +85°C TCM8xxR: $T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to +85°C	4.56 4.50 4.31 4.25 3.04 3.00 2.89 2.85 2.59 2.55	4.63 — 4.38 — 3.08 — 2.93 — 2.63 —	4.70 4.75 4.45 4.50 3.11 3.15 2.96 3.00 2.66 2.70	V
	Reset Threshold Tempco		—	30	—	ppm/ $^\circ\text{C}$
	V_{CC} to Reset Delay	(Note 2) $V_{CC} = V_{TH}$ to ($V_{TH} - 100\text{mV}$)	—	20	—	μsec
	Reset Active Timeout Period		140	240	560	msec
V_{OL}	$\overline{\text{RESET}}$ Output Voltage Low (TCM809)	TCM809R/S/T: $V_{CC} = V_{TH}$ min, $I_{SINK} = 1.2\text{mA}$ TCM809L/M: $V_{CC} = V_{TH}$ min, $I_{SINK} = 3.2\text{mA}$ $V_{CC} > 1.0\text{V}$, $I_{SINK} = 50\mu\text{A}$	— — —	— — —	0.3 0.4 0.3	V
V_{OH}	$\overline{\text{RESET}}$ Output Voltage High (TCM809)	TCM809R/S/T: $V_{CC} > V_{TH}$ max, $I_{SOURCE} = 500\mu\text{A}$ TCM809L/M: $V_{CC} > V_{TH}$ max, $I_{SOURCE} = 800\mu\text{A}$	0.8 V_{CC} $V_{CC} - 1.5$	— —	— —	V
V_{OL}	RESET Output Voltage Low (TCM810)	TCM810R/S/T: $V_{CC} = V_{TH}$ max, $I_{SINK} = 1.2\text{mA}$ TCM810L/M: $V_{CC} = V_{TH}$ max, $I_{SINK} = 3.2\text{mA}$	— —	— —	0.3 0.4	V
V_{OH}	RESET Output Voltage High (TCM810)	$1.8 < V_{CC} < V_{TH}$ min, $I_{SOURCE} = 150\mu\text{A}$	0.8 V_{CC}	—	—	V

NOTES: 1. Production testing done at $T_A = +25^\circ\text{C}$, over temperature limits guaranteed by design.
2. RESET output for TCM809, $\overline{\text{RESET}}$ Output for TCM810.

PIN DESCRIPTION

Pin No. (SOT-23B-3)	Symbol	Description
1	GND	Ground
2	$\overline{\text{RESET}}$ (TCM809)	$\overline{\text{RESET}}$ output remains low while V_{CC} is below the reset voltage threshold, and for 240msec (140msec min.) after V_{CC} rises above reset threshold.
2	RESET (TCM810)	RESET output remains high while V_{CC} is below the reset voltage threshold, and for 240msec (140msec min.) after V_{CC} rises above reset threshold.
3	V_{CC}	Supply voltage (Typ. +3.0V to +5.0V)

3-PIN μ P RESET MONITORS

TCM809
TCM810

APPLICATIONS INFORMATION

V_{CC} Transient Rejection

The TCM809/810 provides accurate V_{CC} monitoring and reset timing during power-up, power-down, and brown-out/sag conditions, and rejects negative-going transients (glitches) on the power supply line. Figure 1 shows the maximum transient duration vs. maximum negative excursion (overdrive) for glitch rejection. Any combination of duration and overdrive which lies **under** the curve will **not** generate a reset signal. Combinations above the curve are detected as a brownout or power-down. Transient immunity can be improved by adding a capacitor in close proximity to the V_{CC} pin of the TCM809/810.

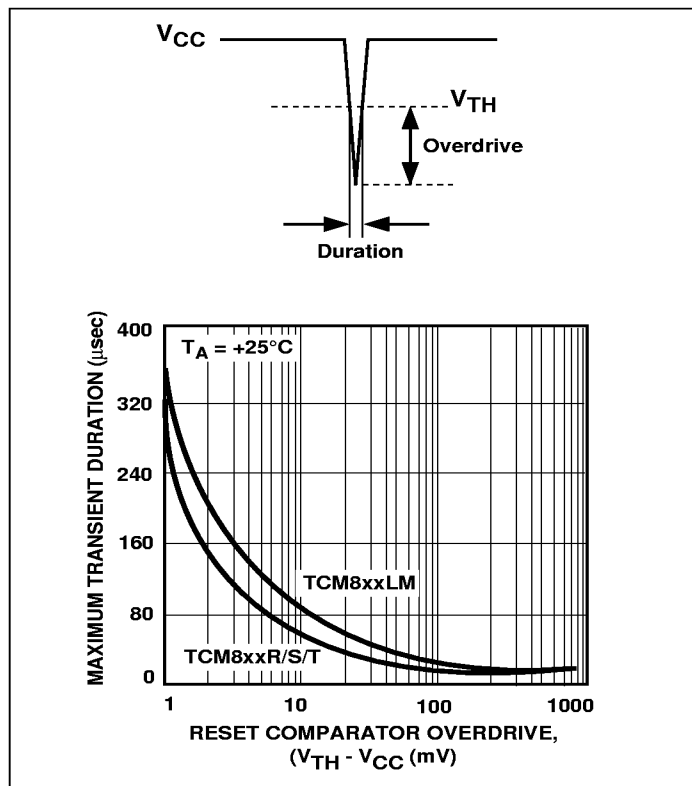


Figure 1. Maximum Transient Duration vs. Overdrive for Glitch Rejection at 25°C

RESET Signal Integrity During Power-Down

The TCM809 RESET output is valid to $V_{CC} = 1.0\text{V}$. Below this voltage the output becomes an "open circuit" and does not sink current. This means CMOS logic inputs to the μ P will be floating at an undetermined voltage. Most digital systems are completely shutdown well above this voltage. However, in situations where RESET must be maintained

valid to $V_{CC} = 0\text{V}$, a pull-down resistor must be connected from RESET to ground to discharge stray capacitances and hold the output low (Figure 2). This resistor value, though not critical, should be chosen such that it does not appreciably load RESET under normal operation (100k Ω will be suitable for most applications). Similarly, a pull-up resistor to V_{CC} is required for the TCM810 to ensure a valid high RESET for V_{CC} below 1.0V.

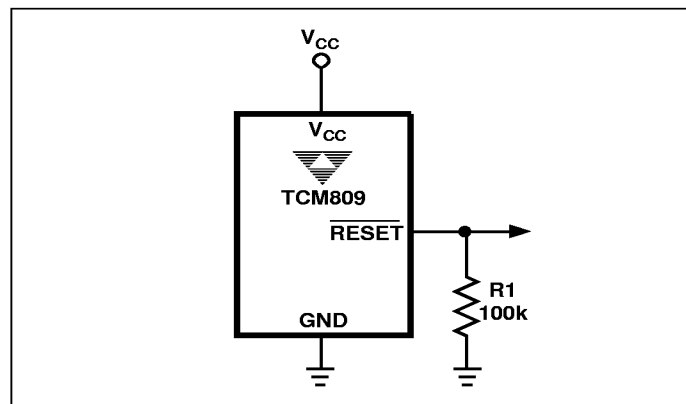


Figure 2. Ensuring RESET Valid to $V_{CC} = 0\text{V}$

Processors With Bidirectional I/O Pins

Some μ P's (such as Motorola 68HC11) have bi-directional reset pins. Depending on the current drive capability of the processor pin, an indeterminate logic level may result if there is a logic conflict. This can be avoided by adding a 4.7k Ω resistor in series with the output of the TCM809/810 (Figure 3). If there are other components in the system which require a reset signal, they should be buffered so as not to load the reset line. If the other components are required to follow the reset I/O of the μ P, the buffer should be connected as shown with the solid line.

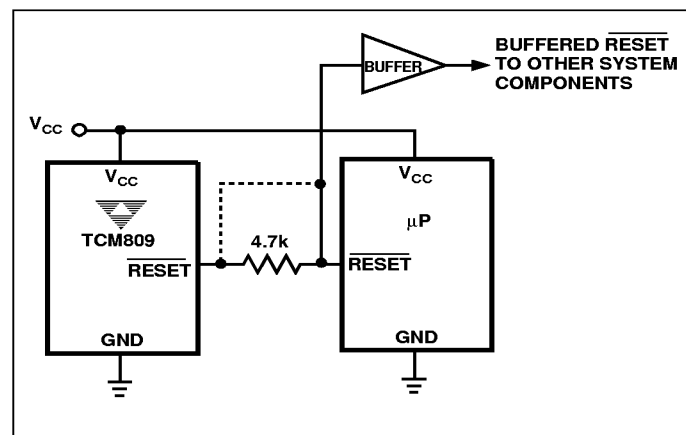
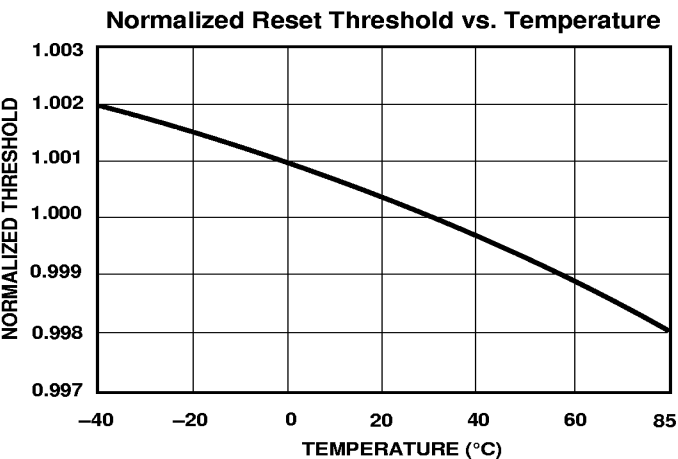
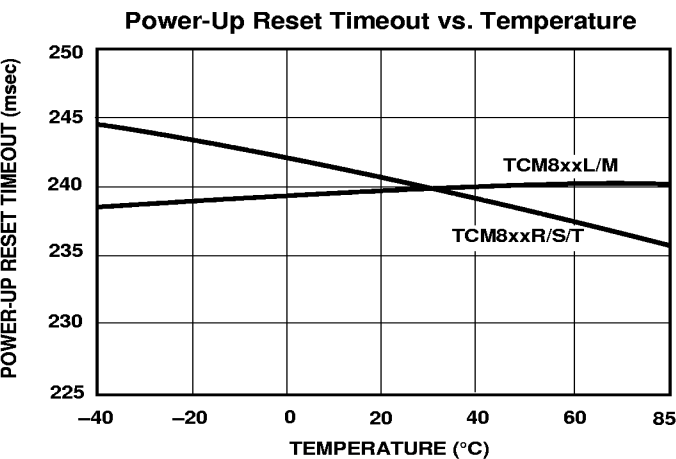
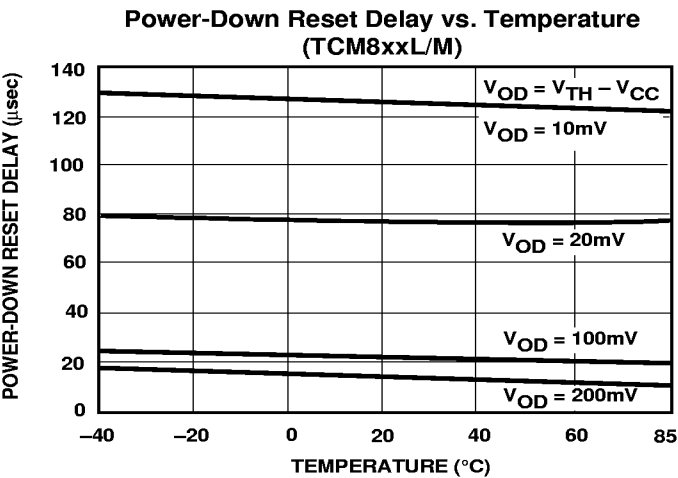
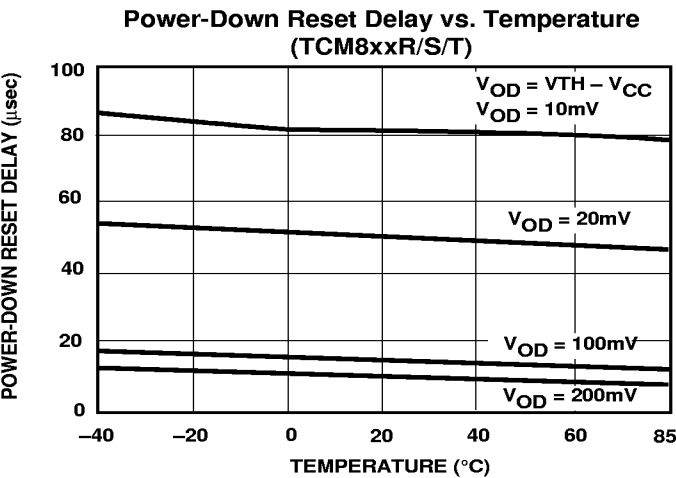
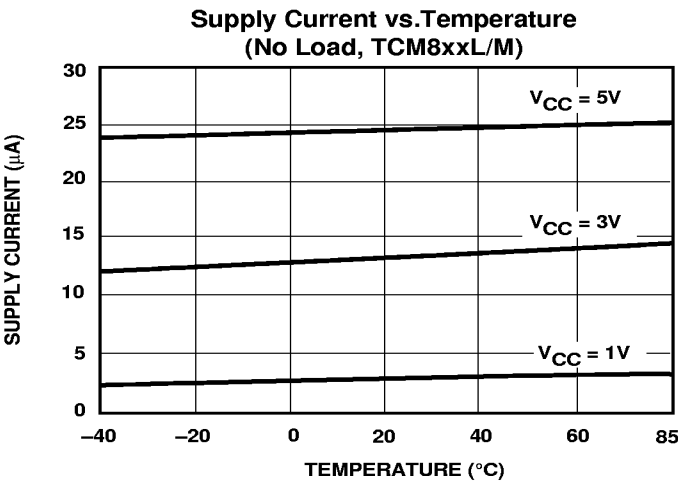
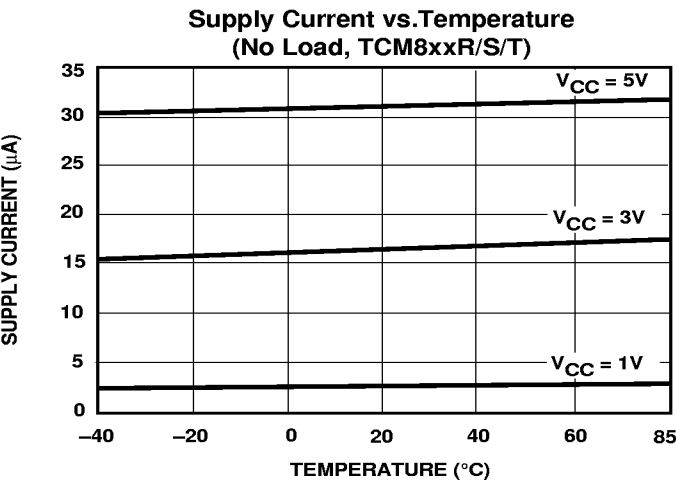


Figure 3. Interfacing to Bidirectional Reset I/O

3-PIN μ P RESET MONITORS

TCM809
TCM810

TYPICAL CHARACTERISTICS



3-PIN μ P RESET MONITORS

TCM809
TCM810

TAPING FORM

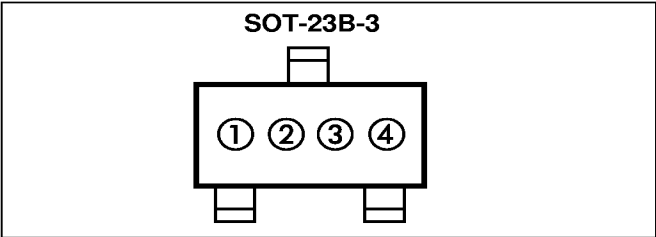
Component Taping Orientation for 3L SOT-23B (JEDEC-236) Devices

Standard Reel Component Orientation
for 713 or TR Suffix Device
(Mark Right Side Up)

Tape & Reel Specifications Table

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
3L SOT-23B	8 mm	4 mm	3000	7

MARKING



- ③ represents year and quarter code
- ④ represents lot ID number

Part Numbers and Part Marking

① & ② = part number code + temperature range (two-digit code).

TCM809	Code
TCM809LENB	J1
TCM809MENB	J2
TCM809TENB	J3
TCM809SENB	J4
TCM809RENB	J5

TCM810	Code
TCM810LENB	K1
TCM810MENB	K2
TCM810TENB	K3
TCM810SENB	K4
TCM810RENB	K5

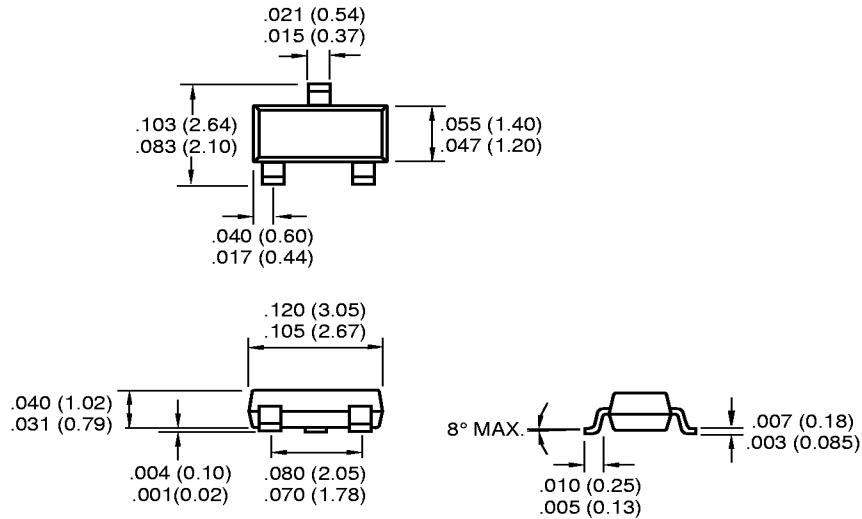
ex: M809LENB = ⓐ①○○○

3-PIN μ P RESET MONITORS

TCM809
TCM810

PACKAGE DIMENSIONS

*SOT-23B-3



NOTE: *SOT-23B-3 is equivalent to JEDEC (TO-236)

Dimensions: inches (mm)

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