



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.

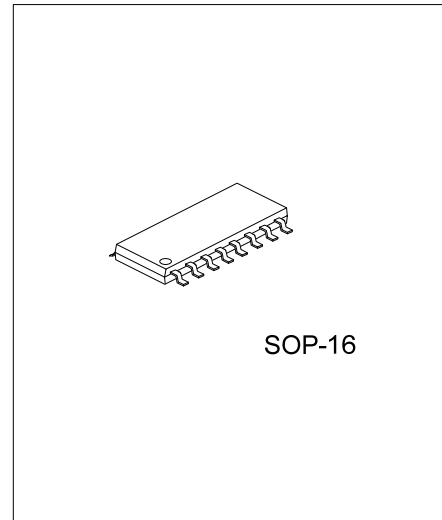
The demultiplexing function is accomplished by using the Address inputs to select the desired device output. One of the Chip Selects is used as a data input while the other Chip Selects are held in their active states.

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

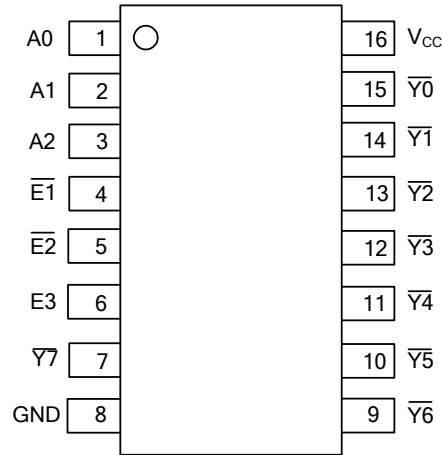
ORDERING INFORMATION

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



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

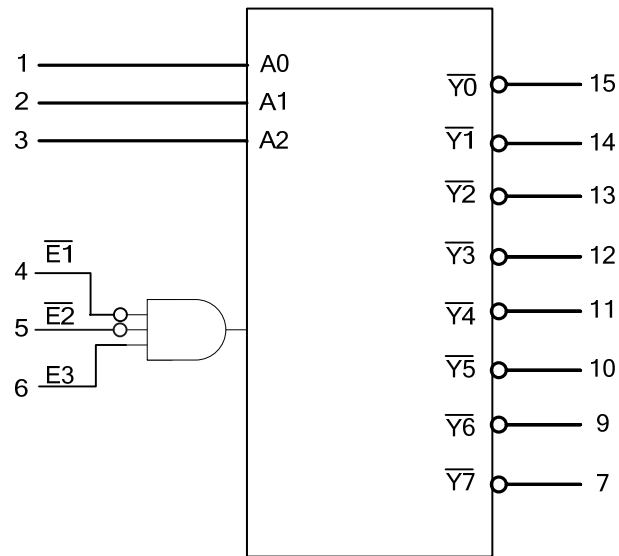


■ FUNCTION TABLE

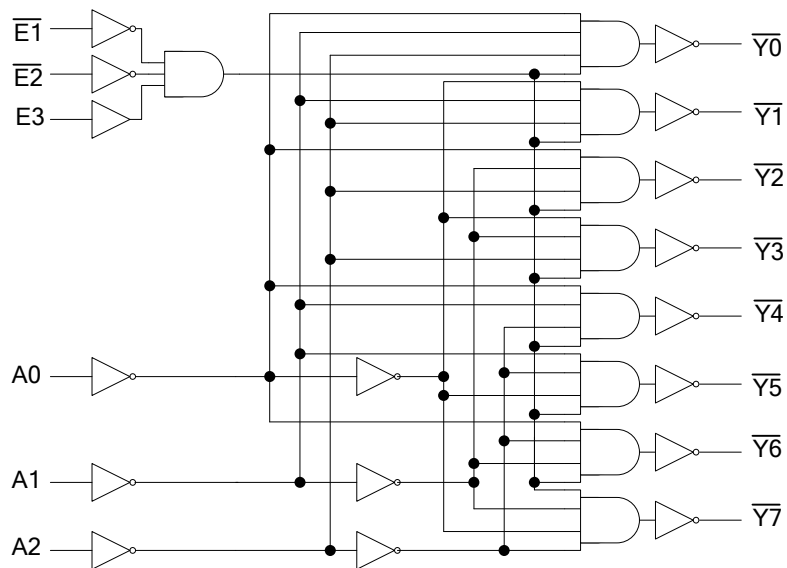
INPUTS						OUTPUTS							
E1	E2	E3	A0	A1	A2	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
H	X	X	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	L	X	X	X	H	H	H	H	H	H	H	H
L	L	H	L	L	L	L	H	H	H	H	H	H	H
L	L	H	H	L	L	H	L	H	H	H	H	H	H
L	L	H	L	H	L	H	H	L	H	H	H	H	H
L	L	H	H	H	L	H	H	H	L	H	H	H	H
L	L	H	L	L	H	H	H	H	H	L	H	H	H
L	L	H	H	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

■ 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	ΔI_{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

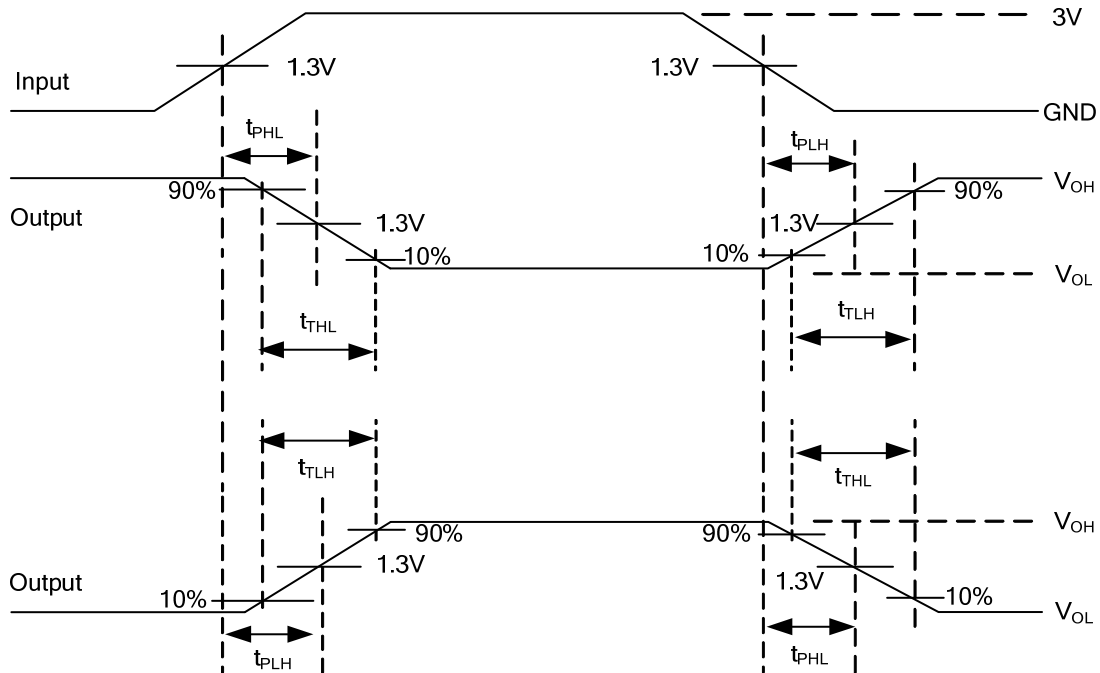
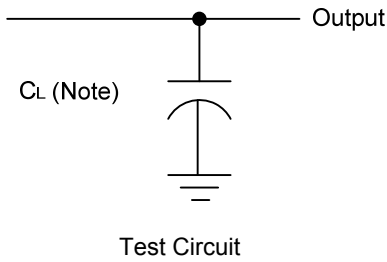
■ SWITCHING CHARACTERISTICS($T_A = 25^\circ C$, see TEST CIRCUIT AND WAVEFORMS)

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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