SGM811C/SGM812C
Microprocessor Supervisory Circuits with Manual Reset Input

GENERAL DESCRIPTION

The SGM811C and SGM812C are integrated microprocessor supervisory devices which can be reset under power-up, power-down or even voltage reduction brownout conditions. When V_{CC} is as low as 1V, the reset output can still operate. On the power-on state, the internal timer maintains a 200ms reset assertion, which keeps the microprocessor in the reset state until the condition is stable.

The SGM811C has an active-low nRESET output, while the SGM812C has an active-high RESET output. These devices provide seven reset threshold voltage options for 1.8V, 2.5V, 3V, 3.3V and 5V voltage monitoring.

These devices also provide a manual reset (nMR) function. It can reduce damage if the device loses its control or is locked.

The SGM811C and SGM812C are available in a Green SOT-143 package. They operates over a junction temperature range of -40℃ to +125℃.

FEATURES

- **Superior Upgrade for MAX811/MAX812 and ADM811/ADM812**
- **High Accuracy Fixed Detection Options: 1.8V, 2.5V, 3V, 3.3V and 5V**
- **Low Supply Current: < 1µA (TYP)**
- **200ms (TYP) Power-on Reset Pulse Width**
- **Reset Output Options:**
  - **Active-Low nRESET Output: SGM811C**
  - **Active-High RESET Output: SGM812C**
- **Manual Reset Input**
- **Reset Valid Down to V_{CC} = 1V**
- **Available in a Green SOT-143 Package**

APPLICATIONS

Computers
Battery-Powered Applications
Portable Equipment
Automotive Equipment
Safety Systems
Intelligent Instruments
Critical µP Power Monitoring

TYPICAL APPLICATION
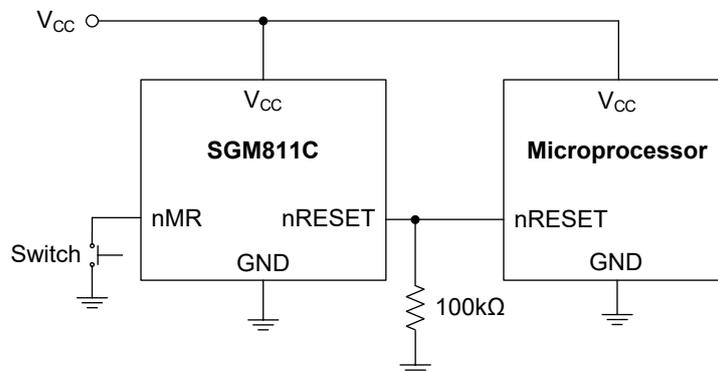
Figure 1. Typical Application Circuit Example

PACKAGE/ORDERING INFORMATION

MODEL	RESET THRESHOLD (V)	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM811C	4.43	SOT-143	-40℃ to +125℃	SGM811C-MXKA4G/TR	045XX	Tape and Reel, 3000
	4.05	SOT-143	-40℃ to +125℃	SGM811C-JXKA4G/TR	047XX	Tape and Reel, 3000
	3.09	SOT-143	-40℃ to +125℃	SGM811C-TXKA4G/TR	044XX	Tape and Reel, 3000
	2.93	SOT-143	-40℃ to +125℃	SGM811C-SXKA4G/TR	MCQXX	Tape and Reel, 3000
	2.63	SOT-143	-40℃ to +125℃	SGM811C-RXKA4G/TR	010XX	Tape and Reel, 3000
	2.33	SOT-143	-40℃ to +125℃	SGM811C-ZXKA4G/TR	011XX	Tape and Reel, 3000
	1.67	SOT-143	-40℃ to +125℃	SGM811C-WXKA4G/TR	MCRXX	Tape and Reel, 3000
SGM812C	4.43	SOT-143	-40℃ to +125℃	SGM812C-MXKA4G/TR	0AOXX	Tape and Reel, 3000
	4.05	SOT-143	-40℃ to +125℃	SGM812C-JXKA4G/TR	0APXX	Tape and Reel, 3000
	3.09	SOT-143	-40℃ to +125℃	SGM812C-TXKA4G/TR	0AQXX	Tape and Reel, 3000
	2.93	SOT-143	-40℃ to +125℃	SGM812C-SXKA4G/TR	0ARXX	Tape and Reel, 3000
	2.63	SOT-143	-40℃ to +125℃	SGM812C-RXKA4G/TR	0ASXX	Tape and Reel, 3000
	2.33	SOT-143	-40℃ to +125℃	SGM812C-ZXKA4G/TR	0ATXX	Tape and Reel, 3000
	1.67	SOT-143	-40℃ to +125℃	SGM812C-WXKA4G/TR	1Z0XX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XX = Date Code.

YYY X X
└─ Date Code - Week
└─ Date Code - Year
└─ Serial Number

Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

V_{CC}.. -0.3V to 6V

All Other Inputs .... -0.3V to V_{CC} + 0.3V

Input Current

V_{CC}, nMR 20mA

Output Current

nRESET/RESET 20mA

Package Thermal Resistance

SOT-143, θ_{JA} .... 305℃/W

Junction Temperature .... +150℃

Storage Temperature Range .... -65℃ to +150℃

Lead Temperature (Soldering, 10s) .... +260℃

ESD Susceptibility

HBM 4000V

CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Operating Junction Temperature Range...... -40℃ to +125℃

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

ESD SENSITIVITY CAUTION

This integrated circuit can be damaged if ESD protections are not considered carefully. 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 even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATION

SGM811C (TOP VIEW)

```
        ┌─────────────┐
GND   1 │             │ 4   V_CC
        │             │
nRESET 2│             │ 3   nMR
        └─────────────┘
```

SOT-143

SGM812C (TOP VIEW)

```
        ┌─────────────┐
GND   1 │             │ 4   V_CC
        │             │
RESET 2 │             │ 3   nMR
        └─────────────┘
```

SOT-143
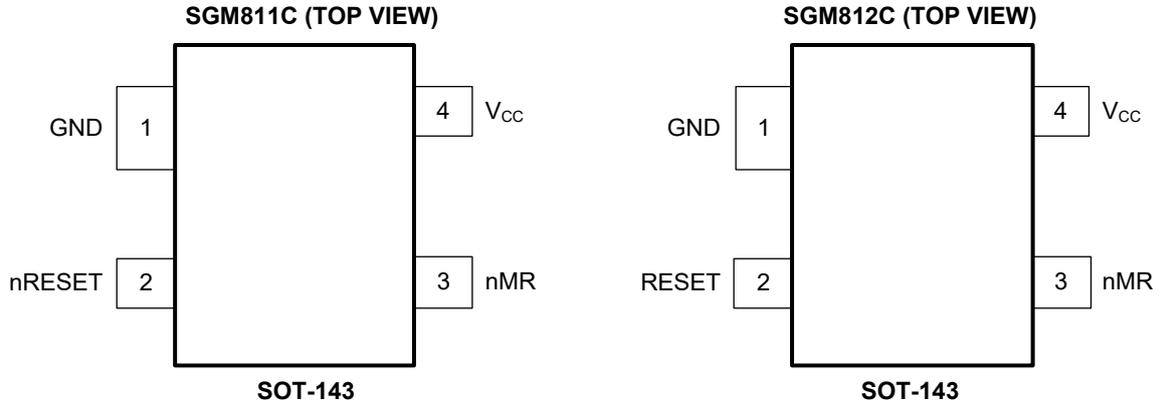
PIN DESCRIPTION

NAME	PIN NUMBER		FUNCTION
	SGM811C	**SGM812C**	
GND	1	1	Ground.
nRESET	2	—	Active-Low Reset Output Pin. If V_{CC} falls below the reset threshold or nMR is low, nRESET will keep low. If V_{CC} exceeds the reset threshold, the nRESET will keep low for 200ms (TYP).
RESET	—	2	Active-High Reset Output Pin. If the V_{CC} falls below the reset threshold or nMR is low, RESET will keep high. If the V_{CC} exceeds the reset threshold, RESET will keep high for 200ms (TYP).
nMR	3	3	Manual Reset Input Pin. It is an active-low reset input with an internal pull-up resistor of 60kΩ. nRESET keeps low when nMR is low. When nMR is high, nRESET becomes high after a timeout period. The nMR can be driven by a CMOS logic or by a switch shorting to GND. If not used, leave it open or connect it to V_{CC}.
V_{CC}	4	4	Supply Voltage Pin.

ELECTRICAL CHARACTERISTICS

(V_{CC} = 5V for M/J Models, V_{CC} = 3.3V for T/S Models, V_{CC} = 3V for R Model, V_{CC} = 2.5V for Z Model, V_{CC} = 1.8 V for W Model, T_J = -40℃ to +125℃, typical values are at T_J = +25℃, unless otherwise noted.)

| PARAMETER		SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Supply								
Operating Voltage Range		V_{CC}			1		5.5	V
Supply Current		I_{SUPPLY}	W/Z/R/S/T Models, V_{CC} = 3.6V, T_J = +25℃			0.6	1.0	µA
			W/Z/R/S/T Models, V_{CC} = 3.6V, T_J = -40℃ to +125℃			0.6	1.2	
			M/J Models, V_{CC} = 5.5V, T_J = +25℃			0.7	1.2	
			M/J Models, V_{CC} = 5.5V, T_J = -40℃ to +125℃			0.7	1.5	
Reset Voltage Threshold								
Reset Threshold		V_{RST}	M Model	T_J = +25℃	4.35	4.43	4.52	V
				T_J = -40℃ to +125℃	4.34		4.53	
			J Model	T_J = +25℃	3.98	4.05	4.13	
				T_J = -40℃ to +125℃	3.97		4.14	
			T Model	T_J = +25℃	3.04	3.09	3.16	
				T_J = -40℃ to +125℃	3.03		3.17	
			S Model	T_J = +25℃	2.89	2.93	3.00	
				T_J = -40℃ to +125℃	2.88		3.01	
			R Model	T_J = +25℃	2.59	2.63	2.69	
				T_J = -40℃ to +125℃	2.58		2.70	
			Z Model	T_J = +25℃	2.28	2.33	2.37	
				T_J = -40℃ to +125℃	2.27		2.38	
			W Model	T_J = +25℃	1.64	1.67	1.71	
				T_J = -40℃ to +125℃	1.59		1.76	
Reset Threshold Hysteresis			M Model			20		mV
			J Model			18		
			T Model			13		
			S Model			13		
			R Model			12		
			Z Model			12		
			W Model			8		
Reset Threshold Temperature Coefficient			T_J = -40℃ to +125℃			20		ppm/℃
V_{CC} to Reset Delay		t_{RD}	V_{RST} - V_{CC} = 200mV			100		µs
Reset Pulse Width		t_{RS}			110	200	300	ms
Manual Reset								
Minimum Pulse Width					320			ns
Glitch Immunity						140		ns
Reset Propagation Delay							360	ns
Pull-up Resistance					35	60	89	kΩ
The Manual Reset Circuit will Act on	An Input Rising above		V_{CC} > V_{RST_MAX}		0.7 × V_{CC}			V
	An Input Falling below		V_{CC} > V_{RST_MAX}				0.3 × V_{CC}	

ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = 5V for M/J Models, V_{CC} = 3.3V for T/S Models, V_{CC} = 3V for R Model, V_{CC} = 2.5V for Z Model, V_{CC} = 1.8 V for W Model, T_J = -40℃ to +125℃, typical values are at T_J = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
nRESET/RESET Output Voltage						
nRESET Output Voltage (SGM811C Only)	V_{OH}	W/Z/R/S/T Models, V_{CC} > V_{RST_MAX}, I_{SOURCE} = 500µA	0.8 × V_{CC}			V
		M/J Models, V_{CC} > V_{RST_MAX}, I_{SOURCE} = 800µA	0.8 × V_{CC}			
	V_{OL}	W/Z/R/S/T Models, V_{CC} = V_{RST_MIN}, I_{SINK} = 1.2mA			0.3	
		M/J Models, V_{CC} = V_{RST_MIN}, I_{SINK} = 3.2mA			0.4	
		All Models, V_{CC} > 1.0V, I_{SINK} = 50µA			0.3	
RESET Output Voltage (SGM812C Only)	V_{OH}	All Models, 1.8V < V_{CC} < V_{RST_MIN}, I_{SOURCE} = 150µA	0.8 × V_{CC}			V
	V_{OL}	W/Z/R/S/T Models, V_{CC} = V_{RST_MAX}, I_{SINK} = 1.2mA			0.3	
		M/J Models, V_{CC} = V_{RST_MAX}, I_{SINK} = 3.2mA			0.4	

TYPICAL PERFORMANCE CHARACTERISTICS

Power-down Reset Delay vs. Temperature

Power-up Reset Delay vs. Temperature

Supply Current vs. Temperature (No Load)

Normalized Reset Voltage Threshold vs. Temperature

Maximum Transient Duration without Causing a Reset Pulse vs. Reset Comparator Overdrive

Reset Output Voltage vs. Supply Voltage
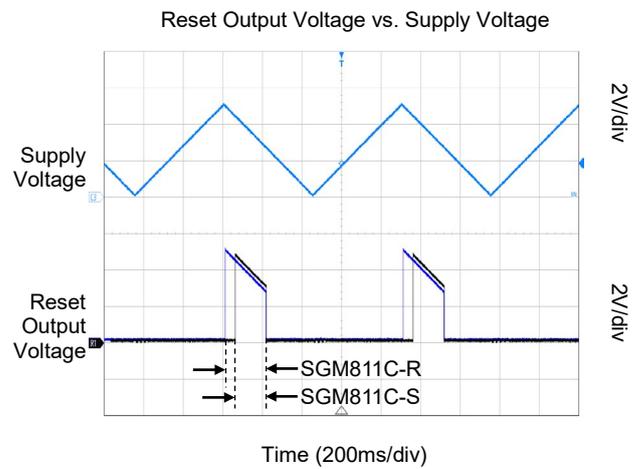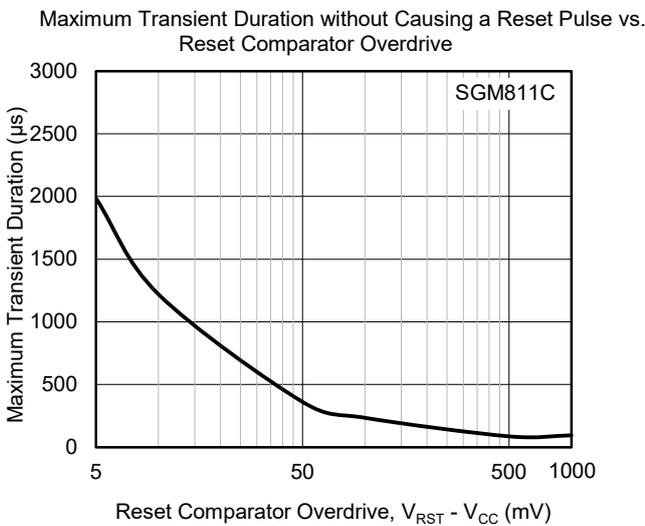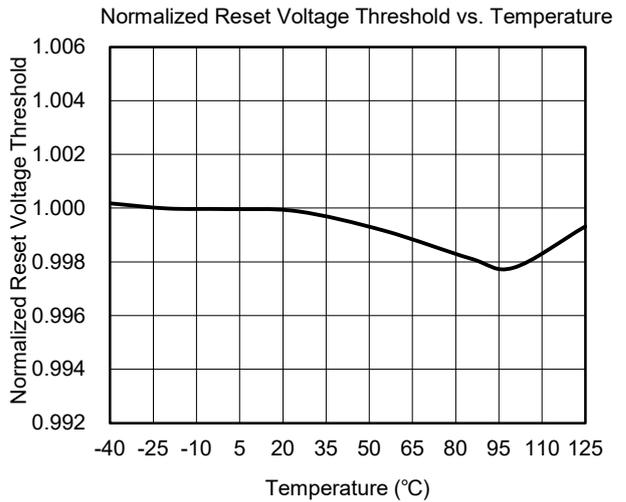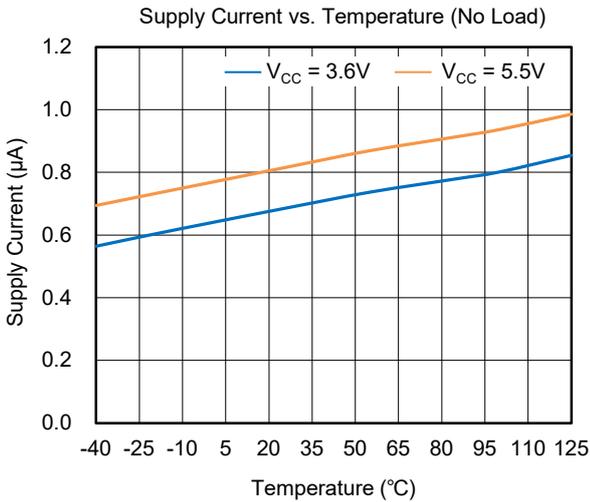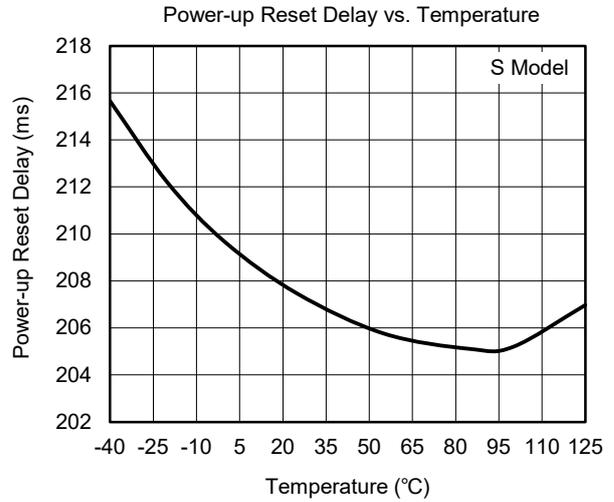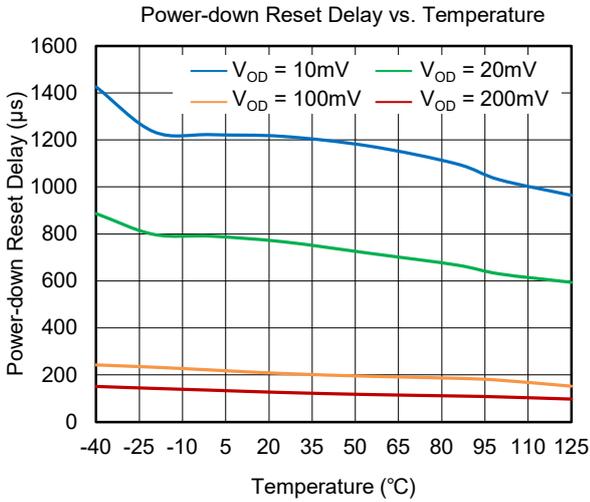
APPLICATION INFORMATION

Manual Reset Input

The SGM811C and SGM812C provide a manual reset (nMR) function that allows users to reset the system manually. It is an active-low reset input with an internal pull-up resistor of 60kΩ. When the nMR is low, and for t_{RS} (200ms, TYP) after nMR returns high, the reset remains active. The nMR can be driven by a CMOS logic or by a reset switch shorting to GND. If not used, leave it open or connect it to the V_{CC}. When the device is far away from the reset switch or used in a noisy environment, a 0.1µF capacitor is recommended to connect between nMR and GND.

Precise Reset Threshold

When the supply voltage drops significantly for the power supply fault, the SGM811C and SGM812C can even operate normally, which greatly reduces the possibility of system failure. In addition, the internal reference voltage accuracy of the SGM811C and SGM812C is very high, which provides high reliability of the devices.

nRESET Valid to V_{CC} = 0V (SGM811C)

The nRESET of SGM811C will stop sinking current and become open circuit if V_{CC} is below 1.0V. And if a high impedance CMOS logic input is connected to the nRESET, the logic level of the CMOS input is undetermined. To solve the problem, it is recommended to use a 100kΩ resistor between nRESET and GND.
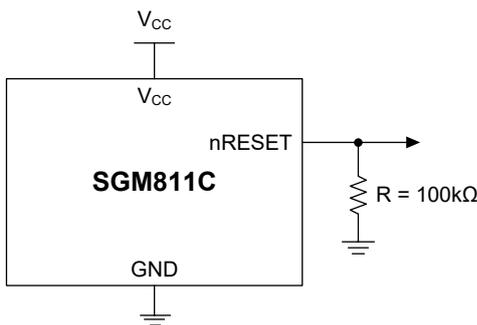
Figure 2. nRESET Valid to V_{CC} = 0V Circuit

Reset Output

To ensure sufficient time for the power supply and microprocessor to stabilize after power-up, a 200ms (TYP) reset output will hold by the internal timer after V_{CC} exceeds the reset threshold voltage. Similarly, a 200ms (TYP) reset output will also exist after the power supply recover from brownout or interruption that allows the power supply and microprocessor to have enough time to reach a steady state (Figure 2).

The SGM811C has an active-low nRESET output, while the SGM812C has an active-high RESET output. When V_{CC} is as low as 1V during power-down, the nRESET of the SGM811C will continue output a low level. This not only keeps the microprocessor shutdown when the supply voltage falls, but also prevents the microprocessor occurring false actions when it powers up.

Glitch Immunity

The SGM811C and SGM812C have an internal filter circuit, which makes them have glitch immunity ability to bear the fast transient glitches on the power supply.
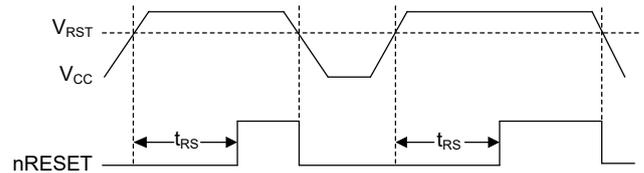

Figure 3. Power Fail nRESET Timing

Interfacing to Other Devices Output

In order to allow the SGM811C and SGM812C to be integrated with a variety of devices, it is guaranteed that the reset output is proportional to the VCC when the VCC is more than 1V. This allows the device to be used with any supply voltage between the minimum and maximum of the V_{CC}, including 1.8V, 2.5V, 3V, 3.3V and 5V.

REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

PACKAGE OUTLINE DIMENSIONS

SOT-143
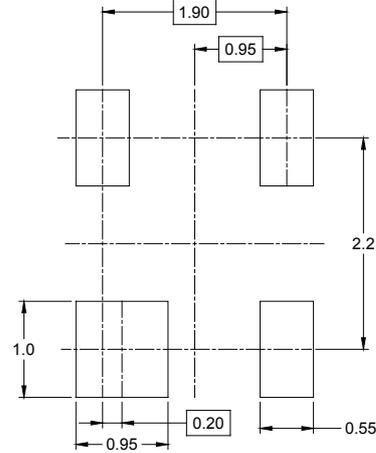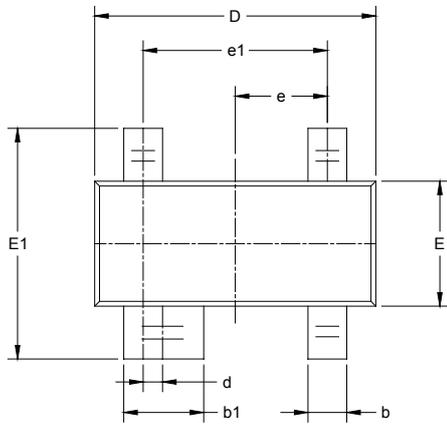
RECOMMENDED LAND PATTERN (Unit: mm)
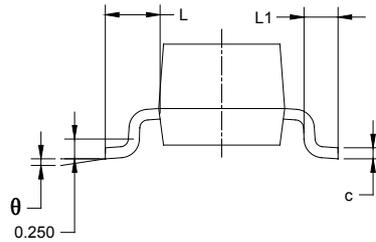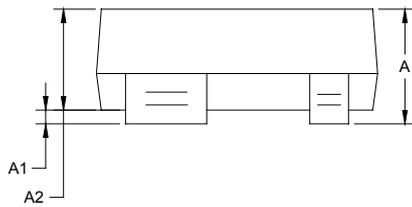
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
b1	0.750	0.900	0.030	0.035
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
d	0.200 TYP		0.008 TYP	
E	1.200	1.400	0.047	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°

TX00047.000

TAPE AND REEL INFORMATION

REEL DIMENSIONS

TAPE DIMENSIONS
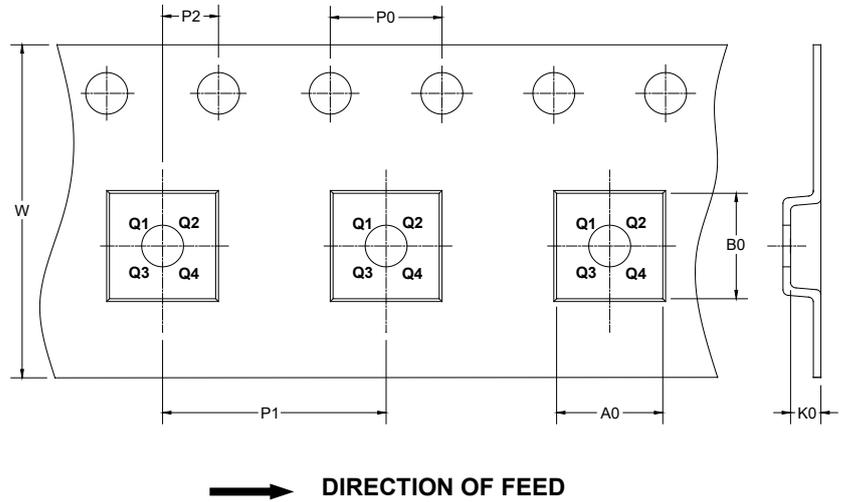
DIRECTION OF FEED

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-143	7″	9.5	3.20	2.80	1.30	4.0	4.0	2.0	8.0	Q3

DD0001

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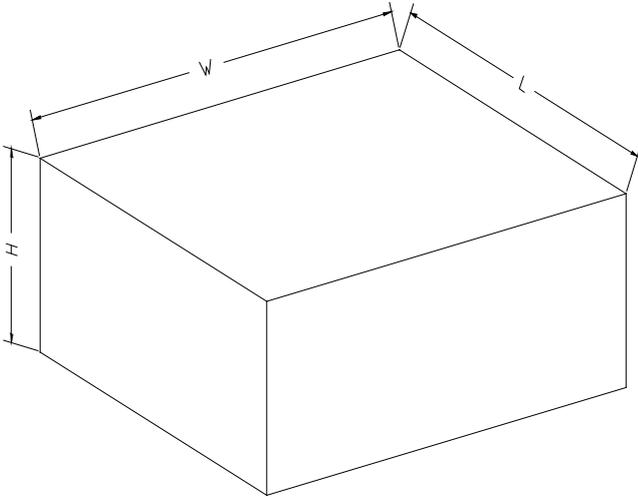
NOTE: The picture is only for reference. Please make the object as the standard.

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

DD0002