



**3-to-8 Line Decoder/Demultiplexer: Inverting**

**CJ74HC/HCT138 Logic**

**1 Introduction**

The CJ74HC/HCT138 decodes three binary weighted address inputs(A0, A1 and A2) to eight mutually exclusive outputs (/Y0 to /Y7). The device features three enable inputs (/E1, /E2 and E3). Every output will be HIGH unless/E1 and /E2 are LOW and E3 is HIGH. This multiple enable function allows easy parallel expansion to a 1-of-32(5 to 32 lines) decoder with just four CJ74HC/HCT138 ICs and one inverter. The CJ74HC/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<sub>CC</sub>.

**2 Available Packages**

PART NUMBER	PACKAGE
CJ74HC138	SOP16
	TSSOP16
CJ74HCT138	SOP16
	TSSOP16

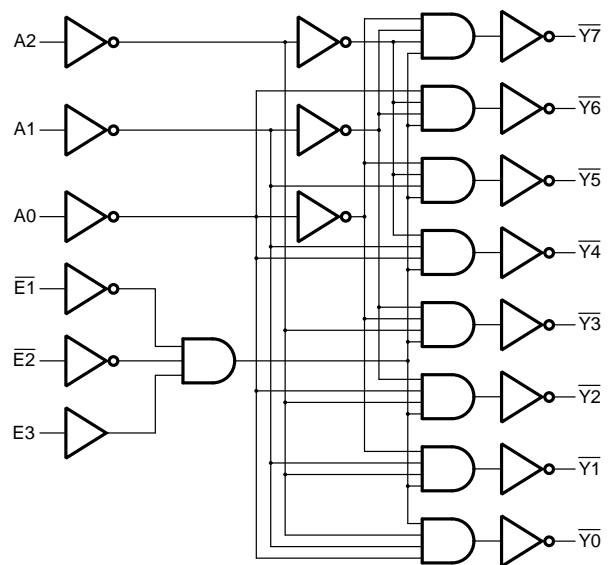
**Note:** For all available packages, please refer to the part Orderable Information.

**3 Features**

- Input levels:
  - For CJ74HC138: CMOS level
  - For CJ74HCT138: 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 +125°C

**4 Applications**

- LED Displays
- Servers
- White Goods
- Power Infrastructure
- Building Automation
- Factory Automation



Function block diagram

**5 Orderable Information**

DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
CJ74HC138AEN	SOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 4000 Units / Reel	Active
CJ74HCT138AEN	SOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 4000 Units / Reel	Active
CJ74HC138BEN	TSSOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 5000 Units / Reel	Active
CJ74HCT138BEN	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

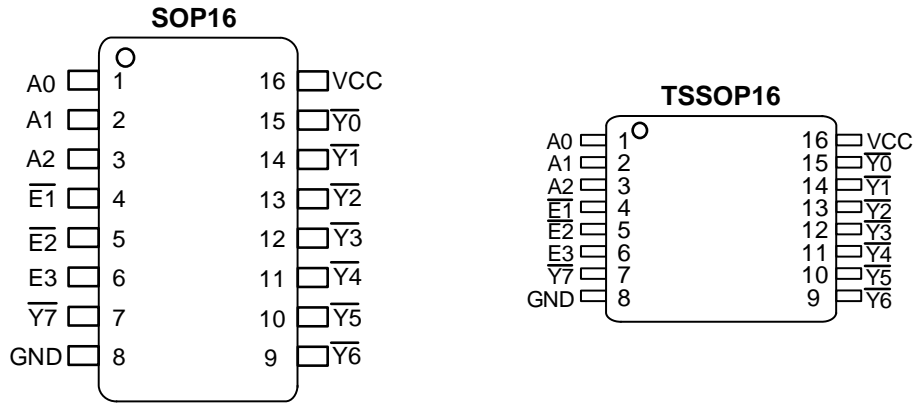


Figure 6-1 Pin configuration

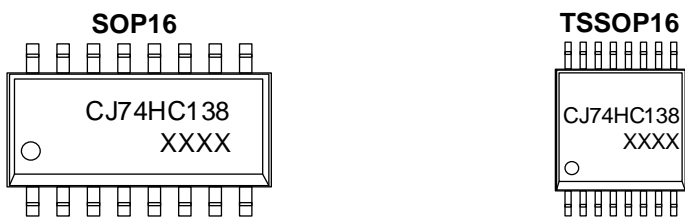
### 6.2 Pin Function

PIN		I/O <sup>(1)</sup>	DESCRIPTION
No.	NAME		
1	A0	I	Address input
2	A1	I	Address input
3	A2	I	Address input
4	$\overline{E1}$	I	Enable input (active LOW)
5	$\overline{E2}$	I	Enable input (active LOW)
6	E3	I	Enable input (active HIGH)
7	$\overline{Y7}$	O	Output (active LOW)
8	GND	G	Ground (0 V)
9	$\overline{Y6}$	O	Output (active LOW)
10	$\overline{Y5}$	O	Output (active LOW)
11	$\overline{Y4}$	O	Output (active LOW)
12	$\overline{Y3}$	O	Output (active LOW)
13	$\overline{Y2}$	O	Output (active LOW)
14	$\overline{Y1}$	O	Output (active LOW)
15	$\overline{Y0}$	O	Output (active LOW)
16	V <sub>CC</sub>	P	Supply voltage

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

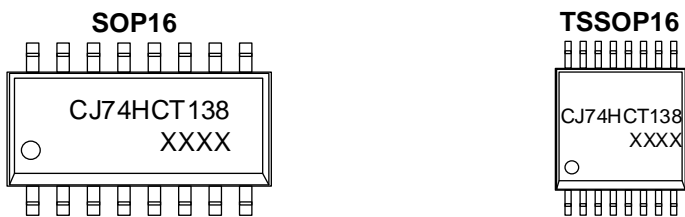
6.3 Marking Information

6.3.1 CJ74HC138



XXXX: Code, indicates weekly record information.

6.3.2 CJ74HCT138



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 <sub>CC</sub>	Supply voltage	-		-0.5	+7	V
I <sub>IK</sub>	Input clamping current	V <sub>I</sub> < -0.5V or V <sub>I</sub> > V <sub>CC</sub> +0.5V		-	±20	mA
I <sub>OK</sub>	Output clamping current	V <sub>O</sub> < -0.5V or V <sub>O</sub> > V <sub>CC</sub> +0.5V		-	±20	mA
I <sub>O</sub>	Output current	-0.5V < V <sub>O</sub> < V <sub>CC</sub> +0.5V		-	±25	mA
I <sub>CC</sub>	Supply current	-		-	50	mA
I <sub>GND</sub>	Ground current	-		-50	-	mA
P <sub>tot</sub>	Total power dissipation	-		-	500	mW
T <sub>stg</sub>	Storage temperature	-		-65	+150	°C
T <sub>L</sub>	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
<b>CJ74HC138</b>						
V <sub>CC</sub>	Supply voltage	-	2.0	5.0	6.0	V
V <sub>I</sub>	Input voltage	-	0	-	V <sub>CC</sub>	V
V <sub>O</sub>	Output voltage	-	0	-	V <sub>CC</sub>	V
Δt/ΔV	Input transition rise and fall rate	V <sub>CC</sub> =2.0V	-	-	625	ns/V
		V <sub>CC</sub> =4.5V	-	1.67	139	ns/V
		V <sub>CC</sub> =6.0V	-	-	83	ns/V
T <sub>amb</sub>	Ambient temperature	-	-40	-	+125	°C
<b>CJ74HCT138</b>						
V <sub>CC</sub>	Supply voltage	-	4.5	5.0	5.5	V
V <sub>I</sub>	Input voltage	-	0	-	V <sub>CC</sub>	V
V <sub>O</sub>	Output voltage	-	0	-	V <sub>CC</sub>	V
Δt/ΔV	Input transition rise and fall rate	V <sub>CC</sub> =4.5V	-	1.67	139	ns/V
T <sub>amb</sub>	Ambient temperature	-	-40	-	+125	°C

### 7.3 ESD Ratings

SYMBOL	ESD RATINGS		VALUE	UNIT
V <sub>ESD-HBM</sub>	Electrostatic discharge	Human body model (HBM) <sup>(1)</sup>	±4000	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**
 $T_{amb}=25^{\circ}\text{C}$ , voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
<b>CJ74HC138</b>							
$V_{IH}$	HIGH-level input voltage	$V_{CC}=2.0\text{V}$	1.5	-	-	V	
		$V_{CC}=4.5\text{V}$	3.15	-	-	V	
		$V_{CC}=6.0\text{V}$	4.2	-	-	V	
$V_{IL}$	LOW-level input voltage	$V_{CC}=2.0\text{V}$	-	-	0.5	V	
		$V_{CC}=4.5\text{V}$	-	-	1.35	V	
		$V_{CC}=6.0\text{V}$	-	-	1.8	V	
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$	$I_o=-20\mu\text{A}; V_{CC}=2.0\text{V}$	1.9	2.0	-	V
			$I_o=-20\mu\text{A}; V_{CC}=4.5\text{V}$	4.4	4.5	-	V
			$I_o=-20\mu\text{A}; V_{CC}=6.0\text{V}$	5.9	6.0	-	V
			$I_o=-4.0\text{mA}; V_{CC}=4.5\text{V}$	3.98	4.32	-	V
			$I_o=-5.2\text{mA}; V_{CC}=6.0\text{V}$	5.48	5.81	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$	$I_o=20\mu\text{A}; V_{CC}=2.0\text{V}$	-	0	0.1	V
			$I_o=20\mu\text{A}; V_{CC}=4.5\text{V}$	-	0	0.1	V
			$I_o=20\mu\text{A}; V_{CC}=6.0\text{V}$	-	0	0.1	V
			$I_o=4.0\text{mA}; V_{CC}=4.5\text{V}$	-	0.15	0.26	V
			$I_o=5.2\text{mA}; V_{CC}=6.0\text{V}$	-	0.16	0.26	V
$I_I$	Input leakage current	$V_I=V_{CC} \text{ or } \text{GND}; V_{CC}=6.0\text{V}$	-	-	$\pm 1.0$	$\mu\text{A}$	
$I_{CC}$	Supply current	$V_I=V_{CC} \text{ or } \text{GND}; I_o=0\text{A}; V_{CC}=6.0\text{V}$	-	-	8.0	$\mu\text{A}$	
$C_I$	Input capacitance	-	-	3.5	-	pF	
<b>CJ74HCT138</b>							
$V_{IH}$	HIGH-level input voltage	$V_{CC}=4.5\text{V to } 5.5\text{V}$	2.0	-	-	V	
$V_{IL}$	LOW-level input voltage	$V_{CC}=4.5\text{V to } 5.5\text{V}$	-	-	0.8	V	
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$	$I_o=-20\mu\text{A}; V_{CC}=4.5\text{V}$	4.4	4.5	-	V
			$I_o=-4.0 \text{ mA}; V_{CC}=4.5\text{V}$	3.98	4.32	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$	$I_o=20\mu\text{A}; V_{CC}=4.5\text{V}$	-	0	0.1	V
			$I_o=4.0\text{mA}; V_{CC}=4.5\text{V}$	-	0.15	0.26	V
$I_I$	Input leakage current	$V_I=V_{CC} \text{ or } \text{GND}; V_{CC}=5.5\text{V}$	-	-	$\pm 1.0$	$\mu\text{A}$	
$I_{CC}$	Supply current	$V_I=V_{CC} \text{ or } \text{GND}; I_o=0\text{A}; V_{CC}=5.5\text{V}$	-	-	8.0	$\mu\text{A}$	
$\Delta I_{CC}$	Additional supply current	$V_I=V_{CC}-2.1\text{V}; I_o=0\text{A}; \text{Other inputs at } V_{CC} \text{ or } \text{GND}; V_{CC}=4.5\text{V to } 5.5\text{V}$	An inputs	-	-	540	$\mu\text{A}$
			$\bar{\text{E}}_n$ inputs	-	-	450	$\mu\text{A}$
			E3 input	-	-	360	$\mu\text{A}$
$C_I$	Input capacitance	-	-	3.5	-	pF	

**7.4.2 DC Characteristics 2**
 $T_{amb} = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ , voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
<b>CJ74HC138</b>							
$V_{IH}$	HIGH-level input voltage	$V_{CC}=2.0\text{V}$	1.5	-	-	V	
		$V_{CC}=4.5\text{V}$	3.15	-	-	V	
		$V_{CC}=6.0\text{V}$	4.2	-	-	V	
$V_{IL}$	LOW-level input voltage	$V_{CC}=2.0\text{V}$	-	-	0.5	V	
		$V_{CC}=4.5\text{V}$	-	-	1.35	V	
		$V_{CC}=6.0\text{V}$	-	-	1.8	V	
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$	$I_O = -20\mu\text{A}; V_{CC}=2.0\text{V}$	1.9	-	-	V
			$I_O = -20\mu\text{A}; V_{CC}=4.5\text{V}$	4.4	-	-	V
			$I_O = -20\mu\text{A}; V_{CC}=6.0\text{V}$	5.9	-	-	V
			$I_O = -4.0\text{mA}; V_{CC}=4.5\text{V}$	3.84	-	-	V
			$I_O = -5.2\text{mA}; V_{CC}=6.0\text{V}$	5.34	-	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$	$I_O = 20\mu\text{A}; V_{CC}=2.0\text{V}$	-	-	0.1	V
			$I_O = 20\mu\text{A}; V_{CC}=4.5\text{V}$	-	-	0.1	V
			$I_O = 20\mu\text{A}; V_{CC}=6.0\text{V}$	-	-	0.1	V
			$I_O = 4.0\text{mA}; V_{CC}=4.5\text{V}$	-	-	0.33	V
			$I_O = 5.2\text{mA}; V_{CC}=6.0\text{V}$	-	-	0.33	V
$I_I$	Input leakage current	$V_I = V_{CC}$ or GND; $V_{CC}=6.0\text{V}$	-	-	$\pm 1.0$	$\mu\text{A}$	
$I_{CC}$	Supply current	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}; V_{CC}=6.0\text{V}$	-	-	80	$\mu\text{A}$	
<b>CJ74HCT138</b>							
$V_{IH}$	HIGH-level input voltage	$V_{CC}=4.5\text{V}$ to $5.5\text{V}$	2.0	-	-	V	
$V_{IL}$	LOW-level input voltage	$V_{CC}=4.5\text{V}$ to $5.5\text{V}$	-	-	0.8	V	
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL};$	$I_O = -20\mu\text{A}; V_{CC}=4.5\text{V}$	4.4	-	-	V
			$I_O = -4.0\text{mA}; V_{CC}=4.5\text{V}$	3.84	-	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$	$I_O = 20\mu\text{A}; V_{CC}=4.5\text{V}$	-	-	0.1	V
			$I_O = 4.0\text{mA}; V_{CC}=4.5\text{V}$	-	-	0.33	V
$I_I$	Input leakage current	$V_I = V_{CC}$ or GND; $V_{CC}=5.5\text{V}$	-	-	$\pm 1.0$	$\mu\text{A}$	
$I_{CC}$	Supply current	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}; V_{CC}=5.5\text{V}$	-	-	80	$\mu\text{A}$	
$\Delta I_{CC}$	Additional supply current	$V_I = V_{CC} - 2.1\text{V};$ $I_O = 0\text{A};$ Other inputs at $V_{CC}$ or GND; $V_{CC}=4.5\text{V}$ to $5.5\text{V}$	An inputs	-	-	675	$\mu\text{A}$
			$\bar{\text{E}}$ n inputs	-	-	562.5	$\mu\text{A}$
			E3 input	-	-	450	$\mu\text{A}$

**7.4.3 DC Characteristics 3**
 $T_{amb} = -40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ , voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
<b>CJ74HC138</b>							
$V_{IH}$	HIGH-level input voltage	$V_{CC}=2.0\text{V}$	1.5	-	-	V	
		$V_{CC}=4.5\text{V}$	3.15	-	-	V	
		$V_{CC}=6.0\text{V}$	4.2	-	-	V	
$V_{IL}$	LOW-level input voltage	$V_{CC}=2.0\text{V}$	-	-	0.5	V	
		$V_{CC}=4.5\text{V}$	-	-	1.35	V	
		$V_{CC}=6.0\text{V}$	-	-	1.8	V	
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$	$I_O = -20\mu\text{A}; V_{CC}=2.0\text{V}$	1.9	-	-	V
			$I_O = -20\mu\text{A}; V_{CC}=4.5\text{V}$	4.4	-	-	V
			$I_O = -20\mu\text{A}; V_{CC}=6.0\text{V}$	5.9	-	-	V
			$I_O = -4.0\text{mA}; V_{CC}=4.5\text{V}$	3.7	-	-	V
			$I_O = -5.2\text{mA}; V_{CC}=6.0\text{V}$	5.2	-	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$	$I_O = 20\mu\text{A}; V_{CC}=2.0\text{V}$	-	-	0.1	V
			$I_O = 20\mu\text{A}; V_{CC}=4.5\text{V}$	-	-	0.1	V
			$I_O = 20\mu\text{A}; V_{CC}=6.0\text{V}$	-	-	0.1	V
			$I_O = 4.0\text{mA}; V_{CC}=4.5\text{V}$	-	-	0.4	V
			$I_O = 5.2\text{mA}; V_{CC}=6.0\text{V}$	-	-	0.4	V
$I_I$	Input leakage current	$V_I = V_{CC}$ or GND; $V_{CC}=6.0\text{V}$	-	-	$\pm 1.0$	$\mu\text{A}$	
$I_{CC}$	Supply current	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}; V_{CC}=6.0\text{V}$	-	-	160	$\mu\text{A}$	
<b>CJ74HCT138</b>							
$V_{IH}$	HIGH-level input voltage	$V_{CC}=4.5\text{V}$ to $5.5\text{V}$	2.0	-	-	V	
$V_{IL}$	LOW-level input voltage	$V_{CC}=4.5\text{V}$ to $5.5\text{V}$	-	-	0.8	V	
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$	$I_O = -20\mu\text{A}; V_{CC}=4.5\text{V}$	4.4	-	-	V
			$I_O = -4.0\text{mA}; V_{CC}=4.5\text{V}$	3.7	-	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$	$I_O = 20\mu\text{A}; V_{CC}=4.5\text{V}$	-	-	0.1	V
			$I_O = 4.0\text{mA}; V_{CC}=4.5\text{V}$	-	-	0.4	V
$I_I$	Input leakage current	$V_I = V_{CC}$ or GND; $V_{CC}=5.5\text{V}$	-	-	$\pm 1.0$	$\mu\text{A}$	
$I_{CC}$	Supply current	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}; V_{CC}=5.5\text{V}$	-	-	160	$\mu\text{A}$	
$\Delta I_{CC}$	Additional supply current	$V_I = V_{CC} - 2.1\text{V}; I_O = 0\text{A};$ Other inputs at $V_{CC}$ or GND; $V_{CC}=4.5\text{V}$ to $5.5\text{V}$	An inputs	-	-	735	$\mu\text{A}$
			$\bar{\text{E}}$ n inputs	-	-	612.5	$\mu\text{A}$
			E3 input	-	-	490	$\mu\text{A}$

7.4.4 AC Characteristics 1

T<sub>amb</sub>=25°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
<b>CJ74HC138</b>							
t <sub>pd</sub>	An to $\bar{Y}_n$ propagation delay	See Figure 8-5 <sup>(1)</sup>	V <sub>CC</sub> =2.0V	-	41	150	ns
			V <sub>CC</sub> =4.5V	-	15	30	ns
			V <sub>CC</sub> =5.0V; C <sub>L</sub> =15pF	-	12	-	ns
			V <sub>CC</sub> =6.0V	-	12	26	ns
t <sub>pd</sub>	E3 to $\bar{Y}_n$ propagation delay	See Figure 8-5 <sup>(1)</sup>	V <sub>CC</sub> =2.0V	-	47	150	ns
			V <sub>CC</sub> =4.5V	-	17	20	ns
			V <sub>CC</sub> =5.0V; C <sub>L</sub> =15pF	-	14	-	ns
			V <sub>CC</sub> =6.0V	-	14	26	ns
t <sub>pd</sub>	$\bar{E}_n$ to $\bar{Y}_n$ propagation delay	See Figure 8-6 <sup>(1)</sup>	V <sub>CC</sub> =2.0V	-	47	150	ns
			V <sub>CC</sub> =4.5V	-	17	20	ns
			V <sub>CC</sub> =5.0V; C <sub>L</sub> =15pF	-	14	-	ns
			V <sub>CC</sub> =6.0V	-	14	26	ns
t <sub>t</sub>	Transition time	See Figure 8-5 <sup>(2)</sup>	V <sub>CC</sub> =2.0V	-	19	75	ns
			V <sub>CC</sub> =4.5V	-	7	15	ns
			V <sub>CC</sub> =6.0V	-	6	13	ns
C <sub>PD</sub>	Power dissipation capacitance	C <sub>L</sub> =50pF; f=1MHz; V <sub>I</sub> =GND to V <sub>CC</sub> <sup>(3)</sup>	-	67	-	pF	
<b>CJ74HCT138</b>							
t <sub>pd</sub>	An to $\bar{Y}_n$ propagation delay	See Figure 8-5 <sup>(1)</sup>	V <sub>CC</sub> =4.5V	-	20	35	ns
			V <sub>CC</sub> =5.0V; C <sub>L</sub> =15pF	-	17	-	ns
t <sub>pd</sub>	E3 to $\bar{Y}_n$ propagation delay	See Figure 8-5 <sup>(1)</sup>	V <sub>CC</sub> =4.5V	-	18	40	ns
			V <sub>CC</sub> =5.0V; C <sub>L</sub> =15pF	-	19	-	ns
t <sub>pd</sub>	$\bar{E}_n$ to $\bar{Y}_n$ propagation delay	See Figure 8-6 <sup>(1)</sup>	V <sub>CC</sub> =4.5V	-	19	40	ns
			V <sub>CC</sub> =5.0V; C <sub>L</sub> =15pF	-	19	-	ns
t <sub>t</sub>	Transition time	See Figure 8-5 <sup>(2)</sup>	V <sub>CC</sub> =4.5V	-	7	15	ns
C <sub>PD</sub>	Power dissipation capacitance	C <sub>L</sub> =50pF; f=1MHz; V <sub>I</sub> =GND to V <sub>CC</sub> -1.5V <sup>(3)</sup>	-	67	-	pF	

(1) t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

(2) t<sub>t</sub> is the same as t<sub>THL</sub> and t<sub>TLH</sub>.

(3) C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in uW).

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

- f<sub>i</sub>=input frequency in MHz;
- f<sub>o</sub>=output frequency in MHz;
- C<sub>L</sub>=output load capacitance in pF;
- V<sub>CC</sub>=supply voltage in V;
- N=number of inputs switching;
- ∑(C<sub>L</sub>×V<sub>CC</sub><sup>2</sup>×f<sub>o</sub>)=sum of outputs.

**7.4.5 AC Characteristics 2**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
<b>CJ74HC138</b>							
$t_{pd}$	An to $\bar{Y}_n$ ; propagation delay	See Figure 8-5 <sup>(1)</sup>	$V_{CC}=2.0\text{V}$	-	-	190	ns
			$V_{CC}=4.5\text{V}$	-	-	38	ns
			$V_{CC}=6.0\text{V}$	-	-	33	ns
$t_{pd}$	E3 to $\bar{Y}_n$ ; propagation delay	See Figure 8-5 <sup>(1)</sup>	$V_{CC}=2.0\text{V}$	-	-	190	ns
			$V_{CC}=4.5\text{V}$	-	-	38	ns
			$V_{CC}=6.0\text{V}$	-	-	33	ns
$t_{pd}$	$\bar{E}_n$ to $\bar{Y}_n$ ; propagation delay	See Figure 8-6 <sup>(1)</sup>	$V_{CC}=2.0\text{V}$	-	-	190	ns
			$V_{CC}=4.5\text{V}$	-	-	38	ns
			$V_{CC}=6.0\text{V}$	-	-	33	ns
$t_t$	Transition time	See Figure 8-5 <sup>(2)</sup>	$V_{CC}=2.0\text{V}$	-	-	95	ns
			$V_{CC}=4.5\text{V}$	-	-	19	ns
			$V_{CC}=6.0\text{V}$	-	-	16	ns
<b>CJ74HCT138</b>							
$t_{pd}$	An to $\bar{Y}_n$ ; propagation delay	See Figure 8-5 <sup>(1)</sup>	$V_{CC}=4.5\text{V}$	-	-	44	ns
$t_{pd}$	E3 to $\bar{Y}_n$ ; propagation delay	See Figure 8-5 <sup>(1)</sup>	$V_{CC}=4.5\text{V}$	-	-	50	ns
$t_{pd}$	$\bar{E}_n$ to $\bar{Y}_n$ ; propagation delay	See Figure 8-6 <sup>(1)</sup>	$V_{CC}=4.5\text{V}$	-	-	50	ns
$t_t$	Transition time	See Figure 8-5 <sup>(2)</sup>	$V_{CC}=4.5\text{V}$	-	-	19	ns

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

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

**7.4.6 AC Characteristics 3**

T<sub>amb</sub>=-40°C to +125°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
<b>CJ74HC138</b>							
t <sub>pd</sub>	An to $\bar{Y}_n$ ; propagation delay	See Figure 8-5 <sup>(1)</sup>	V <sub>CC</sub> =2.0V	-	-	225	ns
			V <sub>CC</sub> =4.5V	-	-	45	ns
			V <sub>CC</sub> =6.0V	-	-	38	ns
t <sub>pd</sub>	E3 to $\bar{Y}_n$ ; propagation delay	See Figure 8-5 <sup>(1)</sup>	V <sub>CC</sub> =2.0V	-	-	225	ns
			V <sub>CC</sub> =4.5V	-	-	45	ns
			V <sub>CC</sub> =6.0V	-	-	38	ns
t <sub>pd</sub>	$\bar{E}_n$ to $\bar{Y}_n$ ; propagation delay	See Figure 8-6 <sup>(1)</sup>	V <sub>CC</sub> =2.0V	-	-	225	ns
			V <sub>CC</sub> =4.5V	-	-	45	ns
			V <sub>CC</sub> =6.0V	-	-	38	ns
t <sub>t</sub>	Transition time	See Figure 8-5 <sup>(2)</sup>	V <sub>CC</sub> =2.0V	-	-	110	ns
			V <sub>CC</sub> =4.5V	-	-	22	ns
			V <sub>CC</sub> =6.0V	-	-	19	ns
<b>CJ74HCT138</b>							
t <sub>pd</sub>	An to $\bar{Y}_n$ ; propagation delay	See Figure 8-5 <sup>(1)</sup>	V <sub>CC</sub> =4.5V	-	-	53	ns
t <sub>pd</sub>	E3 to $\bar{Y}_n$ ; propagation delay	See Figure 8-5 <sup>(1)</sup>	V <sub>CC</sub> =4.5V	-	-	60	ns
t <sub>pd</sub>	$\bar{E}_n$ to $\bar{Y}_n$ ; propagation delay	See Figure 8-6 <sup>(1)</sup>	V <sub>CC</sub> =4.5V	-	-	60	ns
t <sub>t</sub>	Transition time	See Figure 8-5 <sup>(2)</sup>	V <sub>CC</sub> =4.5V	-	-	22	ns

(1) t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

(2) t<sub>t</sub> is the same as t<sub>THL</sub> and t<sub>TLH</sub>.

## 8 Detailed Description

### 8.1 Overview

The CJ74HC/HCT138 decodes three binary weighted address inputs(A0, A1 and A2) to eight mutually exclusive outputs (/Y0 to /Y7). The device features three enable inputs (/E1, /E2 and E3). Every output will be HIGH unless/E1 and /E2 are LOW and E3 is HIGH. This multiple enable function allows easy parallel expansion to a 1-of-32(5 to 32 lines) decoder with just four CJ74HC/HCT138 ICs and one inverter. The CJ74HC/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<sub>CC</sub>.

### 8.2 Functional Block Diagram

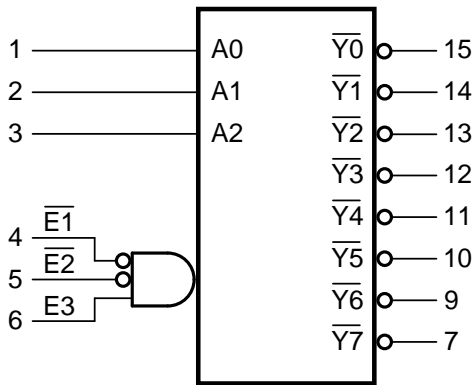


Figure 8-1 Logic symbol

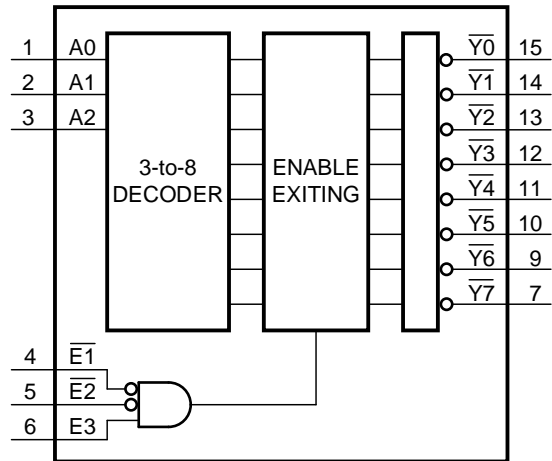


Figure 8-2 Functional diagram

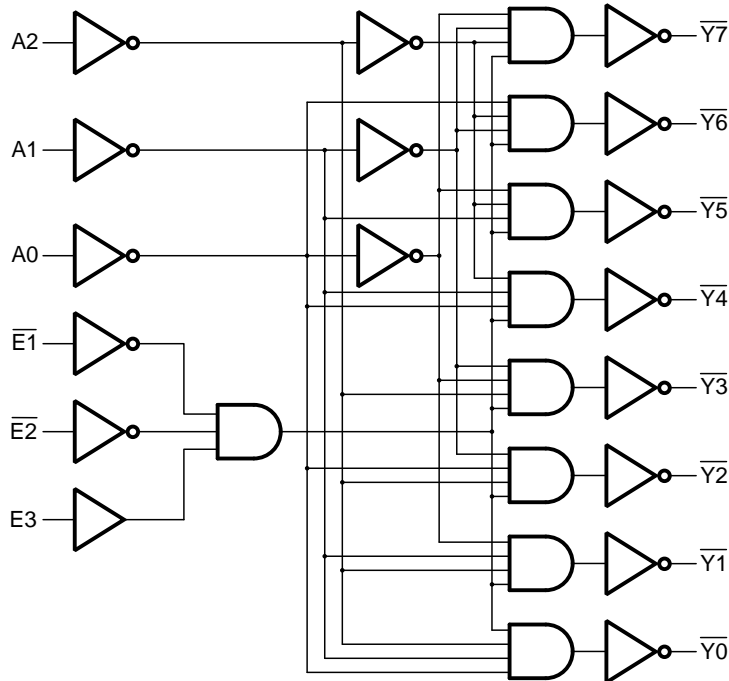


Figure 8-3 Logic diagram

8.3 Function Table<sup>(1)</sup>

INPUT						OUTPUT							
$\bar{E}1$	$\bar{E}2$	E3	A2	A1	A0	$\bar{Y}7$	$\bar{Y}6$	$\bar{Y}5$	$\bar{Y}4$	$\bar{Y}3$	$\bar{Y}2$	$\bar{Y}1$	$\bar{Y}0$
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	H	L	H	H	L	H	H	H	H	H
L	L	H	H	H	H	L	H	H	H	H	H	H	H

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

8.4 Testing Circuit

8.4.1 AC Testing Circuit

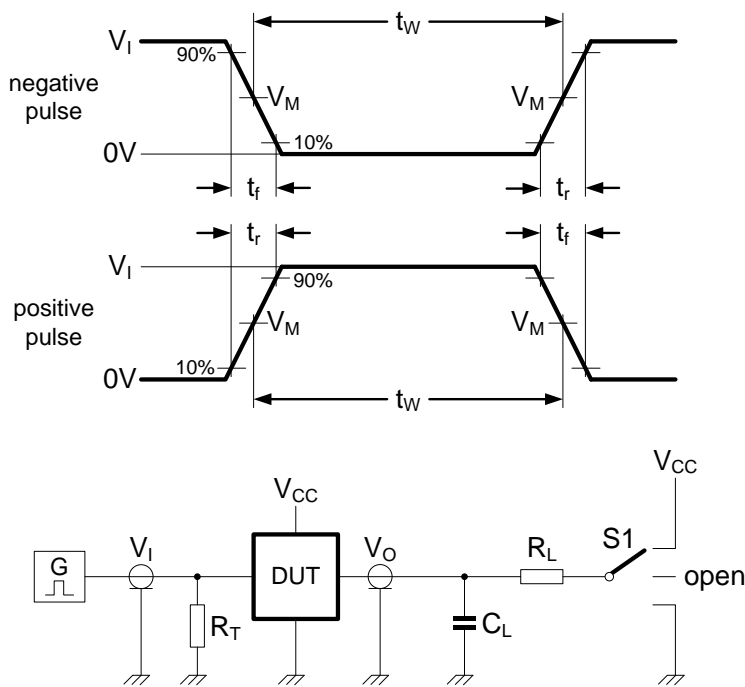


Figure 8-4 Test circuit for measuring switching times

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.

S1=Test selection switch.

8.4.2 AC Testing Waveforms

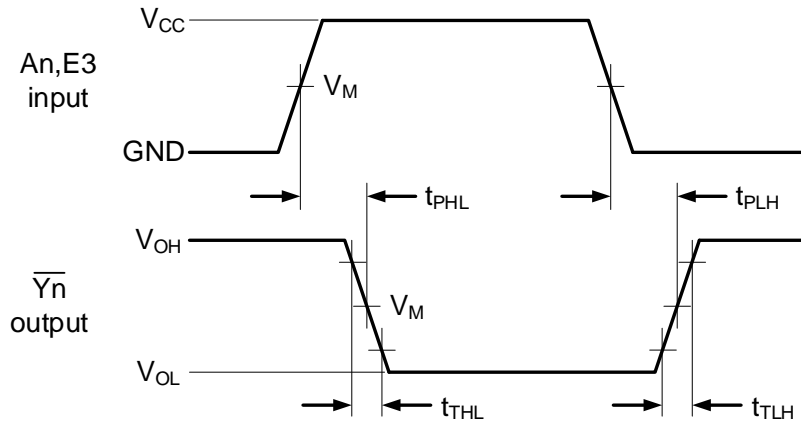


Figure 8-5 Propagation delay input (An) and enable input (E3) to output (Y<sub>n</sub>) and transition time output (Y<sub>n</sub>)

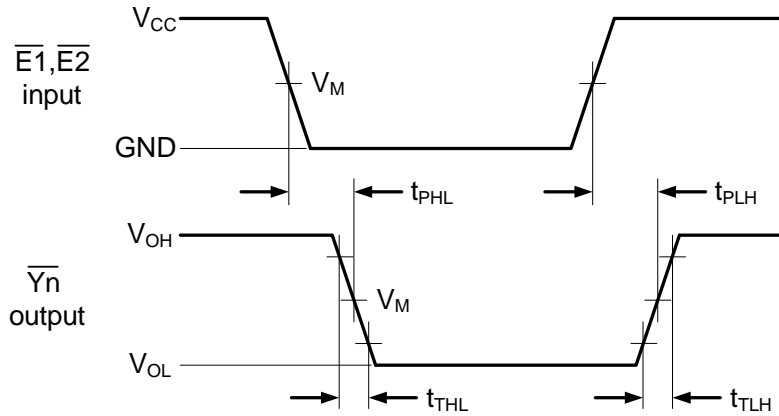


Figure 8-6 Propagation delay enable input (E<sub>n</sub>) to output (Y<sub>n</sub>) and transition time output (Y<sub>n</sub>)

8.4.3 Measurement Points

TYPE	INPUT	OUTPUT
	V <sub>M</sub>	V <sub>M</sub>
CJ74HC138	0.5xV <sub>CC</sub>	0.5xV <sub>CC</sub>
CJ74HCT138	1.3V	1.3V

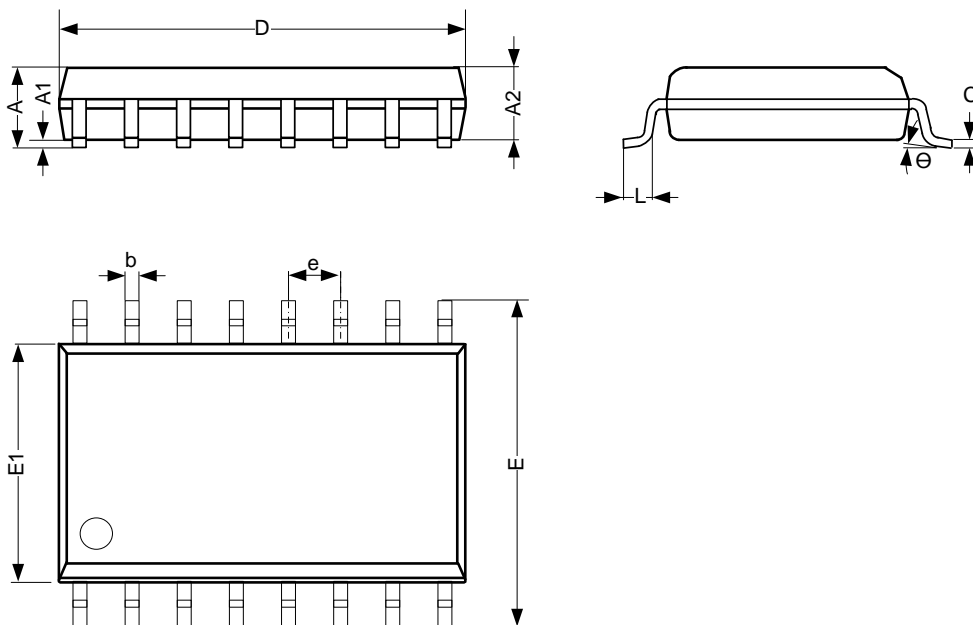
8.4.4 Test Data

TYPE	INPUT		LOAD		S1 POSITION		
	V <sub>I</sub>	t <sub>r</sub> , t <sub>f</sub>	C <sub>L</sub>	R <sub>L</sub>	t <sub>PLH</sub> , t <sub>PHL</sub>	t <sub>PZH</sub> , t <sub>PHZ</sub>	t <sub>PZL</sub> , t <sub>PLZ</sub>
CJ74HC138	V <sub>CC</sub>	6.0ns	15pF, 50pF	1kΩ	Open	GND	V <sub>CC</sub>
CJ74HCT138	3.0V	6.0ns	15pF, 50pF	1kΩ	Open	GND	V <sub>CC</sub>

9 Mechanical Information

9.1 SOP16 Mechanical Information

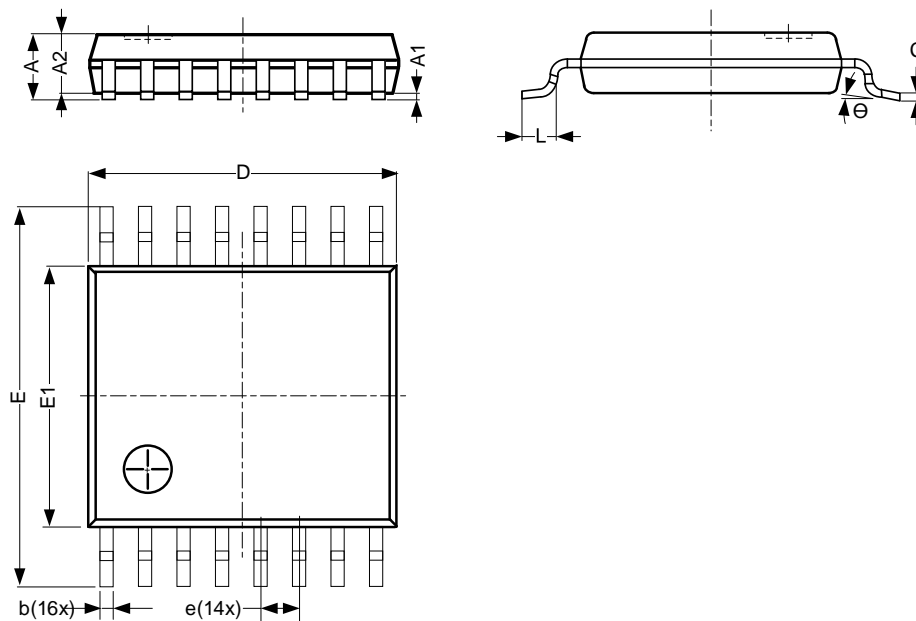
9.1.1 SOP16 Outline Dimensions



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.

### 10.3 Revision History

November, 2025: rev - 1.1, Change marking information.

# DISCLAIMER

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