

8-to-3 Line Priority Encoder

CJ74HC/HCT148 Logic

1 Introduction

The CJ74HC/HCT148 encodes eight data lines to three-line (4-2-1) binary (octal). Cascading circuitry (enable input EI and enable output EO) is provided to allow octal expansion without the need for external circuitry. The data inputs and outputs are active at the low logic level.

2 Available Packages

PART NUMBER	PACKAGE
CJ74HC148	SOP16
	TSSOP16
CJ74HCT148	SOP16
	TSSOP16

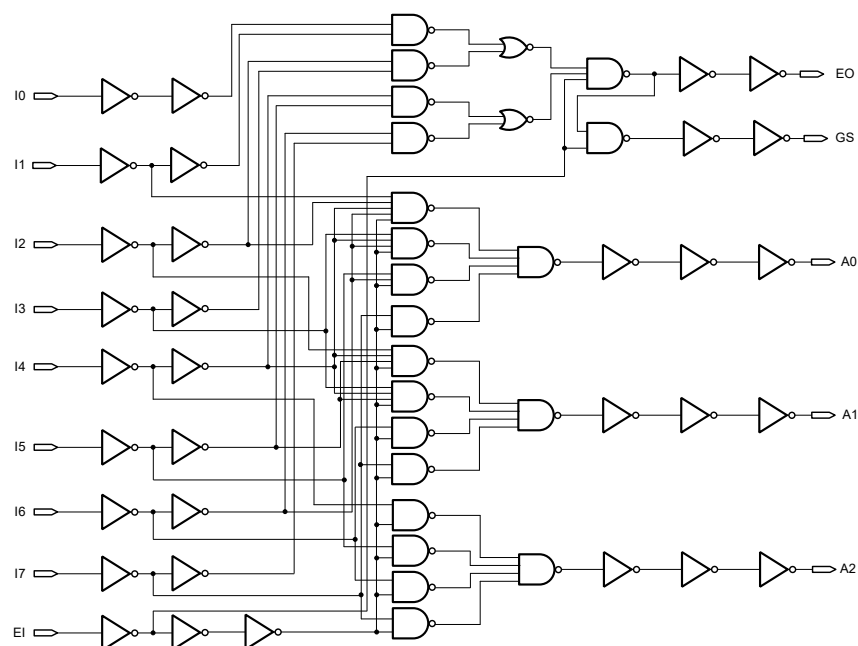
Note: For all available packages, please refer to the part Orderable Information.

3 Features

- Input levels:
 - For CJ74HC148: CMOS level
 - For CJ74HCT148: TTL level
- Specified from -40°C to +125°C

4 Applications

- N-Bit encoding
- Code converters and generators



Function block diagram

5 Orderable Information

DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
CJ74HC148AEN	SOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 4000 Units / Reel	Active
CJ74HCT148AEN	SOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 4000 Units / Reel	Active
CJ74HC148BEN	TSSOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 5000 Units / Reel	Active
CJ74HCT148BEN	TSSOP16	-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

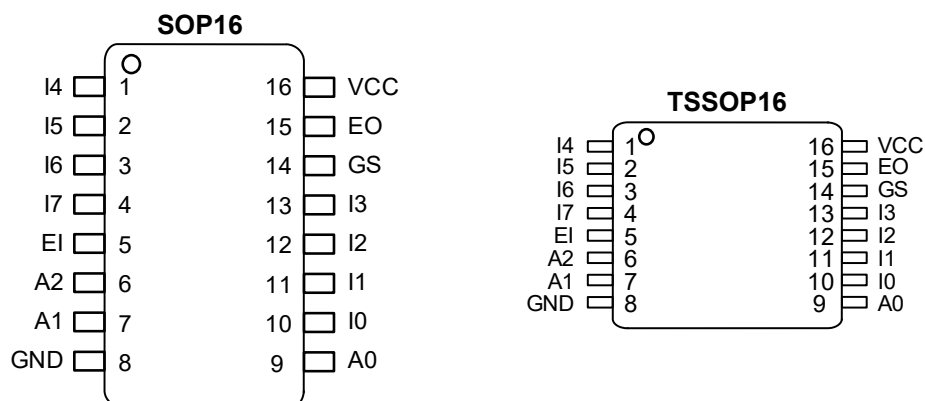


Figure 6-1 Pin configuration

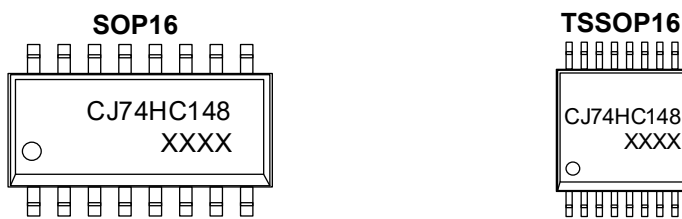
6.2 Pin Function

PIN		I/O ⁽¹⁾	DESCRIPTION
No.	NAME		
1	I4	I	Data input
2	I5	I	Data input
3	I6	I	Data input
4	I7	I	Data input
5	EI	I	Enable input
6	A2	O	Data output
7	A1	O	Data output
8	GND	G	Ground (0V)
9	A0	O	Data output
10	I0	I	Data input
11	I1	I	Data input
12	I2	I	Data input
13	I3	I	Data input
14	GS	O	Data output
15	EO	O	Enable output
16	VCC	P	Supply voltage

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

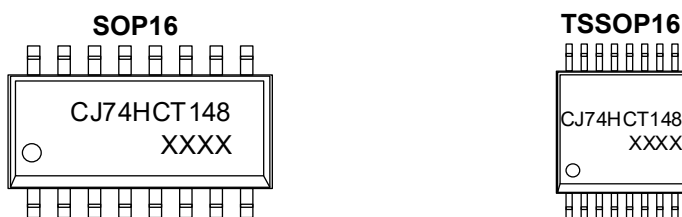
6.3 Marking Information

6.3.1 CJ74HC148



XXXX: Code, indicates weekly record information.

6.3.2 CJ74HCT148



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	+7.0	V
I_{IK}	Input clamping current	$V_I < -0.5V$ or $V_I > V_{CC}+0.5V$		-	± 20	mA
I_{OK}	Output clamping current	$V_O < -0.5V$ or $V_O > V_{CC}+0.5V$		-	± 20	mA
I_O	Output current	$-0.5V < V_O < V_{CC}+0.5V$		-	± 25	mA
I_{CC}	Supply current	-		-	50	mA
I_{GND}	Ground current	-		-50	-	mA
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
CJ74HC148						
V_{CC}	Supply voltage	-	2.0	5.0	6.0	V
V_I	Input voltage	-	0	-	V_{CC}	V
V_O	Output voltage	-	0	-	V_{CC}	V
T_{amb}	Ambient temperature	-	-40	-	+125	°C
CJ74HCT148						
V_{CC}	Supply voltage	-	4.5	5.0	5.5	V
V_I	Input voltage	-	0	-	V_{CC}	V
V_O	Output voltage	-	0	-	V_{CC}	V
T_{amb}	Ambient temperature	-	-40	-	+125	°C

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

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

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
CJ74HC148							
V _{IH}	HIGH-level input voltage	V _{CC} =2.0V		1.5	-	-	V
		V _{CC} =4.5V		3.15	-	-	V
		V _{CC} =6.0V		4.2	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} =2.0V		-	-	0.5	V
		V _{CC} =4.5V		-	-	1.35	V
		V _{CC} =6.0V		-	-	1.8	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL}	I _O =-20uA; V _{CC} =2.0V	1.9	2.0	-	V
			I _O =-20uA; V _{CC} =4.5V	4.4	4.5	-	V
			I _O =-20uA; V _{CC} =6.0V	5.9	6.0	-	V
			I _O =-4.0mA; V _{CC} =4.5V	3.84	4.32	-	V
			I _O =-5.2mA; V _{CC} =6.0V	5.34	5.81	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}	I _O =20uA; V _{CC} =2.0V	-	0	0.1	V
			I _O =20uA; V _{CC} =4.5V	-	0	0.1	V
			I _O =20uA; V _{CC} =6.0V	-	0	0.1	V
			I _O =4.0mA; V _{CC} =4.5V	-	0.15	0.33	V
			I _O =5.2mA; V _{CC} =6.0V	-	0.16	0.33	V
I _I	Input leakage current	V _I =V _{CC} or GND; V _{CC} =6.0V		-	-	±2	uA
I _{CC}	Supply current	V _I =V _{CC} or GND; I _O =0A; V _{CC} =6.0V		-	-	2	uA
CJ74HCT148							
V _{IH}	HIGH-level input voltage	V _{CC} =4.5V to 5.5V		2.0	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} =4.5V to 5.5V		-	-	0.8	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL} ; V _{CC} =4.5V	I _O =-20uA	4.4	4.5	-	V
			I _O =-4.0mA	3.84	4.32	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL} ; V _{CC} =4.5V	I _O =20uA	-	0	0.1	V
			I _O =4.0mA	-	0.15	0.33	V
I _I	Input leakage current	V _I =V _{CC} or GND; V _{CC} =5.5V		-	-	±2	uA
I _{CC}	Supply current	V _I =V _{CC} or GND; I _O =0A; V _{CC} =5.5V		-	-	2	uA
ΔI _{CC}	Additional supply current	V _I =V _{CC} -2.1V; Other inputs at V _{CC} or GND; I _O =0A; V _{CC} =4.5V to 5.5V		-	-	135	uA

7.4.2 DC Characteristics 2

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

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
CJ74HC148							
V _{IH}	HIGH-level input voltage	V _{CC} =2.0V		1.5	-	-	V
		V _{CC} =4.5V		3.15	-	-	V
		V _{CC} =6.0V		4.2	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} =2.0V		-	-	0.5	V
		V _{CC} =4.5V		-	-	1.35	V
		V _{CC} =6.0V		-	-	1.8	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL}	I _O =-20uA; V _{CC} =2.0V	1.9	-	-	V
			I _O =-20uA; V _{CC} =4.5V	4.4	-	-	V
			I _O =-20uA; V _{CC} =6.0V	5.9	-	-	V
			I _O =-4.0mA; V _{CC} =4.5V	3.7	-	-	V
			I _O =-5.2mA; V _{CC} =6.0V	5.2	-	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}	I _O =20uA; V _{CC} =2.0V	-	-	0.1	V
			I _O =20uA; V _{CC} =4.5V	-	-	0.1	V
			I _O =20uA; V _{CC} =6.0V	-	-	0.1	V
			I _O =4.0mA; V _{CC} =4.5V	-	-	0.4	V
			I _O =5.2mA; V _{CC} =6.0V	-	-	0.4	V
I _I	Input leakage current	V _I =V _{CC} or GND; V _{CC} =6.0V		-	-	±4	uA
I _{CC}	Supply current	V _I =V _{CC} or GND; I _O =0A; V _{CC} =6.0V		-	-	4	uA
CJ74HCT148							
V _{IH}	HIGH-level input voltage	V _{CC} =4.5V to 5.5V		2.0	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} =4.5V to 5.5V		-	-	0.8	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL} ; V _{CC} =4.5V	I _O =-20uA	4.4	-	-	V
			I _O =-4.0mA	3.7	-	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL} ; V _{CC} =4.5V	I _O =20uA	-	-	0.1	V
			I _O =4.0mA	-	-	0.4	V
I _I	Input leakage current	V _I =V _{CC} or GND; V _{CC} =5.5V		-	-	±4	uA
I _{CC}	Supply current	V _I =V _{CC} or GND; I _O =0A; V _{CC} =5.5V		-	-	4	uA
ΔI _{CC}	Additional supply current	V _I =V _{CC} -2.1V; Other inputs at V _{CC} or GND; I _O =0A; V _{CC} =4.5V to 5.5V		-	-	147	uA

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
CJ74HC148							
t _{PLH} , t _{PHL}	Propagation delay	See Figure 8-3	V _{CC} =2.0V; C _L =50pF	-	50	160	ns
			V _{CC} =4.5V; C _L =50pF	-	18	32	ns
			V _{CC} =5.0V; C _L =15pF	-	15	-	ns
			V _{CC} =6.0V; C _L =50pF	-	14	27	ns
t _{THL} , t _{TLH}	Transition time	See Figure 8-3	V _{CC} =2.0V; C _L =50pF	-	19	75	ns
			V _{CC} =4.5V; C _L =50pF	-	7	15	ns
			V _{CC} =5.0V; C _L =50pF	-	6	6	ns
CJ74HCT148							
t _{PLH} , t _{PHL}	Propagation delay	See Figure 8-3	V _{CC} =4.5V; C _L =50pF	-	19	75	ns
			V _{CC} =5.0V; C _L =15pF	-	7	15	ns
t _{THL} , t _{TLH}	Transition time	See Figure 8-3	V _{CC} =4.5V; C _L =50pF	-	6	6	ns

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
CJ74HC148							
t _{PLH} , t _{PHL}	Propagation delay	See Figure 8-3	V _{CC} =2.0V; C _L =50pF	-	-	200	ns
			V _{CC} =4.5V; C _L =50pF	-	-	40	ns
			V _{CC} =6.0V; C _L =50pF	-	-	34	ns
t _{THL} , t _{TLH}	Transition time	See Figure 8-3	V _{CC} =2.0V; C _L =50pF	-	-	95	ns
			V _{CC} =4.5V; C _L =50pF	-	-	19	ns
			V _{CC} =5.0V; C _L =50pF	-	-	16	ns
CJ74HCT148							
t _{PLH} , t _{PHL}	Propagation delay	See Figure 8-3	V _{CC} =4.5V; C _L =50pF	-	-	44	ns
t _{THL} , t _{TLH}	Transition time	See Figure 8-3	V _{CC} =4.5V; C _L =50pF	-	-	19	ns

8 Detailed Description

8.1 Overview

The CJ74HC/HCT148 encodes eight data lines to three-line (4-2-1) binary (octal). Cascading circuitry (enable input EI and enable output EO) is provided to allow octal expansion without the need for external circuitry. The data inputs and outputs are active at the low logic level.

8.2 Functional Block Diagram

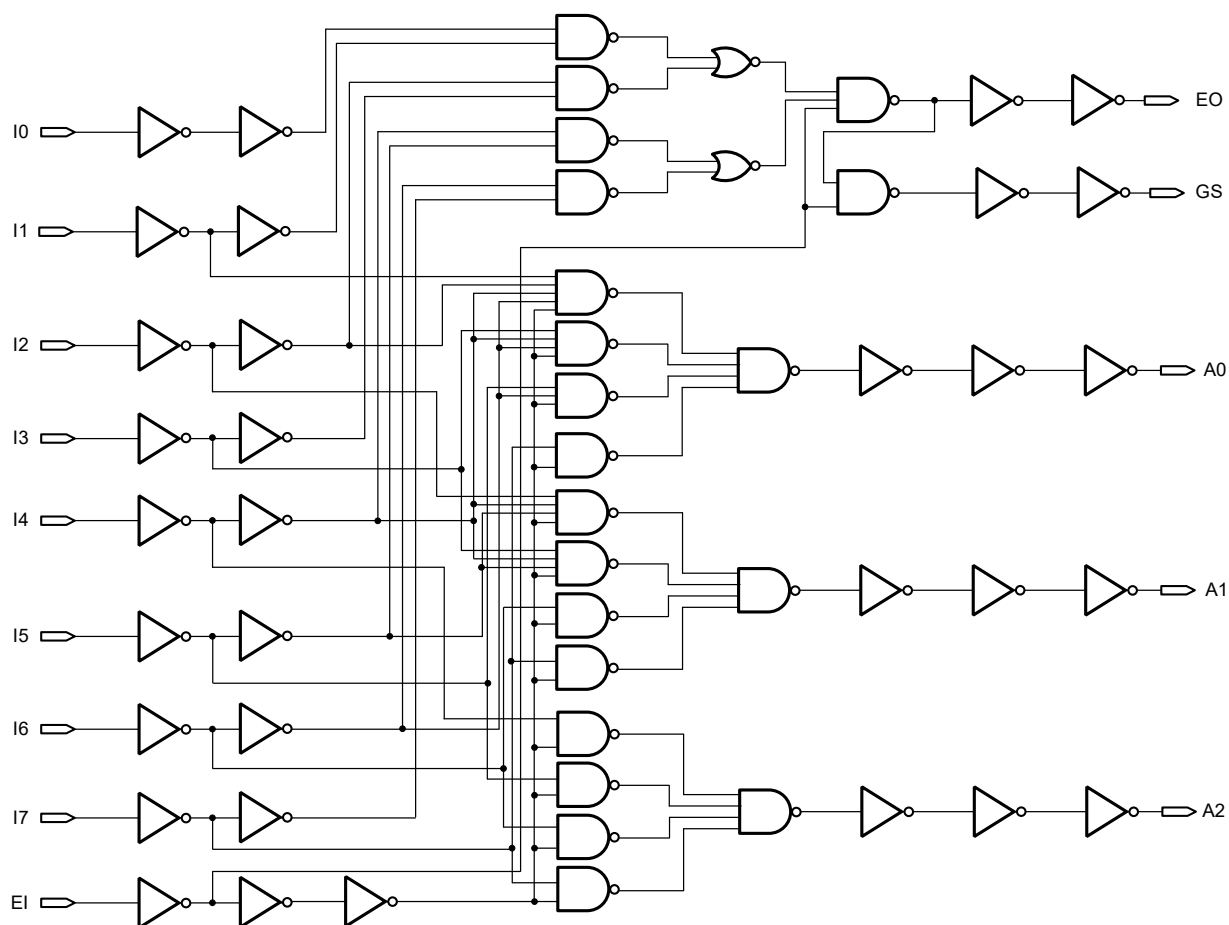


Figure 8-1 Functional diagram

8.3 Function Table⁽¹⁾

INPUT									OUTPUT				
EI	I0	I1	I2	I3	I4	I5	I6	I7	A2	A1	A0	GS	EO
H	X	X	X	X	X	X	X	X	H	H	H	H	H
L	H	H	H	H	H	H	H	H	H	H	H	H	L
L	X	X	X	X	X	X	X	L	L	L	L	L	H
L	X	X	X	X	X	X	L	H	L	L	H	L	H
L	X	X	X	X	X	L	H	H	L	H	L	L	H
L	X	X	X	X	L	H	H	H	L	H	H	L	H
L	X	X	X	L	H	H	H	H	H	L	L	L	H
L	X	X	L	H	H	H	H	H	H	L	H	L	H
L	X	L	H	H	H	H	H	H	H	H	L	L	H
L	L	H	H	H	H	H	H	H	H	H	H	L	H

(1) H=HIGH voltage level; L=LOW voltage level; X=don't care.

8.4 Testing Circuit

8.4.1 AC Testing Circuit

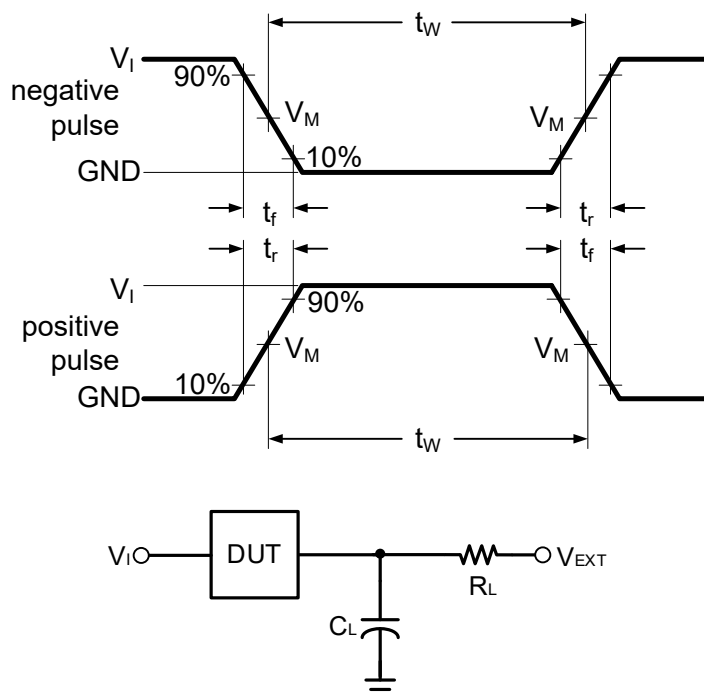


Figure 8-2 Test circuit for measuring switching times

Definitions for test circuit:

C_L =load capacitance including jig and probe capacitance.

8.4.2 AC Testing Waveforms

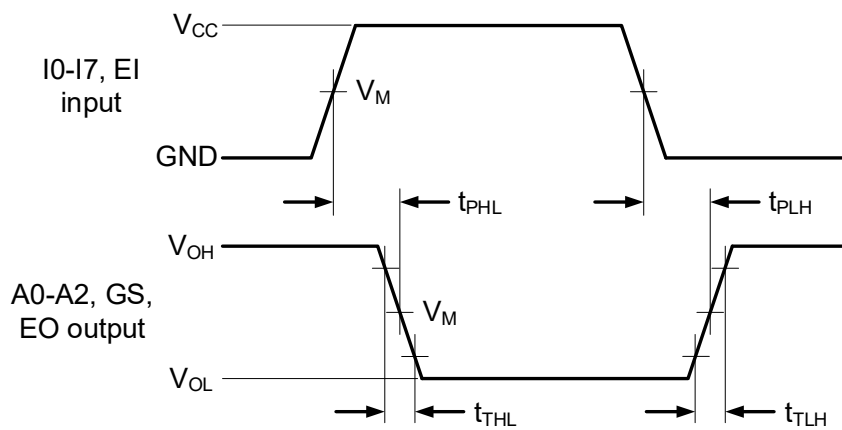


Figure 8-3 Input to output propagation delays and output transition times

8.4.3 Measurement Points

TYPE	INPUT	OUTPUT
	V_M	V_M
CJ74HC148	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
CJ74HCT148	1.3V	1.3V

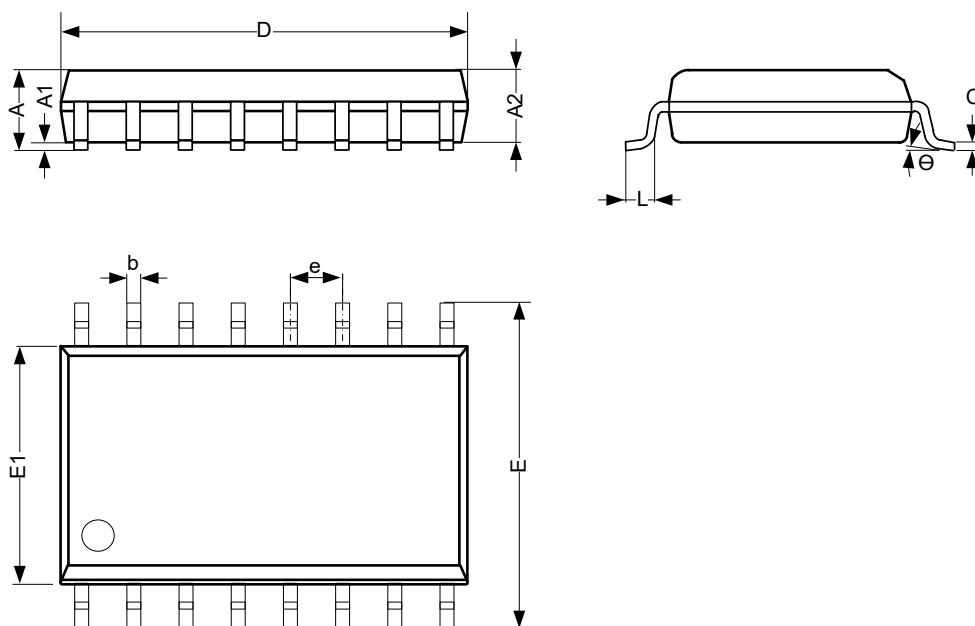
8.4.4 Test Data

TYPE	INPUT		LOAD		S1 POSITION
	V_I	t_r, t_f	C_L	R_L	t_{PLH}, t_{PHL}
CJ74HC148	V_{CC}	3.0ns	15pF, 50pF	1kΩ	Open
CJ74HCT148	3V	3.0ns	15pF, 50pF	1kΩ	Open

9 Mechanical Information

9.1 SOP16 Mechanical Information

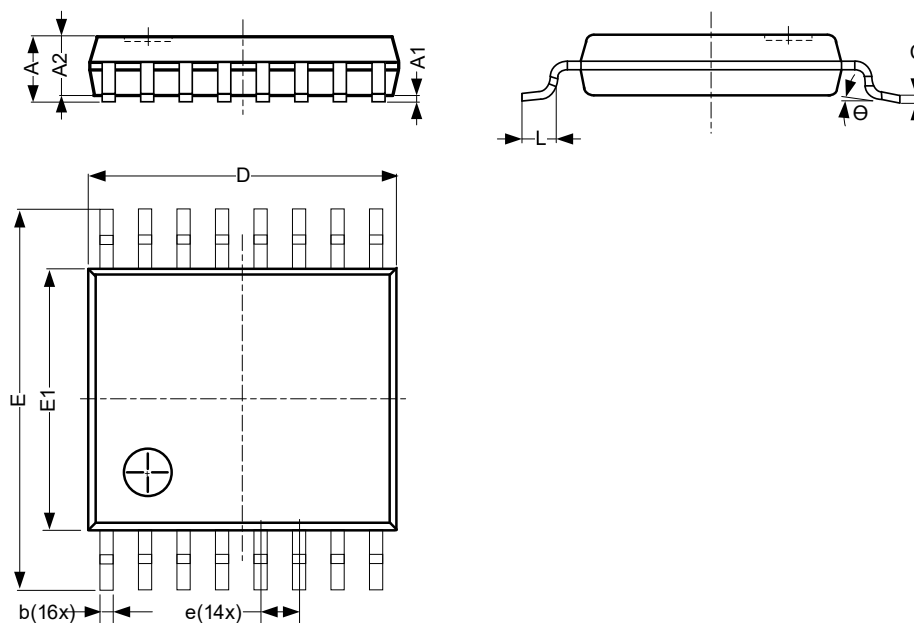
9.1.1 SOP16 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	1.35	-	1.80
A1	0.10	-	0.25
A2	1.25	-	1.55
b	0.33	-	0.51
c	0.19	-	0.25
D	9.50	-	10.10
E	5.80	-	6.30
E1	3.70	-	4.10
e	1.27 BSC		
L	0.35	-	0.89
θ	0°	-	8°
Unit: mm			

9.2 TSSOP16 Mechanical Information

9.2.1 TSSOP16 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
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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