TS809/ 810/ 809R/ 810R

Microprocessor Reset Circuit

SOT-23

Pin assignment:
TS809/810
1. Gnd
2. RESET (RESET)
3. Vcc

Pin assignment:
TS809R/810R
1. RESET (RESET)
2. Gnd
3. Vcc

Threshold Voltage Option
From 2.63V ~ 4.63V

General Description

The TS809/810/809R/810R are microprocessor (µP) supervisory circuit used to monitor the power supplies in µP and digital systems. They provide excellent circuit reliability and low cost by eliminating external components and adjustments when used with +5V, +3.3V, +3.0V powered circuits. These circuits perform a single function: they assert a reset signal whenever the VCC supply voltage declines below a preset threshold, keeping it asserted for at least 140ms after VCC has risen above the reset threshold. Reset thresholds suitable for operation with a variety of supply voltages are available. The TS809/810/809R/810R have push pull outputs. The TS809/809R have an active low RESET output, while the TS810/810R has an active high RESET output. The reset comparator is designed to ignore fast transients on VCC, and the output guaranteed to be in the correct logic state for VCC down to 1V. Low supply correct makes the TS809/810/809R/810R ideal for use in portable equipment.
The TS809/810/809R/810R is available in a 3-pin SOT-23 package.

Features

- ✧ Precision monitoring of +3V, +3.3V and +5V power supply voltage
- ✧ Fully specified over temperature
- ✧ Available in three output configurations
- ✧ Push-Pull RESET low output (TS809 & TS809R)
- ✧ Push-Pull RESET high output (TS810 & TS810R)
- ✧ 140mS min. power-on reset pulse width
- ✧ 12uA supply current
- ✧ Guaranteed reset valid to Vcc = +1V
- ✧ Power supply transient immunity
- ✧ No external components

Ordering Information

Part No.	Enable Function	Package
TS809CX **x**	Active-Low	SOT-23
TS810CX **x**	Active-High	
TS809RCX**x**	Active-Low	
TS810RCX**x**	Active-High	

Note: **x** is the threshold voltage type, option as
A: 4.63V
B: 4.38V
C: 4.00V
D: 3.08V
E: 2.93V
F: 2.63V

Applications

- ✧ Computers
- ✧ Controllers
- ✧ Intelligent instruments
- ✧ Critical uP and uC power monitoring
- ✧ Portable / Battery powered equipment
- ✧ Automotive

Pin Descriptions

Name	Description
Gnd	Ground
RESET (RESET)	Reset output pin L: for TS809 & TS811 H: for TS809R & TS811R
Vcc	Operating voltage input

Absolute Maximum Rating

Terminal Voltage (with respect to Gnd)	V_{CC}	- 0.3 ~ +6.0	V
RESET & (RESET) push-pull	V_{RESET}	- 0.3 ~ (V_{CC} +0.3)	V
Input Current, Vcc	I_{CC}	20	mA
Output Current, RESET, (RESET)	I_O	20	mA
Rate of Rise, Vcc	V_R	100	V/uS
Continuous Power Dissipation (Ta=+70 °C) de-rate 4mW/ °C above +70 °C	P_D	320	mW
Operating Junction Temperature Range	T_{OP}	-40 ~ +105	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°C
Lead Soldering Temperature (260 °C)	T_{LEAD}	10	S

Electrical Characteristics

Ta = 25 °C, unless otherwise specified.

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Input Supply Voltage	Ta = 0 °C ~ +70 °C	V_{CC}	1.0		5.5	V
Supply Current	$V_{CC} \leq 5.5V$	I_{CC}		19	60	uA
	$V_{CC} \leq 3.6V$			17	50	
Reset Threshold	TS809/910/809R/810RCXA	V_{TH}	4.56	4.63	4.7	V
	TS809/910/809R/810RCXB		4.31	4.38	4.45	
	TS809/910/809R/810RCXC		3.94	4.00	4.06	
	TS809/910/809R/810RCXD		3.03	3.08	3.13	
	TS809/910/809R/810RCXE		2.89	2.93	2.97	
	TS809/910/809R/810RCXF		2.59	2.63	2.67	
Reset Threshold Temperature Coefficient		V_{TH}		30		ppm/ °C
V_{CC} to Reset Delay	$V_{CC} = V_{TH}$ to (V_{TH} - 100mV)	T_{DELAY}		20		uS
Reset Active Timeout Period	Ta = 0 °C ~ +70 °C		100	240	380	mS
RESET Output Voltage Low	$V_{CC} = V_{TH(MIN)}$, I_{SINK} =1.2mA, TS809 & TS809R	V_{OL}			0.3	V
	$V_{CC} = V_{TH(MIN)}$, I_{SINK} =3.2mA,				0.4	
	V_{CC} > 1.0V, I_{SINK} =50uA				0.3	
RESET Output Voltage High	$V_{CC} > V_{TH(MAX)}$, I_{SOURCE} =500uA, TS809 & TS809R	V_{OH}	0.8 V_{CC}			V
	$V_{CC} > V_{TH(MAX)}$, I_{SOURCE} =800uA,		V_{CC} -1.5			
RESET Output Voltage Low	$V_{CC} = V_{TH(MAX)}$, I_{SINK} =1.2mA, TS810 & TS810R	V_{OL}			0.3	V
	$V_{CC} = V_{TH(MAX)}$, I_{SINK} =3.2mA,				0.4	
RESET Output Voltage High	1.8V < V_{CC} < $V_{TH(MIN)}$, I_{SOURCE} =150uA, TS810 & TS810R	V_{OH}	0.8 V_{CC}			V

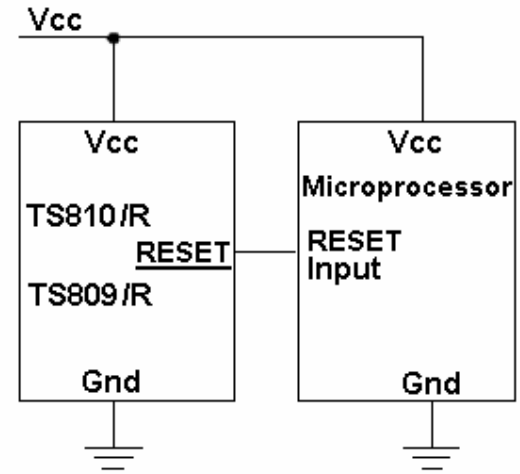
Function Description

A microprocessor's (µP's) reset input starts the µP
In a know state. The TS809/810/809R/810R assert reset to prevent code-execution errors during power-up, power-down, or brownout conditions. They assert a reset signal whenever the Vcc supply voltage declines below a preset threshold, keeping it asserted for at least 140ms after Vcc has risen above the reset threshold. The TS809/810/809R/810R have a push-pull output stage.

Applications Information

Negative-Going VCC transients in addition to issuing a reset to the µP during power-up, power-down, and brownout conditions, the TS809/810/809R/810R are relatively immune to short-duration negative-going Vcc transients (glitches).
The TS809/810/809R/810R do not generate a reset pulse. The graph was generated using a negative going pulse applied to Vcc, starting 0.5V above the actual reset threshold and ending below it by the magnitude indicated (reset comparator overdrive). The graph indicates the maximum pulse width a negative going Vcc transient can have without causing a reset pulse. As the magnitude of the transient increases (goes farther below the reset threshold), the maximum allowable pulse width decreases. Typically, a Vcc transient that goes 100mV below the reset threshold and lasts 20µS or less will not cause a reset pulse. A 0.1µF bypass capacitor mounted as close as possible to the Vcc pin provides additional transient immunity.

Applications Circuit



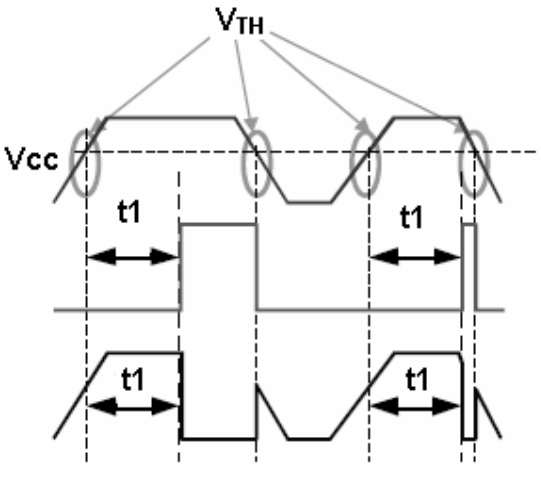
Ensuring a Valid Reset Output Down to Vcc=0

When Vcc falls below 1V, the TS809/810/809R/810R RESET output no longer sinks current - it becomes an open circuit. Therefore, high impedance CMOS logic input connected to RESET can drift to undetermined voltages.
This present no problem in most applications since most µP and other circuitry is inoperative with Vcc below 1V.However, in applications where RESET must be valid down to 0V, adding a pull down resistor to RESET causes and stray leakage currents to flow to ground, holding RESET low (Figure 2.) R1's value is not critical; 100K is large enough not to load RESET and small enough to pull RESET to ground. For the TS809/810/809R/810R if RESET is required to remain valid for Vcc<1V.

Benefits of Highly Accurate Reset Threshold

Most µP supervisor ICs have reset threshold voltages between 5% and 10% below the value of nominal supply voltages. This ensures a reset will not occur within 5% of the nominal supply, but will occur when the supply is 10% below nominal. When using ICs rated at only the nominal supply ±5%, this leaves a zone of uncertainty where the supply is between 5% and 10% low, and where the reset many or may not be asserted.

Timing Diagram



Electrical Characteristics Curve

Figure 1. Iq v.s. Temperature

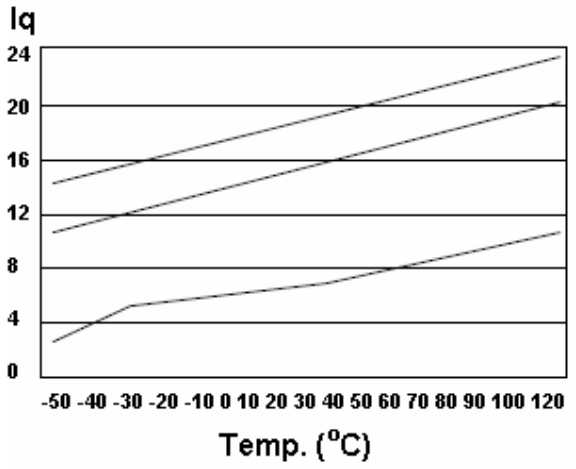


Figure 2. Threshold v.s. Temperature

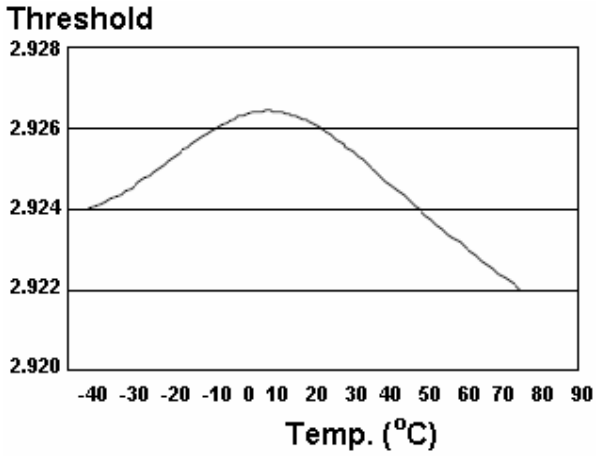
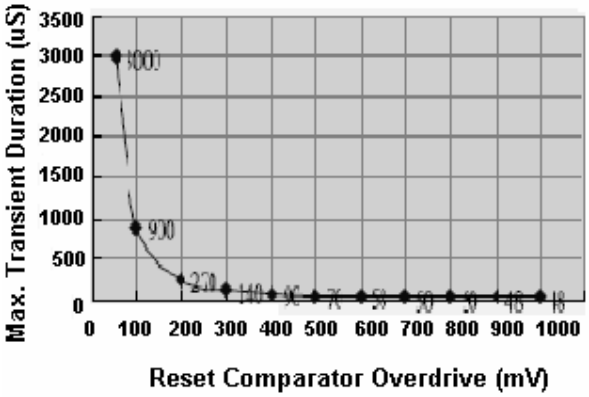
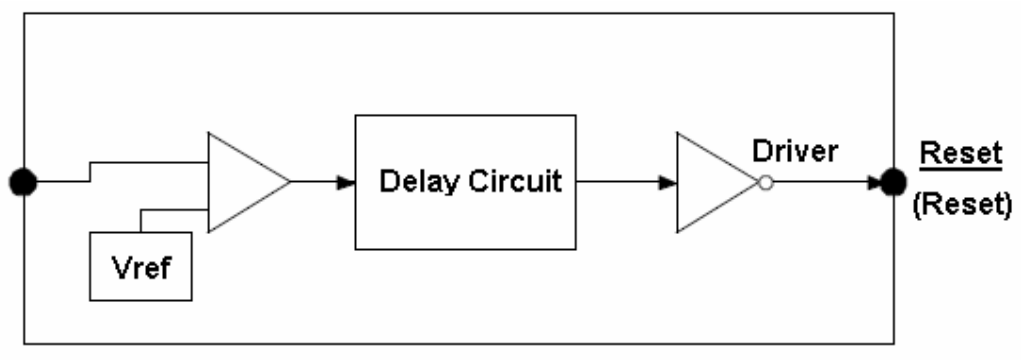


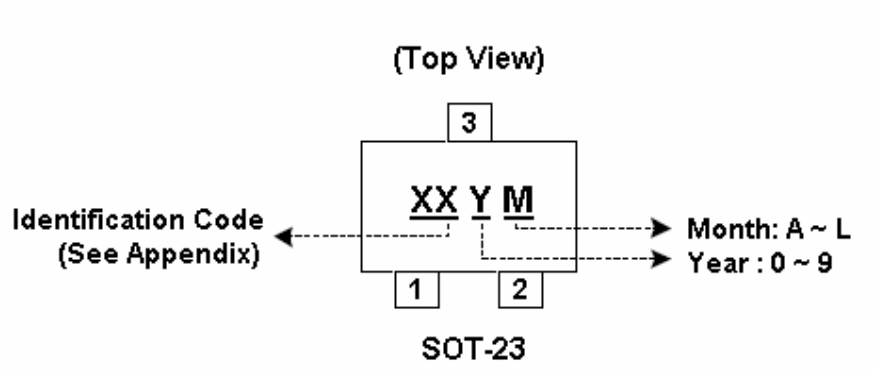
Figure 3. Immunity



Function Block

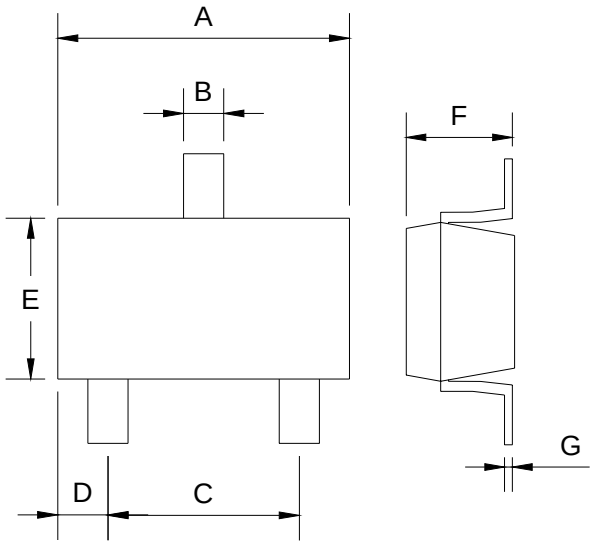


Marking Information



Part No.	Identification Code	Part No.	Identification Code	Part No.	Identification Code	Part No.	Identification Code
TS809CXA	EA	TS810CXA	E0	TS809RCXA	EG	TS810RCXA	E7
TS809CXB	EB	TS810CXB	E2	TS809RCXB	EH	TS810RCXB	E8
TS809CXC	EC	TS810CXC	E3	TS809RCXC	EI	TS810RCXC	E9
TS809CXD	ED	TS810CXD	E4	TS809RCXD	EJ	TS810RCXD	EM
TS809CXE	EE	TS810CXE	E5	TS809RCXE	EK	TS810RCXE	EN
TS809CXF	EF	TS810CXF	E6	TS809RCXF	EL	TS810RCXF	EP

SOT-23 Mechanical Drawing



SOT-23 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.88	2.91	0.113	0.115
B	0.39	0.42	0.015	0.017
C	1.78	2.03	0.070	0.080
D	0.51	0.61	0.020	0.024
E	1.59	1.66	0.063	0.065
F	1.04	1.08	0.041	0.043
G	0.07	0.09	0.003	0.004