74LVC1G17Q
Automotive Single Schmitt-Trigger Buffer

GENERAL DESCRIPTION

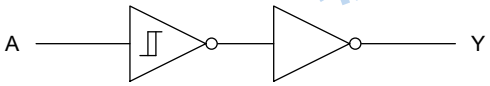
The 74LVC1G17Q is a single Schmitt-trigger buffer which can accept the supply voltage range from 1.65V to 5.5V. The device features high output drive while low static-power dissipation can be maintained over supply voltage operating range, and implements the Boolean function Y = A.

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 outputs are disabled, and the current backflow can be prevented from passing through the device.

The device is AEC-Q100 qualified (Automotive Electronics Council (AEC) standard Q100 Grade 1) and it is suitable for automotive applications.

The 74LVC1G17Q is available in Green SC70-5 and SOT-23-5 packages. It operates over an ambient temperature range of -40℃ to +125℃.

LOGIC DIAGRAM



FEATURES

- **AEC-Q100 Qualified for Automotive Applications**
  Device Temperature Grade 1
  T_A = -40℃ to +125℃
- **Wide Supply Voltage Range: 1.65V to 5.5V**
- **Inputs Accept Voltages up to 5.5V**
- **+24mA/-24mA Output Current at V_{CC} = 3.0V**
- **Low Quiescent Current: I_{CC} = 0.1μA (TYP)**
- **Propagation Delay: 7.5ns (TYP) at V_{CC} = 3.0V**
- **Support Partial Power-Down Mode**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in Green SC70-5 and SOT-23-5 Packages**

APPLICATIONS

Automotive Applications
Medical Equipment
Industrial Equipment
Audio Equipment
Computing: Server, PC and Notebook
Telecom Equipment
Wireless Equipment

FUNCTION TABLE

INPUT	OUTPUT
A	Y
H	H
L	L

Y = A
H = High Voltage Level
L = Low Voltage Level

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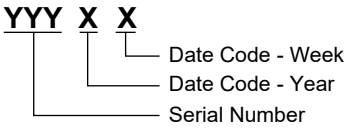
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74LVC1G17Q	SC70-5	-40℃ to +125℃	74LVC1G17QC5G/TR	1L8XX	Tape and Reel, 3000
	SOT-23-5	-40℃ to +125℃	74LVC1G17QN5G/TR	1LC XXXXX	Tape and Reel, 3000

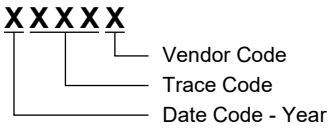
MARKING INFORMATION

NOTE: X = Date Code. XXXXX = Date Code, Trace Code and Vendor Code.

SC70-5



SOT-23-5



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

Supply Voltage, V_{CC} ..... -0.5V to 6.5V
Input Voltage, V_I (1) ..... -0.5V to 6.5V
Output Voltage, V_O (1)
Active Mode ..... -0.5V to MIN(6.5V, V_{CC} + 0.5V)
Power-Down Mode ..... -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 .....±50mA
Continuous Current through V_{CC} or GND.....±100mA
Junction Temperature (2) .....+150℃
Storage Temperature Range .....-65℃ to +150℃
Lead Temperature (Soldering, 10s).....+260℃
ESD Susceptibility (3) (4)
HBM..... TBD
CDM ..... TBD

NOTES:

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

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

3. For human body model (HBM), all pins comply with AEC-Q100-002 specification.

4. For charged device model (CDM), all pins comply with AEC-Q100-011 specification.

RECOMMENDED OPERATING CONDITIONS

Supply Voltage, V_{CC} ..... 1.65V to 5.5V
Input Voltage, V_I ..... 0V to 5.5V
Output Voltage, 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

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

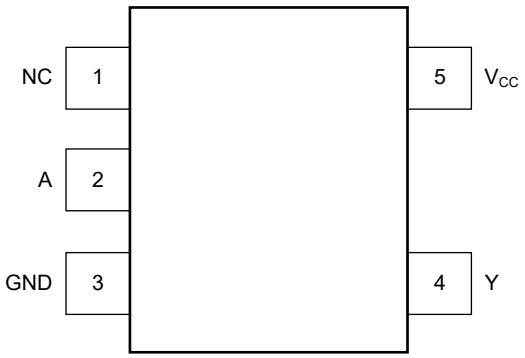
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance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

(TOP VIEW)



SC70-5/SOT-23-5

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	NC	No Connection.
2	A	Data Input.
3	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℃ and V_{CC} = 3.3V, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Positive-Going Input Threshold Voltage	V_{T+}	V_{CC} = 1.65V	+25℃		1.04		V
		V_{CC} = 1.8V	+25℃		1.13		
		V_{CC} = 2.3V	+25℃		1.46		
		V_{CC} = 3.0V	+25℃		1.87		
		V_{CC} = 4.5V	+25℃		2.64		
		V_{CC} = 5.5V	+25℃		3.11		
Negative-Going Input Threshold Voltage	V_{T-}	V_{CC} = 1.65V	+25℃		0.55		V
		V_{CC} = 1.8V	+25℃		0.61		
		V_{CC} = 2.3V	+25℃		0.82		
		V_{CC} = 3.0V	+25℃		1.09		
		V_{CC} = 4.5V	+25℃		1.62		
		V_{CC} = 5.5V	+25℃		1.97		
Hysteresis (V_{T+} - V_{T-})	ΔV_T	V_{CC} = 1.65V	+25℃		0.49		V
		V_{CC} = 1.8V	+25℃		0.52		
		V_{CC} = 2.3V	+25℃		0.64		
		V_{CC} = 3.0V	+25℃		0.79		
		V_{CC} = 4.5V	+25℃		1.02		
		V_{CC} = 5.5V	+25℃		1.14		
High-Level Output Voltage	V_{OH}	V_{CC} = 1.65V to 4.5V, I_{OH} = -100μA	+25℃		V_{CC} - 0.01		V
		V_{CC} = 1.65V, I_{OH} = -4mA	+25℃		1.56		
		V_{CC} = 2.3V, I_{OH} = -8mA	+25℃		2.19		
		V_{CC} = 2.7V, I_{OH} = -12mA	+25℃		2.57		
		V_{CC} = 3.0V, I_{OH} = -16mA	+25℃		2.84		
		V_{CC} = 3.0V, I_{OH} = -24mA	+25℃		2.76		
		V_{CC} = 4.5V, I_{OH} = -32mA	+25℃		4.27		
Low-Level Output Voltage	V_{OL}	V_{CC} = 1.65V to 4.5V, I_{OL} = 100μA	+25℃		0.01		V
		V_{CC} = 1.65V, I_{OL} = 4mA	+25℃		80		
		V_{CC} = 2.3V, I_{OL} = 8mA	+25℃		115		
		V_{CC} = 2.7V, I_{OH} = 12mA	+25℃		150		
		V_{CC} = 3.0V, I_{OL} = 16mA	+25℃		190		
		V_{CC} = 3.0V, I_{OL} = 24mA	+25℃		285		
		V_{CC} = 4.5V, I_{OL} = 32mA	+25℃		310		
Input Leakage Current	I_I	V_{CC} = 0V to 5.5V, V_I = 5.5V or GND	+25℃		±0.1		μA
Power-Off Leakage Current	I_{OFF}	V_{CC} = 0V, V_I = 5.5V or V_O = 5.5V	+25℃		±0.1		μA
Supply Current	I_{CC}	V_{CC} = 1.65V to 5.5V, V_I = 5.5V or GND, I_O = 0A	+25℃		0.1		μA
Additional Supply Current	ΔI_{CC}	V_{CC} = 3.0V to 5.5V, one input at V_{CC} - 0.6V, other inputs at V_{CC} or GND	+25℃		0.1		μA
Input Capacitance	C_I	V_{CC} = 3.3V, V_I = V_{CC} or GND	+25℃		5		pF

DYNAMIC CHARACTERISTICS

(See Figure 1 for test circuit. Full = -40℃ to +125℃, all typical values are measured at T_A = +25℃ and V_{CC} = 1.8V, 2.5V, 3.3V and 5V respectively, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
Propagation Delay (1)	t_{PD}	A to Y, C_L = 30pF	V_{CC} =1.65V to 1.95V	Full	1.0	13.0	27.1	ns
			V_{CC} = 2.3V to 2.7V	Full	0.5	8.5	13.1	
		A to Y, C_L = 50pF	V_{CC} = 3.0V to 3.6V	Full	0.5	7.5	11.0	
			V_{CC} = 4.5V to 5.5V	Full	0.5	7.0	9.4	
Power Dissipation Capacitance (2)	C_{PD}	f = 10MHz	V_{CC} = 1.8V	+25℃		29		pF
			V_{CC} = 2.5V	+25℃		30		
			V_{CC} = 3.3V	+25℃		31		
			V_{CC} = 5.0V	+25℃		35		

NOTES:

1. t_{PD} is the same as t_{PLH} and t_{PHL}.
2. 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.

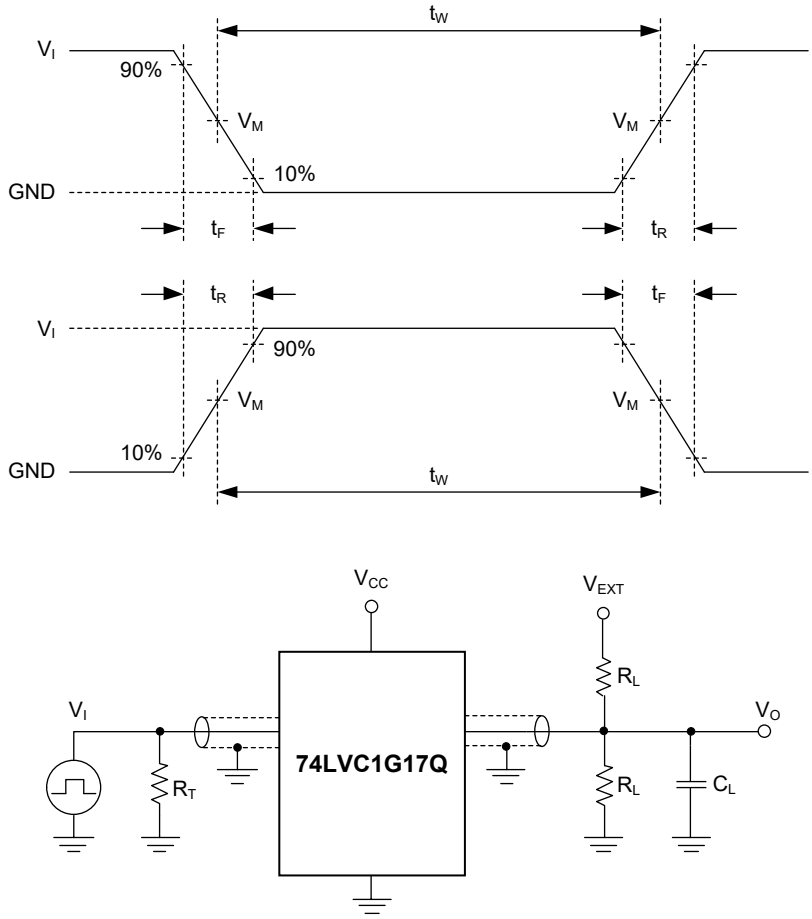
   C_L = Output load capacitance in pF.

   V_{CC} = Supply voltage in Volts.

   N = Number of inputs switching.

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

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 Zo of the pulse generator).

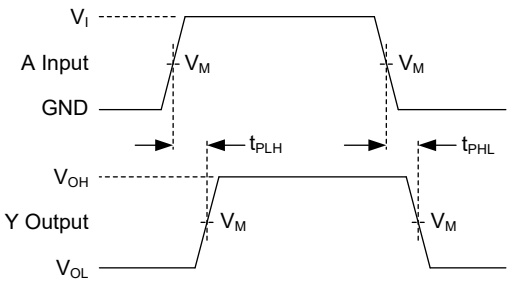
V_{EXT}: External voltage is used to measure switching times.

Figure 1. 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}
1.8V ± 0.15V	V_{CC}	≤ 2.0ns	30pF	1kΩ	Open
2.5V ± 0.2V	V_{CC}	≤ 2.0ns	30pF	500Ω	Open
3.3V ± 0.3V	3.0V	≤ 2.5ns	50pF	500Ω	Open
5.0V ± 0.5V	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 2. Input (A) to Output (Y) Propagation Delays

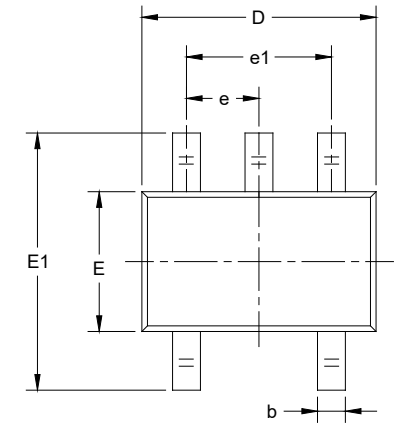
Table 2. Measurement Points

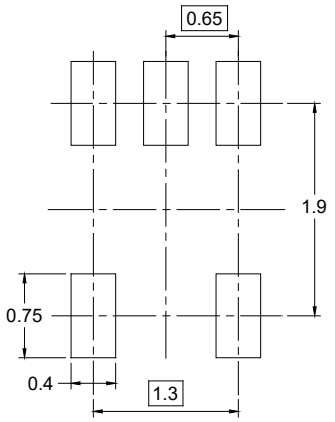
SUPPLY VOLTAGE	INPUT		OUTPUT
V_{CC}	V_I	V_M (1)	V_M
1.8V ± 0.15V	V_{CC}	0.5 × V_{CC}	0.5 × V_{CC}
2.5V ± 0.2V	V_{CC}	0.5 × V_{CC}	0.5 × V_{CC}
3.3V ± 0.3V	3.0V	1.5V	1.5V
5.0V ± 0.5V	V_{CC}	0.5 × V_{CC}	0.5 × V_{CC}

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

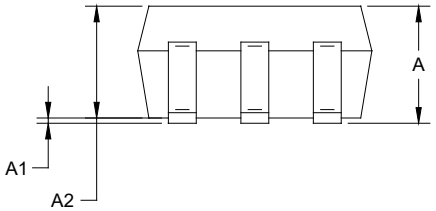
PACKAGE OUTLINE DIMENSIONS

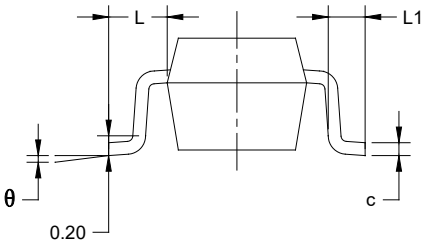
SC70-5





RECOMMENDED LAND PATTERN (Unit: mm)



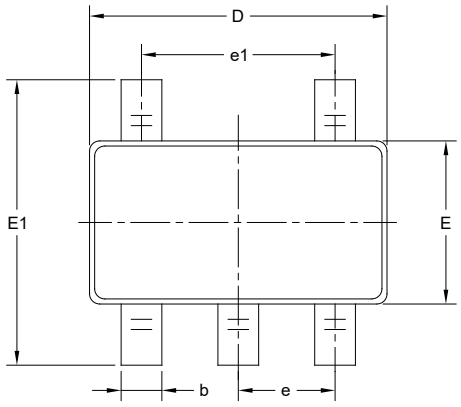


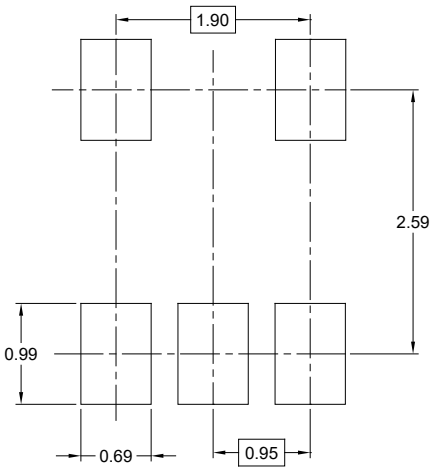
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.800	1.100	0.031	0.043
A1	0.000	0.100	0.000	0.004
A2	0.800	1.000	0.031	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.220	0.003	0.009
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 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.

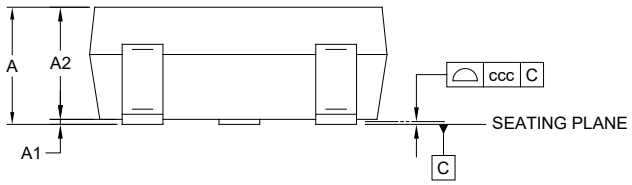
PACKAGE OUTLINE DIMENSIONS

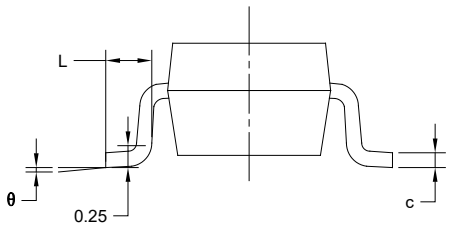
SOT-23-5





RECOMMENDED LAND PATTERN (Unit: mm)



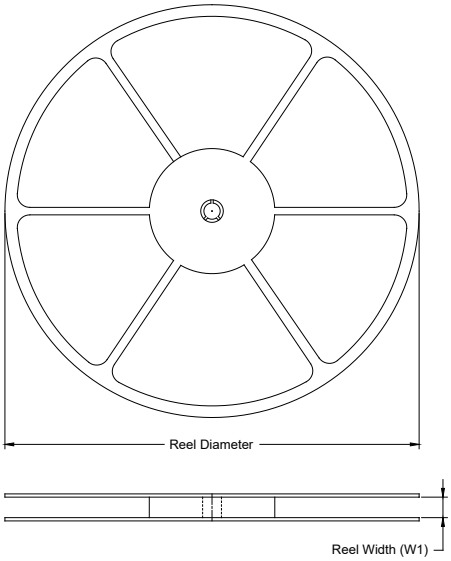


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.450
A1	0.000	-	0.150
A2	0.900	-	1.300
b	0.300	-	0.500
c	0.080	-	0.220
D	2.750	-	3.050
E	1.450	-	1.750
E1	2.600	-	3.000
e	0.950 BSC		
e1	1.900 BSC		
L	0.300	-	0.600
θ	0°	-	8°
ccc	0.100		

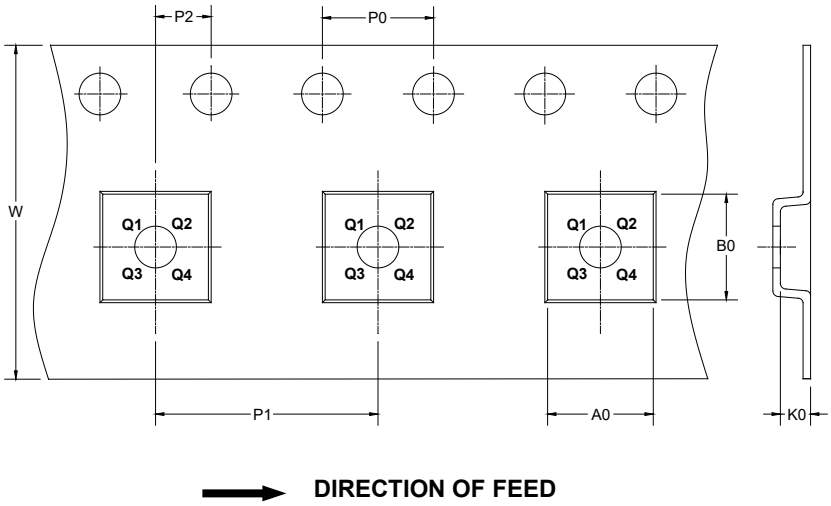
NOTES:
1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-178.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



DIRECTION OF FEED

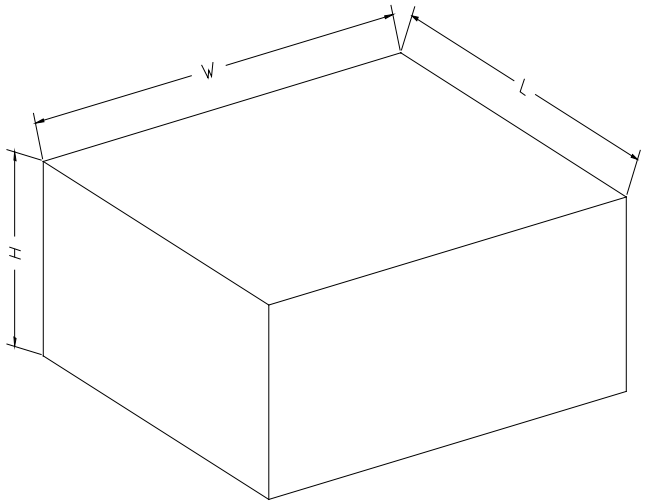
NOTE: The picture is only for reference. Please make the object as the standard.

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
SC70-5	7"	9.5	2.40	2.50	1.20	4.0	4.0	2.0	8.0	Q3
SOT-23-5	7"	9.5	3.20	3.20	1.40	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