ft809

3-Pin Microcontroller Reset Circuits

October 2008 V1.1

Introductions

The ft809 series are power supply supervisory circuits used to monitor the supply change in microprocessors and digital systems. The ft809 series provide a reset to the microprocessors during system power-up, power-down and brown-out conditions.

The ft809 is designed to monitor the V_{CC} supply voltage and assert a reset signal whenever the voltage declined below the preset threshold. The reset signal remains for at least 140ms after VCC has risen above the threshold. The ft809 provides an active-low reset output.

The ft809 series are optimized to reject fast transient glitches on the VCC line. Low power supply current of 10μA makes the ft809 more suitable for battery-powered applications.

The ft809 series are available in SOT23-3 package.

Features

- Precision monitoring of 2.63V/ 2.70V/ 2.93V/ 3.08V
- Fully specified over temperatures
- 140ms min. Power-On-Reset pulse width
- 10μA low supply current
- Power supply transient immunity

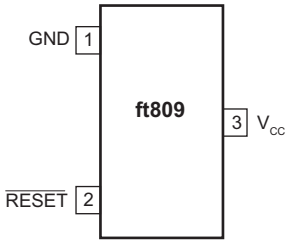
Applications

- Computers
- Controllers
- Portable / Battery-supplied devices
- Automotive

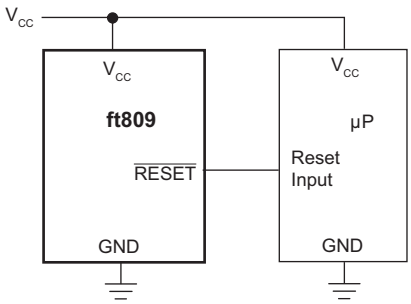
Ordering Information

Reset Threshold (V)			Parts Number	Package
Min	Typ.	Max		
2.59	2.63	2.66	ft809R	SOT23-3
2.55	2.63	2.66	ft809RA	
2.66	2.7	2.73	ft809V	
2.89	2.93	2.96	ft809S	
2.86	2.93	2.99	ft809SA	
3.04	3.08	3.11	ft809T	
3.00	3.08	3.15	ft809TA	

Pinout Diagram



Typical Application



Absolute Maximum Ratings

V_{CC}	- 0.3V to +6.0V
$\overline{RESET}$	- 0.3V to (V_{CC} + 0.3V)
Input Current, V_{CC}	20mA
Output Current, RESET	20mA
Rate of Rise, V_{CC}	100V/µs

Continuous Power Dissipation (derate2.17mW/ºC above +70ºC)	320mW
Ambient Temperature Range	- 40ºC to +105ºC
Maximum Junction Temperature	125°C
Storage Temperature Range	- 65°C to +160°C
Lead Temperature (soldering, 10s)	+300°C

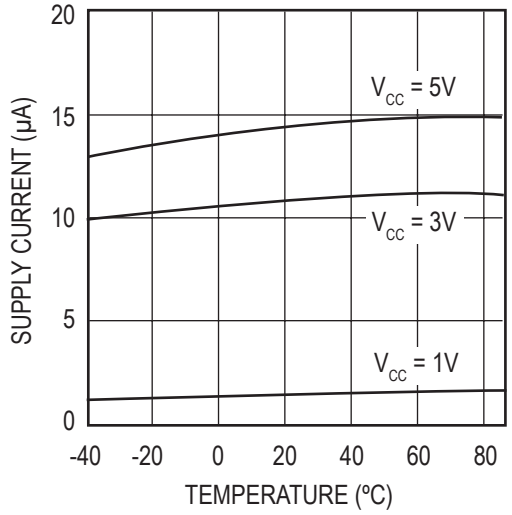
Electrical Characteristics

V_{CC} = full range, T_A = −40°C to +105°C, unless otherwise noted. Typical values are at T_A = +25°C, V_{CC} = 3.3V for 2.93/3.08V versions, and V_{CC} = 3V for 2.7V/2.63V version.

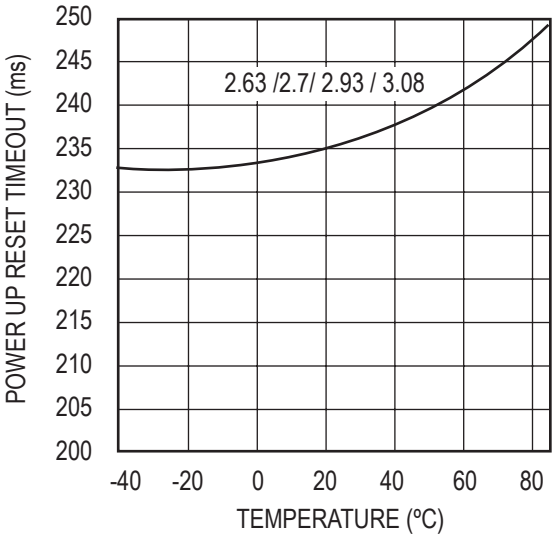
Symbol	Parameter	Conditions		Min	Typ	Max	Units
	V_{CC} Range	T_A = 0°C to +70°C		1.0		5.5	V
		T_A = -40°C to +105°C		1.2		5.5	
I_{CC}	Supply Current	V_{CC} < 3.6V			10	20	µA
V_{TH}	Reset Threshold	ft809R	T_A = + 25ºC	2.59	2.63	2.66	V
		ft809RA	T_A = + 25ºC	2.55	2.63	2.66	
		ft809V	T_A = + 25ºC	2.66	2.7	2.73	
		ft809S	T_A = + 25ºC	2.89	2.93	2.96	
		ft809SA	T_A = + 25ºC	2.86	2.93	2.99	
		ft809T	T_A = + 25ºC	3.04	3.08	3.11	
		ft809TA	T_A = + 25ºC	3.00	3.08	3.15	
	Reset Active Timeout	T_A = -40ºC to +85ºC		140	240	560	ms
V_{OL}	$\overline{RESET}$ Output Voltage Low	V_{CC} = V_{TH} min, I_{SINK} = 1.2mA				0.3	V
		V_{CC} > 1.4V, I_{SINK} = 50µA				0.3	
V_{OH}	$\overline{RESET}$ Output Voltage High	V_{CC} > V_{TH} max, I_{SOURCE} = 500µA		0.8V_{CC}			V

Typical Performance Characteristics

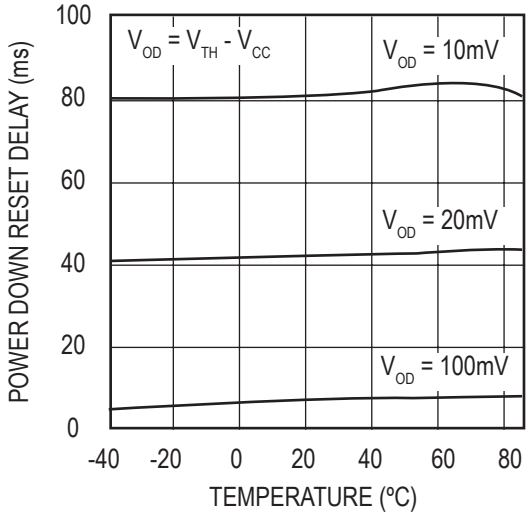
Supply Current vs. Temperature
(No Load, 2.63/2.7/2.93/3.08)



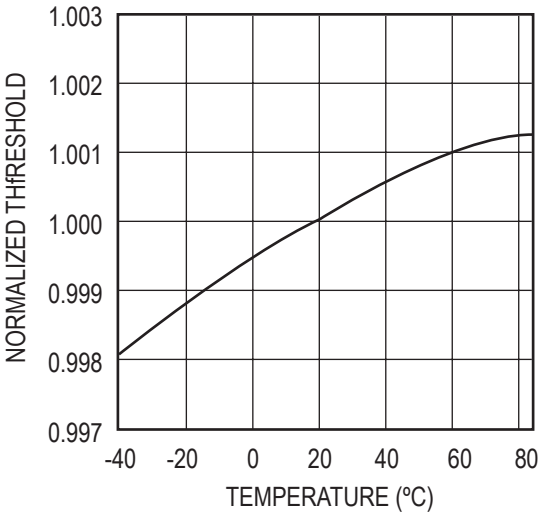
Power Up Reset Timeout vs. Temperature



Power-Down Reset Delay vs. Temperature
(2.63/2.7/2.93/3.08)



Normalized Reset Threshold vs. Temperature

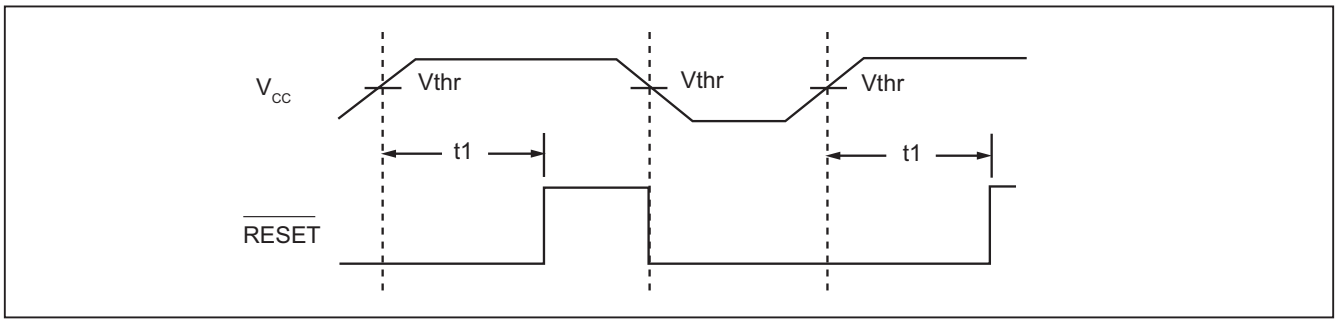


Application Information

Detailed Operation Description

The ft809 series microprocessor reset circuits are designed to monitor the power supplies in digial systems and provide a reset signal to the processor under the preset conditions. Initially consider that the input voltage is within the upper and lower threshold, the reset output pin of the ft809 is high. When voltages falls under the preset lower threshold, the $\overline{\text{RESET}}$ output pin will be driven low to assert reset to the microprocessor. After the power interruption, V_{CC} will rise to its nominal level above the threshold voltage while the reset signal will keep asserting for a preset period. During the reset process, the ft809 internal oscillator circuitry is activated to count the signal asserting period. When the preset asserting period times out, the reset signal will revert back to high.

Figure 1. ft809 Reset Timing Diagram



V_{CC} Transient Rejection

The ft809 series provides accurate power supply monitoring and resets during power-up, power-down and brown-out conditions. It also provides negative-going transients and glitch at the power supply to avoid unwanted resets. The transient rejection feature is achieved by the preset maximum tolerable transient duration and the overdrive scale. Either condition failing to exceed the limits will not generate a reset. Typically, transients that go 100mV below the reset threshold and last 5.0μs or less will not trigger a reset. Transient immunity can be further improved by adding a capacitor in close proximity to the V_{CC} pin of the ft809.

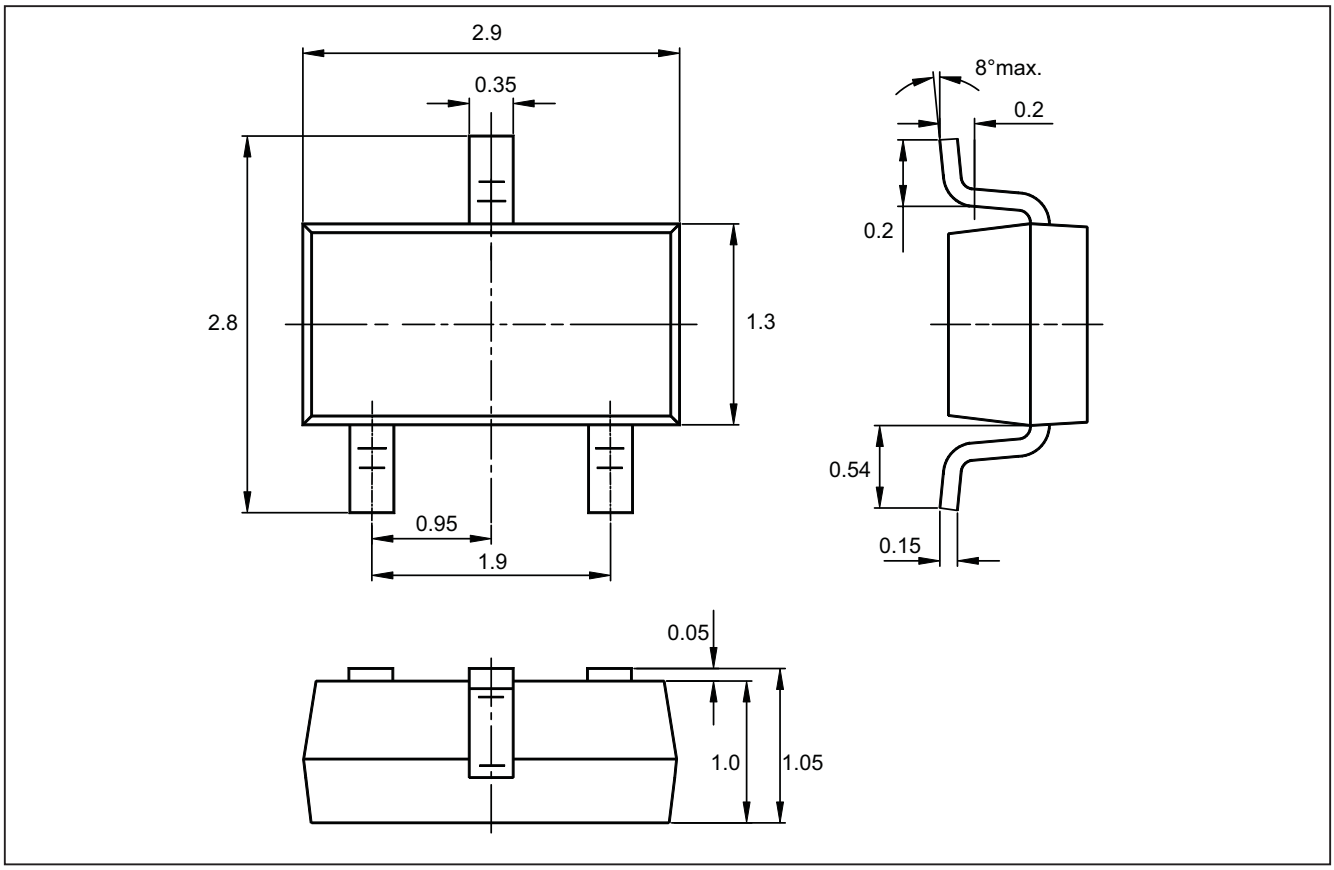
Enable Reset during Power-down

When V_{CC} falls below 1V, the ft809 $\overline{\text{RESET}}$ output no longer sinks current. This will cause the CMOS logic inputs to the microprocessor floating at an undertermined voltage. Most digital systems are shutdown well above this voltage. However, in situations where RESET must be maintained valid to V_{CC} = 0V, a pull-down resistor must be connected from $\overline{\text{RESET}}$ to ground to discharge stray capacitance and hold the output low. A 100kΩ resistor will be suitable for most applications.

Processors with Bi-directional I/O Pins

When the ft809 is to use with microprocessors with a bi-directional reset pin, logic conflict may take place and cause undermined logic level. To avoid such situation, a 4.7Ω resistor shall be connected in series between the ft809 $\overline{\text{RESET}}$ pin and the microprocessor reset interface. If there are other components requiring a reset signal, a buffer shall be added between the reset pin and the other system components.

Packaging Details



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