3-to-8 Line Decoder/Demultiplexer; Inverting

1. Description

The 74HC/HCT138 decodes three binary weighted address inputs(A0, A1 and A2) to eight mutually exclusive outputs ($\overline{Y}0$ to $\overline{Y}7$). The device features three enable inputs ($\overline{E}1$, $\overline{E}2$ and $\overline{E}3$). Every output will be HIGH unless $\overline{E}1$ and $\overline{E}2$ are LOW and $\overline{E}3$ is HIGH. This multiple enable function allows easy parallel expansion to a 1-of-32(5 to 32 lines) decoder with just four 74HC/HCT138 ICs and one inverter. The 74HC/HCT138 can be used as an eight output demultiplexer by using one of the active LOW enable inputs as the data input and the remaining enable inputs as strobes. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC}.

2. Features

- Input levels:
  - For 74HC138: CMOS level
  - For 74HCT138: TTL level
- Demultiplexing capability
- Multiple input enable for easy expansion
- Ideal for memory chip select decoding
- Active LOW mutually exclusive outputs
- Specified from -40°C to +105°C
- Packaging information:
  DIP16/SOIC16/TSSOP16

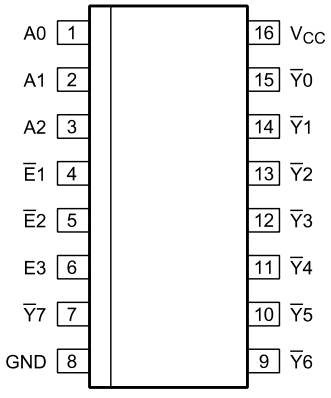
3. Ordering Information

Type Number	Package Type	Packing	Notes
74HC138N	DIP-16	Tube	
74HCT138N	DIP-16	Tube	
74HC138D	SOIC-16	Tape & Reel	
74HCT138D	SOIC-16	Tape & Reel	
74HC138PW	TSSOP-16	Tape & Reel	
74HCT138PW	TSSOP-16	Tape & Reel	

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.

4. Pinning

Pin Configurations



Pin Description

Pin No.	Pin Name	Description
1	A0	address input
2	A1	address input
3	A2	address input
4	$\overline{E}1$	enable input (active LOW)
5	$\overline{E}2$	enable input (active LOW)
6	E3	enable input (active HIGH)
7	$\overline{Y}7$	output (active LOW)
8	GND	ground (0 V)
9	$\overline{Y}6$	output (active LOW)
10	$\overline{Y}5$	output (active LOW)
11	$\overline{Y}4$	output (active LOW)
12	$\overline{Y}3$	output (active LOW)
13	$\overline{Y}2$	output (active LOW)
14	$\overline{Y}1$	output (active LOW)
15	$\overline{Y}0$	output (active LOW)
16	V_{CC}	supply voltage

Function Table

Input						Output							
$\overline{E}1$	$\overline{E}2$	E3	A2	A1	A0	$\overline{Y}7$	$\overline{Y}6$	$\overline{Y}5$	$\overline{Y}4$	$\overline{Y}3$	$\overline{Y}2$	$\overline{Y}1$	$\overline{Y}0$
H	X	X	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	L	X	X	X	H	H	H	H	H	H	H	H
L	L	H	L	L	L	H	H	H	H	H	H	H	L
L	L	H	L	L	H	H	H	H	H	H	H	L	H
L	L	H	L	H	L	H	H	H	H	H	L	H	H
L	L	H	L	H	H	H	H	H	H	L	H	H	H
L	L	H	H	L	L	H	H	H	L	H	H	H	H
L	L	H	H	L	H	H	H	L	H	H	H	H	H
L	L	H	H	H	L	H	L	H	H	H	H	H	H
L	L	H	H	H	H	L	H	H	H	H	H	H	H

Note: H=HIGH voltage level; L=LOW voltage level; X=don’t care.

5. Block Diagram

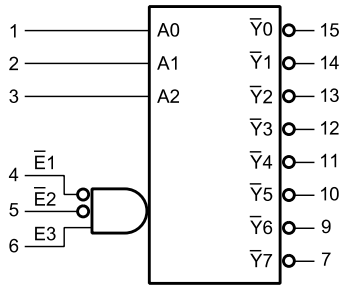


Fig. 1. Logic symbol

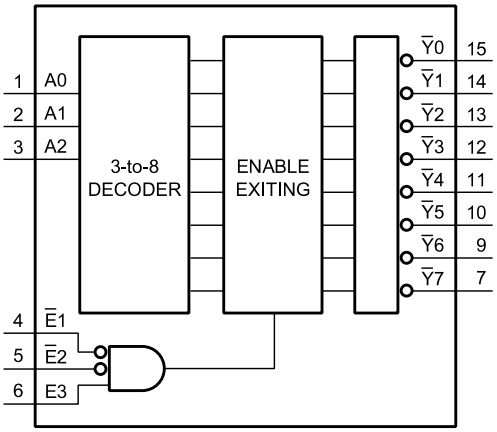


Fig. 2. Functional diagram

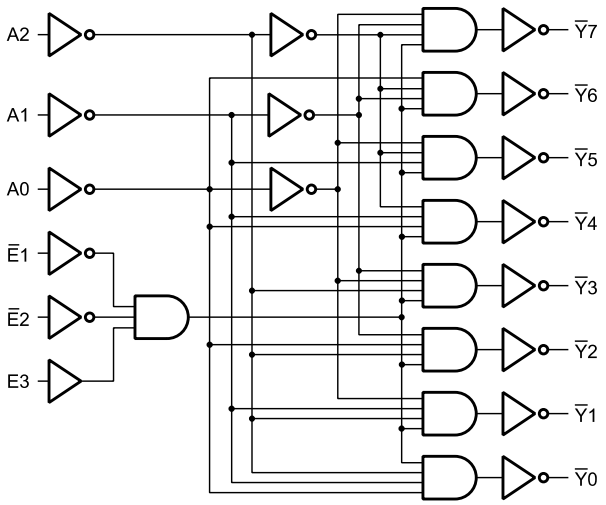


Fig. 3. Logic diagram

6. Electrical Parameter

Absolute Maximum Ratings

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

Parameter	Symbol	Conditions		Min.	Max.	Unit
supply voltage	V_{CC}	-		-0.5	+7	V
input clamping current	I_{IK}	$V_I < -0.5V$ or $V_I > V_{CC}+0.5V$		-	±20	mA
output clamping current	I_{OK}	$V_O < -0.5V$ or $V_O > V_{CC}+0.5V$		-	±20	mA
output current	I_O	$-0.5V < V_O < V_{CC}+0.5V$		-	±25	mA
supply current	I_{CC}	-		-	50	mA
ground current	I_{GND}	-		-50	-	mA
total power dissipation	P_{tot}	-		-	500	mW
storage temperature	T_{stg}	-		-65	+150	˚C
soldering temperature	T_L	10s	DIP	245		˚C
			SOIC	250		

Note:

1 For DIP16 packages: above 70˚C the value of P_{tot} derates linearly with 12mW/K.

2 For SOIC16 packages: above 70˚C the value of P_{tot} derates linearly with 8mW/K.

3 For TSSOP16 packages: above 60˚C the value of P_{tot} derates linearly with 5.5mW/K.

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
74HC138						
supply voltage	V_{CC}	-	2.0	5.0	6.0	V
input voltage	V_I	-	0	-	V_{CC}	V
output voltage	V_O	-	0	-	V_{CC}	V
input transition rise and fall rate	$\Delta t/\Delta V$	V_{CC}=2.0V	-	-	625	ns/V
		V_{CC}=4.5V	-	1.67	139	ns/V
		V_{CC}=6.0V	-	-	83	ns/V
ambient temperature	T_{amb}	-	-40	-	+105	˚C
74HCT138						
supply voltage	V_{CC}	-	4.5	5.0	5.5	V
input voltage	V_I	-	0	-	V_{CC}	V
output voltage	V_O	-	0	-	V_{CC}	V
input transition rise and fall rate	$\Delta t/\Delta V$	V_{CC}=4.5V	-	1.67	139	ns/V
ambient temperature	T_{amb}	-	-40	-	+105	˚C

7. Electrical Characteristics

DC Characteristics 1

(T_{amb}=25˚C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
74HC138							
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	1.2	-	V
		V_{CC}=4.5V		3.15	2.4	-	V
		V_{CC}=6.0V		4.2	3.2	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	0.8	0.5	V
		V_{CC}=4.5V		-	2.1	1.35	V
		V_{CC}=6.0V		-	2.8	1.8	V
HIGH-level output voltage	V_{OH}	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	3.98	4.32	-	V
			I_O=-5.2mA; V_{CC}=6.0V	5.48	5.81	-	V
LOW-level output voltage	V_{OL}	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	0.26	V
			I_O=5.2mA; V_{CC}=6.0V	-	0.16	0.26	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=6.0V		-	-	±0.1	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=6.0V		-	-	8.0	uA

input capacitance	C_I	-		-	3.5	-	pF
74HCT138							
HIGH-level input voltage	V_{IH}	V_{CC}=4.5V to 5.5V		2.0	1.6	-	V
LOW-level input voltage	V_{IL}	V_{CC}=4.5V to 5.5V		-	1.2	0.8	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-20uA; V_{CC}=4.5V	4.4	4.5	-	V
			I_O=-4.0mA; V_{CC}=4.5V	3.98	4.32	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=20uA; V_{CC}=4.5V	-	0	0.1	V
			I_O=4.0mA; V_{CC}=4.5V	-	0.15	0.26	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=5.5V		-	-	±0.1	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=5.5V		-	-	8.0	uA
additional supply current	ΔI_{CC}	V_I=V_{CC}-2.1V; I_O=0A; other inputs at V_{CC} or GND; V_{CC}=4.5V to 5.5V	An inputs	-	150	540	uA
			$\overline{E}$n inputs	-	125	450	
			E3 input	-	100	360	
input capacitance	C_I	-		-	3.5	-	pF

DC Characteristics 2

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
74HC138							
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	-	-	V
		V_{CC}=4.5V		3.15	-	-	V
		V_{CC}=6.0V		4.2	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.5	V
		V_{CC}=4.5V		-	-	1.35	V
		V_{CC}=6.0V		-	-	1.8	V
HIGH-level output voltage	V_{OH}	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	3.84	-	-	V
			I_O=-5.2mA; V_{CC}=6.0V	5.34	-	-	V
LOW-level output voltage	V_{OL}	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	-	-	0.33	V
			I_O=5.2mA; V_{CC}=6.0V	-	-	0.33	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=6.0V		-	-	±1.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=6.0V		-	-	80	uA
74HCT138							
HIGH-level input voltage	V_{IH}	V_{CC}=4.5V to 5.5V		2.0	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=4.5V to 5.5V		-	-	0.8	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-20uA; V_{CC}=4.5V	4.4	-	-	V

			I_O=-4.0mA; V_{CC}=4.5V	3.84	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=20uA; V_{CC}=4.5V	-	-	0.1	V
			I_O=4.0mA; V_{CC}=4.5V	-	-	0.33	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=5.5V		-	-	±1.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=5.5V		-	-	80	uA
additional supply current	ΔI_{CC}	V_I=V_{CC}-2.1V; I_O=0A; other inputs at V_{CC} or GND; V_{CC}=4.5V to 5.5V	An inputs	-	-	675	uA
			$\overline{E}n$ inputs	-	-	562.5	
			E3 input	-	-	450	

DC Characteristics 3

(T_{amb}=-40°C to +105°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
74HC138							
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	-	-	V
		V_{CC}=4.5V		3.15	-	-	V
		V_{CC}=6.0V		4.2	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.5	V
		V_{CC}=4.5V		-	-	1.35	V
		V_{CC}=6.0V		-	-	1.8	V
HIGH-level output voltage	V_{OH}	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
LOW-level output voltage	V_{OL}	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
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=6.0V		-	-	±1.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=6.0V		-	-	160	uA
74HCT138							
HIGH-level input voltage	V_{IH}	V_{CC}=4.5V to 5.5V		2.0	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=4.5V to 5.5V		-	-	0.8	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-20uA; V_{CC}=4.5V	4.4	-	-	V
			I_O=-4.0mA; V_{CC}=4.5V	3.7	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=20uA; V_{CC}=4.5V	-	-	0.1	V
			I_O=4.0mA; V_{CC}=4.5V	-	-	0.4	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=5.5V		-	-	±1.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=5.5V		-	-	160	uA

additional supply current	ΔI_{CC}	$V_I=V_{CC}$-2.1V; I_O=0A; other inputs at V_{CC} or GND; V_{CC}=4.5V to 5.5V	An inputs	-	-	735	uA
			$\overline{E}$n inputs	-	-	612.5	
			E3 input	-	-	490	

8. AC Characteristics 1

(T_{amb}=25°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
74HC138							
An to $\overline{Y}$n propagation delay	t_{pd}	see Figure 5[1]	V_{CC}=2.0V	-	41	150	ns
			V_{CC}=4.5V	-	15	30	ns
			V_{CC}=5.0V; C_L=15pF	-	12	-	ns
			V_{CC}=6.0V	-	12	26	ns
E3 to $\overline{Y}$n propagation delay	t_{pd}	see Figure 5[1]	V_{CC}=2.0V	-	47	150	ns
			V_{CC}=4.5V	-	17	20	ns
			V_{CC}=5.0V; C_L=15pF	-	14	-	ns
			V_{CC}=6.0V	-	14	26	ns
$\overline{E}$n to $\overline{Y}$n propagation delay	t_{pd}	see Figure 6[1]	V_{CC}=2.0V	-	47	150	ns
			V_{CC}=4.5V	-	17	20	ns
			V_{CC}=5.0V; C_L=15pF	-	14	-	ns
			V_{CC}=6.0V	-	14	26	ns
transition time	t_t	see Figure 5[2]	V_{CC}=2.0V	-	19	75	ns
			V_{CC}=4.5V	-	7	15	ns
			V_{CC}=6.0V	-	6	13	ns
Power dissipation capacitance	C_{PD}	C_L=50pF; f=1MHz; V_I=GND to V_{CC}[3]		-	67	-	pF
74HCT138							
An to $\overline{Y}$n propagation delay	t_{pd}	see Figure 5[1]	V_{CC}=4.5V	-	20	35	ns
			V_{CC}=5.0V; C_L=15pF	-	17	-	ns
E3 to $\overline{Y}$n propagation delay	t_{pd}	see Figure 5[1]	V_{CC}=4.5V	-	18	40	ns
			V_{CC}=5.0V; C_L=15pF	-	19	-	ns
$\overline{E}$n to $\overline{Y}$n propagation delay	t_{pd}	see Figure 6[1]	V_{CC}=4.5V	-	19	40	ns
			V_{CC}=5.0V; C_L=15pF	-	19	-	ns
transition time	t_t	see Figure 5[2]	V_{CC}=4.5V	-	7	15	ns
power dissipation capacitance	C_{PD}	C_L=50pF; f=1MHz; V_I=GND to V_{CC}–1.5V[3]		-	67	-	pF

Note:

1 t_{pd} is the same as t_{PLH} and t_{PHL}.

2 t_t is the same as t_{THL} and t_{TLH}.

3 C_{PD} is used to determine the dynamic power dissipation (P_D in uW).

$P_D=(C_{PD}\times V_{CC}^2\times f_i\times N)+\sum(C_L\times V_{CC}^2\times f_o)$ 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 V;

N=number of inputs switching;

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

AC Characteristics 2

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
74HC138							
An to $\overline{Y}$n; propagation delay	t_{pd}	see Figure 5[1]	V_{CC}=2.0V	-	-	190	ns
			V_{CC}=4.5V	-	-	38	ns
			V_{CC}=6.0V	-	-	33	ns
E3 to $\overline{Y}$n; propagation delay	t_{pd}	see Figure 5[1]	V_{CC}=2.0V	-	-	190	ns
			V_{CC}=4.5V	-	-	38	ns
			V_{CC}=6.0V	-	-	33	ns
$\overline{E}$n to $\overline{Y}$n propagation delay	t_{pd}	see Figure 6[1]	V_{CC}=2.0V	-	-	190	ns
			V_{CC}=4.5V	-	-	38	ns
			V_{CC}=6.0V	-	-	33	ns
transition time	t_t	see Figure 5[2]	V_{CC}=2.0V	-	-	95	ns
			V_{CC}=4.5V	-	-	19	ns
			V_{CC}=6.0V	-	-	16	ns
74HCT138							
An to $\overline{Y}$n; propagation delay	t_{pd}	see Figure 5[1]	V_{CC}=4.5V	-	-	44	ns
E3 to $\overline{Y}$n; propagation delay	t_{pd}	see Figure 5[1]	V_{CC}=4.5V	-	-	50	ns
$\overline{E}$n to $\overline{Y}$n propagation delay	t_{pd}	see Figure 6[1]	V_{CC}=4.5V	-	-	50	ns
transition time	t_{pd}	see Figure 5[2]	V_{CC}=4.5V	-	-	19	ns

Note:

1 t_{pd} is the same as t_{PLH} and t_{PHL}.

2 t_t is the same as t_{THL} and t_{TLH}.

AC Characteristics 3

(T_{amb}=-40°C to +105°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
74HC138							
An to $\overline{Y}$n; propagation delay	t_{pd}	see Figure 5[1]	V_{CC}=2.0V	-	-	225	ns
			V_{CC}=4.5V	-	-	45	ns
			V_{CC}=6.0V	-	-	38	ns
E3 to $\overline{Y}$n; propagation delay	t_{pd}	see Figure 5[1]	V_{CC}=2.0V	-	-	225	ns
			V_{CC}=4.5V	-	-	45	ns
			V_{CC}=6.0V	-	-	38	ns
$\overline{E}$n to $\overline{Y}$n propagation delay	t_{pd}	see Figure 6[1]	V_{CC}=2.0V	-	-	225	ns
			V_{CC}=4.5V	-	-	45	ns

			V_{CC}=6.0V	-	-	38	ns
transition time	t_t	see Figure 5[2]	V_{CC}=2.0V	-	-	110	ns
			V_{CC}=4.5V	-	-	22	ns
			V_{CC}=6.0V	-	-	19	ns
74HCT138							
An to $\overline{Y}$n; propagation delay	t_{pd}	see Figure 5[1]	V_{CC}=4.5V	-	-	53	ns
E3 to $\overline{Y}$n; propagation delay	t_{pd}	see Figure 5[1]	V_{CC}=4.5V	-	-	60	ns
$\overline{E}$n to $\overline{Y}$n propagation delay	t_{pd}	see Figure 6[1]	V_{CC}=4.5V	-	-	60	ns
transition time	t_{pd}	see Figure 5[2]	V_{CC}=4.5V	-	-	22	ns

Note:

1 t_{pd} is the same as t_{PLH} and t_{PHL}.

2 t_t is the same as t_{THL} and t_{TLH}.

9. Testing Circuit

AC Testing Circuit

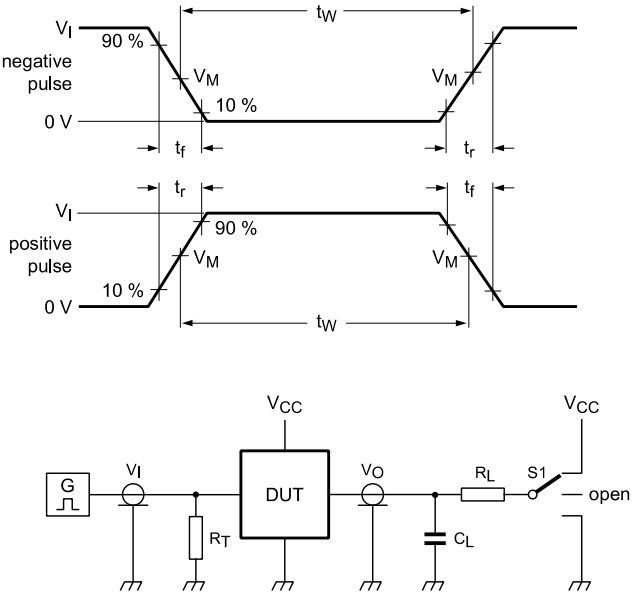


Fig. 4. Test circuit for measuring switching times

Definitions for test circuit:

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.

R_L=Load resistance.

S_1=Test selection switch.

AC Testing Waveforms

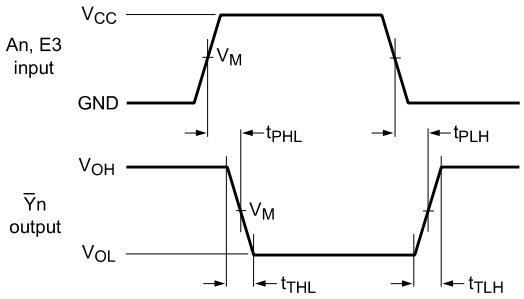


Fig. 5. Propagation delay input (An) and enable input (E3) to output ($\overline{Y}n$) and transition time output ($\overline{Y}n$)

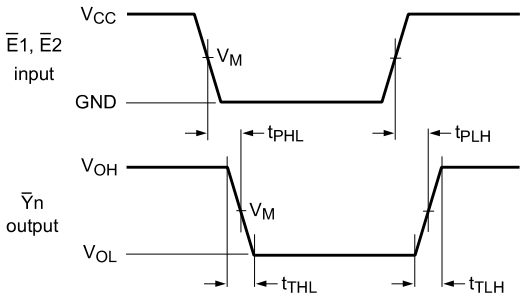


Fig. 6. Propagation delay enable input ($\overline{E}n$) to output ($\overline{Y}n$) and transition time output ($\overline{Y}n$)

Measurement Points

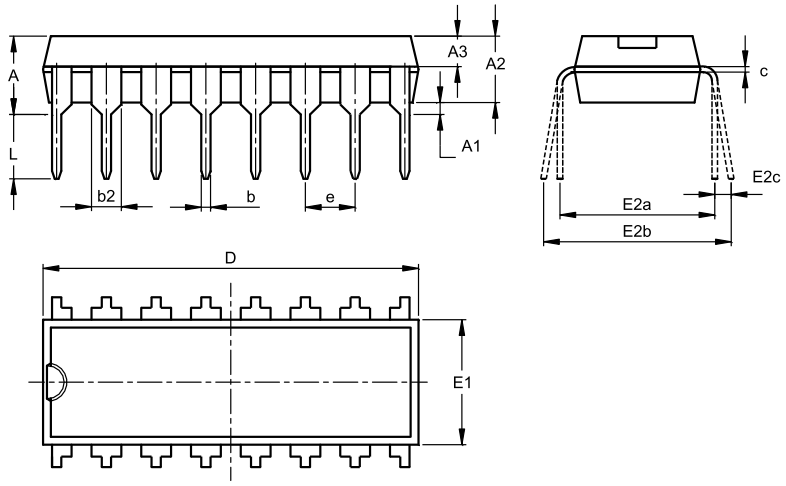
Type	Input	Output
	V_M	V_M
74HC138	0.5×V_{CC}	0.5×V_{CC}
74HCT138	1.3V	1.3V

Test Data

Type	Input		Load		S1 position		
	V_I	t_r, t_f	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
74HC138	V_{CC}	6.0ns	15pF, 50pF	1kΩ	open	GND	V_{CC}
74HCT138	3.0V	6.0ns	15pF, 50pF	1kΩ	open	GND	V_{CC}

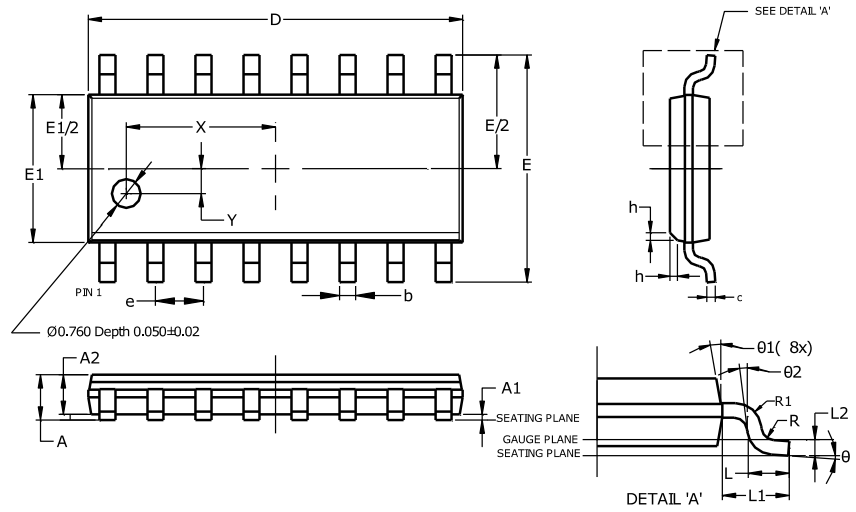
10. Package Outlines

DIP-16



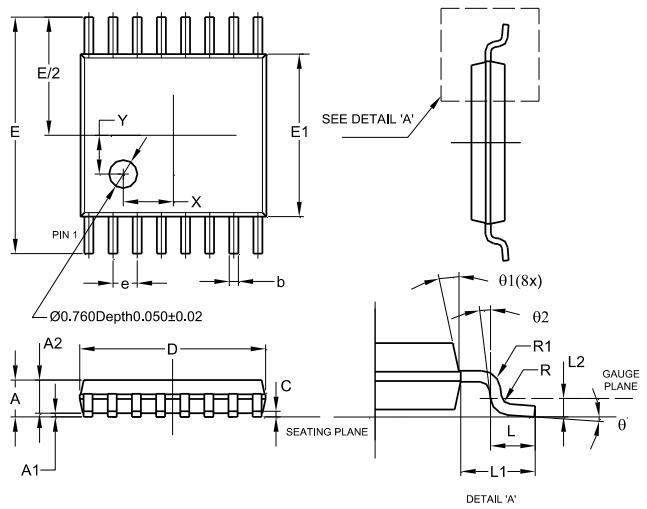
PDIP-16			
Dim	Min	Max	Nom
A	3.60	4.00	3.80
A1	0.51	-	
A2	3.20	3.40	3.30
A3	1.47	1.57	1.52
b	0.44	0.53	–
b2	1.52BSC		
c	0.25	0.31	–
D	18.90	19.30	19.10
E1	6.15	6.55	6.35
E2a	7.62 BSC		
E2b	7.62	9.30	–
E2c	0.00	0.84	–
e	2.54BSC		
L	3.00	–	–
All Dimensions in mm			

SOIC-16



SOIC-16			
Dim	Min	Max	Typ
A	--	1.260	--
A1	0.10	0.23	--
A2	1.02	--	--
b	0.31	0.51	--
c	0.10	0.25	--
D	9.80	10.00	--
E	5.90	6.10	--
E1	3.80	4.00	--
e	1.27 BSC		
h	0.15	0.25	0.20
L	0.40	1.27	--
L1	1.04 REF		
L2	0.25 BSC		
R	0.07	--	--
R1	0.07	--	--
X	3.945 REF		
Y	0.661 REF		
θ	0°	8°	--
θ1	5°	15°	--
θ2	0°	--	--
All Dimensions in mm			

TSSOP-16



TSSOP-16			
Dim	**Min**	**Max**	**Typ**
A	-	1.08	-
A1	0.05	0.15	-
A2	0.80	0.93	-
b	0.19	0.30	-
c	0.09	0.20	-
D	4.90	5.10	-
E	6.40 BSC		
E1	4.30	4.50	-
e	0.65 BSC		
L	0.45	0.75	-
L1	1.00 REF		
L2	0.25 BSC		
R / R1	0.09	-	-
X	-	-	1.350
Y	-	-	1.050
θ	0°	8°	-
θ1	5°	15°	-
θ2	0°	-	-
All Dimensions in mm			

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