3-Pin Microprocessor Reset Circuits

DESCRIPTION

The TK810 is microprocessor (µP) supervisory circuits used to monitor the power supplies in µP and digital systems. It provides excellent circuit reliability and low cost by eliminating external components and adjustments when used with +5V, +3.3V, +3.0V, or +2.5V 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 TK810 has push-pull outputs. The TK810 has an active-low RESET output,The reset comparator is designed to ignore fast transients on VCC, and the outputs are guaranteed to be in the correct logic state for VCC down to 1V.

FEATURES

* Precision Monitoring of +2.5V, +3V, +3.3V, and +5V Power-Supply Voltages
* Fully Specified Over Temperature
* Available in Three Output Configurations--Push-Pull RESET Output
* Guaranteed Reset Valid to VCC = +1V
* 12µA Supply Current
* 140ms (min) Power-On-Reset Pulse Width
* Power Supply Transient Immunity

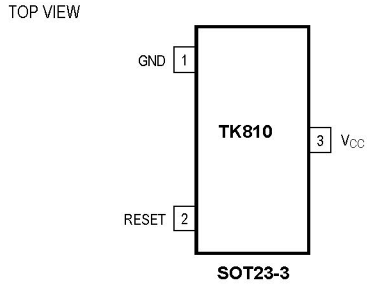
ORDERING INFORMATION

Part Number	Package	Packing	Temperature(TA)	Package Qty	V_{RT}
TK810LEUR	SOT-23-3	Reel	-40°C ~ 85°C	2500	4.63V
TK810MEUR	SOT-23-3	Reel	-40°C ~ 85°C	2500	4.38V
TK810REUR	SOT-23-3	Reel	-40°C ~ 85°C	2500	2.63V
TK810SEUR	SOT-23-3	Reel	-40°C ~ 85°C	2500	2.93V
TK810TEUR	SOT-23-3	Reel	-40°C ~ 85°C	2500	3.08V

APPLICATIONS

* Critical µP and µC Power Monitoring
* Portable/Battery-Powered Equipment
* Intelligent Instruments
* Controllers

PIN CONFIGURATION



PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	GND	Ground
2	RESET	RESET Output remains low while V_{CC} is below the reset threshold, and for at least 140ms after VCC rises above the reset threshold.
3	V_{CC}	Supply Voltage (+5V, +3.3V, +3.0V, or +2.5V)

BLOCK DIAGRAM

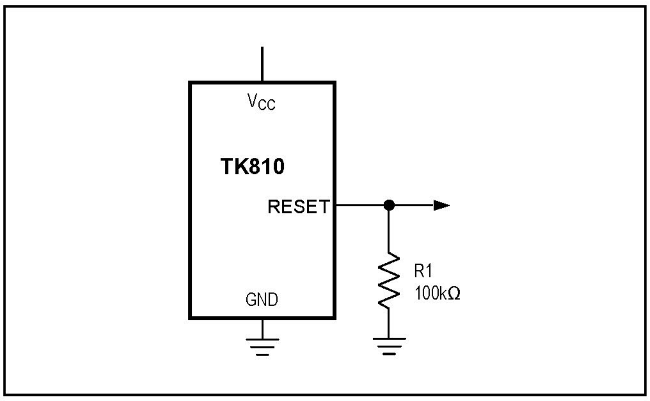


Figure 2.RESET Valid to V_{CC} = Ground Circuit

■ ABSOLUTE MAXIMUM RATING

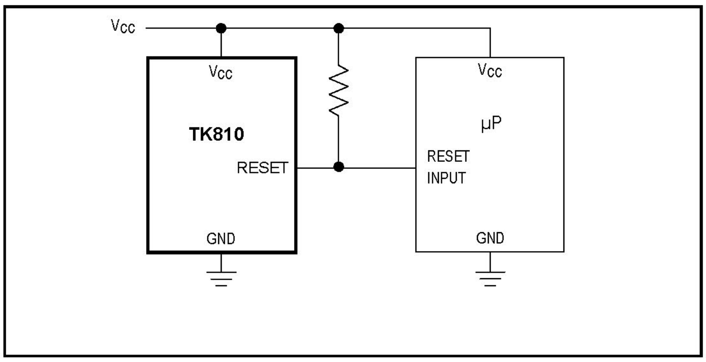
PARAMETER	SYMBOL	RATINGS	UNIT
Terminal Voltage (with respect to GND)	V_{CC}	-0.3 ~ 6.0	V
RESET (push-pull)..................	RESET	-0.3 ~ (V_{CC}+0.3V)	V
Input Current, V_{CC}, GND	I_{CC}	20	mA
Output Current, (all outputs)	RESET	20	mA
Junction Temperature	T_J	+150	℃
Operating Temperature Range	T_{OPR}	-40 ~ +105	℃
Storage Temperature	T_{STG}	-65 ~ +150	℃
Continuous Power Dissipation		320	mW

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS (T$_J$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage Range	V_{CC}		1.2		5.5	V
Supply Current	I_{SUPPLY}			24	60	µA
Reset Threshold	V_{TH}		4.25	4.40	4.45	V
Reset Threshold Tempco				30		ppm/°C
VCC to Reset Delay		V_{CC} = V_{TH} to (V_{TH} - 100mV)		20		µs
Reset Active Timeout Period		TA = -40°C to +85°C	140	240	560	ms
		T_A = +85°C to +105°C	100		840	ms
RESET Output Voltage Low	V_{OL}	V_{CC} = V_{TH} (max), I_{SINK} = 1.2mA,			0.3	V
		V_{CC} = V_{TH} (max), I_{SINK} = 3.2mA,			0.4	V
RESET Output Voltage High	V_{OH}	1.8V < VCC < VTH (min), ISOURCE = 150µA			0.8V_{CC}	V

■ TYPICAL APPLICATION CIRCUIT



■ APPLICATIONS INFORMATION

Negative-Going VCC Transients

In addition to issuing a reset to the µP during power-up, power-down, and brownout conditions, the TK810 is relatively immune to short-duration negative-going VCC transients (glitches).

Ensuring a Valid Reset Output Down to V_{CC} = 0V

When VCC falls below 1V, the TK810 $\overline{RESET}$ output no longer sinks current—it becomes an open circuit.

Therefore, high-impedance CMOS logic inputs connect-ed to $\overline{RESET}$ can drift to undetermined voltages. This presents no problem in most applications since most µP and other circuitry is inoperative with V_{CC} below 1V. However, in applications where $\overline{RESET}$ must be valid down to 0V, adding a pull-down resistor to $\overline{RESET}$ causes any stray leakage currents to flow to ground, holding $\overline{RESET}$ low (Figure 2). R1's value is not critical; 100kΩ is large enough not to load $\overline{RESET}$ and small enough to pull $\overline{RESET}$ to ground.

Interfacing to µPs with Bidirectional Reset Pins

Since the $\overline{RESET}$ output on the TK803 is open drain, this device interfaces easily with µPs that have bidirectional reset pins, such as the Motorola 68HC11. Connecting the µP supervisor's $\overline{RESET}$ output directly to the µC's $\overline{RESET}$ pin with a single pullup resistor allows either device to assert reset (Figure 3).

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.

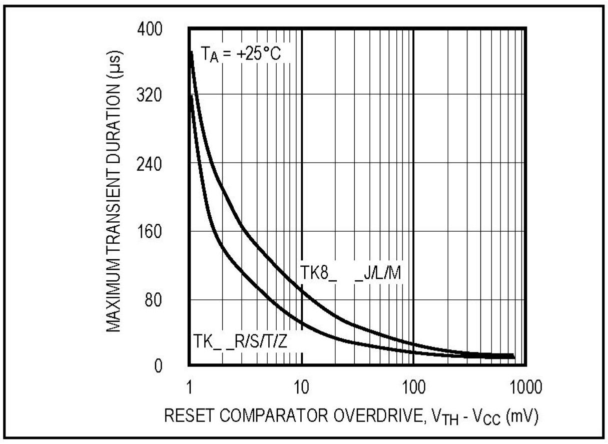


Figure 1. Maximum Transient Duration Without Causing a Reset Pulse vs. Reset Comparator Overdrive

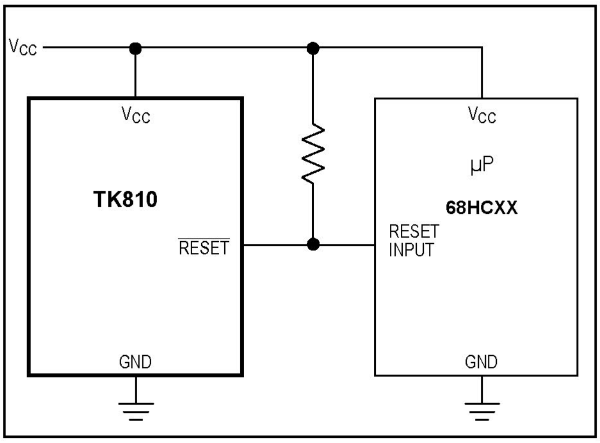


Figure 3. Interfacing to µPs with Bidirectional Reset I/O

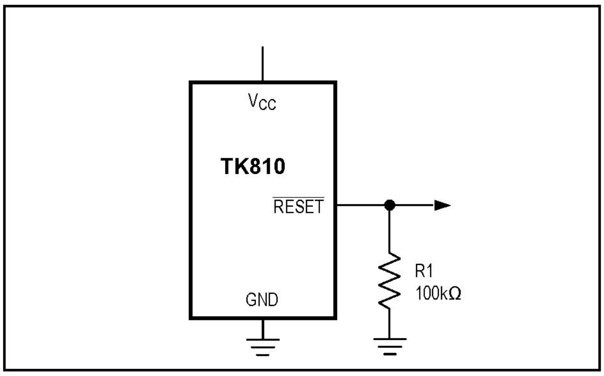


Figure 2. $\overline{RESET}$ Valid to V_{CC} = Ground Circuit