74LVC1G57
Low Power Configurable Multiple Function Gate

GENERAL DESCRIPTION

The 74LVC1G57 is a low power configurable multiple function gate that is designed for 1.65V to 5.5V V_{CC} operation. All inputs support Schmitt-trigger action and can be tied directly to V_{CC} or GND. The use of 3-bit input allows the device to be configured for logic functions such as AND, OR, NAND, NOR, XNOR, inverter and buffer. Both 3.3V and 5V devices can drive inputs, enabling this device to operate in a mixed 3.3V and 5V system environment.

This device is highly suitable for partial power-down applications by using power-off leakage current (I_{OFF}) circuit. When the device is powered down, the output is disabled, and the current backflow can be prevented from passing through the device.

The 74LVC1G57 is available in Green SC70-6 and UTDFN-1.45×1-6AL packages. It operates over an ambient temperature range of -40℃ to +125℃.

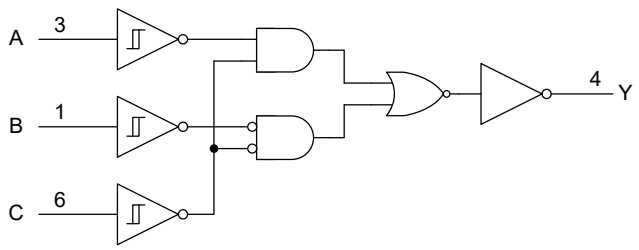
FEATURES

- **Wide Operating Voltage Range: 1.65V to 5.5V**
- **Inputs Accept Voltage up to 5.5V**
- **+24mA/-24mA Output Current at V_{CC} = 3.0V**
- **CMOS Low Power Consumption**
- **High Noise Immunity**
- **All Inputs with Schmitt-Trigger**
- **Direct Interface: TTL Levels**
- **Support Partial Power-Down Mode**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in Green SC70-6 and UTDFN-1.45×1-6AL Package**

APPLICATIONS

Industrial Equipment
Computing Platform
Medical System

LOGIC DIAGRAM



FUNCTION TABLE

INPUT			OUTPUT
A	B	C	Y
L	L	L	H
H	L	L	L
L	H	L	H
H	H	L	L
L	L	H	L
H	L	H	L
L	H	H	H
H	H	H	H

H = High Voltage Level
L = Low Voltage Level

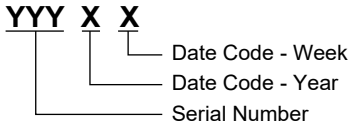
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRITION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74LVC1G57	SC70-6	-40℃ to +125℃	74LVC1G57XC6G/TR	0AAXX	Tape and Reel, 3000
	UTDFN-1.45×1-6AL	-40℃ to +125℃	74LVC1G57XUDL6G/TR	07X	Tape and Reel, 5000

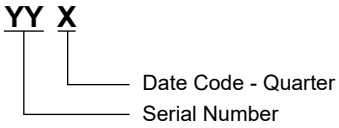
MARKING INFORMATION

NOTE: XX = Date Code. X = Date Code.

SC70-6



UTDFN-1.45×1-6AL



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 (1)

Supply Voltage Range, V_{CC} ..... -0.5V to 6.5V
Input Voltage Range, V_I (2) ..... -0.5V to 6.5V
Output Voltage Range, V_O (2)
Active Mode ..... -0.5V to MIN(6.5V, V_{CC} + 0.5V)
Power-Down Mode (V_{CC} = 0V)..... -0.5V to 6.5V
Input Clamp Current, I_{IK} (V_I < 0V) .....-50mA
Output Clamp Current, I_{OK} (V_O < 0V) .....-50mA
Continuous Output Current, I_O (V_O = 0V to V_{CC}).....±50mA
Continuous Current through V_{CC} or GND.....±100mA
Junction Temperature (3) .....+150℃
Storage Temperature Range .....-65℃ to +150℃
Lead Temperature (Soldering, 10s).....+260℃
ESD Susceptibility
HBM.....5000V
CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range, V_{CC} .....1.65V to 5.5V
Input Voltage Range, V_I .....0V to 5.5V
Output Voltage Range, V_O
Active Mode ..... 0V to V_{CC}
Power-Down Mode (V_{CC} = 0V).....0V to 5.5V
Operating Temperature Range .....-40℃ to +125℃

OVERSTRESS CAUTION

1. 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.

2. The input and output voltage ratings may be exceeded if the input and output clamp current ratings are observed.

3. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

ESD SENSITIVITY CAUTION

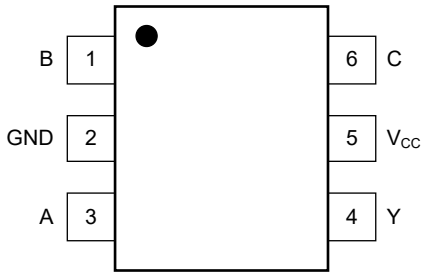
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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.

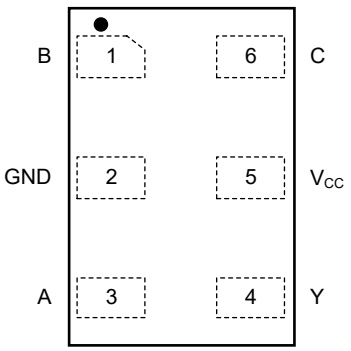
PIN CONFIGURATIONS

(TOP VIEW)



SC70-6

(TOP VIEW)



UTDFN-1.45×1-6AL

PIN DESCRIPTION

PIN	NAME	FUNCTION
1, 3, 6	B, A, C	Data Inputs.
2	GND	Ground.
4	Y	Data Output.
5	V_{CC}	Supply Voltage.

ELECTRICAL CHARACTERISTICS

(Full = -40℃ to +125℃, all typical values are measured at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
High-Level Output Voltage	V_{OH}	V_{CC} = 1.65V to 5.5V, I_{OH} = -100μA	Full	V_{CC} - 0.1	V_{CC} - 0.01		V
		V_{CC} = 1.65V, I_{OH} = -4mA	Full	1.2	1.55		
		V_{CC} = 2.3V, I_{OH} = -8mA	Full	1.9	2.15		
		V_{CC} = 2.7V, I_{OH} = -12mA	Full	2.3	2.55		
		V_{CC} = 3.0V, I_{OH} = -16mA	Full	2.4	2.80		
		V_{CC} = 3.0V, I_{OH} = -24mA	Full	2.3	2.75		
		V_{CC} = 4.5V, I_{OH} = -32mA	Full	3.8	4.25		
Low-Level Output Voltage	V_{OL}	V_{CC} = 1.65V to 5.5V, I_{OL} = 100μA	Full		0.01	0.10	V
		V_{CC} = 1.65V, I_{OL} = 4mA	Full		0.10	0.45	
		V_{CC} = 2.3V, I_{OL} = 8mA	Full		0.15	0.30	
		V_{CC} = 2.7V, I_{OL} = 12mA	Full		0.20	0.30	
		V_{CC} = 3.0V, I_{OL} = 16mA	Full		0.25	0.40	
		V_{CC} = 3.0V, I_{OL} = 24mA	Full		0.30	0.55	
		V_{CC} = 4.5V, I_{OL} = 32mA	Full		0.35	0.55	
Input Leakage Current	I_I	V_{CC} = 0V to 5.5V, V_I = 5.5V or GND	Full		±0.1	±2	μA
Power-Off Leakage Current	I_{OFF}	V_{CC} = 0V, V_I = 5.5V or V_O = 5.5V	Full		±0.1	±2	μA
Supply Current	I_{CC}	V_{CC} = 1.65V to 5.5V, V_I = 5.5V or GND, I_O = 0A	Full		0.1	2	μA
Additional Supply Current	ΔI_{CC}	One input at V_{CC} - 0.6V, other inputs at V_{CC} or GND, V_{CC} = 3.0V to 5.5V	Full		0.1	5	μA
Input Capacitance	C_I	V_{CC} = 3.3V, V_I = V_{CC} or GND	+25℃		5		pF

DYNAMIC CHARACTERISTICS

(See Figure 5 for test circuit. Full = -40℃ to +125℃, all typical values are measured at T_A = +25℃ and V_{CC} = 1.8V, 2.5V, 2.7V, 3.3V and 5.0V respectively, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN (1)	TYP	MAX (1)	UNITS
Propagation Delay (2)	t_{PD}	A, B, C to Y, see Figure 6	V_{CC} = 1.65V to 1.95V	Full	1.5	13.5	31.0	ns
			V_{CC} = 2.3V to 2.7V	Full	0.5	9.0	15.5	
			V_{CC} = 2.7V	Full	1.5	8.5	16.5	
			V_{CC} = 3.0V to 3.6V	Full	0.5	8.5	16.5	
			V_{CC} = 4.5V to 5.5V	Full	0.5	8.0	12.0	
Power Dissipation Capacitance (3)	C_{PD}	f = 10MHz	V_{CC} = 1.8V	+25℃		43		pF
			V_{CC} = 2.5V	+25℃		43		
			V_{CC} = 3.3V	+25℃		35		
			V_{CC} = 5.0V	+25℃		43		

NOTES:

1. Specified by design and characterization, not production tested.
2. t_{PD} is the same as t_{PLH} and t_{PHL}.
3. C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

   $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$

   where:

   f_i = Input frequency in MHz.

   f_o = Output frequency in MHz.

   C_L = Output load capacitance in pF.

   V_{CC} = Supply voltage in Volts.

   N = Number of inputs switching.

   $\Sigma(C_L \times V_{CC}^2 \times f_o)$ = Sum of outputs.

TRANSFER CHARACTERISTICS

(Full = -40℃ to +125℃, all typical values are measured at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
Positive-Going Input Threshold Voltage	V_{T+}	See Figure 1, Figure 2, Figure 3 and Figure 4	V_{CC} = 1.8V	Full	0.67	1.13	1.23	V
			V_{CC} = 2.3V	Full	1.08	1.46	1.60	
			V_{CC} = 3.0V	Full	1.47	1.88	2.04	
			V_{CC} = 4.5V	Full	1.98	2.65	2.87	
			V_{CC} = 5.5V	Full	2.58	3.12	3.36	
Negative-Going Input Threshold Voltage	V_{T-}	See Figure 1, Figure 2, Figure 3 and Figure 4	V_{CC} = 1.8V	Full	0.30	0.61	0.75	V
			V_{CC} = 2.3V	Full	0.58	0.81	1.03	
			V_{CC} = 3.0V	Full	0.80	1.08	1.33	
			V_{CC} = 4.5V	Full	1.21	1.61	1.93	
			V_{CC} = 5.5V	Full	1.45	1.96	2.32	
Hysteresis (V_{T+} - V_{T-})	ΔV_T	See Figure 1, Figure 2, Figure 3 and Figure 4	V_{CC} = 1.8V	Full	0.35	0.49	0.61	V
			V_{CC} = 2.3V	Full	0.53	0.65	0.74	
			V_{CC} = 3.0V	Full	0.68	0.80	0.93	
			V_{CC} = 4.5V	Full	0.89	1.04	1.19	
			V_{CC} = 5.5V	Full	1.01	1.17	1.36	

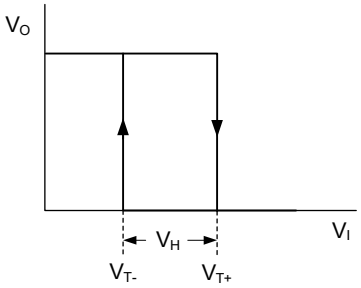


Figure 1. Typical Transfer Characteristics

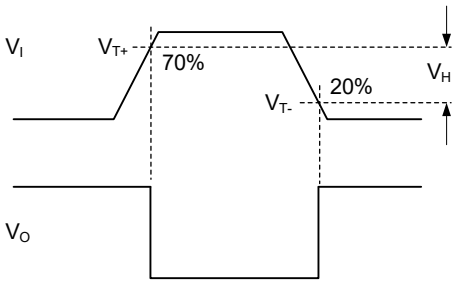


Figure 2. Explanation of V_{T+}, V_{T-} and V_H

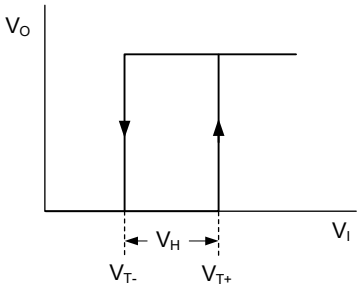


Figure 3. Typical Transfer Characteristics

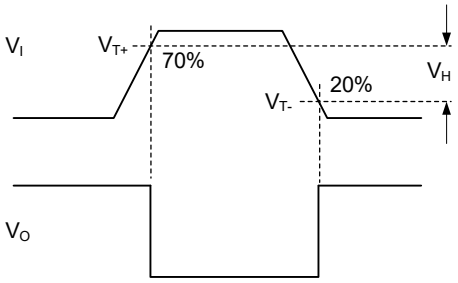
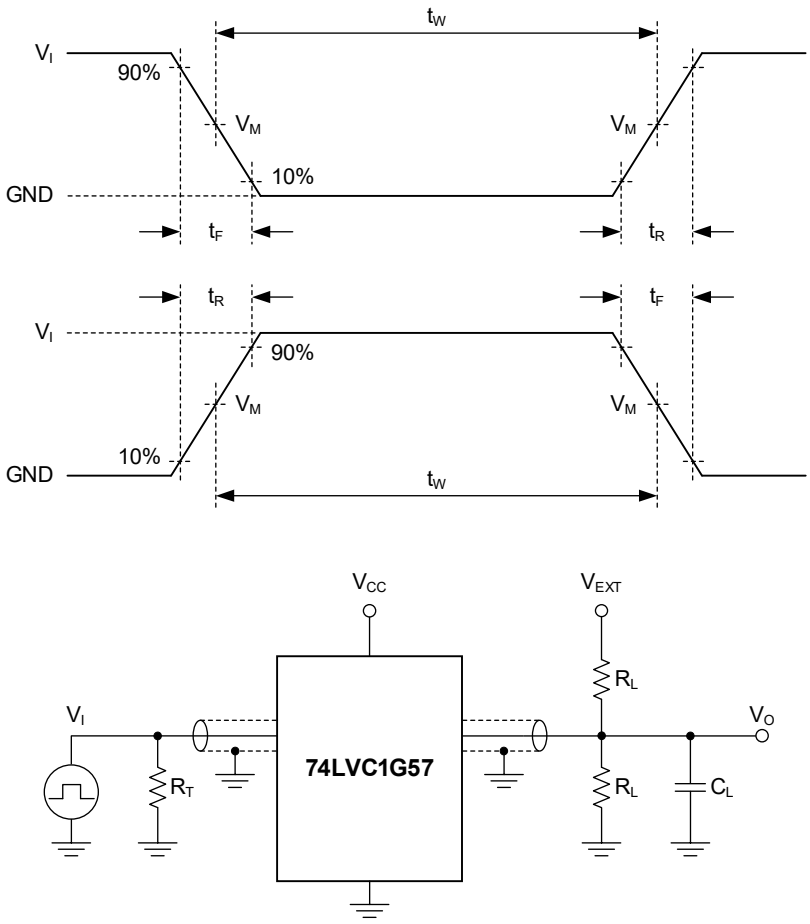


Figure 4. Explanation of V_{T+}, V_{T-} and V_H

TEST CIRCUIT



Test conditions are given in Table 1.

Definitions for test circuit:

R_L: Load resistance.

C_L: Load capacitance (includes jig and probe).

R_T: Termination resistance (equals to output impedance Z_O of the pulse generator).

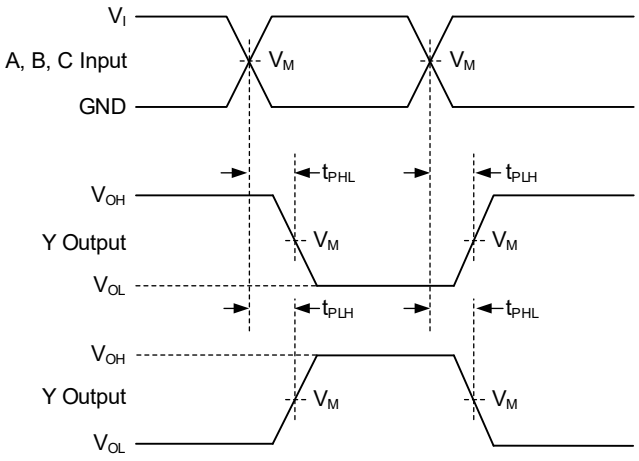
V_{EXT}: External voltage is used to measure switching time.

Figure 5. Test Circuit for Measuring Switching Times

Table 1. Test Conditions

SUPPLY VOLTAGE	INPUT		LOAD		V_{EXT}
V_{CC}	V_I	t_R, t_F	C_L	R_L	t_{PLH}, t_{PHL}
1.65V to 1.95V	V_{CC}	≤ 2.0ns	30pF	1kΩ	Open
2.3V to 2.7V	V_{CC}	≤ 2.0ns	30pF	500Ω	Open
2.7V	2.7V	≤ 2.5ns	50pF	500Ω	Open
3.0V to 3.6V	2.7V	≤ 2.5ns	50pF	500Ω	Open
4.5V to 5.5V	V_{CC}	≤ 2.5ns	50pF	500Ω	Open

WAVEFORMS



Test conditions are given in Table 1.
Measurement points are given in Table 2.
Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Figure 6. Input A, B and C to Output Y Propagation Delay Times

Table 2. Measurement Points

SUPPLY VOLTAGE	INPUT		OUTPUT
V_{CC}	V_I	V_M (1)	V_M
1.65V to 1.95V	0.5 × V_{CC}	0.5 × V_{CC}	0.5 × V_{CC}
2.3V to 2.7V	0.5 × V_{CC}	0.5 × V_{CC}	0.5 × V_{CC}
2.7V	1.5V	1.5V	1.5V
3.0V to 3.6V	1.5V	1.5V	1.5V
4.5V to 5.5V	0.5 × V_{CC}	0.5 × V_{CC}	0.5 × V_{CC}

NOTE:
1. The measurement points should be V_{IH} or V_{IL} when the input rising or falling time exceeds 2.5ns.

REVISION HISTORY

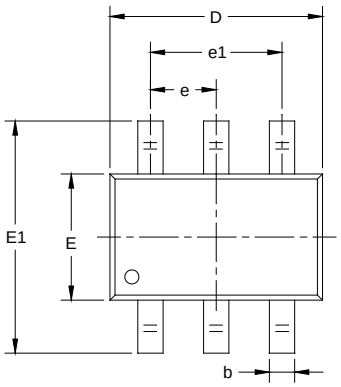
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

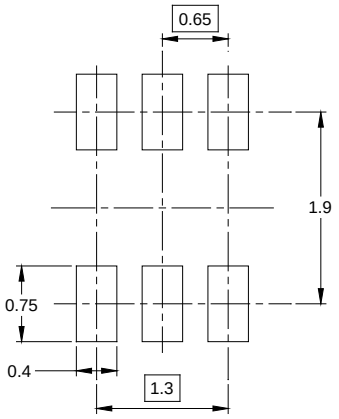
MARCH 2024 – REV.A to REV.A.1	Page
Added UTDFN-1.45×1-6AL package	All

Changes from Original (JANUARY 2024) to REV.A	Page
Changed from product preview to production data	All

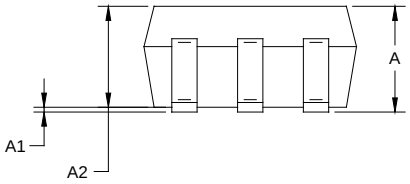
PACKAGE OUTLINE DIMENSIONS

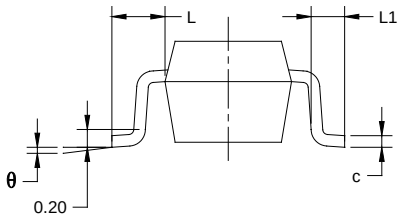
SC70-6





RECOMMENDED LAND PATTERN (Unit: mm)



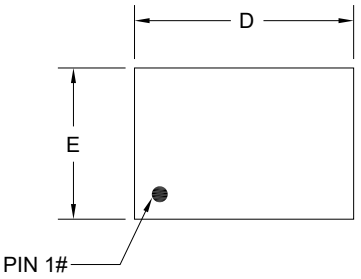


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.800	1.100	0.031	0.043
A1	0.000	0.100	0.000	0.004
A2	0.800	1.000	0.031	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.220	0.003	0.009
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 TYP	
e1	1.300 BSC		0.051 BSC	
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

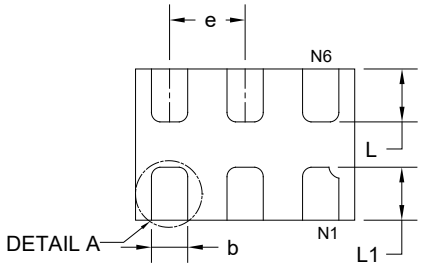
NOTES:
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.

PACKAGE OUTLINE DIMENSIONS

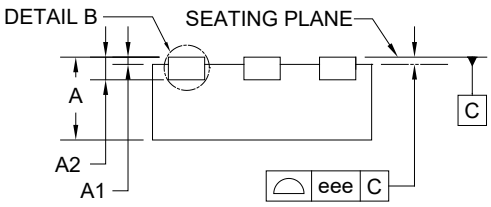
UTDFN-1.45×1-6AL



TOP VIEW



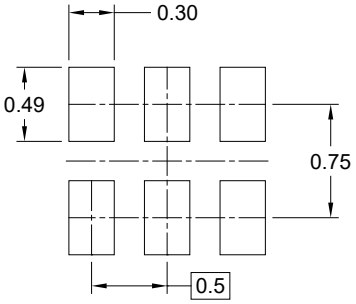
BOTTOM VIEW



SIDE VIEW

DETAIL A
ALTERNATE TERMINAL CONSTRUCTION

DETAIL B
ALTERNATE CONSTRUCTION



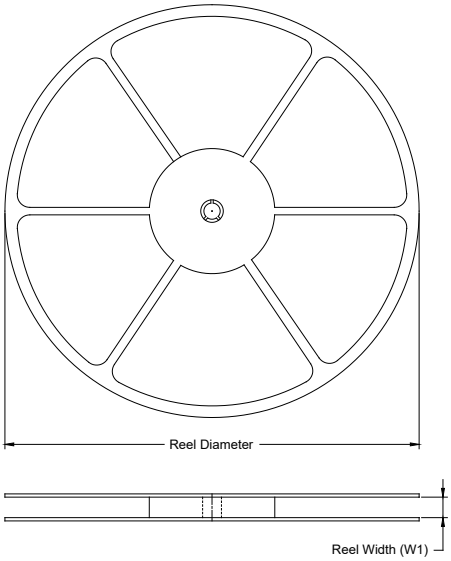
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.450	-	0.600
A1	-0.004	-	0.050
A2	0.150 REF		
b	0.150	-	0.300
D	1.374	-	1.526
E	0.924	-	1.076
e	0.500 BSC		
L	0.250	-	0.450
L1	0.250	-	0.500
L2	0.000	-	0.100
eee	0.050		

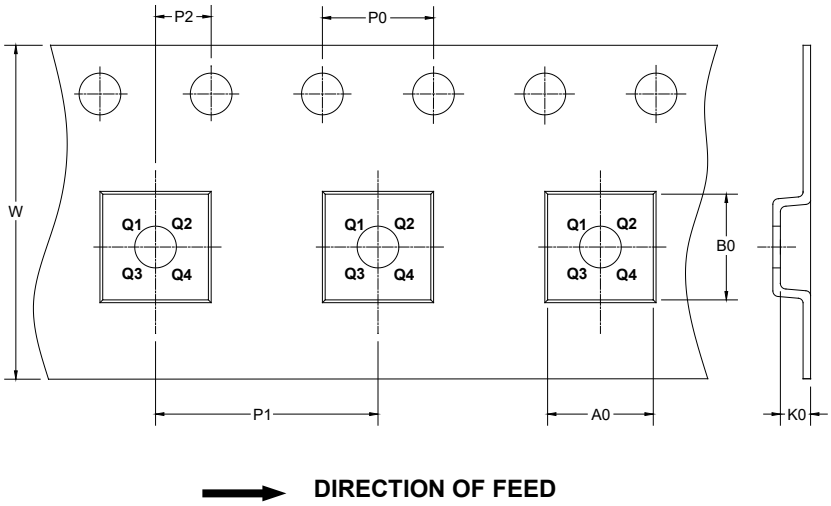
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



DIRECTION OF FEED

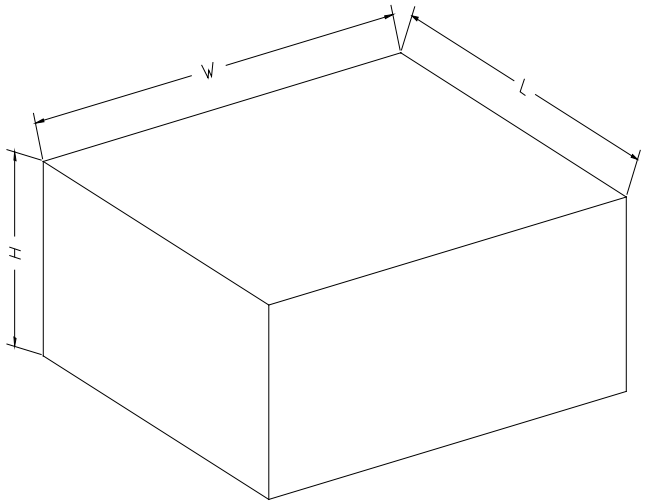
NOTE: The picture is only for reference. Please make the object as the standard.

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
SC70-6	7″	9.5	2.40	2.50	1.20	4.0	4.0	2.0	8.0	Q3
UTDFN-1.45×1-6AL	7"	9.5	1.15	1.60	0.75	4.0	4.0	2.0	8.0	Q1

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