

# SGM811 SGM812

# Microprocessor Supervisory with Manual Reset Input

## GENERAL DESCRIPTION

The SGM811/SGM812 supervisory circuits monitor the power supply voltage in microprocessor and digital systems. The SGM811/SGM812 is designed to monitor seven different voltages, these voltages have been selected for the effective monitoring of 2.5V, 3 V, 3.3 V, and 5 V supply voltage levels.

They provide a reset output during power-up, power-down and brownout conditions. On power-up, an internal timer holds reset asserted for 240 ms. This holds the microprocessor in a reset state until conditions have stabilized. The  $\overline{\text{RESET}}$  output remains operational with  $V_{CC}$  as low as 1 V. The SGM811 provides an active low reset signal ( $\overline{\text{RESET}}$ ) while the SGM812 provides an active high signal (RESET) output.

The SGM811/SGM812 has a manual reset input. The manual reset function is very useful, especially if the circuit in which the SGM811/SGM812 is operating enters into a state that can only be detected by the user. Allowing the user to reset a system manually can reduce the damage or danger that could otherwise be caused by an out-of-control or locked system. The devices come in a 4-pin SOT143 and 5-pin SOT23 packages.

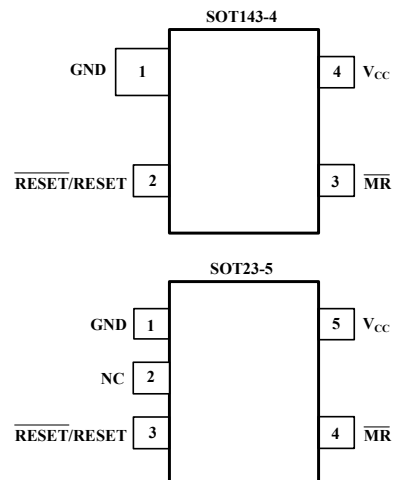
## APPLICATIONS

Microprocessor Systems  
Controllers  
Intelligent Instruments  
Automotive Systems  
Safety Systems  
Portable Instruments

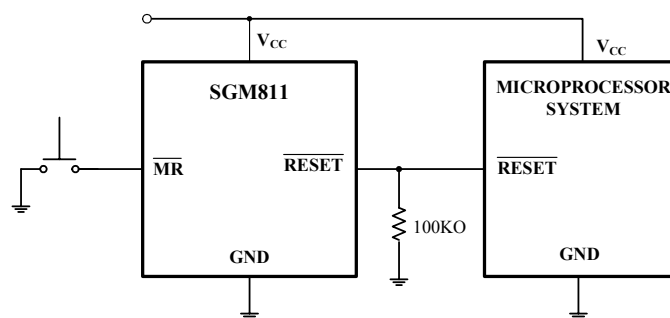
## FEATURES

- Superior Upgrade for MAX811/MAX812 and ADM811/ADM812
- Specified over Temperature
- Low Power Consumption (17  $\mu\text{A}$  Typ)
- Precision Voltage Monitor: 2.5V, 3 V, 3.3 V, 5 V Options
- Reset Assertion Down to 1 V  $V_{CC}$
- 160 ms Min Power-On Reset
  - Logic Low  $\overline{\text{RESET}}$  Output (SGM811)
  - Logic High RESET Output (SGM812)
- Manual Reset Input
- Compact 4-Pin SOT143 and 5-Pin SOT23 Packages

## PIN CONFIGURATIONS (TOP VIEW)



## TYPICAL OPERATION CIRCUIT



## ORDERING INFORMATION

ORDERING NUMBER	RESET THRESHOLD (V)	PECKAGE TYPE	SPECIFIED TEMPERATURE RANGE	PACKAGE MARKING	PACKAGE OPTION
SGM811-LXN5	4.63	SOT23-5	- 40°C to +125°C	811L	Tape and Reel, 3000
SGM811-M XN5	4.38	SOT23-5	- 40°C to +125°C	811M	Tape and Reel, 3000
SGM811-JXN5	4.00	SOT23-5	- 40°C to +125°C	811J	Tape and Reel, 3000
SGM811-T XN5	3.08	SOT23-5	- 40°C to +125°C	811T	Tape and Reel, 3000
SGM811-S XN5	2.93	SOT23-5	- 40°C to +125°C	811S	Tape and Reel, 3000
SGM811-R XN5	2.63	SOT23-5	- 40°C to +125°C	811R	Tape and Reel, 3000
SGM811-Z XN5	2.32	SOT23-5	- 40°C to +125°C	811Z	Tape and Reel, 3000
SGM811-LXKA4	4.63	SOT143-4	- 40°C to +125°C	811L	Tape and Reel, 3000
SGM811-MX KA4	4.38	SOT143-4	- 40°C to +125°C	811M	Tape and Reel, 3000
SGM811-JX KA4	4.00	SOT143-4	- 40°C to +125°C	811J	Tape and Reel, 3000
SGM811-TX KA4	3.08	SOT143-4	- 40°C to +125°C	811T	Tape and Reel, 3000
SGM811-SX KA4	2.93	SOT143-4	- 40°C to +125°C	811S	Tape and Reel, 3000
SGM811-RX KA4	2.63	SOT143-4	- 40°C to +125°C	811R	Tape and Reel, 3000
SGM811-Z X KA4	2.32	SOT143-4	- 40°C to +125°C	811Z	Tape and Reel, 3000
SGM812-LXN5	4.63	SOT23-5	- 40°C to +125°C	812L	Tape and Reel, 3000
SGM812-M XN5	4.38	SOT23-5	- 40°C to +125°C	812M	Tape and Reel, 3000
SGM812-JXN5	4.00	SOT23-5	- 40°C to +125°C	812J	Tape and Reel, 3000
SGM812-T XN5	3.08	SOT23-5	- 40°C to +125°C	812T	Tape and Reel, 3000
SGM812-S XN5	2.93	SOT23-5	- 40°C to +125°C	812S	Tape and Reel, 3000
SGM812-R XN5	2.63	SOT23-5	- 40°C to +125°C	812R	Tape and Reel, 3000
SGM812-Z XN5	2.32	SOT23-5	- 40°C to +125°C	812Z	Tape and Reel, 3000
SGM812-LX KA4	4.63	SOT143-4	- 40°C to +125°C	812L	Tape and Reel, 3000
SGM812-MX KA4	4.38	SOT143-4	- 40°C to +125°C	812M	Tape and Reel, 3000
SGM812-JX KA4	4.00	SOT143-4	- 40°C to +125°C	812J	Tape and Reel, 3000
SGM812-TX KA4	3.08	SOT143-4	- 40°C to +125°C	812T	Tape and Reel, 3000
SGM812-SX KA4	2.93	SOT143-4	- 40°C to +125°C	812S	Tape and Reel, 3000
SGM812-RX KA4	2.63	SOT143-4	- 40°C to +125°C	812R	Tape and Reel, 3000
SGM812-Z X KA4	2.32	SOT143-4	- 40°C to +125°C	812Z	Tape and Reel, 3000

# ELECTRICAL CHARACTERISTICS

(V<sub>CC</sub> Typ = 5 V for L/M/J Models, 3.3 V for T/S Models, 3 V for R Models, 2.5 V for Z Models; unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
<b>SUPPLY</b>					
Voltage	T <sub>A</sub> = 0°C to 70°C	1.0		5.5	V
	T <sub>A</sub> = - 40°C to +125°C	1.2		5.5	V
Current	V <sub>CC</sub> < 5.5 V, SGM81_L/M/J, T <sub>A</sub> = 25°C		20	30	μA
	V <sub>CC</sub> < 5.5 V, SGM81_L/M/J, T <sub>A</sub> = - 40°C to +125°C			50	μA
	V <sub>CC</sub> < 3.6 V, SGM81_R/S/T/Z, T <sub>A</sub> = 25°C		17	25	μA
	V <sub>CC</sub> < 3.6 V, SGM81_R/S/T/Z, T <sub>A</sub> = - 40°C to +125°C			45	μA
<b>RESET VOLTAGE THRESHOLD</b>					
SGM81_L	T <sub>A</sub> = 25°C	4.537	4.63	4.723	V
	T <sub>A</sub> = - 40°C to +125°C	4.40		4.86	V
SGM81_M	T <sub>A</sub> = 25°C	4.292	4.38	4.468	V
	T <sub>A</sub> = - 40°C to +125°C	4.16		4.56	V
SGM81_J	T <sub>A</sub> = 25°C	3.92	4.00	4.08	V
	T <sub>A</sub> = - 40°C to +125°C	3.8		4.2	V
SGM81_T	T <sub>A</sub> = 25°C	3.003	3.08	3.157	V
	T <sub>A</sub> = - 40°C to +125°C	2.92		3.23	V
SGM81_S	T <sub>A</sub> = 25°C	2.857	2.93	3.003	V
	T <sub>A</sub> = - 40°C to +125°C	2.78		3.08	V
SGM81_R	T <sub>A</sub> = 25°C	2.564	2.63	2.696	V
	T <sub>A</sub> = - 40°C to +125°C	2.50		2.76	V
SGM81_Z	T <sub>A</sub> = 25°C	2.262	2.23	2.378	V
	T <sub>A</sub> = - 40°C to +125°C	2.22		2.42	V
<b>RESET THRESHOLD</b> Temperature Coefficient			30		ppm/°C
V <sub>CC</sub> to RESET/ $\overline{\text{RESET}}$ Delay	V <sub>CC</sub> = V <sub>TH</sub> to (V <sub>TH</sub> - 100 mV)		20		μs
Reset Active Timeout Period	T <sub>A</sub> = - 40°C to +85°C	160	240	560	ms
	T <sub>A</sub> = - 40°C to +125°C	100		840	ms
<b>MANUAL RESET</b>					
Minimum Pulsewidth		10			μs
Glitch Immunity			100		ns
RESET/ $\overline{\text{RESET}}$ Propagation Delay			0.5		μs
Pull-Up Resistance			1		MΩ
The Manual Reset Circuit Will Act On:					
An Input Rising Above	V <sub>CC</sub> > V <sub>TH(MAX)</sub> , SGM81_L/M/J	2.3			V
An Input Falling Below	V <sub>CC</sub> > V <sub>TH(MAX)</sub> , SGM81_L/M/J			0.8	V
An Input Rising Above	V <sub>CC</sub> > V <sub>TH(MAX)</sub> , SGM81_R/S/T/Z	0.7 × V <sub>CC</sub>			V
An Input Falling Below	V <sub>CC</sub> > V <sub>TH(MAX)</sub> , SGM81_R/S/T/Z			0.25 × V <sub>CC</sub>	V

# ELECTRICAL CHARACTERISTICS (continued)

(V<sub>CC</sub> Typ = 5 V for L/M/J Models, 3.3 V for T/S Models, 3 V for R Models, 2.5 V for Z Models; unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
<b>RESET/RESET<sup>¯</sup> OUTPUT VOLTAGE</b>					
Low (SGM811R/S/T/Z)	V <sub>CC</sub> = V <sub>TH(MIN)</sub> , I <sub>SINK</sub> = 1.2mA			0.3	V
Low (SGM811L/M/J)	V <sub>CC</sub> = V <sub>TH(MIN)</sub> , I <sub>SINK</sub> = 3.2mA			0.4	V
Low (SGM811R/S/T/Z/L/M/J)	V <sub>CC</sub> > 1.0 V, I <sub>SINK</sub> = 50µA			0.3	V
High (SGM811R/S/T/Z)	V <sub>CC</sub> > V <sub>TH(MAX)</sub> , I <sub>SOURCE</sub> = 500µA	0.8×V <sub>CC</sub>			V
High (SGM811L/M/J)	V <sub>CC</sub> > V <sub>TH(MAX)</sub> , I <sub>SOURCE</sub> = 800µA	V <sub>CC</sub> - 1.5			V
Low (SGM812R/S/T/Z)	V <sub>CC</sub> = V <sub>TH(MAX)</sub> , I <sub>SINK</sub> = 1.2mA			0.3	V
Low (SGM812L/M/J)	V <sub>CC</sub> = V <sub>TH(MAX)</sub> , I <sub>SINK</sub> = 3.2mA			0.4	V
High (SGM812 R/S/T/Z/L/M/J)	1.8 V < V <sub>CC</sub> < V <sub>TH(MIN)</sub> , I <sub>SOURCE</sub> = 150µA	0.8×V <sub>CC</sub>			V

Specifications subject to change without notice.

## ABSOLUTE MAXIMUM RATINGS

(Typical values are at T<sub>A</sub> = 25°C, unless otherwise noted.)

Terminal Voltage (With Respect to Ground)

V<sub>CC</sub>.....-0.3 V to +6 V

All Other Inputs ..... -0.3 V to V<sub>CC</sub> + 0.3 V

Input Current

V<sub>CC</sub>, MR ..... 20 mA

Output Current

RESET, RESET<sup>¯</sup> ..... 20 mA

Power Dissipation, P<sub>D</sub> @ T<sub>A</sub> = 25°C

SOT23-5 .....0.4W

SOT143-4..... 0.32W

Operating Temperature Range.....- 40°C to +125°C

Junction Temperature.....+150°C

Storage Temperature.....- 65°C to +150°C

Lead Temperature (soldering, 10s).....+260°C

ESD Susceptibility

HBM.....4000V

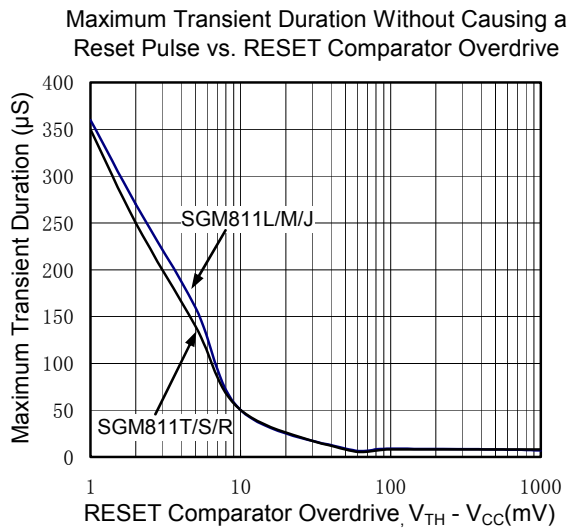
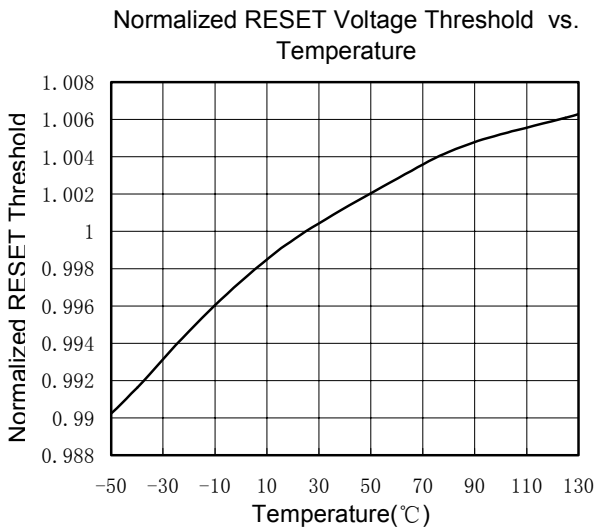
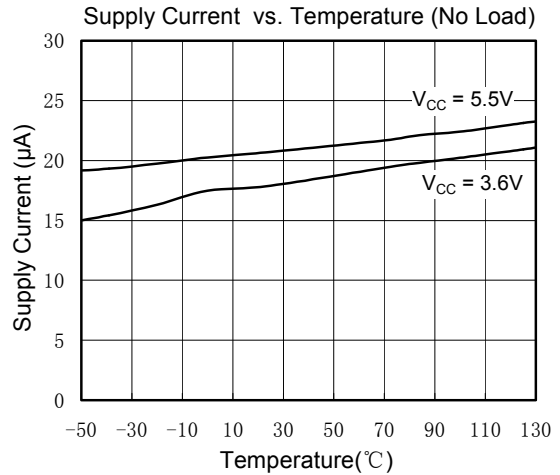
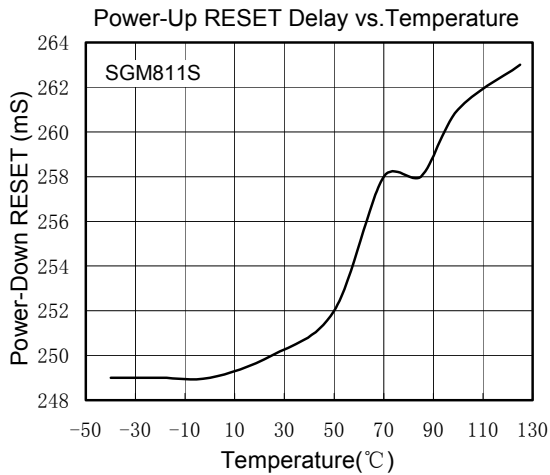
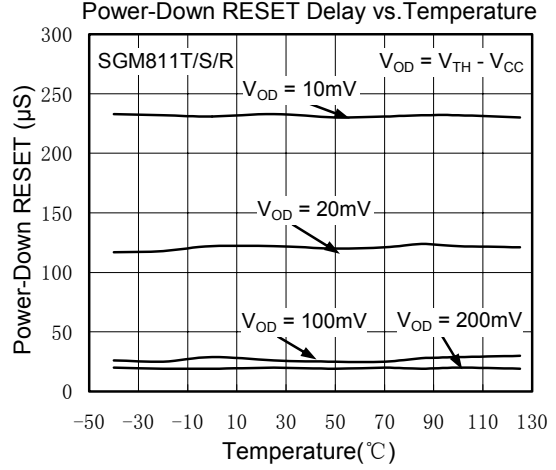
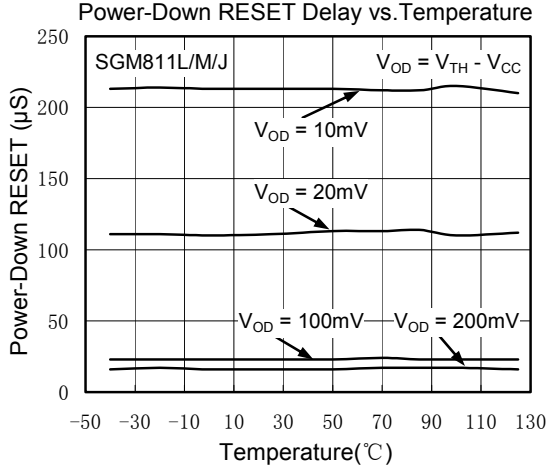
MM.....400V

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## PIN DESCRIPTION

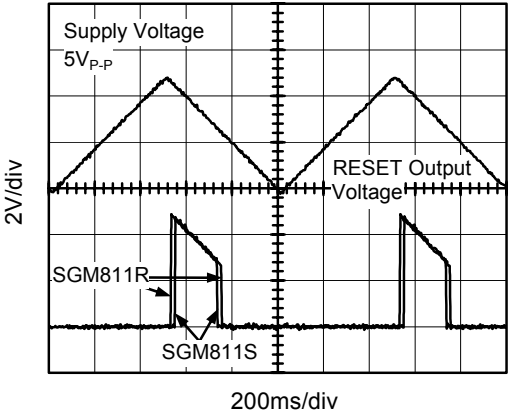
NAME	Pin Number			FUNCTION
	SGM811		SGM812	
	SOT143-4	SOT23-5	SOT143-4	
GND	1	1	1	Ground
NC		2		No connect.
RESET <sup>¯</sup>	2	3	—	Active Low Logic Output. RESET <sup>¯</sup> remains low while V <sub>CC</sub> is below the reset threshold or when MR is low; RESET <sup>¯</sup> then remains low for at least 160 ms after V <sub>CC</sub> rises above the reset threshold.
RESET	—	—	2	Active High Logic Output. RESET remains high while V <sub>CC</sub> is below the reset threshold or when MR is low; RESET then remains high for 240 ms (typical) after V <sub>CC</sub> rises above the reset threshold.
MR <sup>¯</sup>	3	4	3	Manual Reset. This active low debounced input will ignore input pulses of 100 ns or less (typical) and is guaranteed to accept input pulses of greater than 10 µs. Leave floating when not used.
V <sub>CC</sub>	4	5	4	Power supply voltage that is monitored.

# TYPICAL PERFORMANCE CHARACTERISTICS



# TYPICAL PERFORMANCE CHARACTERISTICS

RESET Output Voltage vs. Supply Voltage



# APPLICATION NOTES

## MANUAL RESET

The SGM811/SGM812 is equipped with a manual reset input. This input is designed to operate in a noisy environment where unwanted glitches could be induced. These glitches could be produced by the bouncing action of a switch contact, or where a manual reset switch may be located some distance away from the circuit (the cabling of which may pick-up noise).

The manual reset input is guaranteed to ignore logically valid inputs that are faster than 100 ns and to accept inputs longer in duration than 10  $\mu$ s.

## BENEFITS OF A VERY ACCURATE RESET THRESHOLD

Because the SGM811/SGM812 can operate effectively even when there are large degradations of the supply voltages, the possibility of a malfunction during a power failure is greatly reduced. Another advantage of the SGM811/SGM812 is its very accurate internal voltage reference circuit. Combined, these benefits produce an exceptionally reliable microprocessor supervisory circuit.

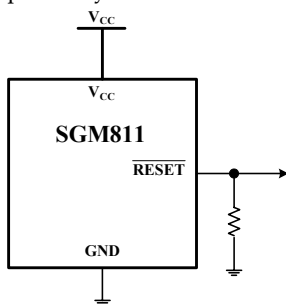


Figure 1. Ensuring a Valid  $\overline{RESET}$  Output Down to  $V_{CC} = 0V$

## ENSURING A VALID RESET OUTPUT DOWN TO $V_{CC} = 0V$

When  $V_{CC}$  falls below 1.0 V, the SGM811/SGM812's  $\overline{RESET}$  no longer sinks current. Therefore, a high impedance CMOS logic input connected to  $\overline{RESET}$  may drift to undetermined logic levels. To eliminate this problem, a 100 k $\Omega$  resistor should be connected from  $\overline{RESET}$  to ground.

## RESET OUTPUT

On power-up and after  $V_{CC}$  rises above the reset threshold, an internal timer holds the reset output active for 240 ms (typical). This is intended as a power-on reset signal for the processor. It allows time for both the power supply and the microprocessor to stabilize after power-up. If a power supply brownout or interruption occurs, the reset output is similarly activated and remains active for 240 ms (typical) after the supply recovers. This allows time for the power supply and microprocessor to stabilize.

The SGM811 provides an active low reset output ( $\overline{RESET}$ ) while the SGM812 provides an active high output ( $RESET$ ). During power-down of the SGM811, the  $\overline{RESET}$  output remains valid (low) with  $V_{CC}$  as low as 1 V. This ensures that the microprocessor is held in a stable shutdown condition as the supply falls and also ensures that no spurious activity can occur via the microprocessor as it powers up.

## Glitch Immunity

The SGM811/SGM812 contains internal filtering circuitry providing glitch immunity from fast transient glitches on the power supply line.

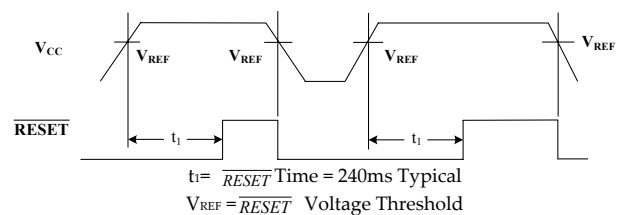


Figure 2. Power Fail  $\overline{RESET}$  Timing

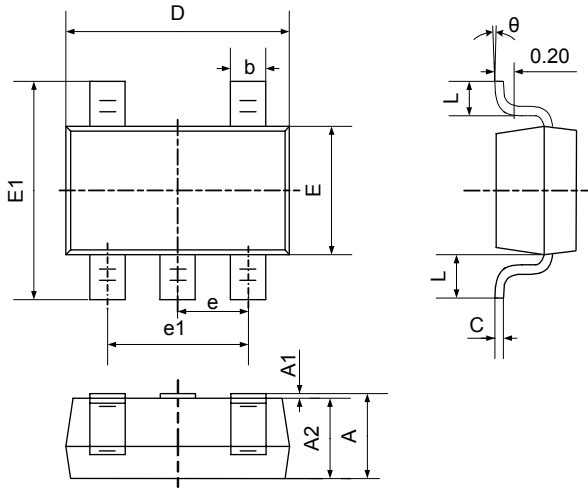
## INTERFACING TO OTHER DEVICES

### Output

The SGM811/SGM812 is designed to integrate with as many devices as possible. One feature of the SGM811/SGM812 is the reset output, which is directly proportional to  $V_{CC}$  (this is guaranteed only while  $V_{CC}$  is greater than 1 V). This enables the part to be used with both 3 V and 5 V, or any nominal voltage within the minimum and maximum specifications for  $V_{CC}$ .

# PACKAGE OUTLINE DIMENSIONS

## SOT23-5

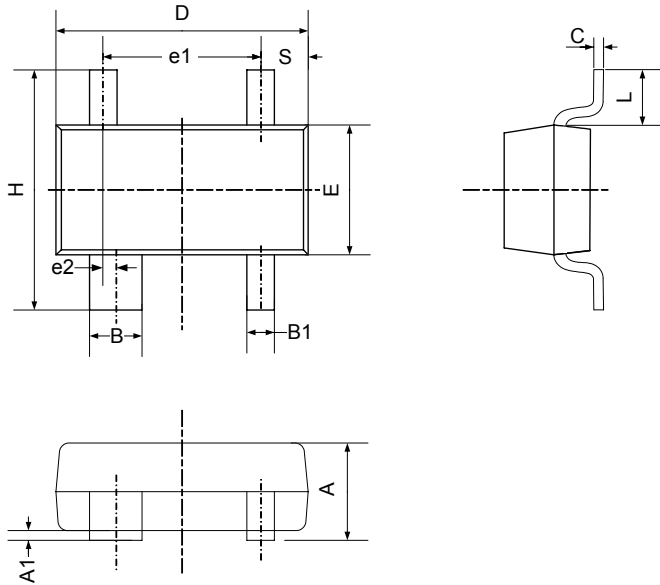


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



# PACKAGE OUTLINE DIMENSIONS

## SOT143- 4



Symbol	Dimensions In Millimeters	
	Min	Max
A	0.890	1.120
A1	0.013	0.100
B	0.760	0.940
B1	0.370	0.510
C	0.085	0.180
D	2.800	3.040
E	1.200	1.400
e1	1.920 BSC	
e2	0.200 BSC	
H	2.100	2.640
L	0.55 REF	
S	0.450	0.600