Quad Buffer/Line Driver; 3-state

CJ74LVC125 Logic

1 Introduction

The CJ74LVC125 consists of four non-inverting buffers/line drivers with 3-state outputs (nY) that are controlled by the output enable input (/nOE). A HIGH at /nOE causes the outputs to assume a high-impedance OFF-state.

Inputs can be driven from either 3.3V or 5V devices. When disabled, up to 5.5V can be applied to the outputs.

2 Available Packages

PART NUMBER	PACKAGE
CJ74LVC125	SOP14
	TSSOP14

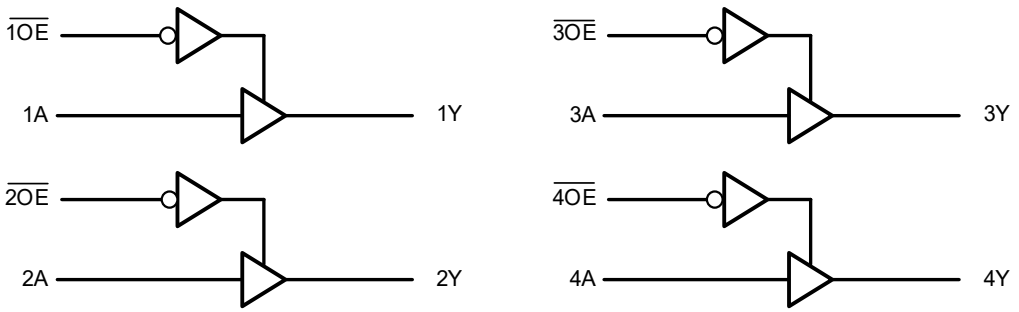
Note: For all available packages, please refer to the part Orderable Information.

3 Features

- 5V tolerant inputs/outputs for interfacing with 5V logic
- Wide supply voltage range from 1.2V to 3.6V
- CMOS low power consumption
- Direct interface with TTL levels
- Specified from -40°C to +125°C

4 Applications

- Cable modem termination systems
- IP phones: wired and wireless
- Optical modules
- Point-to-point microwave backhaul
- Private branch exchanges (PBX)
- TETRA base stations
- Telecom base band units
- Telecom shelters
- Vector signal analyzers and generators
- Video conferencing: IP-based HD
- WiMAX and wireless infrastructure equipment
- Wireless communications testers
- xDSL modems and DSLAM



Simplified schematic

5 Orderable Information

DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
CJ74LVC125ADN	SOP14	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 4000 Units / Reel	Active
CJ74LVC125BDN	TSSOP14	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 5000 Units / Reel	Active

Note:

ECO PLAN: For the RoHS and Green certification standards of this product, please refer to the official report provided by JSCJ.

MSL: Moisture Sensitivity Level. Determined according to JEDEC industry standard classification.

SORT: Specifically defined as follows:
Active: Recommended for new products;
Customized: Products manufactured to meet the specific needs of customers;
Preview: The device has been released and has not been fully mass produced. The sample may or may not be available;
NoRD: It is not recommended to use the device for new design. The device is only produced for the needs of existing customers;
Obsolete: The device has been discontinued.

6 Pin Configuration and Marking Information

6.1 Pin Configuration

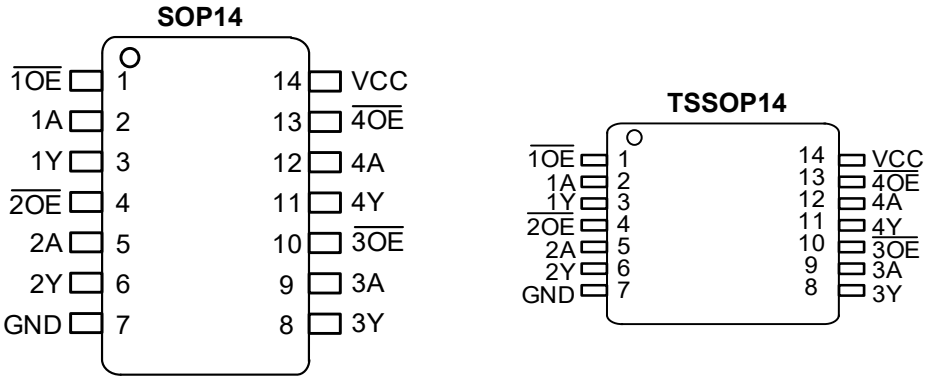


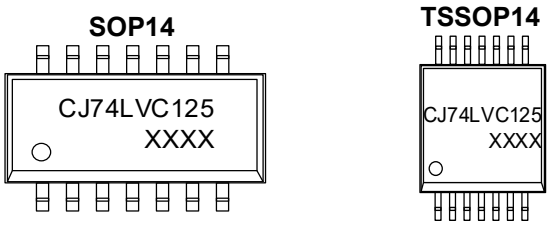
Figure 6-1 Pin configuration

6.2 Pin Function

PIN		I/O(1)	DESCRIPTION
No.	NAME		
1	$\overline{1OE}$	I	Data enable input (active LOW)
2	1A	I	Data input
3	1Y	O	Data output
4	$\overline{2OE}$	I	Data enable input (active LOW)
5	2A	I	Data input
6	2Y	O	Data output
7	GND	G	Ground (0V)
8	3Y	O	Data output
9	3A	I	Data input
10	$\overline{3OE}$	I	Data enable input (active LOW)
11	4Y	O	Data output
12	4A	I	Data input
13	$\overline{4OE}$	I	Data enable input (active LOW)
14	VCC	P	Supply voltage

(1) I-Input, O-Output, P-Power, G-Ground

6.3 Marking Information



XXXX: Code, indicates weekly record information.

7 Specifications

7.1 Absolute Maximum Ratings

Voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	MAX.	UNIT
V_{CC}	Supply voltage	-		-0.5	+6.5	V
I_{IK}	Input clamping current	V_I < 0V		-50	-	mA
V_I	Input voltage	-		-0.5	+6.5	V
I_{OK}	Output clamping current	V_O > V_{CC} or V_O < 0V		-	±50	mA
V_O	Output voltage	Output HIGH or LOW-state		-0.5	V_{CC}+0.5	V
		Output 3-state		-0.5	+6.5	V
I_O	Output current	V_O=0V to V_{CC}		-	±50	mA
I_{CC}	Supply current	-		-	100	mA
I_{GND}	Ground current	-		-100	-	mA
P_{tot}	Total power dissipation	-		-	500	mW
T_{stg}	Storage temperature	-		-65	+150	°C
T_L	Soldering temperature	10s	SOP/TSSOP	-	260	°C

Note: Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to GND. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

7.2 Recommended Operating Conditions

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CC}	Supply voltage	-	1.65	-	3.6	V
		Functional	1.2	-	-	V
V_I	Input voltage	-	0	-	5.5	V
V_O	Output voltage	Output HIGH or LOW-state	0	-	V_{CC}	V
		Output 3-state	0	-	5.5	V
T_{amb}	Ambient temperature	-	-40	-	+125	°C
Δt/ΔV	Input transition rise and fall rate	V_{CC}=2.3V to 2.7V	0	-	20	ns/V
		V_{CC}=2.7V to 3.6V	0	-	10	ns/V

7.3 ESD Ratings

SYMBOL	ESD RATINGS		VALUE	UNIT
$V_{ESD-HBM}$	Electrostatic discharge	Human body model (HBM)(1)	±2000	V

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

7.4 Electrical Characteristics

7.4.1 DC Characteristics 1

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

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
V_{IH}	HIGH-level input voltage	V_{CC}=1.2V		1.08	-	-	V
		V_{CC}=1.65V to 1.95V		0.65xV_{CC}	-	-	V
		V_{CC}=2.3V to 2.7V		1.7	-	-	V
		V_{CC}=2.7V to 3.6V		2.0	-	-	V
V_{IL}	LOW-level input voltage	V_{CC}=1.2V		-	-	0.12	V
		V_{CC}=1.65V to 1.95V		-	-	0.35xV_{CC}	V
		V_{CC}=2.3V to 2.7V		-	-	0.7	V
		V_{CC}=2.7V to 3.6V		-	-	0.8	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL}	I_O=-100uA; V_{CC}=1.65V to 3.6V	V_{CC} - 0.2	-	-	V
			I_O=-4mA; V_{CC}=1.65V	1.2	-	-	V
			I_O=-8mA; V_{CC}=2.3V	1.8	-	-	V
			I_O=-12mA; V_{CC}=2.7V	2.2	-	-	V
			I_O=-18mA; V_{CC}=3.0V	2.4	-	-	V
			I_O=-24mA; V_{CC}=3.0V	2.2	-	-	V
V_{OL}	LOW-level output voltage	V_I = V_{IH} or V_{IL}	I_O=100uA; V_{CC}=1.65V to 3.6V	-	-	0.2	V
			I_O=4mA; V_{CC}=1.65V	-	-	0.45	V
			I_O=8mA; V_{CC}=2.3V	-	-	0.6	V
			I_O=12mA; V_{CC}=2.7V	-	-	0.4	V
			I_O=24mA; V_{CC}=3.0V	-	-	0.55	V
I_I	Input leakage current	V_I=5.5V or GND; V_{CC}=3.6V		-	-	±5	uA
I_{OZ}	OFF-state output current	V_I=V_{IH} or V_{IL}; V_O=5.5V or GND; V_{CC}=3.6V		-	-	±5	uA
I_{OFF}	Power-off leakage current	V_I or V_O=5.5V; V_{CC}=0V		-	-	±10	uA
I_{CC}	Supply current	V_I=V_{CC} or GND; I_O=0A; V_{CC}=3.6V		-	-	10	uA
ΔI_{CC}	Additional supply current	Per input pin; V_I=V_{CC}-0.6V; I_O=0A; V_{CC}=2.7V to 3.6V		-	-	500	uA
C_I	Input capacitance	V_{CC}=0V to 3.6V; V_I= GND to V_{CC}		-	4.0	-	pF

Note: All typical values are measured at V_{CC}=3.3V (unless stated otherwise) and T_{amb}=25°C.

7.4.2 DC Characteristics 2

T_{amb}=-40°C to +125°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
V_{IH}	HIGH-level input voltage	V_{CC}=1.2V		1.08	-	-	V
		V_{CC}=1.65V to 1.95V		0.65xV_{CC}	-	-	V
		V_{CC}=2.3V to 2.7V		1.7	-	-	V
		V_{CC}=2.7V to 3.6V		2.0	-	-	V
V_{IL}	LOW-level input voltage	V_{CC}=1.2V		-	-	0.12	V
		V_{CC}=1.65V to 1.95V		-	-	0.35xV_{CC}	V
		V_{CC}=2.3V to 2.7V		-	-	0.7	V
		V_{CC}=2.7V to 3.6V		-	-	0.8	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL}	I_O=-100uA; V_{CC}=1.65V to 3.6V	V_{CC} - 0.3	-	-	V
			I_O=-4mA; V_{CC}=1.65V	1.05	-	-	V
			I_O=-8mA; V_{CC}=2.3V	1.65	-	-	V
			I_O=-12mA; V_{CC}=2.7V	2.05	-	-	V
			I_O=-18mA; V_{CC}=3.0V	2.25	-	-	V
			I_O=-24mA; V_{CC}=3.0V	2.0	-	-	V
V_{OL}	LOW-level output voltage	V_I = V_{IH} or V_{IL}	I_O=100uA; V_{CC}=1.65V to 3.6V	-	-	0.3	V
			I_O=4mA; V_{CC}=1.65V	-	-	0.65	V
			I_O=8mA; V_{CC}=2.3V	-	-	0.8	V
			I_O=12mA; V_{CC}=2.7V	-	-	0.6	V
			I_O=24mA; V_{CC}=3.0V	-	-	0.8	V
I_I	Input leakage current	V_I=5.5V or GND; V_{CC}=3.6V		-	-	±20	uA
I_{OZ}	OFF-state output current	V_I=V_{IH} or V_{IL}; V_O=5.5V or GND; V_{CC}=3.6V		-	-	±20	uA
I_{OFF}	Power-off leakage current	V_I or V_O=5.5V; V_{CC}=0V		-	-	±20	uA
I_{CC}	Supply current	V_I=V_{CC} or GND; I_O=0A; V_{CC}=3.6V		-	-	40	uA
ΔI_{CC}	Additional supply current	Per input pin; V_I=V_{CC}-0.6V; I_O=0A; V_{CC}=2.7V to 3.6V		-	-	5000	uA

Note: All typical values are measured at V_{CC}=3.3V (unless stated otherwise) and T_{amb}=25°C.

7.4.3 AC Characteristics 1

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

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
t_{pd}	nA to nY propagation delay	See Figure 8-5	V_{CC}=1.2V	-	12.0	-	ns
			V_{CC}=1.65V to 1.95V	1.5	5.4	11.0	ns
			V_{CC}=2.3V to 2.7V	1.0	2.9	5.7	ns
			V_{CC}=2.7V	1.5	2.8	5.5	ns
			V_{CC}=3.0V to 3.6V	1.0	2.5	4.8	ns
t_{en}	$\overline{nOE}$ to nY enable time	See Figure 8-6	V_{CC}=1.2V	-	16.0	-	ns
			V_{CC}=1.65V to 1.95V	1.0	5.0	12.2	ns
			V_{CC}=2.3V to 2.7V	0.5	2.9	6.8	ns
			V_{CC}=2.7V	1.5	3.1	6.6	ns
			V_{CC}=3.0V to 3.6V	1.0	2.3	5.4	ns
t_{dis}	$\overline{nOE}$ to nY disable time	See Figure 8-6	V_{CC}=1.2V	-	7.0	-	ns
			V_{CC}=1.65V to 1.95V	2.2	4.6	7.5	ns
			V_{CC}=2.3V to 2.7V	0.5	2.6	4.2	ns
			V_{CC}=2.7V	1.5	3.1	5.0	ns
			V_{CC}=3.0V to 3.6V	1.0	3.2	4.6	ns
$t_{sk(o)}$	Output skew time	V_{CC}=3.0V to 3.6V		-	-	1.0	ns
C_{PD}	Power dissipation capacitance	Per buffer; V_I= GND to V_{CC}	V_{CC}=1.65V to 1.95V	-	6.0	-	pF
			V_{CC}=2.3V to 2.7V	-	9.4	-	pF
			V_{CC}=3.0V to 3.6V	-	12.4	-	pF

Note:

(1) Typical values are measured at T_{amb}=25°C and V_{CC}=1.2V, 1.8V, 2.5V, 2.7V and 3.3V respectively.

(2) t_{pd} is the same as t_{PLH} and t_{PHL}.
t_{en} is the same as t_{PZH} and t_{PZL}.
t_{dis} is the same as t_{PLZ} and t_{PHZ}.

(3) Skew between any two outputs of the same package switching in the same direction. This parameter is guaranteed by design.

(4) C_{PD} is used to determine the dynamic power dissipation (P_D in uW).
$P_D=(C_{PD}xV_{CC}^2xf_ixN)+\sum(C_LxV_{CC}^2xf_o)$ 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 V;
N=number of inputs switching;
$\sum(C_LxV_{CC}^2xf_o)$=sum of outputs.

7.4.4 AC Characteristics 2

T_{amb}=-40°C to +125°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
t_{pd}	nA to nY propagation delay	See Figure 8-5	V_{CC}=1.65V to 1.95V	1.5	-	12.8	ns
			V_{CC}=2.3V to 2.7V	1.0	-	6.7	ns
			V_{CC}=2.7V	1.5	-	7.0	ns
			V_{CC}=3.0V to 3.6V	1.0	-	6.0	ns
t_{en}	$\overline{nOE}$ to nY enable time	See Figure 8-6	V_{CC}=1.65V to 1.95V	1.0	-	14.2	ns
			V_{CC}=2.3V to 2.7V	0.5	-	7.9	ns
			V_{CC}=2.7V	1.5	-	8.5	ns
			V_{CC}=3.0V to 3.6V	1.0	-	7.0	ns
t_{dis}	$\overline{nOE}$ to nY disable time	See Figure 8-6	V_{CC}=1.65V to 1.95V	2.2	-	8.7	ns
			V_{CC}=2.3V to 2.7V	0.5	-	5.0	ns
			V_{CC}=2.7V	1.5	-	6.5	ns
			V_{CC}=3.0V to 3.6V	1.0	-	6.0	ns
$t_{sk(o)}$	Output skew time	V_{CC}=3.0V to 3.6V		-	-	1.5	ns

Note:

(1) Typical values are measured at T_{amb}=25°C and V_{CC}=1.2V, 1.8V, 2.5V, 2.7V and 3.3V respectively.

(2) t_{pd} is the same as t_{PLH} and t_{PHL}.
t_{en} is the same as t_{PZH} and t_{PZL}.
t_{dis} is the same as t_{PLZ} and t_{PHZ}.

(3) Skew between any two outputs of the same package switching in the same direction. This parameter is guaranteed by design.

8 Detailed Description

8.1 Overview

The CJ74LVC125 consists of four non-inverting buffers/line drivers with 3-state outputs (nY) that are controlled by the output enable input (/nOE). A HIGH at /nOE causes the outputs to assume a high-impedance OFF-state.

Inputs can be driven from either 3.3V or 5V devices. When disabled, up to 5.5V can be applied to the outputs.

8.2 Functional Block Diagram

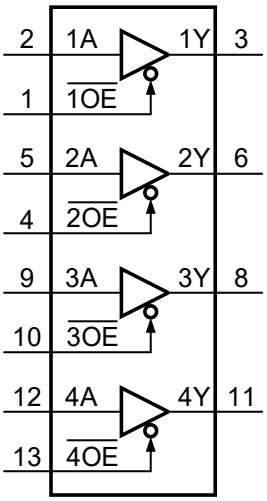


Figure 8-1 Logic symbol

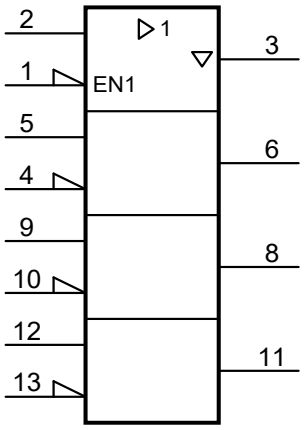


Figure 8-2 IEC logic symbol

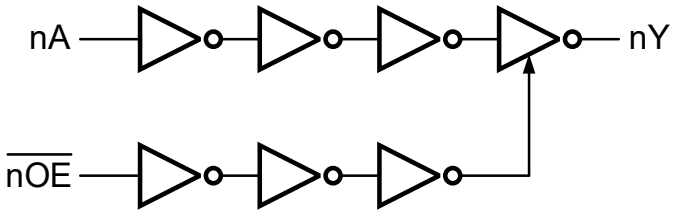


Figure 8-3 Logic diagram

8.3 Function Table(1)

INPUT		OUTPUT
$\overline{\text{nOE}}$	nA	nY
L	L	L
L	H	H
H	X	Z

(1) H=HIGH voltage level; L=LOW voltage level; X=don't care; Z=high-impedance OFF-state.

8.4 Testing Circuit

8.4.1 AC Testing Circuit

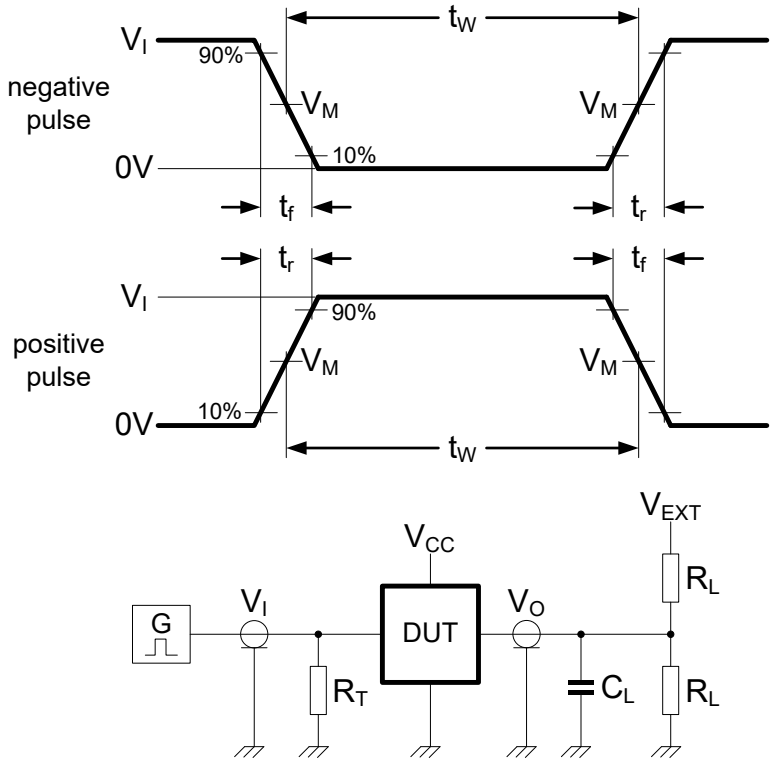


Figure 8-4 Test circuit for measuring switching times

Definitions for test circuit:

R_L=Load resistance.

C_L=Load capacitance including jig and probe capacitance.

R_T=Termination resistance should be equal to the output impedance Z_o of the pulse generator.

V_{EXT}=External voltage for measuring switching times.

8.4.2 AC Testing Waveforms

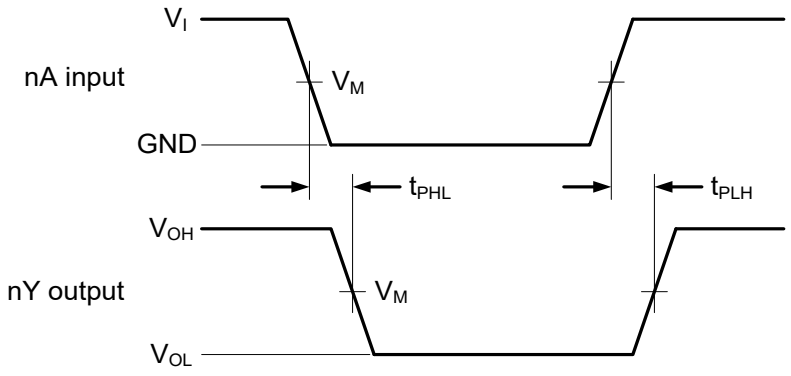


Figure 8-5 The input (nA) to output (nY) propagation delays

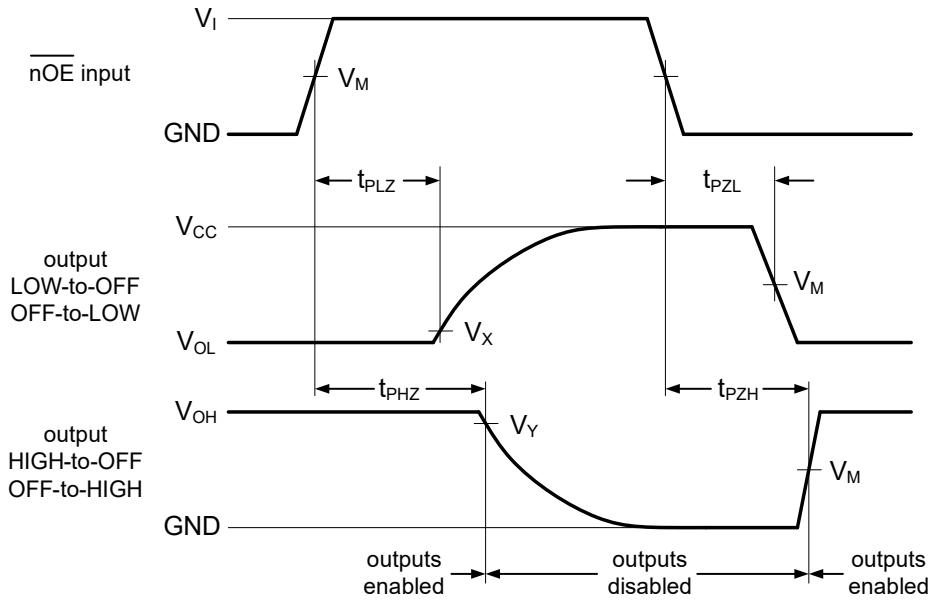


Figure 8-6 3-state enable and disable times

8.4.3 Measurement Points

SUPPLY VOLTAGE	INPUT		OUTPUT
V_{CC}	V_I	V_M	V_M
1.2V	V_{CC}	0.5xV_{CC}	0.5xV_{CC}
1.65V to 1.95V	V_{CC}	0.5xV_{CC}	0.5xV_{CC}
2.3V to 2.7V	V_{CC}	0.5xV_{CC}	0.5xV_{CC}
2.7V	2.7V	1.5V	1.5V
3.0V to 3.6V	2.7V	1.5V	1.5V

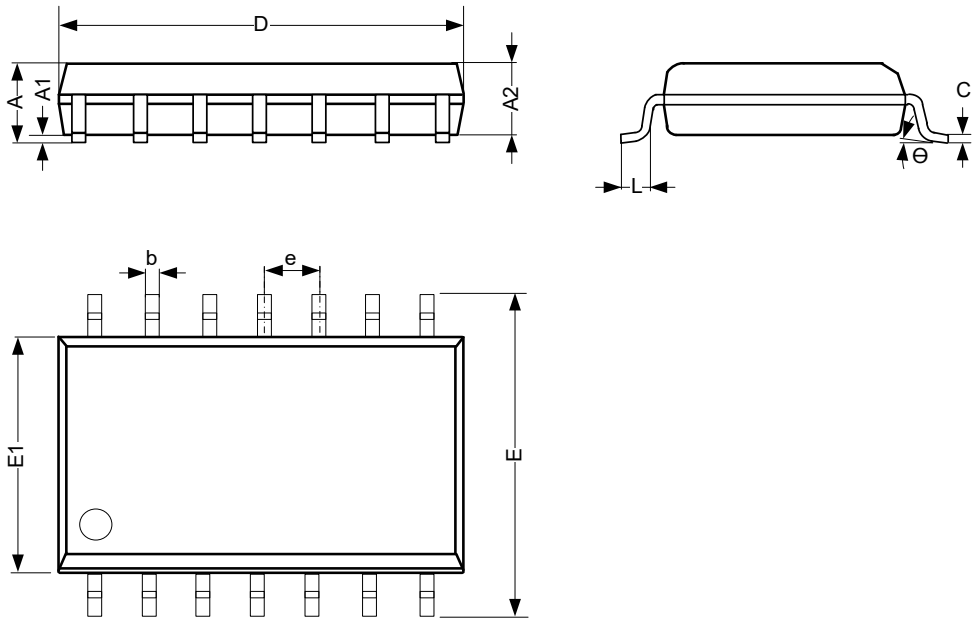
8.4.4 Test Data

SUPPLY VOLTAGE	INPUT		LOAD		V_{EXT}		
V_{CC}	V_I	t_r,t_f	C_L	R_L	t_{PLH},t_{PHL}	t_{PZH},t_{PHZ}	t_{PZL},t_{PLZ}
1.2V	V_{CC}	≤ 2.0ns	30pF	1kΩ	Open	GND	2xV_{CC}
1.65V to 1.95V	V_{CC}	≤ 2.0ns	30pF	1kΩ	Open	GND	2xV_{CC}
2.3V to 2.7V	V_{CC}	≤ 2.0ns	30pF	500Ω	Open	GND	2xV_{CC}
2.7V	2.7V	≤ 2.5ns	50pF	500Ω	Open	GND	2xV_{CC}
3.0V to 3.6V	2.7V	≤ 2.5ns	50pF	500Ω	Open	GND	2xV_{CC}

9 Mechanical Information

9.1 SOP14 Mechanical Information

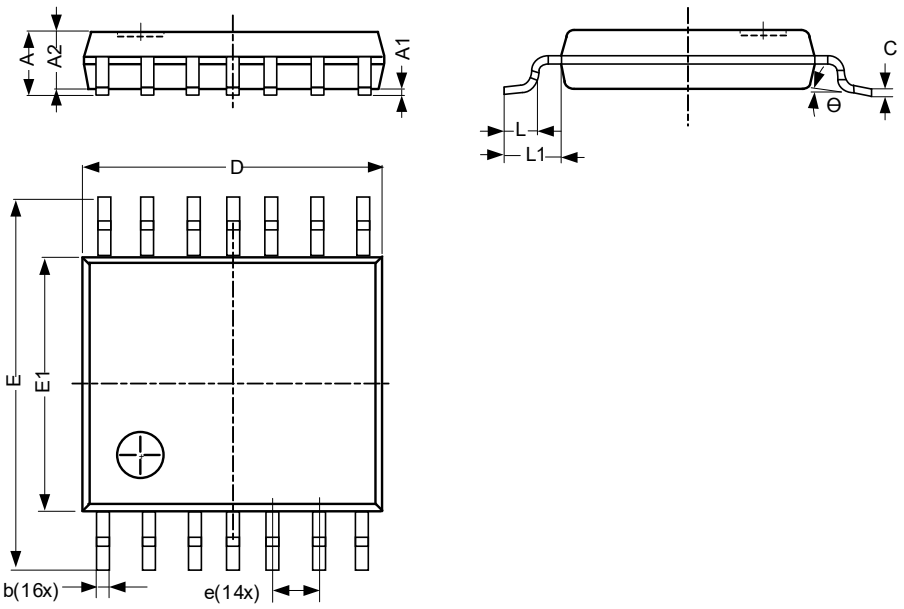
9.1.1 SOP14 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	1.50	-	1.75
A1	0.05	-	0.25
A2	1.30	-	-
b	0.33	-	0.50
c	0.19	-	0.25
D	8.43	-	8.76
E	5.80	-	6.25
E1	3.75	-	4.00
e	1.27 BSC		
L	0.40	-	0.89
Θ	0°	-	8°
Unit: mm			

9.2 TSSOP14 Mechanical Information

9.2.1 TSSOP14 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	-	-	1.20
A1	0.05	-	0.15
A2	0.80	-	1.05
b	0.19	-	0.30
c	0.09	-	0.20
D	4.90	-	5.10
E	6.20	-	6.60
E1	4.30	-	4.50
e	0.65 BSC		
L	0.45	-	0.75
L1	-	1.00	-
Θ	0°	-	8°
Unit: mm			

10 Notes and Revision History

10.1 Associated Product Family and Others

To view other products of the same type or IC products of other types, click the official website of JSCJ -- ***https:www.jscj-elec.com*** for more details.

10.2 Notes

Electrostatic Discharge Caution

This IC may be damaged by ESD. Relevant personnel shall comply with correct installation and use specifications to avoid ESD damage to the IC. If appropriate measures are not taken to prevent ESD damage, the hazards caused by ESD include but are not limited to degradation of integrated circuit performance or complete damage of integrated circuit. For some precision integrated circuits, a very small parameter change may cause the whole device to be inconsistent with its published specifications.

DISCLAIMER

IMPORTANT NOTICE, PLEASE READ CAREFULLY

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