FSP2200

■ FEATURES

- Precision VCC Monitor for 2.5 V, 3.0V, 3.3 V, and 5.0 V Supplies
- Fully Specified Over Temperature
- Available in Three Output Configurations Push-Pull RESET Output
- 140ms min Power-On Reset Pulse Width
- 12μA Supply Current
- Guaranteed Reset Valid to Vcc=+1V
- Power Supply Transient Immunity
- No External Components
- SOT323-3L and SOT23-3L Packages

■ APPLICATIONS

- Computers
- Controllers
- Intelligent Instruments
- Critical MPU and MPU Power Monitoring
- Portable/Battery-Powered Equipment
- Automotive

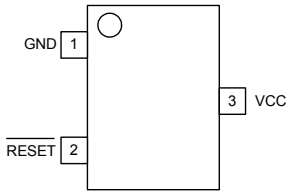
■ GENERAL DESCRIPTION

The FSP2200 is a microprocessor supervisory circuits used to monitor the power supplies in MPU 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, or +2.5V powered circuits

These curcuits 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 whit a variety of supply voltages are available. The FSP2200 have push-pull outputs, 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. Low supply current makes the FSP2200 ideal for use in portable equipment. The FSP2200 are available in SOT323-3L or SOT23-3L packages.

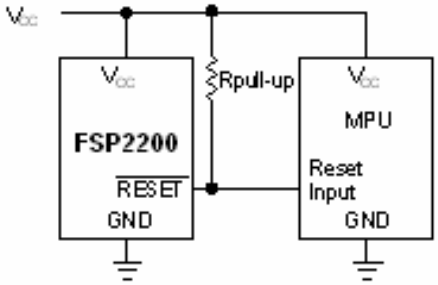
■ PIN CONFIGURATION

(Top View)



Pin	Name	Function
1	GND	Ground reference
2	$\overline{\text{RESET}}$	Active-low output. $\overline{\text{RESET}}$ remains low while VCC is below the reset threshold, and for a reset timeout period after VCC rises above the reset threshold.
3	VCC	Supply voltage (typ.)

■ TYPICAL OPERATION CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Terminal Voltage (with respect to GND)	V_{CC}	-0.3 to 6.0	V
	$V_{\overline{RESET}}$(push-pull)	-0.3 to (V_{CC} + 0.3)	
	$V_{\overline{RESET}}$(push-drain)	-0.3 to 6.0	
Output Current, $\overline{RESET}$		20	mA
Rate of Rise, V_{CC}		100	V/μs
Continuous Power Dissipation(TA=70°C)	SOT323-3L	174	mW
	SOT23-3L	320	
Operating Temperature Range	SOT323-3L	-40 to +125	°C
	SOT23-3L	-40 to +105	
Storage Temperature Range	Tstg	-65 to +150	°C
Lead Temperature (Soldering, 10 Seconds)	T_L	300	°C

■ ELECTRICAL CHARACTERISTICS

(Vcc=full range, T_A = -40°C to +105°C(SOT23) or T_A = -40°C to +125°C(SOT323)unless otherwise noted.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Vcc Range		TA=0°C to +70		1.0		5.5	V
		TA=-40°C to +105°C(SOT23)		1.2		5.5	
		TA=-40°C to +125°C(SOT323)		1.2		5.5	
Supply Current(SOT23)	ICC	TA=-40°C to +85°C	VCC＜5.5V,FSP2200-4.63/4.38		24	60	μA
			VC＜3.6V, FSP2200-2.32/2.63/2.93/3.08		17	50	
		TA=+85°C to +105°C	VCC＜5.5V,FSP2200-4.63/4.38			100	
			VCC＜3.6V, FSP2200-2.32/2.63/2.93/3.08			100	
Supply Current(SOT323)	ICC	TA=-40°C to +85°C	VCC＜5.5V,FSP2200-4.63/4.38		24	35	
			VCC＜3.6V, FSP2200-2.32/2.63/2.93/3.08		17	30	
		TA=+85°C to +125°C	VCC＜5.5V,FSP2200-4.63/4.38			60	
			VCC＜3.6V, FSP2200-2.32/2.63/2.93/3.08			60	
Reset Threshold (SOT23)	V_{TH}	FSP2200-4.63	TA=+25°C	4.56	4.63	4.70	V
			TA=-40°C to +85°C	4.50		4.75	
			TA=-40°C to +105°C	4.40		4.86	
		FSP2200-4.38	TA=+25°C	4.31	4.38	4.45	
			TA=-40°C to +85°C	4.25		4.50	
			TA=-40°C to +105°C	4.16		4.56	
		FSP2200-4.00	TA=+25°C	3.93	4.00	4.06	
			TA=-40°C to +85°C	3.89		4.10	
			TA=-40°C to +105°C	3.80		4.20	
		FSP2200-3.08	TA=+25°C	3.04	3.08	3.11	
			TA=-40°C to +85°C	3.00		3.15	
			TA=-40°C to +105°C	2.92		3.23	
		FSP2200-2.93	TA=+25°C	2.89	2.93	2.96	
			TA=-40°C to +85°C	2.85		3.00	
			TA=-40°C to +105°C	2.78		3.08	
		FSP2200-2.63	TA=+25°C	2.59	2.63	2.66	
			TA=-40°C to +85°C	2.55		2.70	
			TA=-40°C to +105°C	2.50		2.76	

■ ELECTRICAL CHARACTERISTICS (CONTINUED)

(Vcc=full range, T_A = -40°C to +105°C(SOT23) or T_A = -40°C to +125°C(SOT323)unless otherwise noted.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Reset Threshold (SOT323)	V_{TH}	FSP2200-4.63	TA=+25°C	4.56	4.63	4.70	V
			TA=-40°C to +85°C	4.50		4.75	
			TA=-40°C to +125°C	4.44		4.82	
		FSP2200-4.38	TA=+25°C	4.31	4.38	4.45	
			TA=-40°C to +85°C	4.25		4.50	
			TA=-40°C to +125°C	4.20		4.56	
		FSP2200-3.08	TA=+25°C	3.04	3.08	3.11	
			TA=-40°C to +85°C	3.00		3.15	
			TA=-40°C to +125°C	2.95		3.21	
		FSP2200-2.93	TA=+25°C	2.89	2.93	2.96	
			TA=-40°C to +85°C	2.85		3.00	
			TA=-40°C to +125°C	2.81		3.05	
		FSP2200-2.63	TA=+25°C	2.59	2.63	2.66	
			TA=-40°C to +85°C	2.55		2.70	
			TA=-40°C to +125°C	2.52		2.74	
		FSP2200-2.32	TA=+25°C	2.28	2.32	2.35	
			TA=-40°C to +85°C	2.25		2.38	
			TA=-40°C to +125°C	2.22		2.42	
Reset Threshold Tempco					30		ppm/°C
Vcc to Reset Delay		Vcc= V_{TH} to (V_{TH}-100mV)			20		μ s
Reset Active Timeout Period(SOT23)		TA=-40°C to +85°C		140	240	560	ms
		TA=-40°C to +105°C		100		840	
Reset Active Timeout Period(SOT323)		TA=-40°C to +85°C		140	240	460	
		TA=-40°C to +125°C		100		840	
RESET Output Voltage Low (push-pull active low)	V_{OL}	Vcc=V_{TH} min, I_{SINK}=1.2mA FSP2200-2.32/2.63/2.93/3.08				0.3	V
		Vcc=V_{TH} min, I_{SINK}=3.2mA FSP2200-4.00/4.38/4.63				0.4	
		Vcc＞1.0V, I_{SINK}=50μA				0.3	
RESET Output Voltage High (push-pull active low)	V_{OH}	Vcc＞V_{TH} max, I_{SOURCE}=500μA FSP2200-2.32/2.63/2.93/3.08		0.8Vcc			V
		Vcc＞V_{TH} max, I_{SOURCE}=80μA FSP2200-4.00/4.38/4.63		Vcc-1.5			

Typical Values: TA=-+25°C Vcc=5V for FSP2200-4.00/4.38/4.63
Vcc=3.3V for FSP2200-3.08/2.93
Vcc=3V for FSP2200-2.63
Vcc=2.5V for FSP2200-2.32

■ DETAILED DESCRIPTION

A microprocessor's (MPU) reset input starts the MPU in a known state. The FSP2200 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 thresh-old, keeping it asserted for at least 140ms after Vcc has risen above the reset threshold. The FSP2200 push-pull output stage.

■ APPLICATION INFORMATION

Negative-Going V_{CC} Transients

In addition to issuing a reset to the MPU during power-up, power-down, and brownout conditions, the FSP2200 is relatively immune to short-duration negative-going Vcc transients (glitches). Figure 1 shows typical transient duration vs. reset comparator overdrive, for which the FSP2200 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 in dicated (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, for the FSP2200-4.63/4.38, 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.

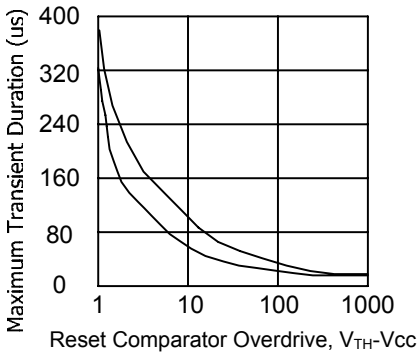


Figure 1

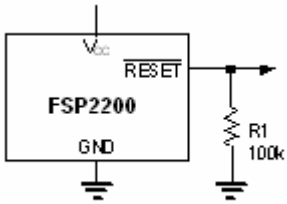


Figure 2

Ensuring a Valid Reset Output: Down to VCC = 0

When VCC falls below 1V, the FSP2200 $\overline{\text{RESET}}$ output no longer sinks current-it becomes an open circuit. Therefore, high-impedance CMOS logic input connected to $\overline{\text{RESET}}$ can drift to undetermined voltages. This presents no problem in most applications since most MPU and other circuitry is inoperative with Vcc below 1V. However, in applications where $\overline{\text{RESET}}$ must be valid down to 0V, adding a pull-down resistor to $\overline{\text{RESET}}$ causes any stray leakage currents to flow to ground, holding $\overline{\text{RESET}}$ low Figure 2. R1's value is not critical, 100kΩ is large enough not to load $\overline{\text{RESET}}$ and small enough to pull $\overline{\text{RESET}}$ to ground

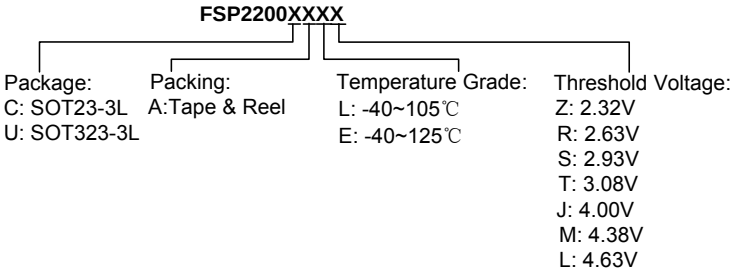
Benefits of Highly Accurate Reset Threshold

Most MPU 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.

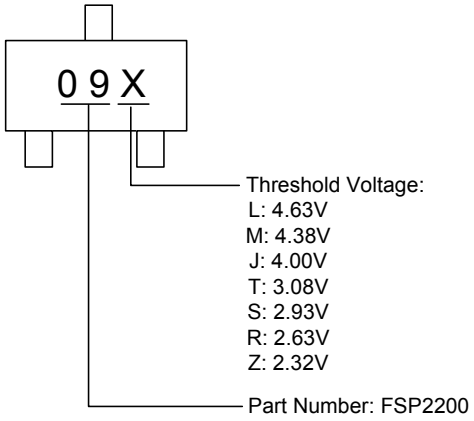
When using ICs rated at only the nominal supply ±5%, this leaves a zone of uncertainty where the supply is between 5% and 10% low, and where the reset may or may not be asserted.

The FSP2200-4.63/3.08/2.32 use highly accurate circuitry to ensure that reset is asserted close to the 5% limit, and long before the supply has declined to 10% below nominal.

■ ORDERING INFORMATION

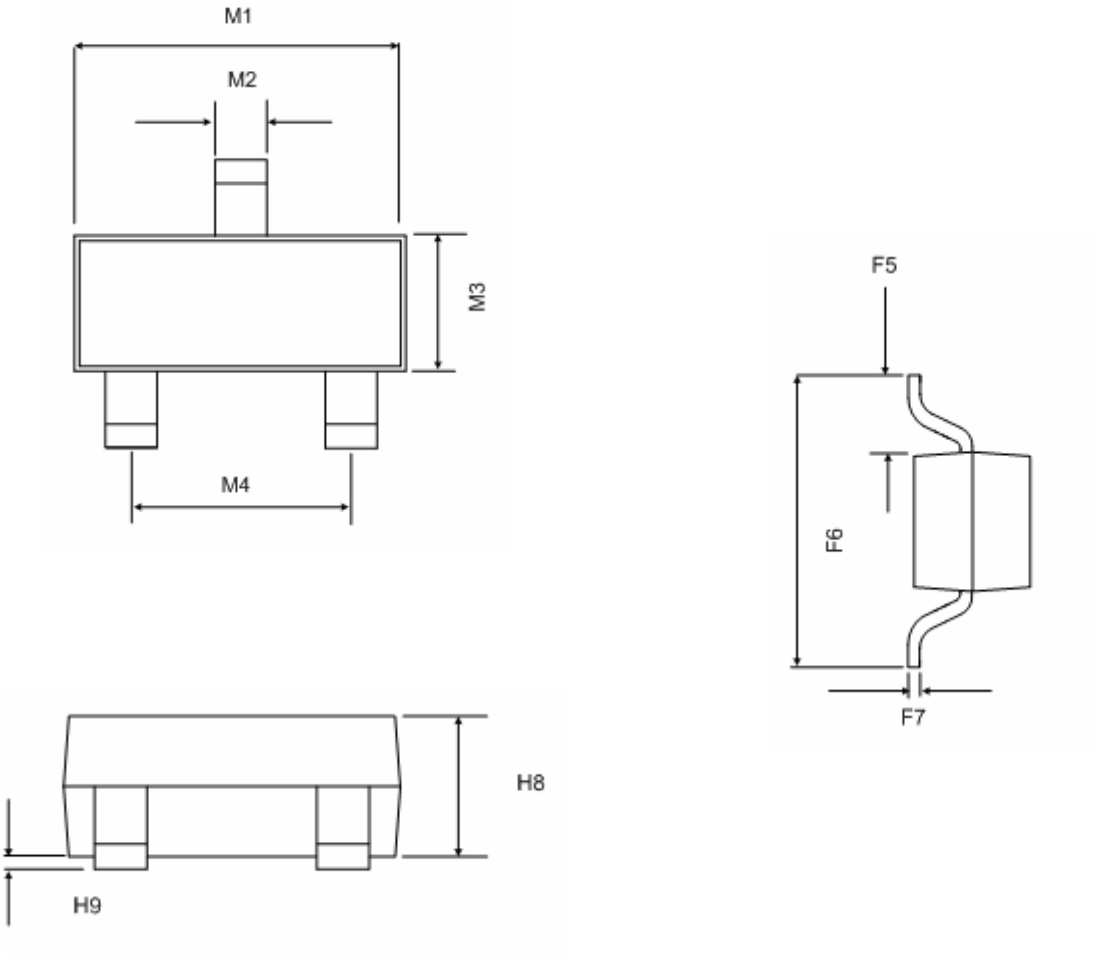


■ MARKING INFORMATION



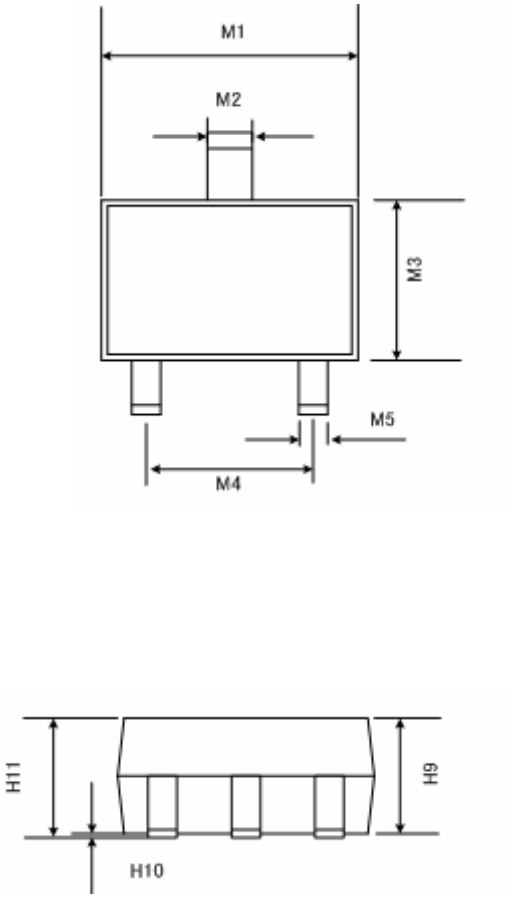
■ PACKAGE INFORMATION

(1) SOT23-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
M1	2.8	3.0	0.112	0.120
M2	0.35	0.5	0.014	0.020
M3	1.3	1.7	0.052	0.068
M4	1.7	2.1	0.068	0.084
F5	0.6		0.024	
F6	2.05	2.75	0.082	0.110
F7	0.1		0.004	
H8	1.0	1.4	0.040	0.056
H9	0	0.15	0	0.006

(2) SOT323-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
M1	2.0	2.2	0.080	0.088
M2	0.2	0.4	0.008	0.016
M3	1.15	1.35	0.046	0.054
M4	1.2	1.4	0.048	0.056
M5	0.65		0.026	
F6	2.15	2.45	0.086	0.098
F7	0.08	0.15	0.003	0.006
F8	0.2	0.4	0.008	0.016
H9	0.9	1.0	0.036	0.040
H10	0	0.1	0	0.004
H11	0.9	1.1	0.036	0.044