



## U74HCT138

CMOS IC

### 3-TO-8 LINE DECODERS / DEMULTIPLEXERS

#### DESCRIPTION

The **U74HCT138** decodes a three-bit Address to 1-of-8 active-low outputs.

This device features three Chip Select inputs, two active-low and one active-high, to facilitate the demultiplexing, cascading and chip-selecting functions.

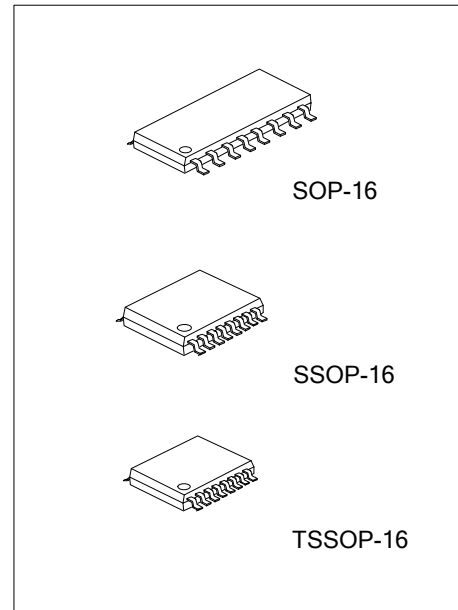
The demultiplexing function is accomplished by using the Address inputs to select the desired device output. One of the Chip Selects is used as a data input while the other Chip Selects are held in their active states.

#### FEATURES

- \* Operate from 4.5V to 5.5V
- \* Low Input Current: 1.0uA Max
- \* Low Power Consumption: 8μA Max
- \* Typical  $t_{PD}$  = 15ns
- \* Inputs are TTL voltage compatible

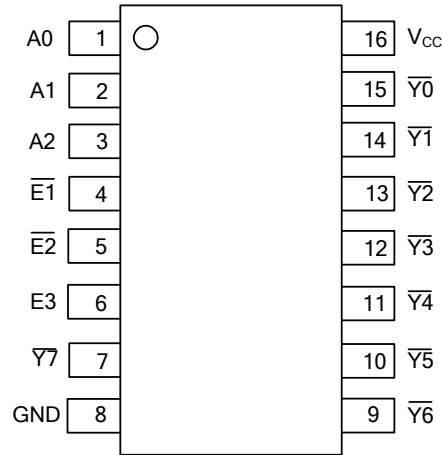
#### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HCT138L-S16-T	U74HCT138G-S16-T	SOP-16	Tube
U74HCT138L-S16-R	U74HCT138G-S16-R	SOP-16	Tape Reel
U74HCT138L-R16-T	U74HCT138G-R16-T	SSOP-16	Tube
U74HCT138L-R16-R	U74HCT138G-R16-R	SSOP-16	Tape Reel
U74HCT138L-P16-T	U74HCT138G-P16-T	TSSOP-16	Tube
U74HCT138L-P16-R	U74HCT138G-P16-R	TSSOP-16	Tape Reel



<p>U74HCT138L-S16-T</p> <p>(1) Packing Type (2) Package Type (3) Lead Free</p>	<p>(1) T: Tube, R: Tape Reel (2) S16: SOP-16, R16: SSOP-16, P16: TSSOP-16 (3) L: Lead Free, G: Halogen Free</p>
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■ PIN CONFIGURATION

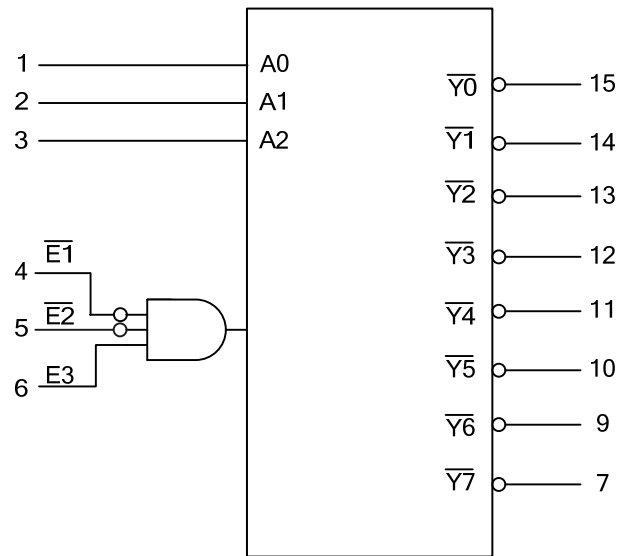


■ FUNCTION TABLE

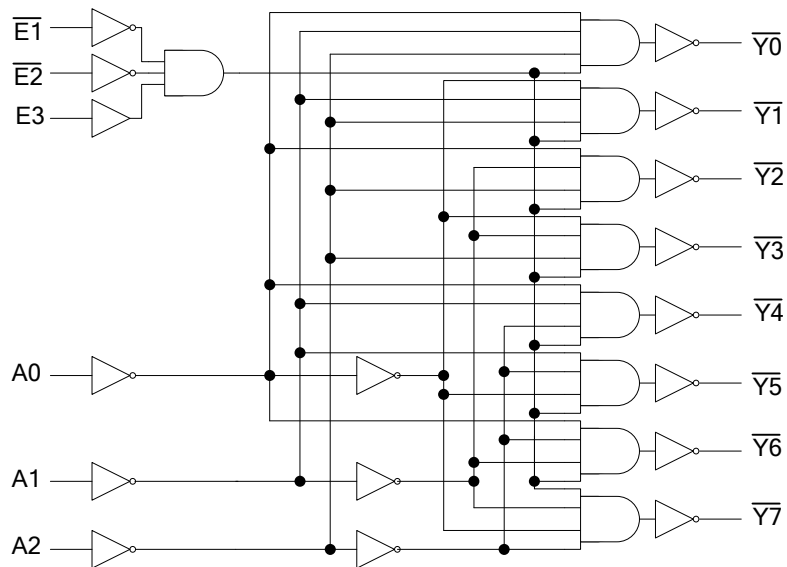
INPUTS						OUTPUTS							
$\overline{E1}$	$\overline{E2}$	E3	A0	A1	A2	$\overline{Y0}$	$\overline{Y1}$	$\overline{Y2}$	$\overline{Y3}$	$\overline{Y4}$	$\overline{Y5}$	$\overline{Y6}$	$\overline{Y7}$
H	X	X	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	L	X	X	X	H	H	H	H	H	H	H	H
L	L	H	L	L	L	L	H	H	H	H	H	H	H
L	L	H	H	L	L	H	L	H	H	H	H	H	H
L	L	H	L	H	L	H	H	L	H	H	H	H	H
L	L	H	H	H	L	H	H	H	L	H	H	H	H
L	L	H	L	L	H	H	H	H	H	L	H	H	H
L	L	H	H	L	H	H	H	H	H	H	L	H	H
L	L	H	L	H	H	H	H	H	H	H	H	L	H
L	L	H	H	H	H	H	H	H	H	H	H	H	L

Note: H : High voltage level    L : Low voltage level    X : Don't care

■ LOGIC SYMBOL



■ LOGIC DIAGRAM



## ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	-0.5 ~ 7.0	V
Input Clamp Current( $V_I < 0$ or $V_I > V_{CC}$ )	$I_{IK}$	±20	mA
Output Clamp Current( $V_O < 0$ or $V_O > V_{CC}$ )	$I_{OK}$	±20	mA
Continuous Output Current( $V_O = 0$ to $V_{CC}$ )	$I_O$	±25	mA
$V_{CC}$ or GND Current	$I_{CC}$	±50	mA
Storage Temperature	$T_{STG}$	-65 ~ + 150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$	Operating	4.5	5.0	5.5	V
Input Voltage	$V_{IN}$		0		$V_{CC}$	V
Output Voltage	$V_{OUT}$		0		$V_{CC}$	V
Operating Temperature	$T_A$		-40		+85	°C
Input Rise or Fall Times	$t_R, t_F$	$V_{CC}=4.5V\sim 5.5V$			500	ns

## ■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-16	73	°C/W
	TSSOP-16	108	

## ■ ELECTRICAL CHARACTERISTICS( $T_A=25^\circ C$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level input voltage	$V_{IH}$	$V_{CC}=4.5V\sim 5.5V$	2.0			V
Low-Level output voltage	$V_{IL}$	$V_{CC}=4.5V\sim 5.5V$			0.8	V
High-Level Output Voltage	$V_{OH}$	$V_{CC}=4.5V, I_{OH}=-20\mu A$	4.4	4.499		V
		$V_{CC}=4.5V, I_{OH}=-4mA$	3.98	4.3		V
Low-Level Output Voltage	$V_{OL}$	$V_{CC}=4.5V, I_{OL}=20\mu A$		0.001	0.1	V
		$V_{CC}=4.5V, I_{OL}=4mA$		0.17	0.26	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=5.5V, V_{IN}=V_{CC}$ or GND		±0.1	±100	nA
Quiescent Supply Current	$I_{CC}$	$V_{CC}=5.5V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			8	μA
Additional Quiescent Supply Current	$\Delta I_{CC}$	One input at 0.5V or 2.4V, other inputs at 0 or $V_{CC}$		1.4	2.4	mA
Input Capacitance	$C_i$	$V_{CC}=4.5V\sim 5.5V$		3	10	pF

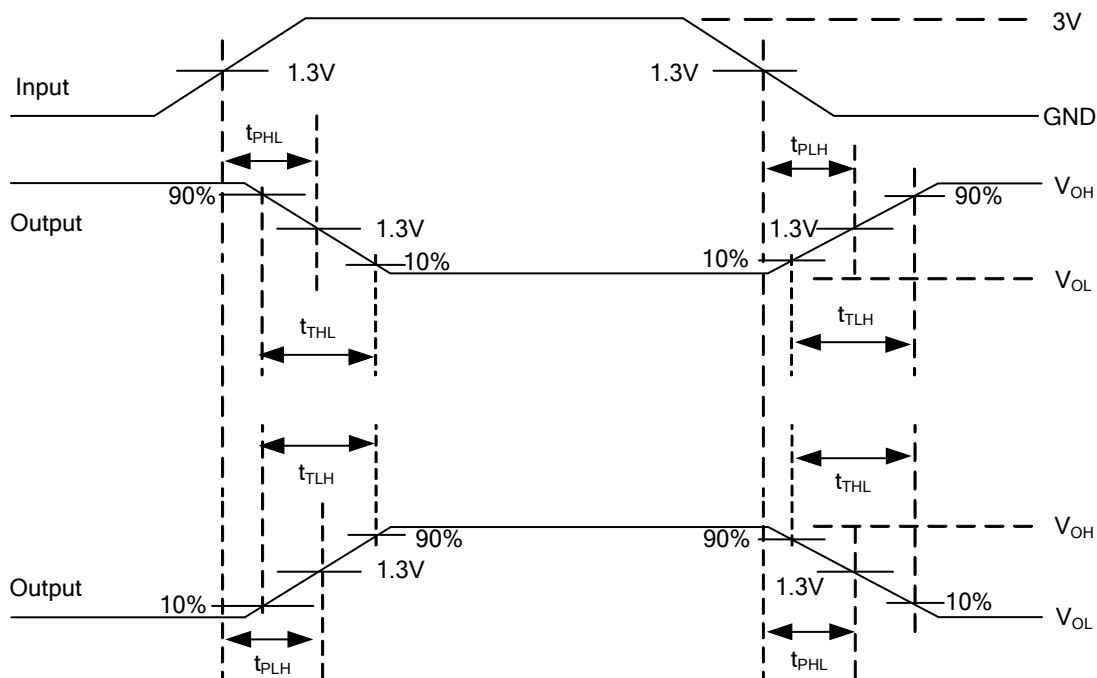
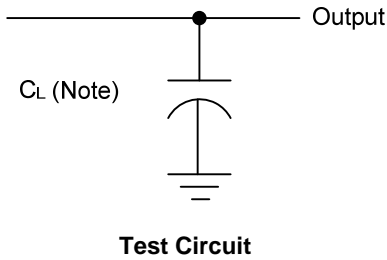
## ■ SWITCHING CHARACTERISTICS( $T_A=25^\circ C$ , see TEST CIRCUIT AND WAVEFORMS)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input ( $A_n$ ) to output ( $\bar{Y}_n$ )	$t_{PLH}/t_{PHL}$	$V_{CC}=4.5V, C_L=50pF$		23	36	ns
		$V_{CC}=5.5V, C_L=50pF$		17	32	ns
Propagation delay from input ( $\bar{E}_n$ ) to output ( $\bar{Y}_n$ )	$t_{PLH}/t_{PHL}$	$V_{CC}=4.5V, C_L=50pF$		22	33	ns
		$V_{CC}=5.5V, C_L=50pF$		18	30	ns
Output Transition Time	$t_{TLH}/t_{THL}$	$V_{CC}=4.5V, C_L=50pF$		12	15	ns
		$V_{CC}=5.5V, C_L=50pF$		11	14	ns

## ■ OPERATING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{PD}$	No load		85		pF

## ■ TEST CIRCUIT AND WAVEFORMS



**Propagation Delay and Output Transition Times**

Note:  $C_L$  includes probe and jig capacitance.

All input pulses are supplied by generators having the following characteristics:  $Z_o = 50\Omega$ ,  $t_r = 6ns$ ,  $t_f = 6ns$ .

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