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, 3V, 3.3V, and 5V 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 240ms. 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 1V. 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 SOT-143 and SOT-23-5 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 (13μA TYP)**
- **Precision Voltage Monitor: 2.5V, 3V, 3.3V, 5V Options**
- **Reset Assertion Down to 1V V_{CC}**
- **150ms Min Power-On Reset**
    Logic Low $\overline{\text{RESET}}$ Output (SGM811)
    Logic High RESET Output (SGM812)
- **Manual Reset Input**
- **Green SOT-143 and SOT-23-5 Packages**

PIN CONFIGURATIONS (TOP VIEW)
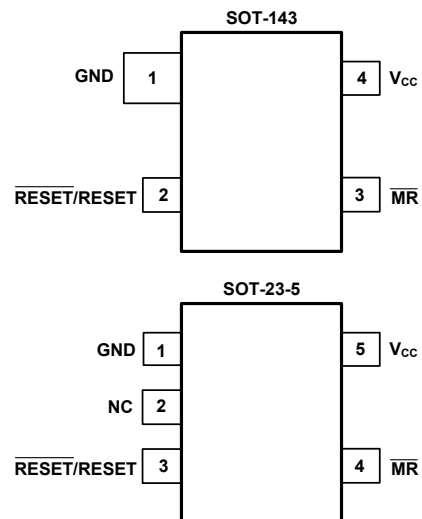
TYPICAL OPERATION CIRCUIT
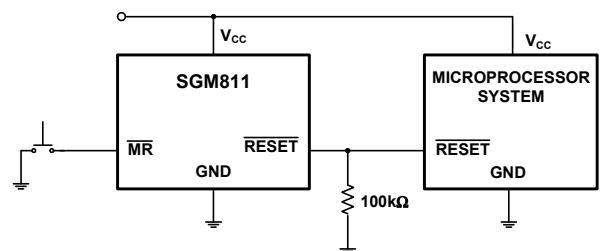
PACKAGE/ORDERING INFORMATION

ORDERING NUMBER	RESET THRESHOLD (V)	PECKAGE TYPE	SPECIFIED TEMPERATURE RANGE	PACKAGE MARKING	PACKAGE OPTION
SGM811-LXN5/TR	4.63	SOT-23-5	-40℃ to +125℃	811L	Tape and Reel, 3000
SGM811-MXN5/TR	4.38	SOT-23-5	-40℃ to +125℃	811M	Tape and Reel, 3000
SGM811-JXN5/TR	4.00	SOT-23-5	-40℃ to +125℃	811J	Tape and Reel, 3000
SGM811-TXN5/TR	3.08	SOT-23-5	-40℃ to +125℃	811T	Tape and Reel, 3000
SGM811-SXN5/TR	2.93	SOT-23-5	-40℃ to +125℃	811S	Tape and Reel, 3000
SGM811-RXN5/TR	2.63	SOT-23-5	-40℃ to +125℃	811R	Tape and Reel, 3000
SGM811-ZXN5/TR	2.32	SOT-23-5	-40℃ to +125℃	811Z	Tape and Reel, 3000
SGM811-LXKA4/TR	4.63	SOT-143	-40℃ to +125℃	811L	Tape and Reel, 3000
SGM811-MXKA4/TR	4.38	SOT-143	-40℃ to +125℃	811M	Tape and Reel, 3000
SGM811-JXKA4/TR	4.00	SOT-143	-40℃ to +125℃	811J	Tape and Reel, 3000
SGM811-TXKA4/TR	3.08	SOT-143	-40℃ to +125℃	811T	Tape and Reel, 3000
SGM811-SXKA4/TR	2.93	SOT-143	-40℃ to +125℃	811S	Tape and Reel, 3000
SGM811-RXKA4/TR	2.63	SOT-143	-40℃ to +125℃	811R	Tape and Reel, 3000
SGM811-ZXKA4/TR	2.32	SOT-143	-40℃ to +125℃	811Z	Tape and Reel, 3000
SGM812-LXN5/TR	4.63	SOT-23-5	-40℃ to +125℃	812L	Tape and Reel, 3000
SGM812-M XN5/TR	4.38	SOT-23-5	-40℃ to +125℃	812M	Tape and Reel, 3000
SGM812-JXN5/TR	4.00	SOT-23-5	-40℃ to +125℃	812J	Tape and Reel, 3000
SGM812-TXN5/TR	3.08	SOT-23-5	-40℃ to +125℃	812T	Tape and Reel, 3000
SGM812-SXN5/TR	2.93	SOT-23-5	-40℃ to +125℃	812S	Tape and Reel, 3000
SGM812-RXN5/TR	2.63	SOT-23-5	-40℃ to +125℃	812R	Tape and Reel, 3000
SGM812-ZXN5/TR	2.32	SOT-23-5	-40℃ to +125℃	812Z	Tape and Reel, 3000
SGM812-LXKA4/TR	4.63	SOT-143	-40℃ to +125℃	812L	Tape and Reel, 3000
SGM812-MXKA4/TR	4.38	SOT-143	-40℃ to +125℃	812M	Tape and Reel, 3000
SGM812-JXKA4/TR	4.00	SOT-143	-40℃ to +125℃	812J	Tape and Reel, 3000
SGM812-TXKA4/TR	3.08	SOT-143	-40℃ to +125℃	812T	Tape and Reel, 3000
SGM812-SXKA4/TR	2.93	SOT-143	-40℃ to +125℃	812S	Tape and Reel, 3000
SGM812-RXKA4/TR	2.63	SOT-143	-40℃ to +125℃	812R	Tape and Reel, 3000
SGM812-ZXKA4/TR	2.32	SOT-143	-40℃ to +125℃	812Z	Tape and Reel, 3000

ELECTRICAL CHARACTERISTICS

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

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
SUPPLY					
Voltage	T_A = 0℃ to +70℃	1.0		5.5	V
	T_A = -40℃ to +125℃	1.2		5.5	V
Current	V_{CC} < 5.5V, SGM81_L/M/J, T_A = +25℃		17	30	µA
	V_{CC} < 5.5V, SGM81_L/M/J, T_A = -40℃ to +125℃			50	µA
	V_{CC} < 3.6V, SGM81_R/S/T/Z, T_A = +25℃		13	25	µA
	V_{CC} < 3.6V, SGM81_R/S/T/Z, T_A = -40℃ to +125℃			45	µA
RESET VOLTAGE THRESHOLD					
SGM81_L	T_A = +25℃	4.537	4.63	4.723	V
	T_A = -40℃ to +125℃	4.40		4.86	V
SGM81_M	T_A = +25℃	4.292	4.38	4.468	V
	T_A = -40℃ to +125℃	4.16		4.56	V
SGM81_J	T_A = +25℃	3.92	4.00	4.08	V
	T_A = -40℃ to +125℃	3.8		4.2	V
SGM81_T	T_A = +25℃	3.003	3.08	3.157	V
	T_A = -40℃ to +125℃	2.92		3.23	V
SGM81_S	T_A = +25℃	2.857	2.93	3.003	V
	T_A = -40℃ to +125℃	2.78		3.08	V
SGM81_R	T_A = +25℃	2.564	2.63	2.696	V
	T_A = -40℃ to +125℃	2.50		2.76	V
SGM81_Z	T_A = +25℃	2.262	2.32	2.378	V
	T_A = -40℃ to +125℃	2.22		2.42	V
Reset Threshold Temperature Coefficient			30		ppm/°C
V_{CC} to RESET/$\overline{\text{RESET}}$ Delay	V_{CC} = V_{TH} to (V_{TH} - 100mV)		20		µs
Reset Active Timeout Period	T_A = -40℃ to +85℃	150	240	560	ms
	T_A = -40℃ to +125℃	100		840	ms
MANUAL RESET					
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_{CC} > $V_{TH(MAX)}$, SGM81_L/M/J	2.3			V
An Input Falling Below	V_{CC} > $V_{TH(MAX)}$, SGM81_L/M/J			0.8	V
An Input Rising Above	V_{CC} > $V_{TH(MAX)}$, SGM81_R/S/T/Z	0.7 × V_{CC}			V
An Input Falling Below	V_{CC} > $V_{TH(MAX)}$, SGM81_R/S/T/Z			0.25 × V_{CC}	V
RESET/$\overline{\text{RESET}}$ OUTPUT VOLTAGE					
Low (SGM811R/S/T/Z)	V_{CC} = $V_{TH(MIN)}$, I_{SINK} = 1.2mA			0.3	V
Low (SGM811L/M/J)	V_{CC} = $V_{TH(MIN)}$, I_{SINK} = 3.2mA			0.4	V
Low (SGM811R/S/T/Z/L/M/J)	V_{CC} > 1.0V, I_{SINK} = 50µA			0.3	V
High (SGM811R/S/T/Z)	V_{CC} > $V_{TH(MAX)}$, I_{SOURCE} = 500µA	0.8 × V_{CC}			V
High (SGM811L/M/J)	V_{CC} > $V_{TH(MAX)}$, I_{SOURCE} = 800µA	V_{CC} - 1.5			V
Low (SGM812R/S/T/Z)	V_{CC} = $V_{TH(MAX)}$, I_{SINK} = 1.2mA			0.3	V
Low (SGM812L/M/J)	V_{CC} = $V_{TH(MAX)}$, I_{SINK} = 3.2mA			0.4	V
High (SGM812 R/S/T/Z/L/M/J)	1.8 V < V_{CC} < $V_{TH(MIN)}$, I_{SOURCE} = 150µA	0.8 × V_{CC}			V

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ABSOLUTE MAXIMUM RATINGS

(Typical values are at T_A = +25°C, unless otherwise noted.)
Terminal Voltage (With Respect to Ground)
V_{CC}...-0.3V to 6V
All Other Inputs...-0.3V to V_{CC} + 0.3V
Input Current
V_{CC}, $\overline{MR}$ 20mA
Output Current
RESET, $\overline{RESET}$ 20mA
Power Dissipation, P_D @ T_A = +25°C
SOT-23-5 ....0.4W
SOT-143... 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.

CAUTION

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.
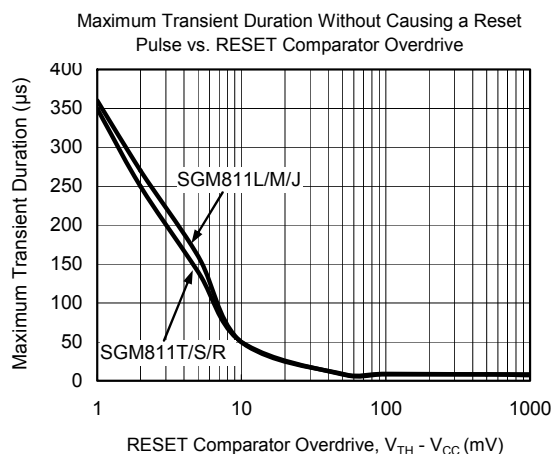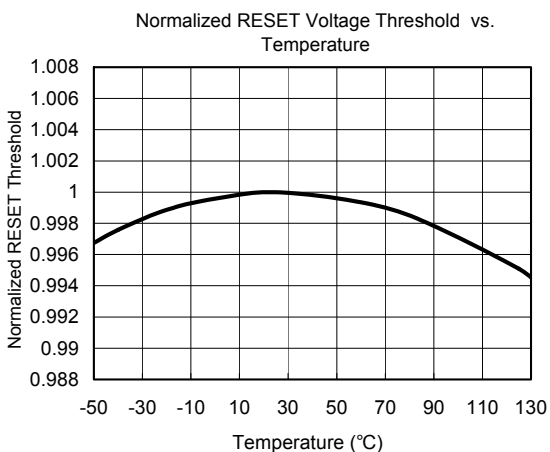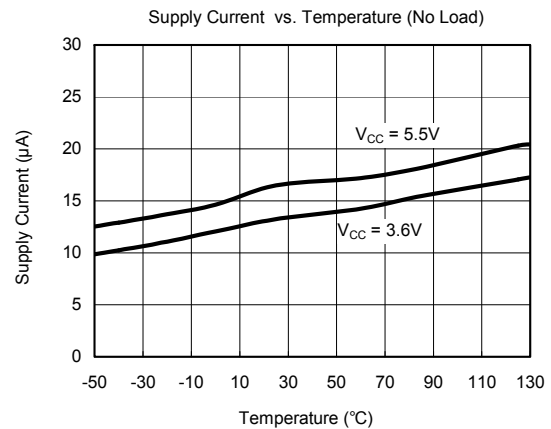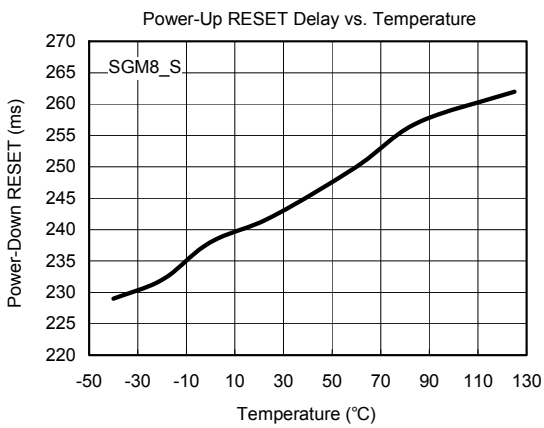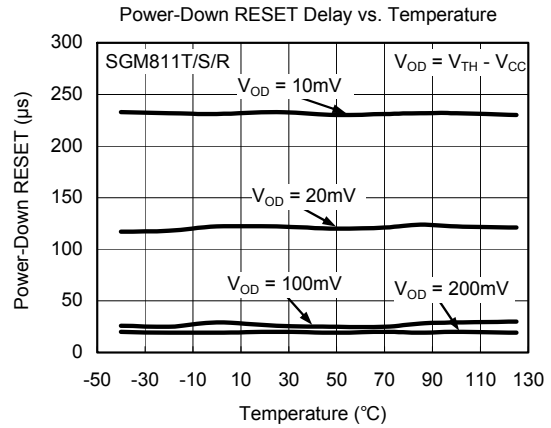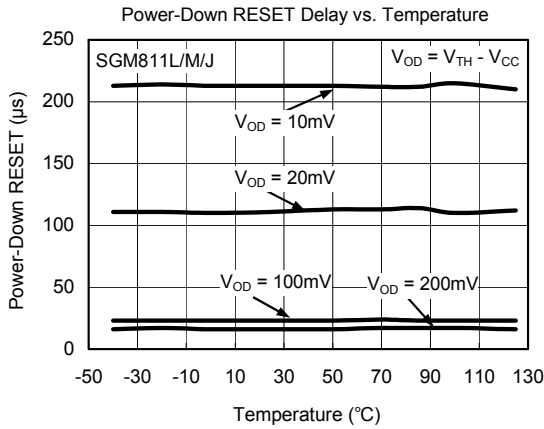
SGMICRO reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SGMICRO sales office to get the latest datasheet.

PIN DESCRIPTION

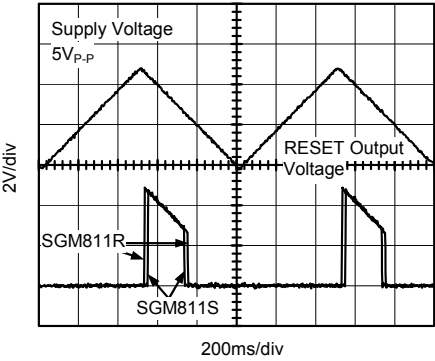| NAME	PIN NUMBER			FUNCTION
	SGM811		**SGM812**	
	SOT-143	SOT-23-5	SOT-143	
GND	1	1	1	Ground
NC		2		No connect.
$\overline{RESET}$	2	3	—	Active Low Logic Output. $\overline{RESET}$ remains low while V_{CC} is below the reset threshold or when $\overline{MR}$ is low; $\overline{RESET}$ then remains low for at least 150ms after V_{CC} rises above the reset threshold.
RESET	—	—	2	Active High Logic Output. RESET remains high while V_{CC} is below the reset threshold or when $\overline{MR}$ is low; RESET then remains high for 240ms (typical) after V_{CC} rises above the reset threshold.
$\overline{MR}$	3	4	3	Manual Reset. This active low debounced input will ignore input pulses of 100ns or less (typical) and is guaranteed to accept input pulses of greater than 10µs. Leave floating when not used.
V_{CC}	4	5	4	Power supply voltage that is monitored.

TYPICAL PERFORMANCE CHARACTERISTICS

Power-Down RESET Delay vs. Temperature

SGM811L/M/J $V_{OD} = V_{TH} - V_{CC}$

$V_{OD} = 10mV$

$V_{OD} = 20mV$

$V_{OD} = 100mV$ $V_{OD} = 200mV$

Power-Down RESET Delay vs. Temperature

SGM811T/S/R $V_{OD} = V_{TH} - V_{CC}$

$V_{OD} = 10mV$

$V_{OD} = 20mV$

$V_{OD} = 100mV$ $V_{OD} = 200mV$

Power-Up RESET Delay vs. Temperature

SGM8_S

Supply Current vs. Temperature (No Load)

$V_{CC} = 5.5V$

$V_{CC} = 3.6V$

Normalized RESET Voltage Threshold vs.
Temperature

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

SGM811L/M/J

SGM811T/S/R

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 100ns and to accept inputs longer in duration than 10μs.

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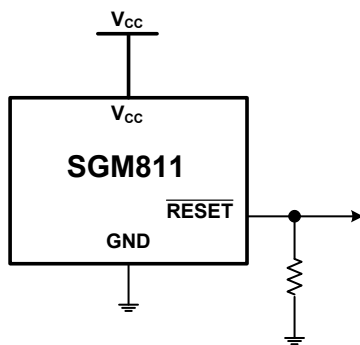
Figure 1. Ensuring a Valid $\overline{\text{RESET}}$ Output Down to V_{CC} = 0V

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

When V_{CC} falls below 1.0 V, the SGM811/SGM812's $\overline{\text{RESET}}$ no longer sinks current. Therefore, a high impedance CMOS logic input connected to $\overline{\text{RESET}}$ may drift to undetermined logic levels. To eliminate this problem, a 100kΩ resistor should be connected from $\overline{\text{RESET}}$ 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 240ms (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 240ms (typical) after the supply recovers. This allows time for the power supply and microprocessor to stabilize.

The SGM811 provides an active low reset output ($\overline{\text{RESET}}$) while the SGM812 provides an active high output ($\overline{\text{RESET}}$). During power-down of the SGM811, the $\overline{\text{RESET}}$ output remains valid (low) with V_{CC} as low as 1V. 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.
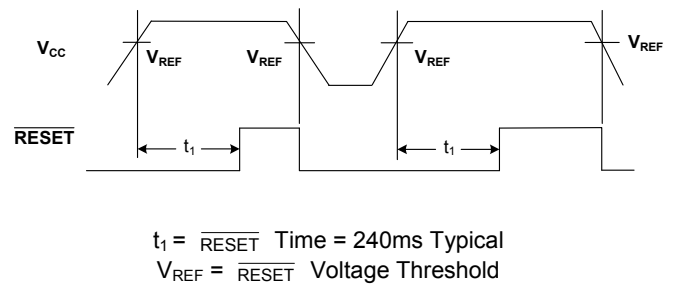

$t_1 = \overline{\text{RESET}}$ Time = 240ms Typical
$V_{REF} = \overline{\text{RESET}}$ Voltage Threshold

Figure 2. Power Fail $\overline{\text{RESET}}$ 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 1V). This enables the part to be used with both 3V and 5V, or any nominal voltage within the minimum and maximum specifications for V_{CC}.
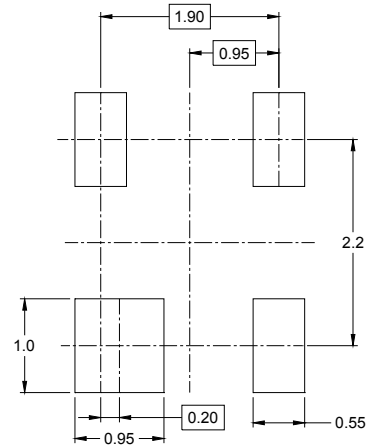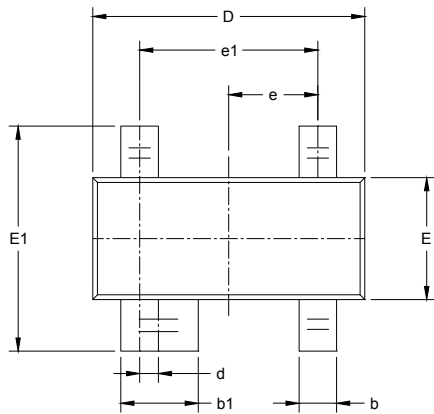
PACKAGE OUTLINE DIMENSIONS

SOT-23-5
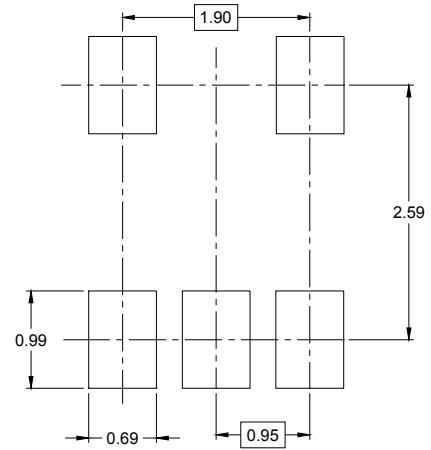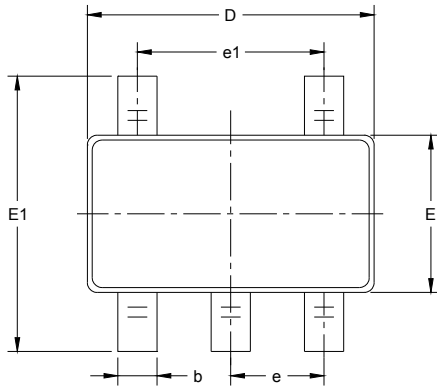
RECOMMENDED LAND PATTERN (Unit: mm)
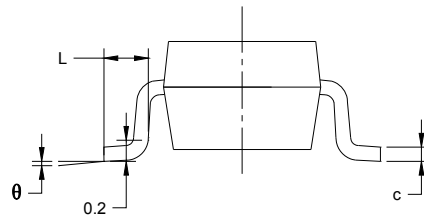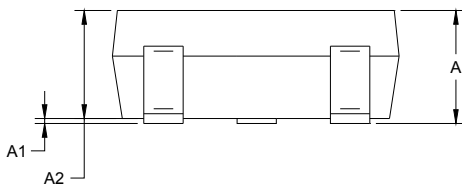
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

SOT-143

RECOMMENDED LAND PATTERN (Unit: mm)
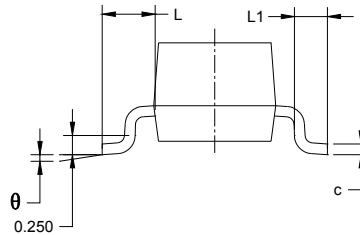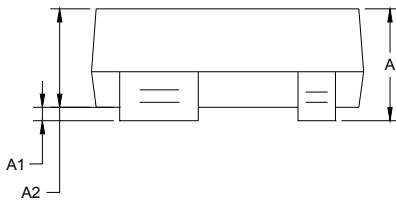
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	**MAX**	**MIN**	**MAX**
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
b1	0.750	0.900	0.030	0.035
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
d	0.200 TYP		0.008 TYP	
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.95 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.55 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

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TAPE AND REEL INFORMATION

REEL DIMENSIONS

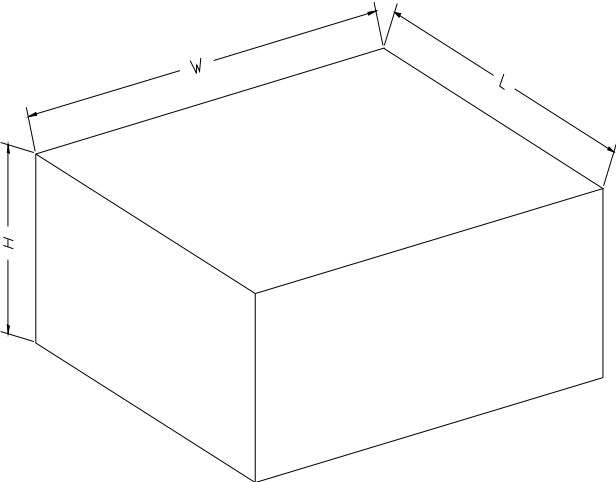**TAPE DIMENSIONS**
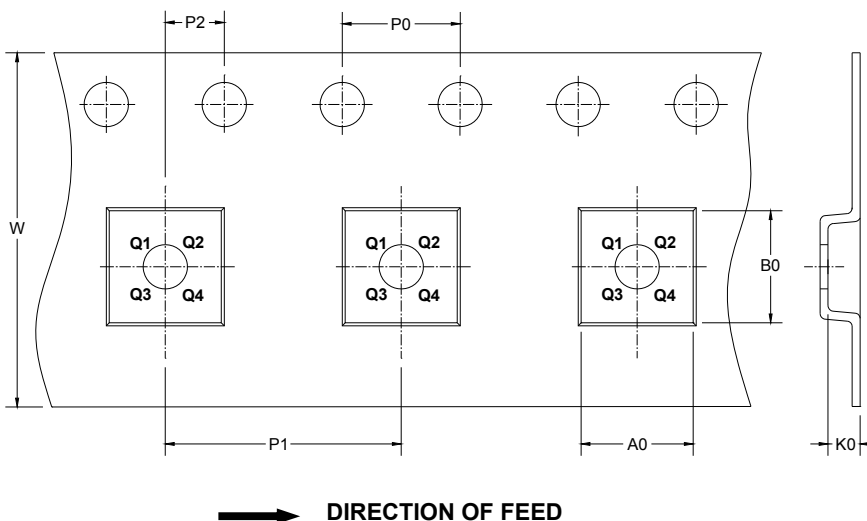
DIRECTION OF FEED

NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOT-23-5	7″	9.5	3.2	3.2	1.4	4.0	4.0	2.0	8.0	Q3
SOT-143	7″	9.5	3.2	2.8	1.3	4.0	4.0	2.0	8.0	Q3

CARTON BOX DIMENSIONS

NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7″ (Option)	368	227	224	8
7″	442	410	224	18