

GENERAL DESCRIPTION

The 74LVC2G14 is dual inverter with 5.5V tolerant Schmitt-Trigger inputs. The device incorporates two independent inverters that can convert the slowly changing input signals into clearly defined and jitter-free output signals. The 74LVC2G14 is designed for 1.65V to 5.5V V_{CC} operation. The device implements the Boolean function $Y = \bar{A}$.

Both 3.3V and 5V devices can drive inputs, enabling this device to operate in a mixed 3.3V and 5V system environment. All of the inputs support Schmitt-Trigger action, allowing slower input rise and fall times.

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 74LVC2G14 is available in Green SC70-6 and SOT-23-6 packages. It operates over an operating temperature range of -40°C to $+125^{\circ}\text{C}$.

FUNCTIONAL TABLE

INPUT	OUTPUT
nA	nY
L	H
H	L

$$Y = \bar{A}$$

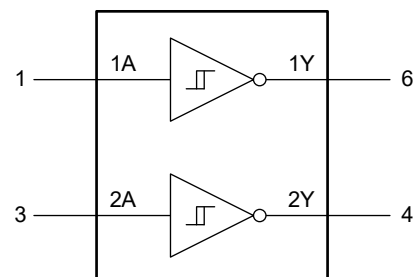
H = High Voltage Level

L = Low Voltage Level

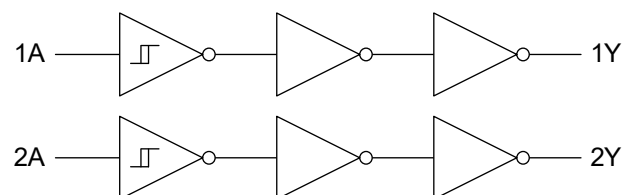
FEATURES

- Wide Supply Voltage Range: 1.65V to 5.5V
- Support Interfacing with 5V Logic Circuits
- Inputs Accept Voltages up to 5.5V
- +24mA/-24mA Output Current at $V_{CC} = 3.0\text{V}$
- High Noise Immunity
- CMOS Low Power Dissipation
- Direct Interface with TTL Levels
- -40°C to $+125^{\circ}\text{C}$ Operating Temperature Range
- Available in Green SC70-6 and SOT-23-6 Packages

LOGIC SYMBOL



LOGIC DIAGRAM



PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74LVC2G14	SC70-6	-40°C to +125°C	74LVC2G14XC6G/TR	R55XX	Tape and Reel, 3000
	SOT-23-6	-40°C to +125°C	74LVC2G14XN6G/TR	1FM XXXXX	Tape and Reel, 3000

MARKING INFORMATION

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

SC70-6

YYY X X

Date Code - Week

Date Code - Year

Serial Number

SOT-23-6

XXXXX

Vendor Code

Trace Code

Date Code - Year

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 Range, V_{CC} -0.5V to 6.5V
 Input Voltage Range, V_I ⁽¹⁾ -0.5V to 6.5V
 Output Voltage Range, V_O ⁽¹⁾
 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} ($V_O > V_{CC}$ or $V_O < 0V$) $\pm 50mA$
 Continuous Output Current, I_O ($V_O = 0V$ to V_{CC}) $\pm 50mA$
 Continuous Current through V_{CC} or GND $\pm 100mA$
 Junction Temperature ⁽²⁾ +150°C
 Storage Temperature Range -65°C to +150°C
 Lead Temperature (Soldering, 10s) +260°C
 ESD Susceptibility ^{(3) (4)}
 HBM $\pm 8000V$
 CDM $\pm 1000V$

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 ANSI/ESDA/JEDEC JS-001 specifications.
4. For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.

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°C to +125°C

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.

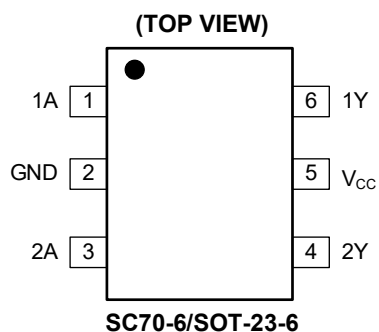
ESD SENSITIVITY CAUTION

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



PIN DESCRIPTION

PIN	NAME	FUNCTION
1, 3	1A, 2A	Data Inputs.
2	GND	Ground.
4, 6	2Y, 1Y	Data Outputs.
5	V _{CC}	Supply Voltage.

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

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
High-Level Output Voltage	V _{OH}	V _I = V _{T+} or V _{T-}	V _{CC} = 1.65V to 5.5V, I _O = -100μA	Full	V _{CC} - 0.05	V _{CC} - 0.01	V
			V _{CC} = 1.65V, I _O = -4mA	Full	1.43	1.55	
			V _{CC} = 2.3V, I _O = -8mA	Full	2.02	2.18	
			V _{CC} = 2.7V, I _O = -12mA	Full	2.38	2.56	
			V _{CC} = 3.0V, I _O = -24mA	Full	2.52	2.74	
			V _{CC} = 4.5V, I _O = -32mA	Full	4	4.22	
Low-Level Output Voltage	V _{OL}	V _I = V _{T+} or V _{T-}	V _{CC} = 1.65V to 5.5V, I _O = 100μA	Full		0.01	V
			V _{CC} = 1.65V, I _O = 4mA	Full		0.10	
			V _{CC} = 2.3V, I _O = 8mA	Full		0.12	
			V _{CC} = 2.7V, I _O = 12mA	Full		0.16	
			V _{CC} = 3.0V, I _O = 24mA	Full		0.30	
			V _{CC} = 4.5V, I _O = 32mA	Full		0.32	
Input Leakage Current	I _I	V _{CC} = 0V to 5.5V, V _I = 5.5V or GND	Full		±0.01	±1	μA
Power-Off Leakage Current	I _{OFF}	V _{CC} = 0V, V _I or V _O = 5.5V	Full		±0.01	±1	μA
Supply Current	I _{CC}	V _{CC} = 1.65V to 5.5V, V _I = 5.5V or GND, I _O = 0A	Full		0.01	1	μA
Additional Supply Current ⁽¹⁾	ΔI _{CC}	V _{CC} = 2.3V to 5.5V, V _I = V _{CC} - 0.6V, I _O = 0A	Full		0.05	10	μA
Input Capacitance	C _I	V _{CC} = 3.3V, V _I = GND to V _{CC}	+25°C		5		pF

NOTE:

1. It is the increase in supply current for per input at the specified voltage level except V_{CC} or GND.**DYNAMIC CHARACTERISTICS**(See Figure 4 for test circuit. Full = -40°C to +125°C, all typical values are measured at T_A = +25°C 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}	nA to nY, see Figure 5	V _{CC} = 1.65V to 1.95V	Full	0.5	10.1	ns
			V _{CC} = 2.3V to 2.7V	Full	0.5	5.6	
			V _{CC} = 2.7V	Full	0.5	5.2	
			V _{CC} = 3.0V to 3.6V	Full	0.5	5.2	
			V _{CC} = 4.5V to 5.5V	Full	0.5	4.4	
Power Dissipation Capacitance ⁽³⁾	C _{PD}	V _{CC} = 3.3V, V _I = GND to V _{CC}	+25°C		40		pF

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.

Σ(C_L × V_{CC}² × f_o) = Sum of outputs.

TRANSFER CHARACTERISTICS

(Full = -40°C to +125°C, all typical values are measured at $T_A = +25^\circ\text{C}$, unless stated noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
Positive-Going Threshold Voltage	V _{T+}	See Figure 1 and Figure 2	V _{CC} = 1.8V	Full	0.70	1.15	1.70	V
			V _{CC} = 2.3V	Full	1.00	1.47	2.00	
			V _{CC} = 3.0V, see Figure 3	Full	1.30	1.90	2.40	
			V _{CC} = 4.5V	Full	1.90	2.65	3.30	
			V _{CC} = 5.5V	Full	2.20	3.10	3.80	
Negative-Going Threshold Voltage	V _{T-}	See Figure 1 and Figure 2	V _{CC} = 1.8V	Full	0.25	0.60	1.10	V
			V _{CC} = 2.3V	Full	0.40	0.80	1.35	
			V _{CC} = 3.0V, see Figure 3	Full	0.60	1.07	1.70	
			V _{CC} = 4.5V	Full	1.00	1.60	2.20	
			V _{CC} = 5.5V	Full	1.20	1.95	2.50	
Hysteresis Voltage (V _{T+} - V _{T-})	V _H	See Figure 1 and Figure 2	V _{CC} = 1.8V	Full	0.15	0.53	1.20	V
			V _{CC} = 2.3V	Full	0.25	0.65	1.30	
			V _{CC} = 3.0V, see Figure 3	Full	0.40	0.81	1.40	
			V _{CC} = 4.5V	Full	0.59	1.04	1.70	
			V _{CC} = 5.5V	Full	0.70	1.16	1.90	

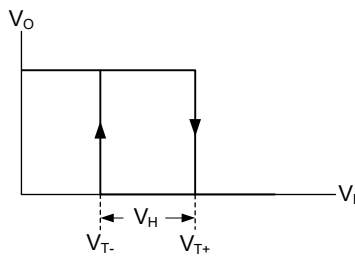


Figure 1. Typical Transfer Characteristics

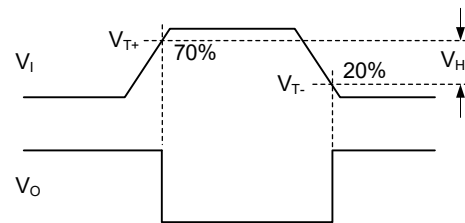


Figure 2. Explanation of V_{T+} , V_{T-} , and V_H

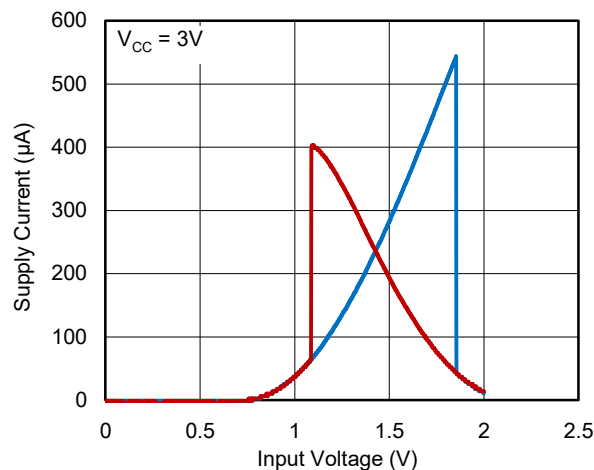
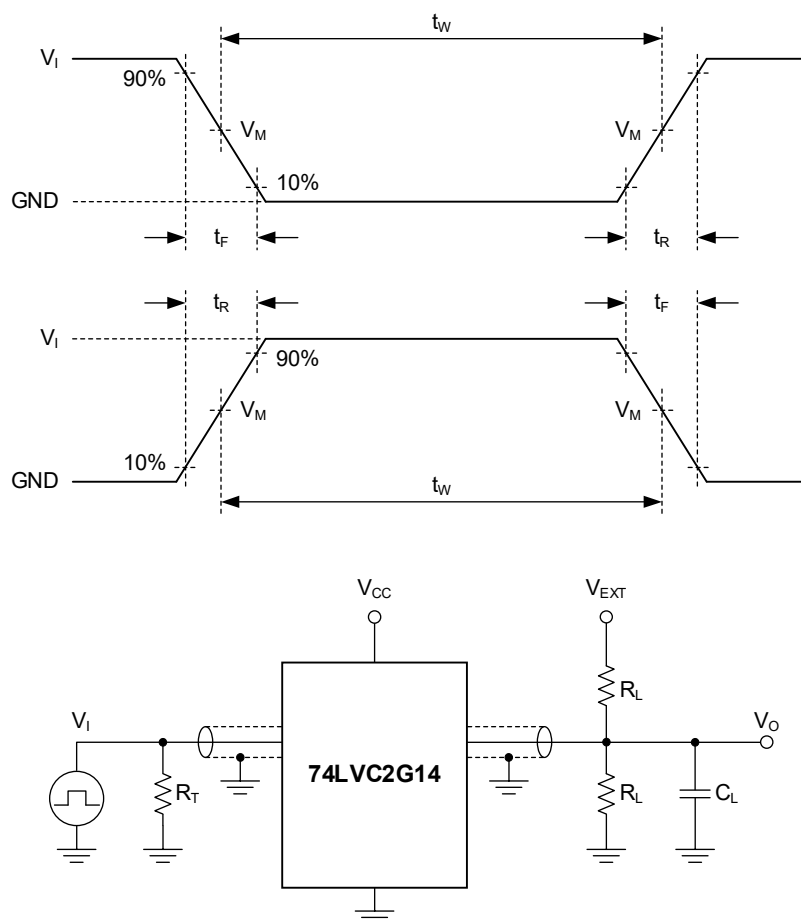


Figure 3. Supply Current vs. Input Voltage

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).

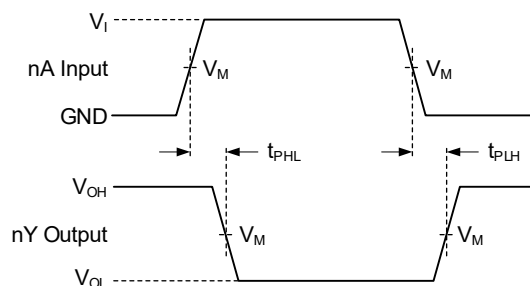
V_{EXT} : External voltage is used to measure switching time.

Figure 4. 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}	$\leq 2.0\text{ns}$	30pF	1k Ω	Open
2.3V to 2.7V	V_{CC}	$\leq 2.0\text{ns}$	30pF	500 Ω	Open
2.7V	2.7V	$\leq 2.5\text{ns}$	50pF	500 Ω	Open
3.0V to 3.6V	2.7V	$\leq 2.5\text{ns}$	50pF	500 Ω	Open
4.5V to 5.5V	V_{CC}	$\leq 2.5\text{ns}$	50pF	500 Ω	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 5. Input (nA) to Output (nY) Propagation Delays

Table 2. Measurement Points

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

NOTE:

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

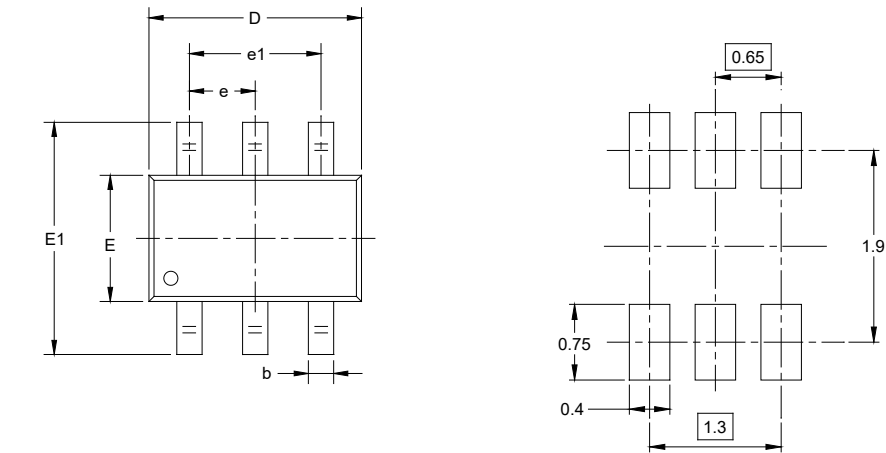
REVISION HISTORY

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

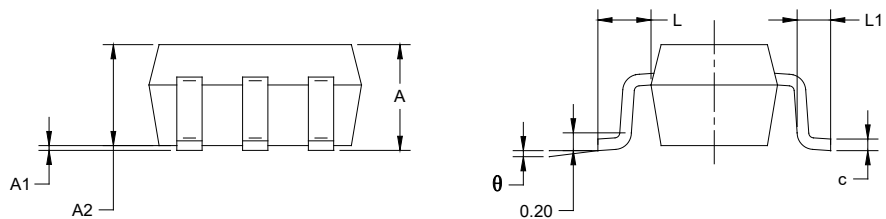
MARCH 2025 – REV.A.1 to REV.A.2	Page
Updated Recommended Operating Conditions section.....	2
Updated Absolute Maximum Ratings section.....	2
Updated Transfer Characteristics section	5
Added SOT-23-6 package	All
NOVEMBER 2021 – REV.A to REV.A.1	Page
Updated Dynamic Characteristics section.....	4
Added note of Table 2	7
Changes from Original (FEBRUARY 2021) to REV.A	Page
Changed from product preview to production data.....	All

PACKAGE OUTLINE DIMENSIONS

SC70-6



RECOMMENDED LAND PATTERN (Unit: mm)



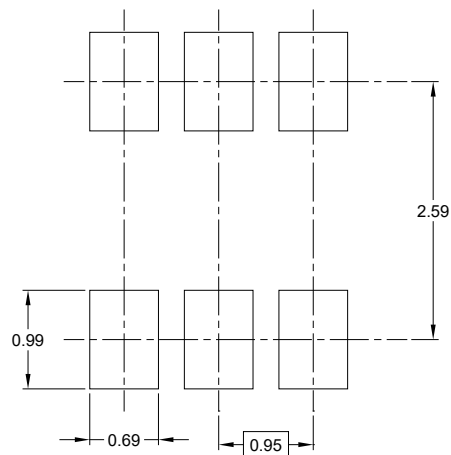
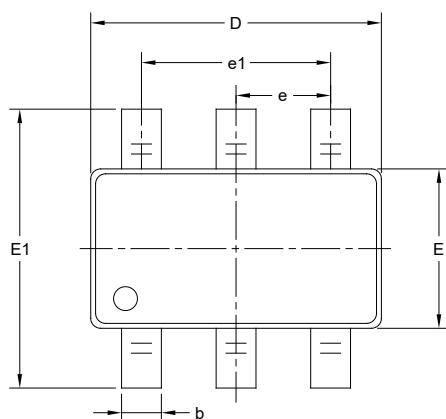
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.800	1.100	0.031	0.043
A1	0.000	0.100	0.000	0.004
A2	0.800	1.000	0.031	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.220	0.003	0.009
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026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

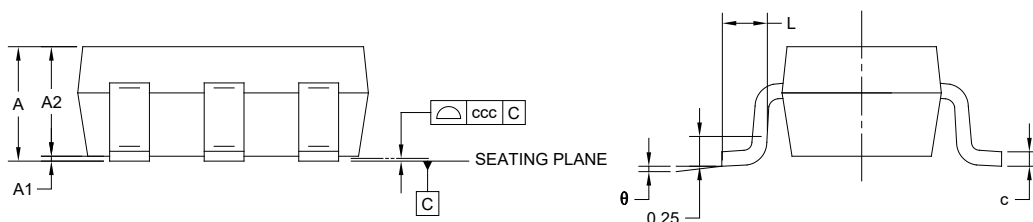
1. Body dimensions do not include mold flash or protrusion.
2. This drawing is subject to change without notice.

PACKAGE OUTLINE DIMENSIONS

SOT-23-6



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		

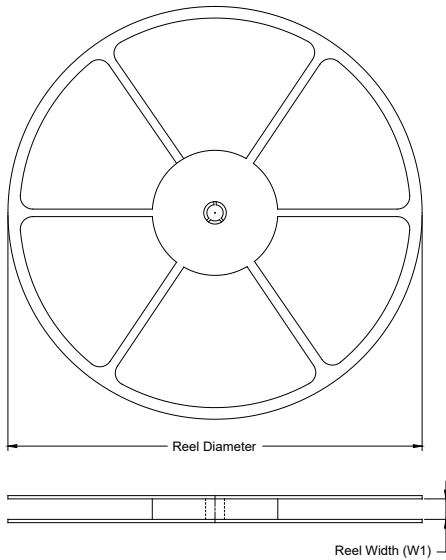
NOTES:

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.

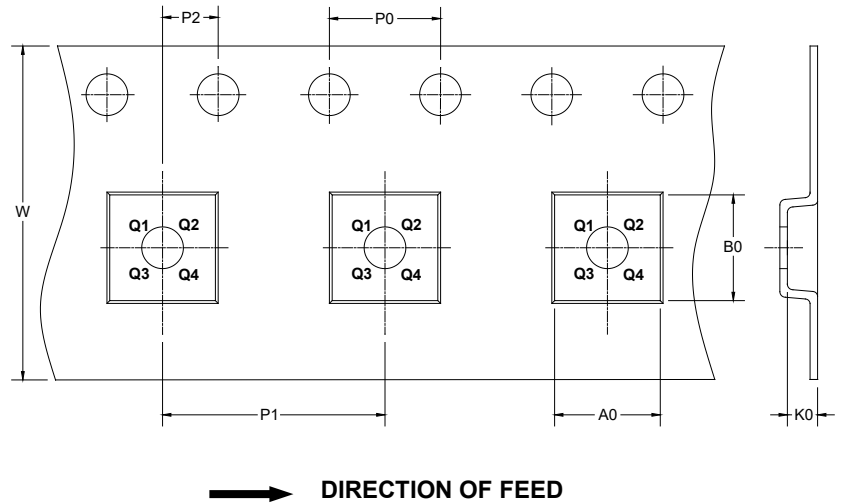
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

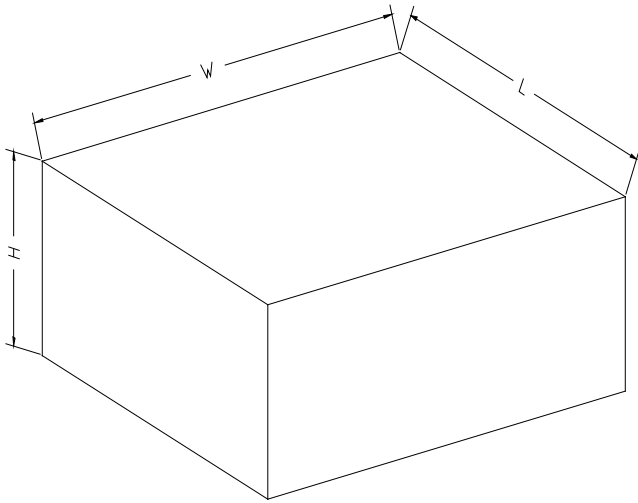
KEY PARAMETER LIST OF TAPE AND REEL

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
SOT-23-6	7"	9.5	3.23	3.17	1.37	4.0	4.0	2.0	8.0	Q3

DD00001

PACKAGE INFORMATION

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