# GT74LVC125
Quadruple Bus Buffer Gate With 3-State Output

1 Features	2 Application
- 3-State output - Separate $\overline{OE}$ for all 4 buffers - Wide supply voltage range from 1.65 to 5.5V - Inputs accept voltages to 5.5 V - Max t_{pd} of 4.7 ns at 3.3 V - ±24-mA output drive at 3.3 V - I_{off} ssupports partial-power-down mode	- Cable modem termination system - Video communications system - High-speed data acquisition and generation - Military: radar and sonar - Motor control: high-voltage - Power line communication modem - SSD: Internal or external - Video broadcasting and infrastructure - Video broadcasting - WiMAX and wireless infrastructure equipment

3 Description	Circuit Diagram
The operating voltage range of the bus buffer gate is 1.65-V to 5.5-V. The GT74LVC125 device contains quadruple buffer drivers with a 3-state output. The output is disabled when the output-enable ($\overline{OE}$) input is high. To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver. This device is fully specified for partial-power-down applications using I_{off}. The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.	
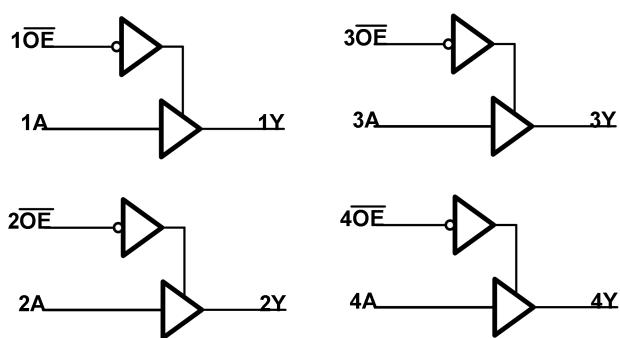
4 Revision History

Revision	Date	Note
Rev. A1. 0	2023. 09. 02	Original Version
Rev. A1. 1	2023. 12. 15	1.Updated Package Qty 2.Added Tape and Reel Information 3.Added Application Note
Rev. A1. 2	2023. 12. 26	1.Added Marking 2.Added MSL
Rev. A1. 3	2024. 01. 26	Updated Part Name

The latest datasheet version should be checked on the GTIC official website, as the company does not actively inform customers about updates to the datasheet.

# 5 Device Summary, Pin and Packages

Table 5-1. Device Summary[1]

Serial Name	Part Name	Package	Body Size (Nom)	Marking[2]	MSL[3]	Package Qty
GT74LVC125	GT74LVC125TD	TSSOP14	5.00mm×4.40mm×1.20mm	GT74LVC125 XXXXXXX	3	Tape and Reel 4000
	GT74LVC125PD	SOP14	5.00mm×4.40mm×1.20mm	GT74LVC125 XXXXXXX	3	Tape and Reel 4000

(1) For all available packages, please contact product sales.

(2) There may be additional marking, which relates to the lot trace code information (data code and vendor code), the logo or the environmental category on the device.

(3) MSL, The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications.

(4) "XXXXX" in Marking will be appeared as the batch code.

5 Device Summary, Pin and Packages(Continued)

Top View

1$\overline{OE}$	1		14	Vcc
1A	2		13	4$\overline{OE}$
1Y	3		12	4A
2$\overline{OE}$	4		11	4Y
2A	5		10	3$\overline{OE}$
2Y	6		9	3A
GND	7		8	3Y
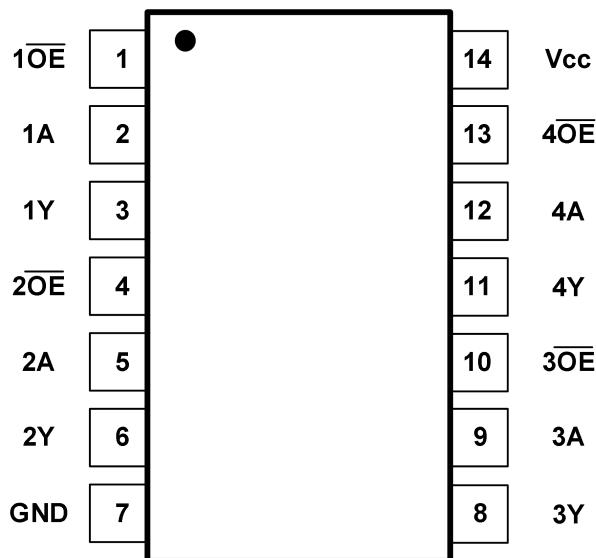
Fig.5-1.GT74LVC125:PD (SOP14) Package,

GT74LVC125:TD (TSSOP14) Package

Table 5-2 PD/TD Pin definition

Pin		I/O	Description
Name	PD TD		
1$\overline{OE}$	1	I	Enable Input 1
1A	2	I	Input 1
1Y	3	O	Output 1
2$\overline{OE}$	4	I	Enable Input 2
2A	5	I	Input 2
2Y	6	O	Output 2
GND	7	—	Ground
3Y	8	O	Output 3
3A	9	I	Input 3
3$\overline{OE}$	10	I	Enable Input 3
4Y	11	O	Output 4
4A	12	I	Input 4
4$\overline{OE}$	13	I	Enable Input 4
V$_{CC}$	14	—	Positive Supply

6 Voltage, Temperature, ESD and Thermal Ratings

6.1 Absolute Maximum Ratings[1]

Parameters		Min	Max.	Unit
V_{CC}	Supply voltage range	-0.5	6.5	V
V_I	Input voltage range[2]	-0.5	6.5	V
V_O	Voltage range applied to any output in the high-impedance or power-off state[2]	-0.5	6.5	V
V_O	Voltage range applied to any output in the high or low state[2][3]	-0.5	V_{CC}+0.5	V
I_{IK}	Input clamp current	$V_I<0$		-50	mA
I_{OK}	Output clamp current	$V_O<0$		-50	mA
I_O	Continuous output current		±50	mA
	Continuous current through V_{CC} or GND		±100	mA
T_J	Junction temperature under bias		150	°C
T_{stg}	Storage temperature range	-65	150	°C

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.

6.2 ESD Ratings

ESD			Value	Unit
V(ESD)	Electrostatic discharge	Human-Body Model (HBM)[1]	8 K	V
		Charged-Device Model (CDM)[2]	2 K	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6 Voltage, Temperature, ESD and Thermal Ratings(Continued)

6.3 Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter		Min	Max	Unit
V_{CC}	Supply voltage		1.65	5.5	V
V_I	Input voltage		0	5.5	V
V_O	Output voltage		0	V_{CC}	V
I_{OH}	High-level output current	V_{CC}=1.65V		-4	mA
		V_{CC}=2.3V		-8	
		V_{CC}=3V		-16	
				-24	
		V_{CC}=4.5V		-32	
I_{OL}	Low-level output current	V_{CC}=1.65V		4	mA
		V_{CC}=2.3V		8	
		V_{CC}=3V		16	
				24	
		V_{CC}=4.5V		32	
T_A	Operating free-air temperature		-40	125	°C

6.4 Thermal Information

Package Type	θ_{JA}	θ_{JC}	Unit
TSSOP14	180	35	°C/W
SOP14	120	36	°C/W

7 Electrical Specifications

All typical values are at V_{CC} = 3.3V, T_A = +25°C

Symbol		Parameter	V_{CC}	−40°C to 85°C			−40°C to 125°C			Unit
				Min	Typ	Max	Min	Typ	Max	
V_{OH}		I_{OH}=− 100 µA	1.65 V to 5.5 V	V_{CC}-0.1			V_{CC}-0.1			V
		I_{OH}=−4 mA	1.65 V	1.2			1.2			
		I_{OH}=−8 mA	2.3 V	1.9			1.9			
		I_{OH}=− 16 mA	3 V	2.4			2.4			
		I_{OH}=−24 mA		2.3			2.3			
		I_{OH}=−32 mA	4.5 V	3.8			3.8			
V_{OL}		I_{OL}=100 µA	1.65 V to 5.5 V			0.1			0.1	V
		I_{OL}=4 mA	1.65 V			0.45			0.45	
		I_{OL}=8 mA	2.3 V			0.3			0.3	
		I_{OL}=16 mA	3 V			0.4			0.4	
		I_{OL}=24 mA				0.55			0.55	
		I_{OL}=32 mA	4.5 V			0.55			0.55	
I_I	A or $\overline{OE}$	V_I=5.5 V or GND	0 to 5.5 V			±5			±5	µA
	Input									
I_{off}		V_I or V_O=5.5 V	0			±10			±10	µA
I_{OZ}		VO=0 to 5.5 V	3.6 V			10			10	µA
I_{CC}		V_I=5.5 V or GND, I_O = 0	1.65 V to 5.5 V			10			10	µA
ΔI_{CC}		One Input at V_{CC} − 0.6 V, Other Inputs at V_{CC} or GND	3 V to 5.5 V			500			500	µA
C_i		V_I=V_{CC} or GND	3.3 V		5			5		pF

(1) All unused digital inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

7 Electrical Specifications (Continued)

Typical Values at T_A=+25°C and nominal voltages 1.8V, 2.5V, 3.3V, and 5.0V.

Parameter	From (Input)	To (Output)	−40°C to 125°C								Unit
			V_{CC}=1.8 V ± 0.15 V		V_{CC}=2.5 V ± 0.15 V		V_{CC}=3.3 V ± 0.15 V		V_{CC}=5 V ± 0.15 V		
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	A	Y	2.8	9.5	1.2	5.8	1	4.7	1	3.2	ns
t_{en}	$\overline{OE}$	Y	3.3	10.8	1.5	6.9	1	5.6	1	5.2	ns
t_{dis}	$\overline{OE}$	Y	1.3	11.8	1	5.2	1	5.2	1	4.4	ns

T_A=25°C

Parameter		Test Conditions	V_{CC}=1.8 V	V_{CC}=2.5 V	V_{CC}=3.3 V	V_{CC}=5 V	Unit
			Typ	Typ	Typ	Typ	
C_{pd}	Power Dissipation Capacitance	f=10 MHz	17	18	25	30	pF

8 Typical Characteristics
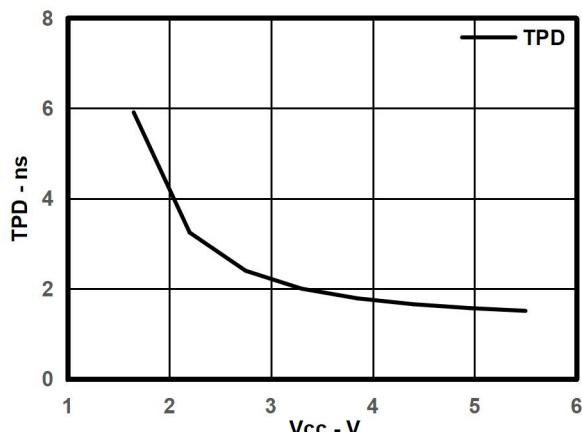

Fig.8-1.Typical Tpd vs Vcc
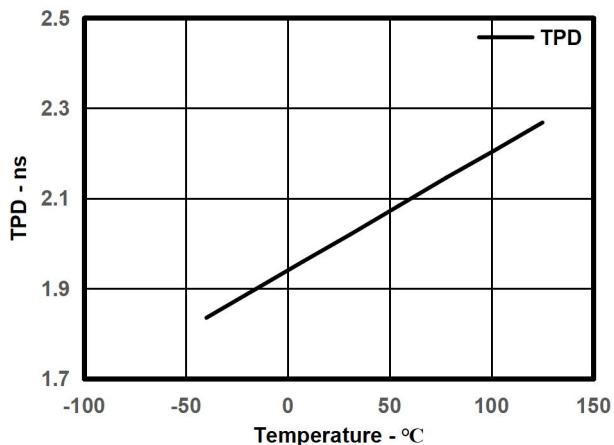
Fig.8-2.Typical Tpd vs Temp

9 Measurement Information

Load Circuits
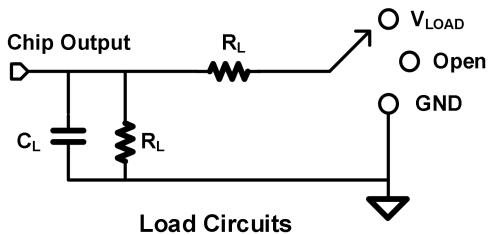
TEST	S1
T_{PHL}/T_{PLH}	OPEN
T_{PLZ}/T_{PZL}	V_{LOAD}
T_{PHZ}/T_{PZH}	GND

V_{CC}	Inputs		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_I	T_r/T_f					
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	2×V_{CC}	30pF	1kΩ	0.15V
2.5V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	2×V_{CC}	30pF	500Ω	0.15V
3.3V±0.15V	3V	≤2.5ns	1.5V	6V	50pF	500Ω	0.3V
5V±0.15V	V_{CC}	≤2.5ns	$V_{CC}/2$	2×V_{CC}	50pF	500Ω	0.3V

Period Time

Setup and Hold Times
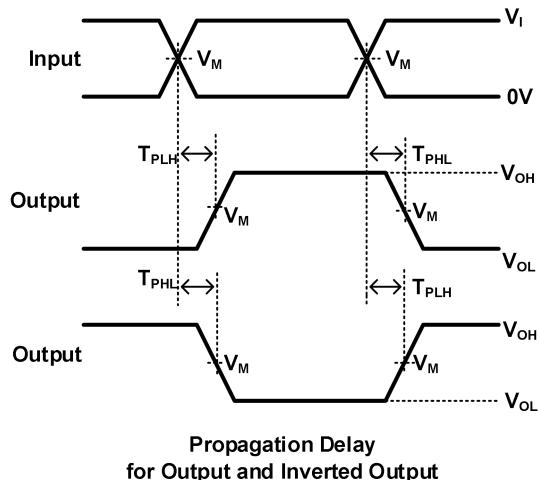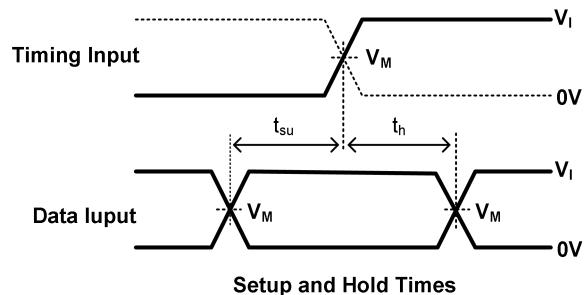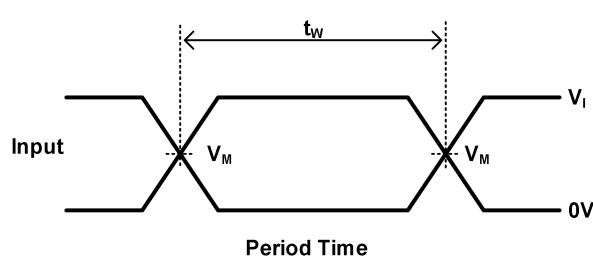
**Propagation Delay
for Output and Inverted Output**
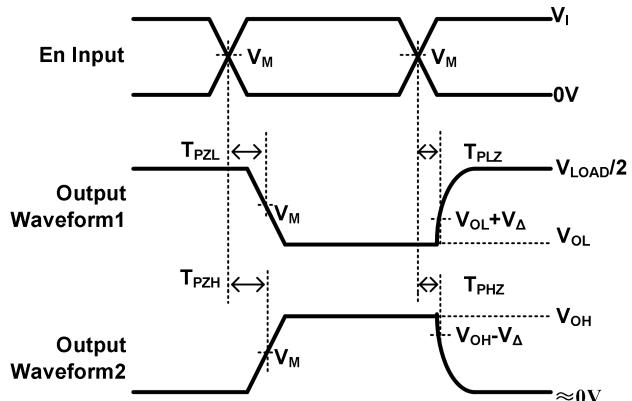
**Enable and Disable Times
Low-And High-Level Enabling**

Notes: A. C_L includes probe and jig capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.

C. All input pulses are supplied by generators having the following characteristics: PRR 10 MHz, Z = 50Ω.

D. The outputs are measured one at a time, with one transition per measurement.

E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .

F. t_{PZL} and t_{PZH} are the same as t_{en} .

G. t_{PLH} and t_{PHL} are the same as t_{pd} .

H. All parameters and waveforms are not applicable to all devices.

10 Detailed Description

10.1 Overview

The GT74LVC125 device contains quadruple buffer gate device with output enable control and performs the Boolean function Y = A. This device is fully specified for partial-power-down applications using I_{off}. The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down. To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

10.2 Functional Block Diagram
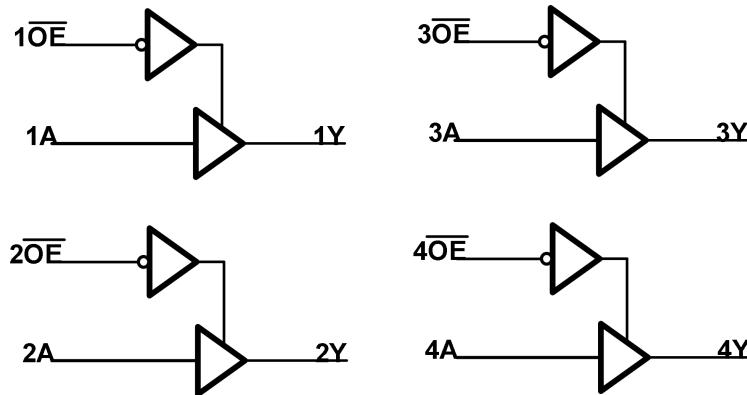
Fig.10-1

10.3 Feature Description

The GT74LVC125 have wide operating voltage range from 1.65 V to 5.5 V, It Allows down voltage translation and I_{off} feature allows voltages on the inputs and outputs, when V_{CC} is 0 V.

10.4 Device Functional Modes

Table 10-1 Function Table

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

11 Application note

11.1 Application Information

GT74LVC125 is a high drive CMOS device that can be used for a multitude of bus interface type applications where output drive or PCB trace length is a concern. The inputs can accept voltages to 5.5 V at any valid V_{CC} making it ideal for down translation.

11.2 Typical Power Button Circuit
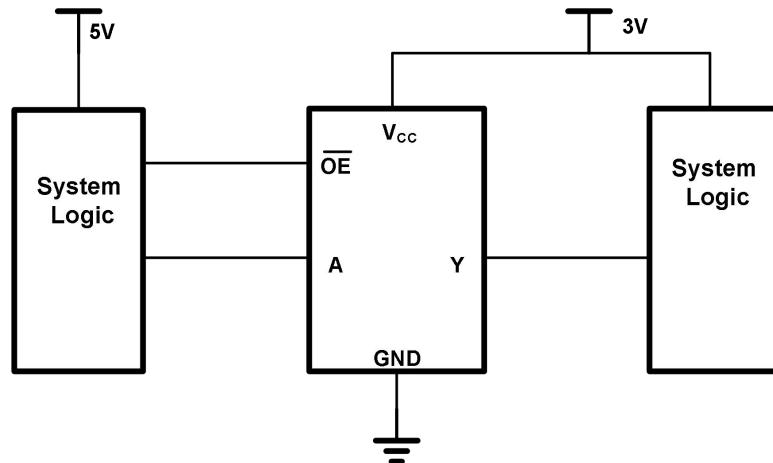

Fig.11-1

12 Package Outline Dimension

TSSOP14

SECTION B-B
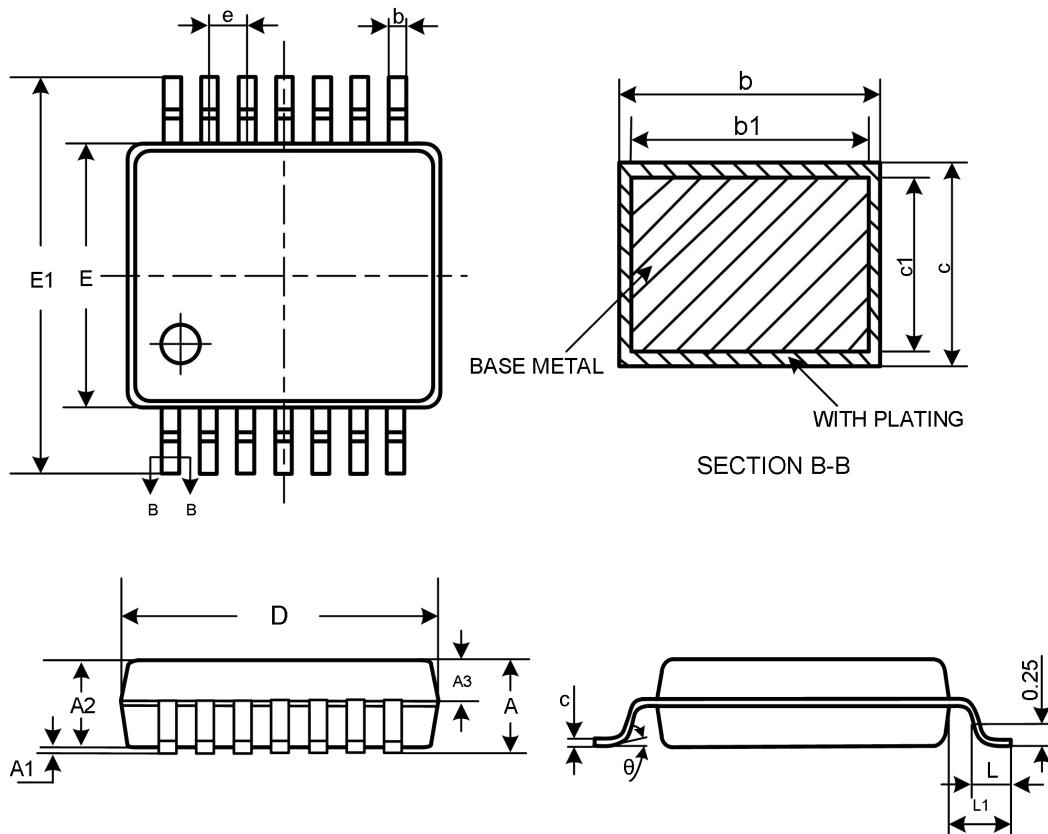
Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min	Nom	Max	Min	Nom	Max
A	——	——	1.20	——	——	0.047
A1	0.05	——	0.15	0.002	——	0.006
A2	0.90	1.00	1.05	0.035	0.039	0.041
A3	0.39	0.44	0.49	0.015	0.017	0.019
b	0.20	——	0.28	0.008	——	0.011
b1	0.19	0.22	0.25	0.007	0.009	0.010
c	0.13	——	0.17	0.005	——	0.007
c1	0.12	0.13	0.14	0.005	0.005	0.006
D	4.90	5.00	5.10	0.193	0.197	0.201
E	4.30	4.40	4.50	0.169	0.173	0.177
E1	6.20	6.40	6.60	0.244	0.252	0.260
e	0.65BSC			0.026BSC		
L	0.45	0.60	0.75	0.018	0.024	0.030
L1	1.00BCS			0.039BSC		
θ	0	——	8°	0	——	8°

12 Package Outline Dimension(Continued)

SOP14

BASE METAL

WITH PLATING

SECTION B-B
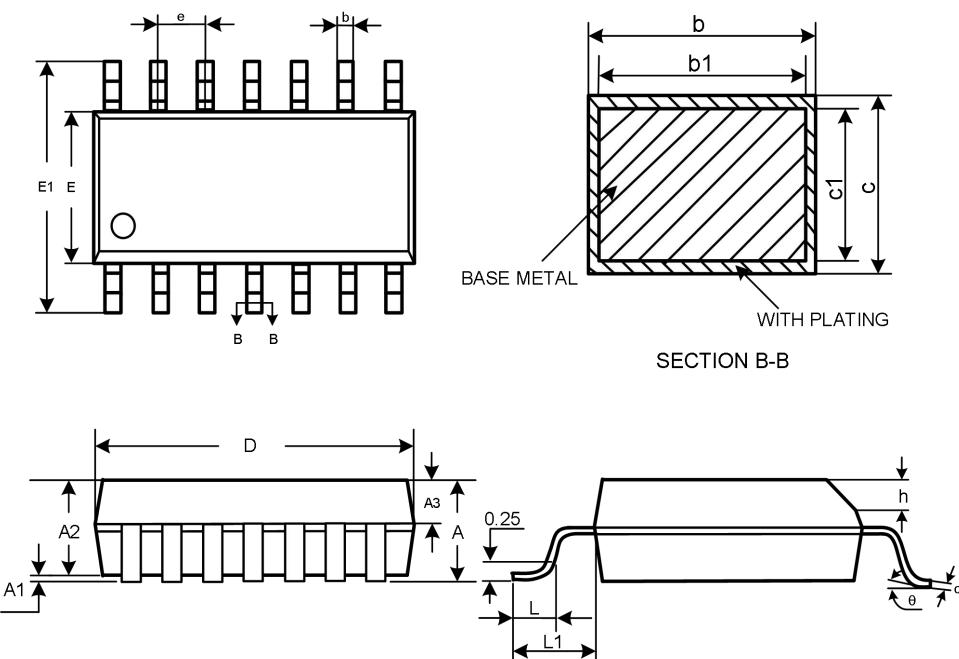
Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min	Nom	Max	Min	Nom	Max
A	——	——	1.75	——	——	0.069
A1	0.10	——	0.225	0.004	——	0.009
A2	1.30	1.40	1.50	0.051	0.055	0.059
A3	0.60	0.65	0.70	0.024	0.026	0.028
b	0.39	——	0.47	0.015	——	0.019
b1	0.38	0.41	0.44	0.015	0.016	0.017
c	0.20	——	0.24	0.008	——	0.009
c1	0.19	0.20	0.21	0.007	0.008	0.008
D	8.55	8.65	8.75	0.337	0.341	0.344
E1	5.80	6.00	6.20	0.228	0.236	0.244
E	3.80	3.90	4.00	0.150	0.154	0.157
e	1.27BSC			0.05BSC		
h	0.25	——	0.50	0.010	——	0.020
L	0.50	——	0.80	0.020	——	0.031
L1	1.05REF			0.041REF		
θ	0	——	8°	0	——	8°

13 TAPE AND REEL INFORMATION

REEL DIMENSIONS

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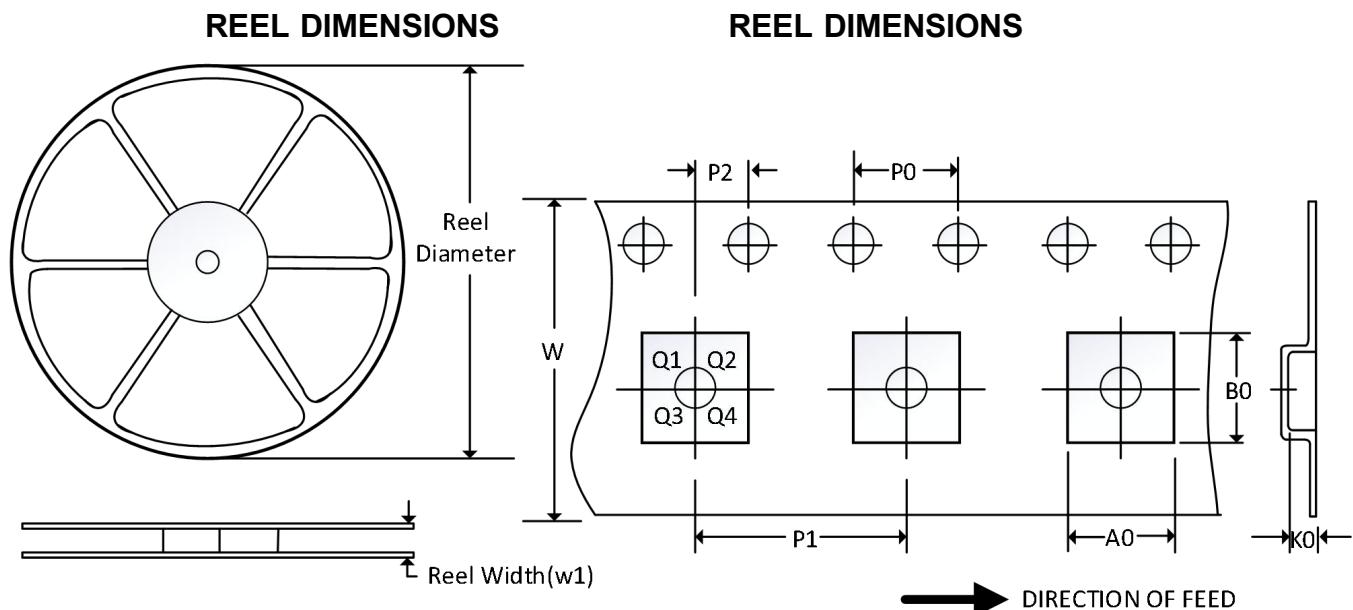
NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width(mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TSSOP14	13''	12.4	6.95	5.60	1.20	4.0	8.0	2.0	12.0	Q1
SOP14	13''	16.4	6.60	9.30	2.10	4.0	8.0	2.0	16.0	Q1

NOTE:

1. All dimensions are nominal.
2. Plastic or metal protrusions of 0.15mm maximum per side are not included.