

Single Buffer/Line Driver; 3-state

Features

- * Wide Supply Voltage Range from 1.65V to 5.5V
- * $\pm 24\text{mA}$ Output Drive ($V_{CC}=3.0\text{V}$)
- * CMOS Low Power Consumption
- * Latch-up Performance Exceeds 250mA
- * Direct Interface With TTL Levels
- * Input Accepts Voltages up to 5V
- * -40°C to $+85^{\circ}\text{C}$ Operating Temperature Range
- * Available in SOT23-5 and SOT353(SC70-5) package.

Applications

- * TVs, Servers
- * Motor Controls; AC Induction
- * Patient Monitoring
- * Electronic Points of Sale

General Description

The HCR74LVC1G125 provides one non-inverting buffer/line driver with 3-state output. The 3-state output is controlled by the output enable input ($\overline{\text{OE}}$). A HIGH-level at pin $\overline{\text{OE}}$ causes the output to assume a high-impedance OFF-state.

The input can be driven from either 3.3V or 5V devices. This feature allows the use of this device in a mixed 3.3V and 5V environment.

This device is fully specified for partial power-down applications using I_{OFF}. The I_{OFF} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

The HCR74LVC1G125 is available in Green SOT-23-5 and SC70-5 packages. It operates over an ambient temperature range of -40°C to $+85^{\circ}\text{C}$.



SC70-5(SOT-353)



SOT-23-5

Figure 1. Package Type of HCR74LVC1G125

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Pin Configuration

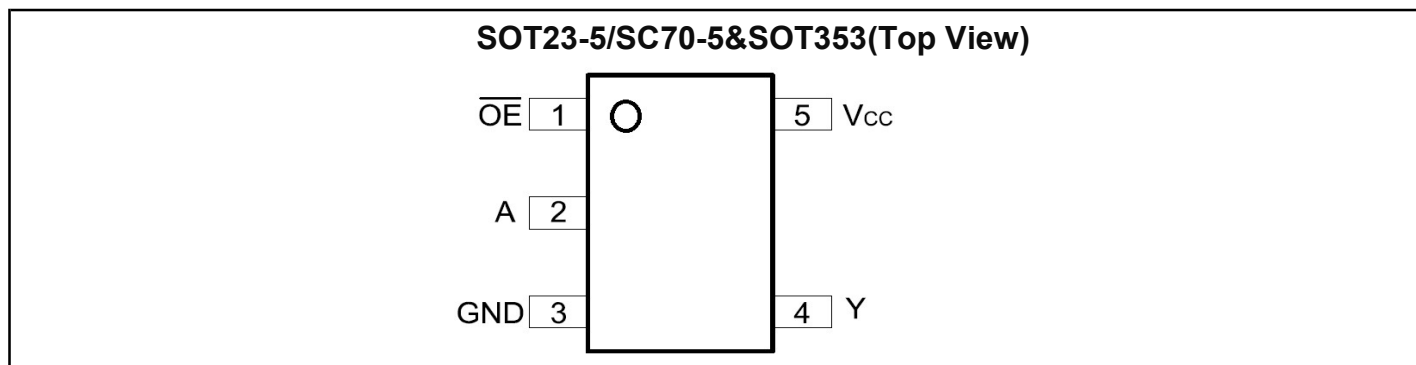


Figure 2. Pin Configuration of HCR74LVC1G125 (Top View)

Pin Function Table

Pin	NAME	FUNCTION
1	$\overline{OE}$	Output enable Input.
2	A	Data Input.
3	GND	Ground.(0V)
4	Y	Data Output.
5	VCC	Supply Voltage.

Logic Symbol

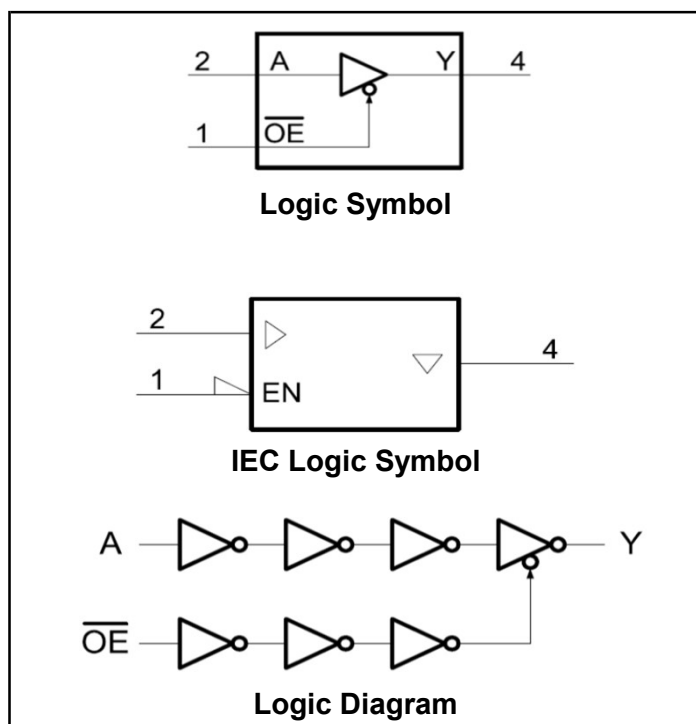


Figure 3. Logic Symbol

Function Table

Inputs		Output
$\overline{OE}$	A	Y
L	L	L
L	H	H
H	X	Z

Note:

H=HIGH Voltage Level
 L=LOW Voltage Level
 X=don't care
 Z=high-impedance OFF-state

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Ordering Information

Circuit Type /   **TR : Tape and Reel**
 Circuit Type: **HCR74LVC1G125**
 Package:
 M5: SOT-23-5
 ST35: SC70-5 (SOT-353)

Ordering Code

Part Number	Marking ^{noteA}	Temperature Range	Package	Quantity per Reel
HCR74LVC1G125/M5TR	ACXX	-40°C to +85°C	SOT-23-5	3000pcs/TR
HCR74LVC1G125/ST35TR	ACXX	-40°C to +85°C	SC70-5 (SOT-353)	3000pcs/TR

note A. X = Date Code-Year, X = Date code-Month.

Absolute Maximum Ratings ^{Note 1}

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	-	V _{CC}	-0.5	-	+6.5	V
Input Voltage	-	V _{IN}	-0.5	-	+6.5	V
Input Clamping Current	V _I < 0V	I _{IK}	-50	-	-	mA
Output Clamping Current	V _O < 0V or V _O > V _{CC}	I _{OK}	-	-	±50	mA
Output Voltage	Active mode	V _O	-0.5	-	V _{CC} +0.5	V
	Power-down mode		-0.5	-	+6.5	V
Output Current	V _O =0V to V _{CC}	I _O	-	-	±50	mA
Supply Current	-	I _{CC}	-	-	100	mA
Ground Current	-	I _{GND}	-100	-	-	mA
Total Power Dissipation		P _{tot}	250			mW
Operating Temperature Range		T _A	-40 to +85			°C
Junction Temperature Range		T _J	150			°C
Storage Temperature Range		T _{STG}	-65 to +150			°C
Lead Temperature (Soldering, 10s)		T _{LEAD}	+250			°C

Recommend Operating Conditions ^{note2}

Parameter		Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	-	V _{CC}	1.65	-	5.5	V
Input Voltage	-	V _I	0	-	5.5	V
Output Voltage	Active Mode	V _O	0	-	V _{CC}	V
	Power-down mode; V _{CC} =0V		0	-	5.5	V
Ambient Temperature	-	T _{amb}	-40	-	+85	°C
Input Transition rise and fall rate ^t	V _{CC} =1.65V to 2.7V	$\Delta t/\Delta V$	-	-	20	ns/V
	V _{CC} =2.7V to 5.5V		-	-	10	ns/V

Note 1: Stresses beyond those listed under "Absolute maximum Ratings" may damage the device.

2: The device is not guaranteed to function outside the recommended operating conditions.

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Electrical Characteristics

DC Characteristics

(Tamb= -40°C to +85°C, voltages are referenced to GND(ground=0V), unless otherwise specified.)

Parameter	Symbol	Test Condition		Vcc(V)	Min	Type	Max	Unit
HIGH-Level Input Voltage	VIH			1.65 to 1.95	0.65XVcc	-	-	V
				2.3 to 2.7	1.7	-	-	
				2.7 to 3.6	2.0	-	-	
				4.5 to 5.5	0.7XVcc	-	-	
LOW-Level Input Voltage	VIL			1.65 to 1.95	-	-	0.35XVcc	V
				2.3 to 2.7	-	-	0.7	
				2.7 to 3.6	-	-	0.8	
				4.5 to 5.5	-	-	0.3XVcc	
HIGH-Level Output Voltage	VOH	VI=VIH or VIL	Io=-100uA	1.65 to 5.5	Vcc-0.1	-	-	V
			Io=-4mA	1.65	1.2	-	-	
			Io=-8mA	2.3	1.9	-	-	
			Io=-12mA	2.7	2.2	-	-	
			Io=-24mA	3.0	2.3	-	-	
			Io=-32mA	4.5	3.8	-	-	
LOW-Level Output Voltage	VOL	VI=VIH or VIL	Io=100uA	1.65 to 5.5	-	-	0.10	V
			Io=4mA	1.65	-	-	0.45	
			Io=8mA	2.3	-	-	0.30	
			Io=12mA	2.7	-	-	0.40	
			Io=24mA	3.0	-	-	0.55	
			Io=32mA	4.5	-	-	0.55	
OFF-state output Current	Ioz	VI=VIH or VIL, VO=5.5V or GND		3.6	-	±0.1	±2.0	uA
Input Leakage Current	II	VI=5.5V or GND		0 to 5.5	-	±0.1	±1.0	uA
Power-OFF Leakage Current	IOFF	VI or VO=5.5V		0	-	±0.1	±2.0	uA
Supply Current	Icc	VI=5.5V or GND, Io=0A		1.65 to 5.5	-	0.1	4.0	uA
Additional Supply Current	ΔIcc	per pin; VI=VCC-0.6V, Io=0A		2.3 to 5.5	-	5	500	uA
Input Capacitance	CI	-		-	-	5	-	pF

Note: All typical values are measured at Vcc=3.3V, and Tamb=25°C.

Single Buffer/Line Driver; 3-state
AC Characteristics

(Tamb= -40°C to +85°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Test Condition	VCC(V)	Min	Type	Max	Unit
A to Y Propagation Delay	$t_{pd}^{(2)}$	see Figure 5	1.65 to 1.95	1.0	3.3	8.0	ns
			2.3 to 2.7	0.5	2.2	5.5	ns
			2.7	0.5	2.2	5.5	ns
			3.0 to 3.6	0.5	2.1	4.5	ns
			4.5 to 5.5	0.5	1.7	4.0	ns
$\overline{OE}$ to Y Enable Delay	$t_{en}^{(3)}$	see Figure 6	1.65 to 1.95	1.0	4.1	9.4	ns
			2.3 to 2.7	0.5	2.8	6.6	ns
			2.7	0.5	3.3	6.6	ns
			3.0 to 3.6	0.5	2.4	5.3	ns
			4.5 to 5.5	0.5	2.1	5.0	ns
$\overline{OE}$ to Y Disable time	$t_{dis}^{(4)}$	see Figure 6	1.65 to 1.95	1.0	4.3	9.2	ns
			2.3 to 2.7	0.5	2.7	5.0	ns
			2.7	0.5	3.0	5.0	ns
			3.0 to 3.6	0.5	3.1	5.0	ns
			4.5 to 5.5	0.5	2.2	4.2	ns
Power dissipation capacitance	$CPD^{(5)}$	per buffer; $V_I=GND$ to V_{CC}	output enabled	-	25	-	pF
			output disabled	-	6	-	pF

Note: (1) Typical values are measured at Tamb=25°C and VCC=1.8V, 2.5V, 2.7V, 3.3V and 5.0V respectively.

(2) t_{pd} is the same as t_{PLH} and t_{PHL} .

(3) t_{en} is the same as t_{PZL} and t_{PZH} .

(4) t_{dis} is the same as t_{PLZ} and t_{PHZ} .

(5) CPD is used to determine the dynamic power dissipation (P_D in uW).

$P_D = (CPD \times V_{CC}^2 \times f_i \times N) + \Sigma (CL \times V_{CC}^2 \times f_o)$ where:

f_i =input frequency in MHz;

f_o =output frequency in MHz;

CL =output load capacitance in pF;

V_{CC} =supply voltage in Volts.

N =number of inputs switching;

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

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Testing Circuit

AC Testing Circuit

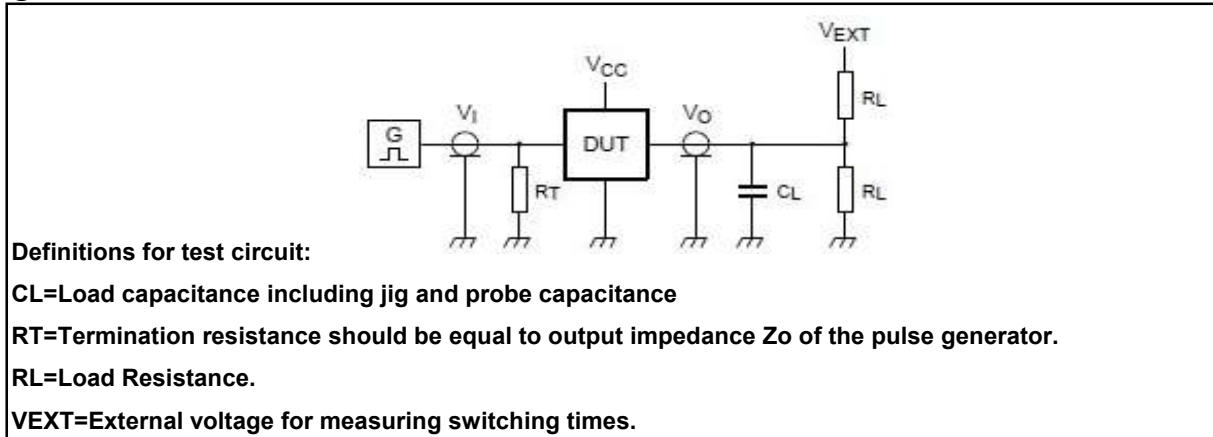


Figure 4. Test Circuit for Measuring switching times

AC Testing Waveforms

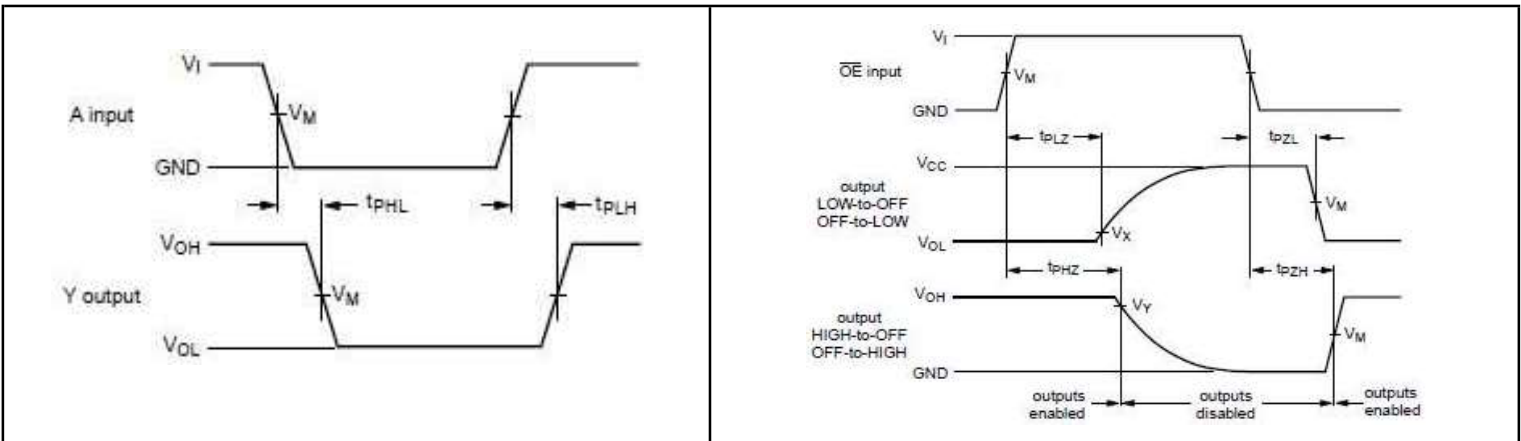


Figure 5. Input(A) to output (Y) propagation delay times

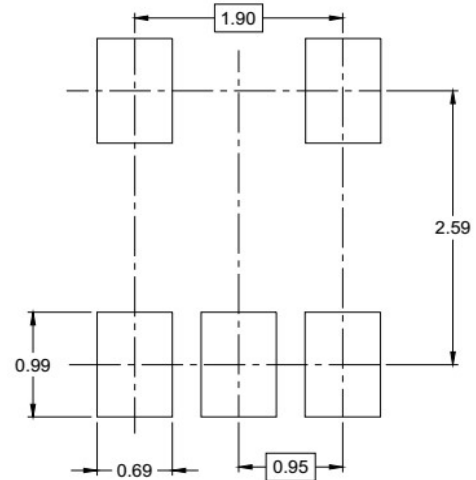
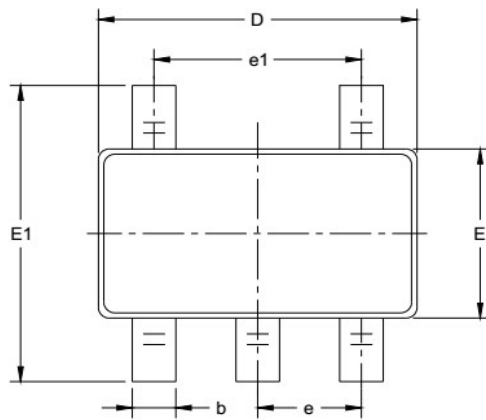
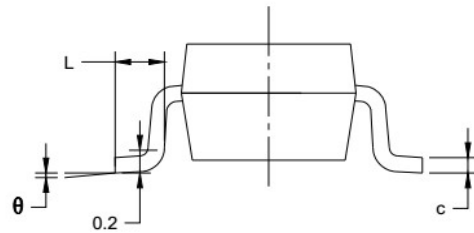
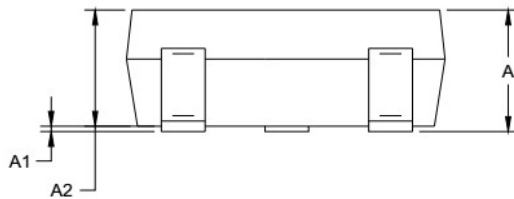
Figure 6. 3-state Enable and disable times

Measurement Points

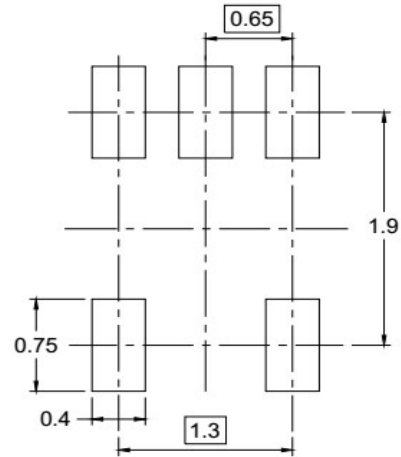
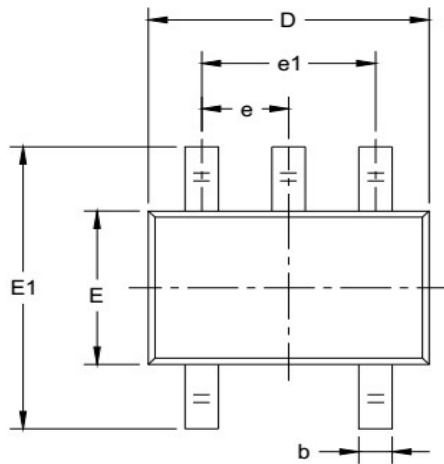
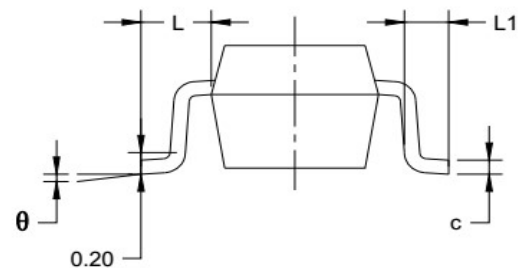
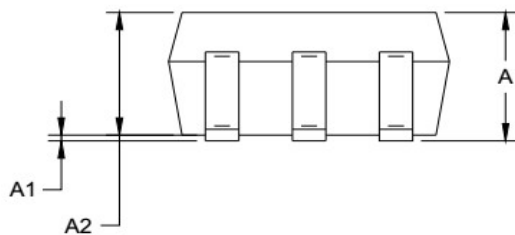
Type number	Input	Output		
VCC	VM	VM	VX	VY
1.65V to 1.95V	0.5 X VCC	0.5 X VCC	VOL + 0.15V	VOH - 0.15V
2.3V to 2.7V	0.5 X VCC	0.5 X VCC	VOL + 0.15V	VOH - 0.15V
2.7V	1.5V	1.5V	VOL + 0.3V	VOH - 0.3V
3.0V to 3.6V	1.5V	1.5V	VOL + 0.3V	VOH - 0.3V
4.5V to 5.5V	0.5 X VCC	0.5 X VCC	VOL + 0.3V	VOH - 0.3V

Test Data

Type number	Input		Load		VEXT		
VCC	Vi	tr, tf	CL	RL	tPHL, tPLH	tpZH, tPHZ	tpZL, tPLZ
1.65V to 1.95V	VCC	≤2.0ns	30pF	1KΩ	open	GND	2XVCC
2.3V to 2.7V	VCC	≤2.0ns	30pF	500Ω	open	GND	2XVCC
2.7V	2.7V	≤2.5ns	50pF	500Ω	open	GND	6V
3.0V to 3.6V	2.7V	≤2.5ns	50pF	500Ω	open	GND	6V
4.5V to 5.5V	VCC	≤2.5ns	50pF	500Ω	open	GND	2XVCC

Single Buffer/Line Driver; 3-state
Mechanical Dimensions
PKG: SOT23-5 (M5)
Unit: mm(inch)

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°

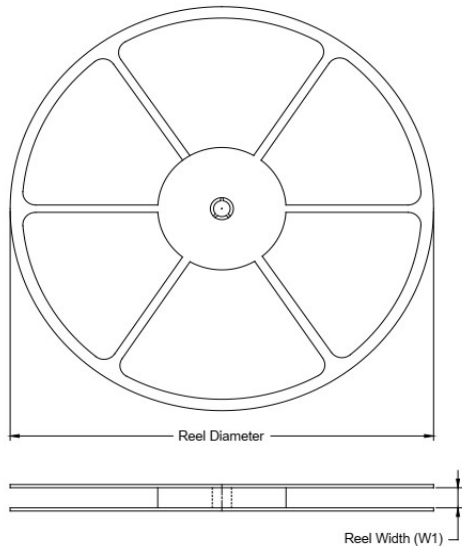
Single Buffer/Line Driver; 3-state
Mechanical Dimensions(Con.)
PKG: SC70-5/SOT353 (ST35)
Unit: mm(inch)

RECOMMENDED LAND PATTERN (Unit: mm)


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
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°

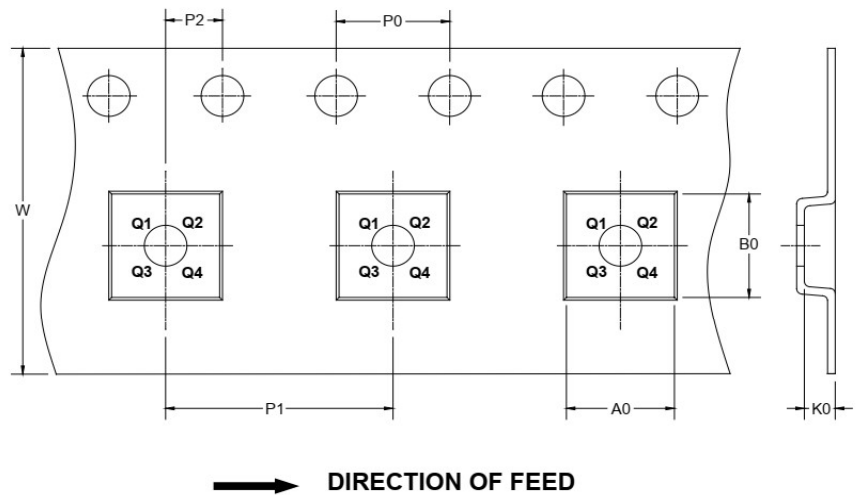
Single Buffer/Line Driver; 3-state

TAPE AND REEL INFORMATION

REEL DIMENSIONS



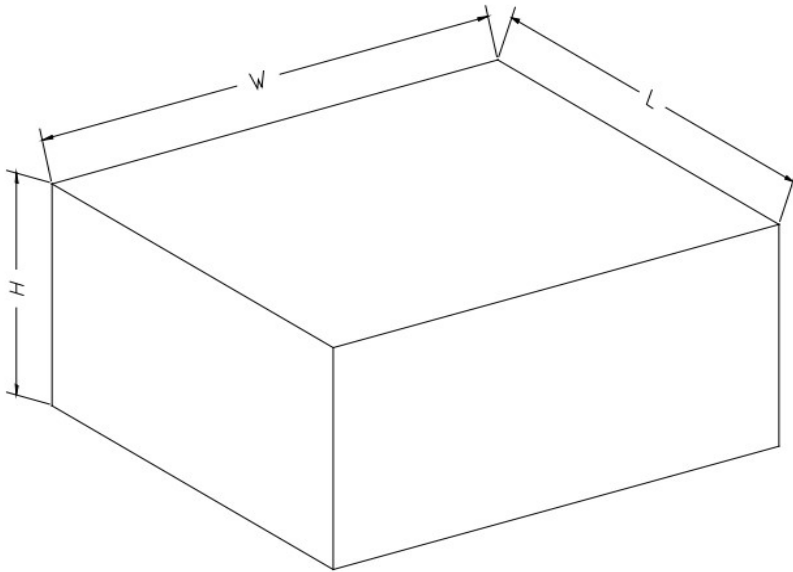
TAPE DIMENSIONS



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
SC70-5	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

Single Buffer/Line Driver; 3-state**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

Single Buffer/Line Driver; 3-state

Statements And Notes

The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	o	o	o	o	o	o	o	o	o	o
Plastic resin	o	o	o	o	o	o	o	o	o	o
Chip	o	o	o	o	o	o	o	o	o	o
The lead	o	o	o	o	o	o	o	o	o	o
Plastic sheet installed	o	o	o	o	o	o	o	o	o	o
explanation	o: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. X: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

Notion

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