3-Pin Microprocessor Reset Circuits

FEATURES

- Ultra-low supply current 1µA (typ.)
- Guaranteed reset valid to Vcc=0.9V
- Available in three output types:
  - Open-drain active low (SS809N-xxGx)
  - Push-pull active low (SS809-xxGx)
  - Push-pull active high (SS810-xxGx)
- Power-on reset pulse width min. 140ms
- Internally fixed threshold 2.3V, 2.6V, 2.9V, 3.1V, 4.0V, 4.4V, 4.6V
- Tight voltage threshold tolerance: 1.5%
- **Packaged in RoHS-compliant SOT-23-3**

APPLICATIONS

- Notebook Computers
- Digital Still Cameras
- PDAs
- Critical Microprocessor Monitoring

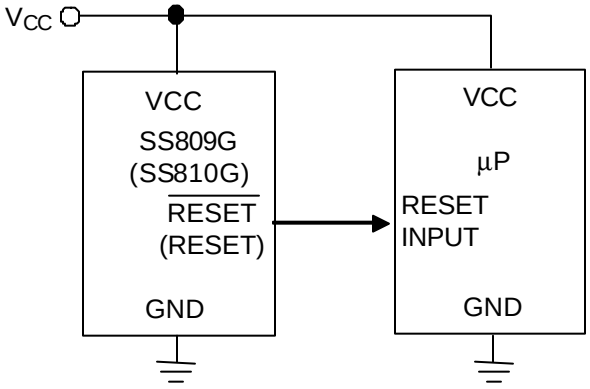
DESCRIPTION

The SS809G and SS810G are low-power microprocessor (µP) supervisory circuits used to monitor power supplies in µP and digital systems. They improve circuit reliability and reduce cost by eliminating external components.

These devices provide valid signals in applications with Vcc ranging from 6.0V down to 0.9V. The reset signal lasts for a minimum period of 140ms whenever the V_{CC} supply voltage falls below a preset threshold. Both the SS809G and SS810G were designed with a reset comparator to help identify invalid signals lasting less than 140ms. The only difference between the two devices is that one has an active-low $\overline{\text{RESET}}$ output and the other an active-high RESET output.

Low supply current (1µA) makes the SS809G and SS810G ideal for portable equipment. The devices are available in a SOT-23-3 package.

TYPICAL APPLICATION CIRCUIT



Push-Pull Output

ORDERING INFORMATION

SS809X-XXGU XX
SS810 -XXGU XX

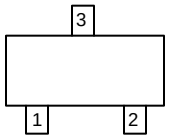
- Packing type
  TR: Tape and reel
- Package type
  GU: RoHS-compliant Pb-free SOT-23-3
- Reset threshold voltage
  23: 2.3V
  26: 2.6V
  29: 2.9V
  31: 3.1V
  40: 4.0V
  44: 4.4V
  46: 4.6V
- Output type
  Default: Push-Pull type
  N: N-ch open-drain type

Example: SS809-31GU TR

→ 3.1V, push-pull version in RoHS-compliant SOT-23-3 , shipped in tape and reel

PIN CONFIGURATION

SOT-23-3
TOP VIEW
1: GND
2: $\overline{\text{RESET}}$ (RESET)
3: VCC



SOT-23 Part Marking

Part No.	Marking
SS809-23GU	RA23P
SS809-26GU	RA26P
SS809-29GU	RA29P
SS809-31GU	RA31P
SS809-40GU	RA40P
SS809-44GU	RA44P
SS809-46GU	RA46P

Part No.	Marking
SS809N-23GU	RB23P
SS809N-26GU	RB26P
SS809N-29GU	RB29P
SS809N-31GU	RB31P
SS809N-40GU	RB40P
SS809N-44GU	RB44P
SS809N-46GU	RB46P

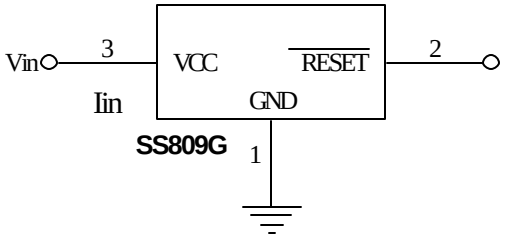
Part No.	Marking
SS810-23GU	RD23P
SS810-26GU	RD26P
SS810-29GU	RD29P
SS810-31GU	RD31P
SS810-40GU	RD40P
SS810-44GU	RD44P
SS810-46GU	RD46P

ABSOLUTE MAXIMUM RATINGS

V_{CC}	-0.3V ~6.5V
RESET, $\overline{\text{RESET}}$	-0.3V ~ (VCC+0.3V)
Input Current (V_{CC})	20mA
Output Current (RESET or $\overline{\text{RESET}}$)	20mA
Continuous Power Dissipation (T_A = +70°C)	320mW
Operating Junction Temperature Range	-40°C ~ 85°C
Storage Temperature Range	- 65°C ~ 125°C
Lead Temperature (Soldering) 10 sec	260°C

Note1: Any stress beyond the Absolute Maximum Ratings above may cause permanent damage to the device.

TEST CIRCUIT



ELECTRICAL CHARACTERISTICS

(Typical values are at T_A=25°C, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Operating Voltage Range	V_{CC}			0.9		6	V
Supply Current	I_{CC}	V_{CC} = V_{TH} +0.1V			1	3	µA
Reset Threshold	V_{TH}	SS809-23	T_A=+25°C	2.265	2.3	2.335	V
			T_A= -40°C to +85°C	2.254		2.346	
		SS809-26	T_A=+25°C	2.561	2.6	2.639	
			T_A= -40°C to +85°C	2.548		2.652	
		SS809-29	T_A=+25°C	2.857	2.9	2.944	
			T_A= -40°C to +85°C	2.842		2.958	
		SS809-31	T_A=+25°C	3.054	3.1	3.147	
			T_A= -40°C to +85°C	3.038		3.162	
		SS809-40	T_A=+25°C	3.940	4.0	4.060	
			T_A= -40°C to +85°C	3.920		4.080	
		SS809-44	T_A=+25°C	4.334	4.4	4.466	
			T_A= -40°C to +85°C	4.312		4.488	
		SS809-46	T_A=+25°C	4.531	4.6	4.669	
			T_A=-40°C to +85°C	4.508		4.692	
V_{CC} to Reset Delay	T_{RD}	V_{CC}=V_{TH} to (V_{TH} -0.1V), V_{TH}=3.1V			20		µS
Reset Active Timeout Period	T_{RP}	V_{CC} = $V_{TH\,(MAX)}$	T_A=+25°C	140	230	560	mS
			T_A= -40°C to +85°C	100		1030	
$\overline{\text{RESET}}$ Output Voltage	V_{OH}	V_{CC}=V_{TH}+0.1V, I_{SOURCE}=1mA		0.8V_{CC}			V
	V_{OL}	V_{CC}=V_{TH} - 0.1V, I_{SINK}=1mA				0.2Vcc	
RESET Output Voltage	V_{OH}	V_{CC}=V_{TH}-0.1V, I_{SOURCE}=1mA		0.8V_{CC}			V
	V_{OL}	V_{CC}=V_{TH}+0.1V, I_{SINK}=1mA				0.2Vcc	

Note2: $\overline{\text{RESET}}$ output is for the SS809G; RESET output is for the SS810G.

Note3: Specifications for operating temperature ranges from -40°C to 85°C are guaranteed by Statistical Quality Controls (SQC), with no production testing.

TYPICAL PERFORMANCE CHARACTERISTICS

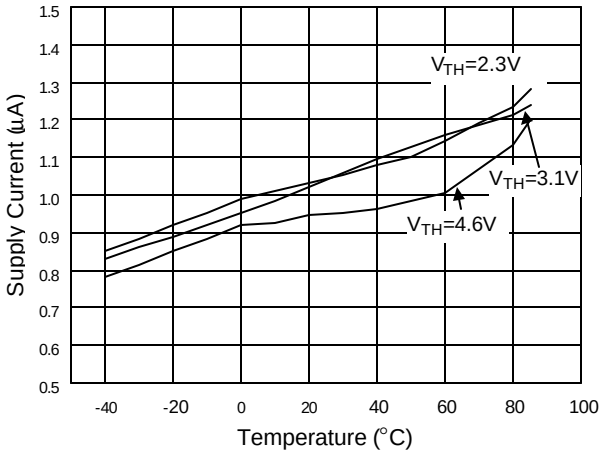


Fig 1 Supply Current vs. Temperature

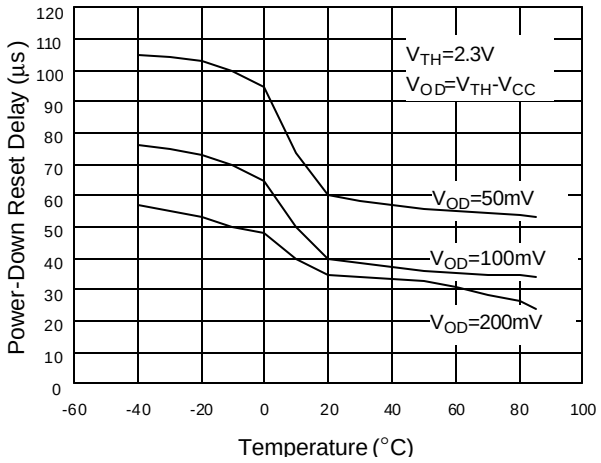


Fig 2 Power-Down Reset Delay vs. Temperature

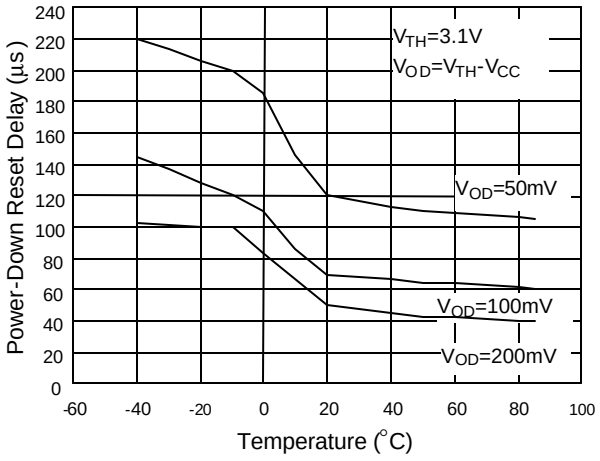


Fig 3 Power-Down Reset Delay vs. Temperature

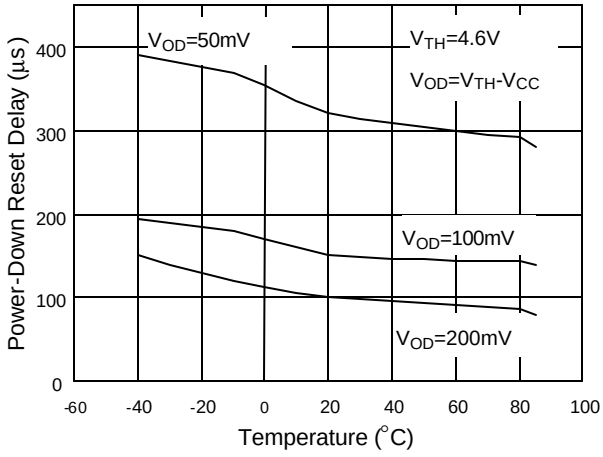


Fig 4 Power-Down Reset Delay vs. Temperature

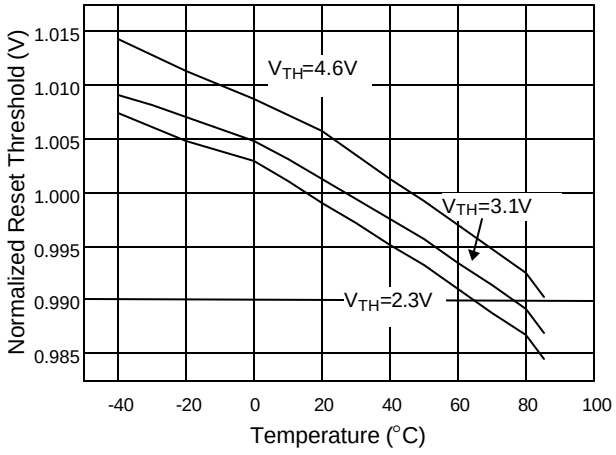


Fig 5 Normalized Reset Threshold vs. Temperature

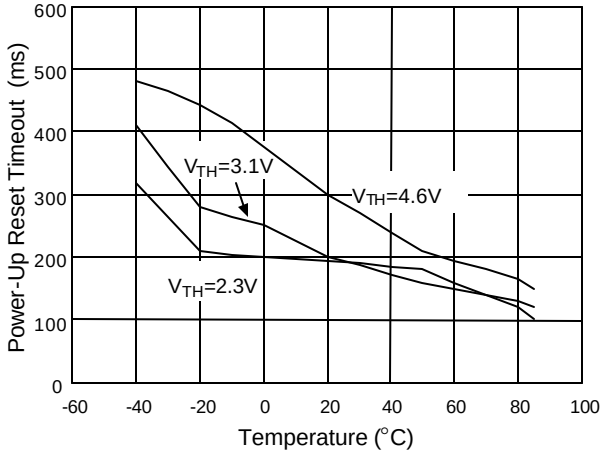
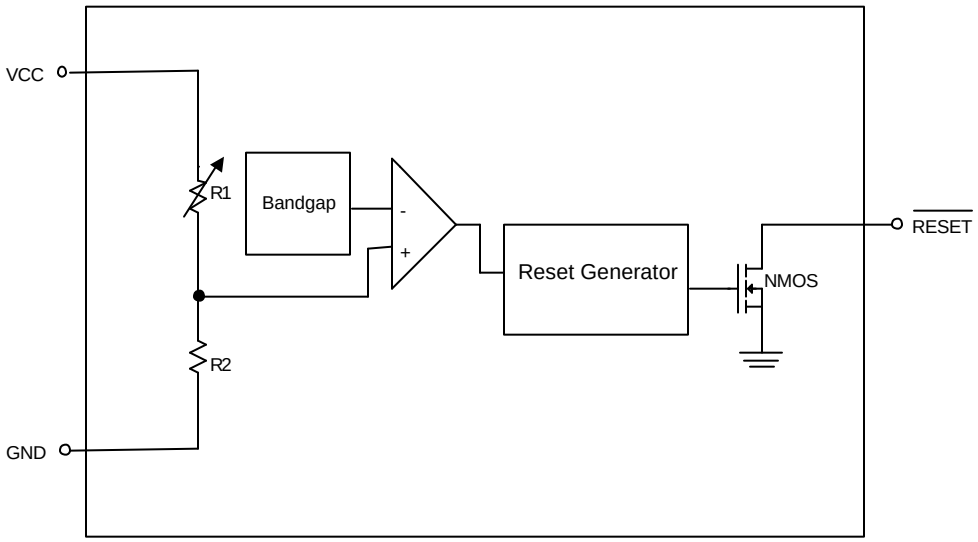
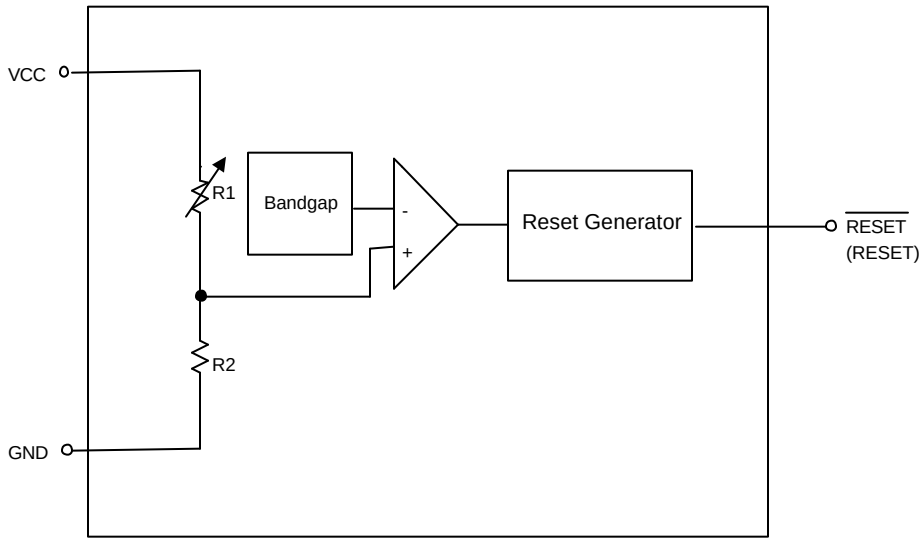


Fig 6 Power-Up Reset Timeout vs. Temperature

BLOCK DIAGRAM



N-ch Open-Drain Type



Push-Pull Type

PIN DESCRIPTIONS

GND Pin : Ground.

$\overline{\text{RESET}}$ Pin (SS809G) : Active low output pin. $\overline{\text{RESET}}$ Output remains low while Vcc is below the reset

RESET Pin (SS810G) : Active high output pin. RESET output remains high while Vcc is below the reset threshold.

Vcc Pin : Supply voltage.

DETAILED DESCRIPTIONS OF TECHNICAL TERMS

RESET OUTPUT

The µP will be activated at a valid reset state. These µP supervisory circuits assert reset to prevent code execution errors during power-up, power-down, or brownout conditions.

$\overline{RESET}$ is guaranteed to be a logic low for $V_{TH}>V_{CC}>0.9V$. Once V_{CC} exceeds the reset threshold, an internal timer keeps $\overline{RESET}$ low for the reset timeout period; after this interval, $\overline{RESET}$ goes high.

If a brownout condition occurs (V_{CC} drops below the reset threshold), $\overline{RESET}$ goes low. Any time V_{CC} goes below the reset threshold, the internal timer resets to zero, and $\overline{RESET}$ goes low. The internal timer is activated after V_{CC} returns above the reset threshold, and $\overline{RESET}$ remains low for the reset timeout period.

BENEFITS OF HIGHLY ACCURATE RESET THRESHOLD

The SS809G and SS810G with specified voltage as 5V± 10% or 3V±10% are ideal for systems using a 5V±5% or 3V±5% power supply. The reset is guaranteed to assert after the power supply falls out of regulation, but before the power drops below the minimum specified operating voltage range of the system ICs. The pre-trimmed thresholds reduce the range over which an undesirable reset may occur.

APPLICATION INFORMATION

NEGATIVE-GOING VCC TRANSIENTS

In addition to issuing a reset to the µP during power-up, power-down, and brownout conditions, the SS809G series are relatively resistant to short-duration negative-going VCC transients.

ENSURING A VALID RESET OUTPUT DOWN TO VCC=0

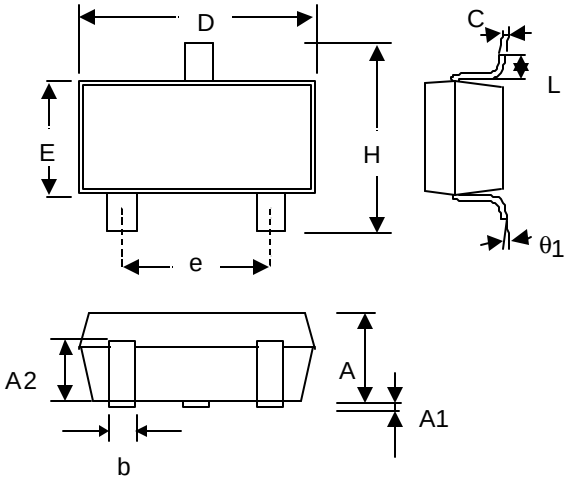
When VCC falls below 0.9V, the SS809G $\overline{RESET}$ output no longer sinks current; it becomes an open circuit. In this case, high-impedance CMOS logic inputs connected to $\overline{RESET}$ can drift to undetermined voltages. Therefore, the SS809G/810G are perfect for most CMOS applications down to VCC of 0.9V. However in applications where $\overline{RESET}$ must be valid down to 0V, adding a pull-down resistor to $\overline{RESET}$ causes any leakage currents to flow to ground, holding $\overline{RESET}$ low.

INTERFACING TO A MICROPROCESSOR WITH BIDIRECTIONAL RESET PINS

The $\overline{RESET}$ output on the SS809N is open drain, and this device interfaces easily with µPs that have bidirectional reset pins. Connecting the µP supervisor's $\overline{RESET}$ output directly to the microcontroller's $\overline{RESET}$ pin with a single pull-up resistor allows either device to assert reset.

PHYSICAL DIMENSIONS

SOT-23-3 (unit: mm)



SYMBOL	MIN	MAX
A	1.00	1.30
A1	—	0.10
A2	0.70	0.90
b	0.35	0.50
C	0.10	0.25
D	2.70	3.10
E	1.40	1.80
e	1.90 (TYP)	
H	2.60	3.00
L	0.37	—
θ1	1°	9°