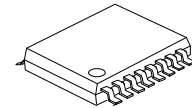


**U74HC238****CMOS IC****3 TO 8 LINE
DECODER/DEMULTIPLEXER****■ DESCRIPTION**

The **U74HC238** decodes three binary weighted address inputs (A0, A1 and A2) to eight mutually exclusive outputs (Y0 to Y7). The device features three enable inputs ($\bar{E}1$ and $\bar{E}2$ and E3). Every output will be LOW unless $\bar{E}1$ and $\bar{E}2$ 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 **U74HC238** ICs and one inverter. The **U74HC238** 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} .



TSSOP-16

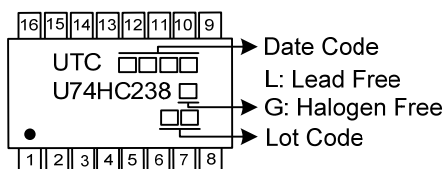
■ FEATURES

- * Demultiplexing capability
- * Multiple input enable for easy expansion
- * Ideal for memory chip select decoding
- * Active HIGH mutually exclusive outputs

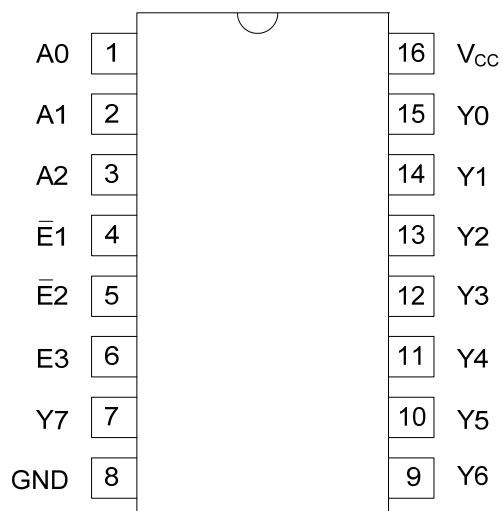
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC238L-P16-R	U74HC238G-P16-R	TSSOP-16	Tape Reel

U74HC238G-P16-R (1) Packing Type (2) Package Type (3) Green Package	(1) R: Tape Reel (2) P16: TSSOP-16 (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING

■ PIN CONFIGURATION

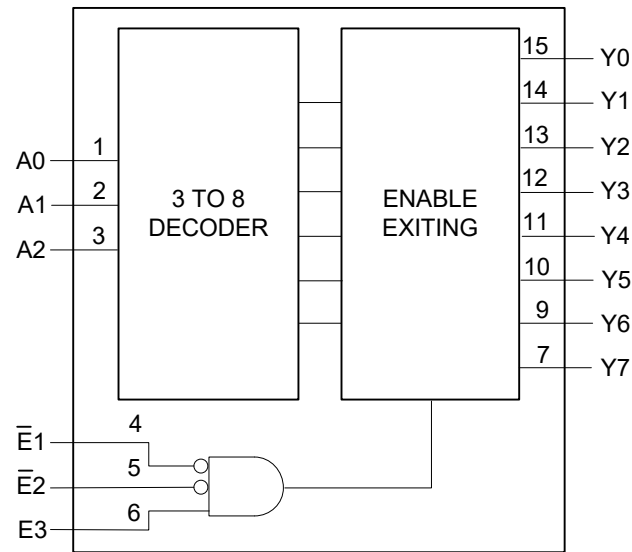


■ FUNCTION TABLE

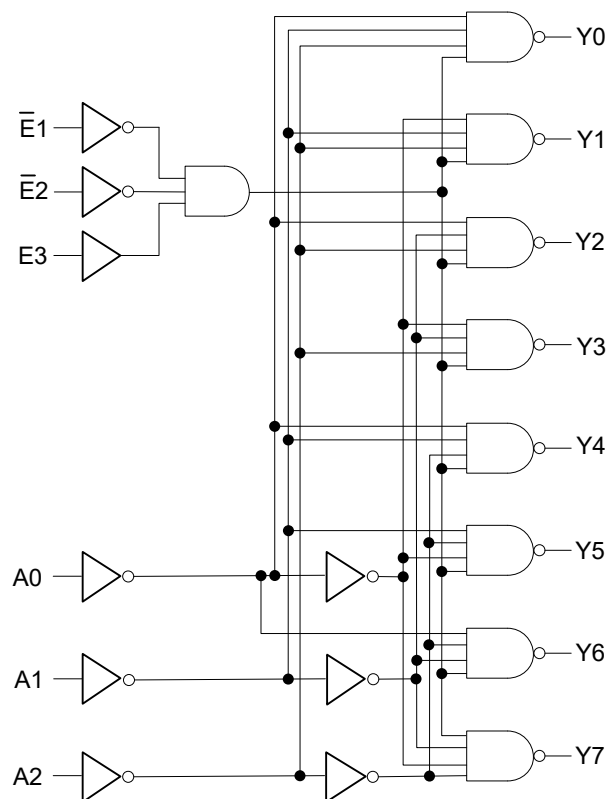
$\bar{E}1$	$\bar{E}2$	E3	A0	A1	A2	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
H	X	X	X	X	X	L	L	L	L	L	L	L	L
X	H	X	X	X	X	L	L	L	L	L	L	L	L
X	X	L	X	X	X	L	L	L	L	L	L	L	L
L	L	H	L	L	L	H	L	L	L	L	L	L	L
L	L	H	H	L	L	L	H	L	L	L	L	L	L
L	L	H	L	H	L	L	L	H	L	L	L	L	L
L	L	H	H	H	L	L	L	L	H	L	L	L	L
L	L	H	L	L	H	L	L	L	L	H	L	L	L
L	L	H	H	L	H	L	L	L	L	L	H	L	L
L	L	H	L	H	H	L	L	L	L	L	L	H	L
L	L	H	H	H	H	L	L	L	L	L	L	L	H

H = High Voltage level ; L = Low Voltage level ; X = Don't care

■ LOGIC SYMBOL



■ FUNCTION DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Supply Voltage	V_{CC}		-0.5 ~ 7	V
Continuous Output Current	I_{OUT}	$-0.5V < V_{OUT} < V_{CC} + 0.5V$	± 25	mA
Input Clamp Current	I_{IK}	$V_{IN} < -0.5V$ or $V_{IN} > V_{CC} + 0.5V$	± 20	mA
Output Clamp Current	I_{OK}	$V_{OUT} < -0.5V$ or $V_{OUT} > V_{CC} + 0.5V$	± 20	mA
Supply Current	I_{CC}		50	mA
Ground Current	I_{GND}		-50	mA
Storage Temperature Range	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	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2.0	5.0	6.0	V
High-Level Input Voltage	V_{IH}	$V_{CC}=2V$	1.5	1.2		V
		$V_{CC}=4.5V$	3.15	2.4		V
		$V_{CC}=6V$	4.2	3.2		V
Low-Level Input Voltage	V_{IL}	$V_{CC}=2V$		0.8	0.5	V
		$V_{CC}=4.5V$		2.1	1.35	V
		$V_{CC}=6V$		2.8	1.8	V
Input Voltage	V_{IN}		0		V_{CC}	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Input Transition Rise or Fall Rate	$\Delta t/\Delta v$	$V_{CC}=2V$			625	ns/V
		$V_{CC}=4.5V$		1.67	139	ns/V
		$V_{CC}=6V$			83	ns/V
Operating Temperature	T_A		-40		+125	°C

■ ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP ⁽¹⁾	MAX	UNIT
High-Level Output Voltage	V_{OH}	$V_{CC}=2V, I_{OH}=-20\mu A$	1.9	2.0		V
		$V_{CC}=4.5V, I_{OH}=-20\mu A$	4.4	4.5		V
		$V_{CC}=6V, I_{OH}=-20\mu A$	5.9	6.0		V
		$V_{CC}=4.5V, I_{OH}=-4mA$	3.98	4.32		V
		$V_{CC}=6V, I_{OH}=-5.2mA$	5.48	5.81		V
Low-Level Output Voltage	V_{OL}	$V_{CC}=2V, I_{OL}=20\mu A$		0	0.1	V
		$V_{CC}=4.5V, I_{OL}=20\mu A$		0	0.1	V
		$V_{CC}=6V, I_{OL}=20\mu A$		0	0.1	V
		$V_{CC}=4.5V, I_{OL}=4mA$		0.15	0.26	V
		$V_{CC}=6V, I_{OL}=5.2mA$		0.16	0.26	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=6V, V_I=V_{CC}$ or GND			± 0.1	μA
Quiescent Supply Current	I_{CC}	$V_{CC}=6V, V_I=V_{CC}$ or GND, $I_{OUT}=0A$			8	μA
Input Capacitance	C_I			3.5		pF

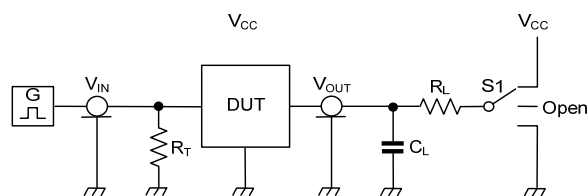
■ **SWITCHING CHARACTERISTICS** ($T_A=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (An) to output (Yn)	t _{PD}	V _{CC} =2.0V		25	150	ns
		V _{CC} =4.5V		17	30	ns
		V _{CC} =5.0V, C _L =15pF		14		ns
		V _{CC} =6.0V		10	26	ns
Propagation delay from input (E3) to output (Yn)		V _{CC} =2.0V		22	160	ns
		V _{CC} =4.5V		19	32	ns
		V _{CC} =5.0V, C _L =15pF		16		ns
		V _{CC} =6.0V		8	27	ns
Propagation delay from input (Ēn) to output (Yn)		V _{CC} =2.0V		20	155	ns
		V _{CC} =4.5V		18	31	ns
		V _{CC} =5.0V, C _L =15pF		17		ns
		V _{CC} =6.0V		6	26	ns
Transition Time	t _t	V _{CC} =2.0V		19	75	ns
		V _{CC} =4.5V		7	15	ns
		V _{CC} =6.0V		6	13	ns

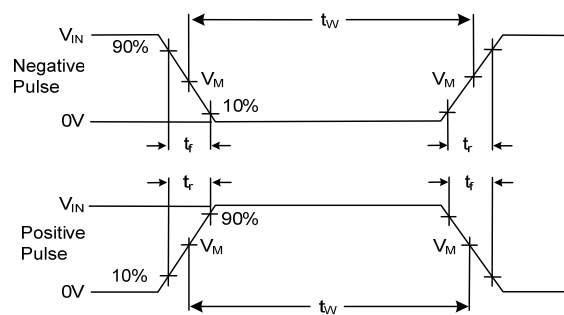
■ **OPERATING CHARACTERISTICS** ($T_A=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	$V_{IN}=\text{GND or } V_{CC}$		76		pF

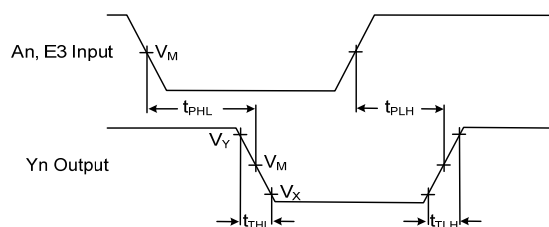
■ TEST CIRCUIT AND WAVEFORMS



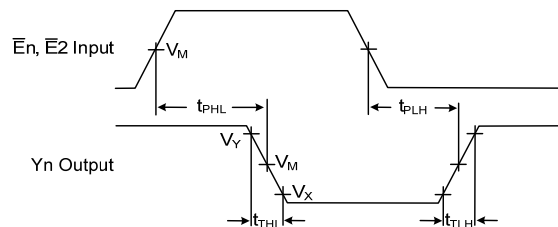
Load Circuit



Test Circuit For Measuring Switching Times



Input ($\bar{A}_n$, $\bar{E}_3$) to Output (Y_n) Propagation Delays And Output Transition Times



Input (E_1 , E_2) to Output (Y_n) Propagation Delays And Output Transition Times

Table 1. Measurement Points

Input	Output		
V_M	V_M	V_X	V_Y
$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$

Table 2. Test data

Input		Load		S1 Position
V_{IN}	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}
V_{CC}	6nS	15pF, 50pF	1k Ω	Open

Note: V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

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