

# SN74HC238

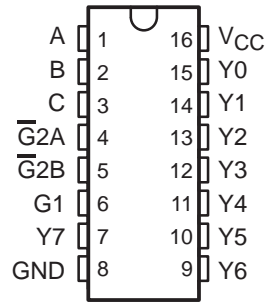
## 3-LINE TO 8-LINE DECODERS/DEMULTIPLEXERS

- Targeted Specifically for High-Speed Memory Decoders and Data-Transmission Systems
- Wide Operating Voltage Range of 2 V to 6 V
- Outputs Can Drive Up To 10 LSTTL Loads
- Low Power Consumption, 80- $\mu$ A Max  $I_{CC}$
- Typical  $t_{pd} = 15$  ns
- $\pm 4$ -mA Output Drive at 5 V
- Low Input Current of 1  $\mu$ A Max
- Incorporate Three Enable Inputs to Simplify Cascading and/or Data Reception

### description/ordering information

The SN74HC238 devices are designed to be used in high-performance memory-decoding or data-routing applications requiring very short propagation delay times. In high-performance memory systems, these decoders can be used to minimize the effects of system decoding. When employed with high-speed memories utilizing a fast enable circuit, the delay times of these decoders and the enable time of the memory are usually less than the typical access time of the memory. This means that the effective system delay introduced by the decoders is negligible.

SN74HC238N PACKAGE  
(TOP VIEW)



### ORDERING INFORMATION

T <sub>A</sub>	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	PDIP - N	Tube of 25	SN74HC238N	SN74HC238N

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

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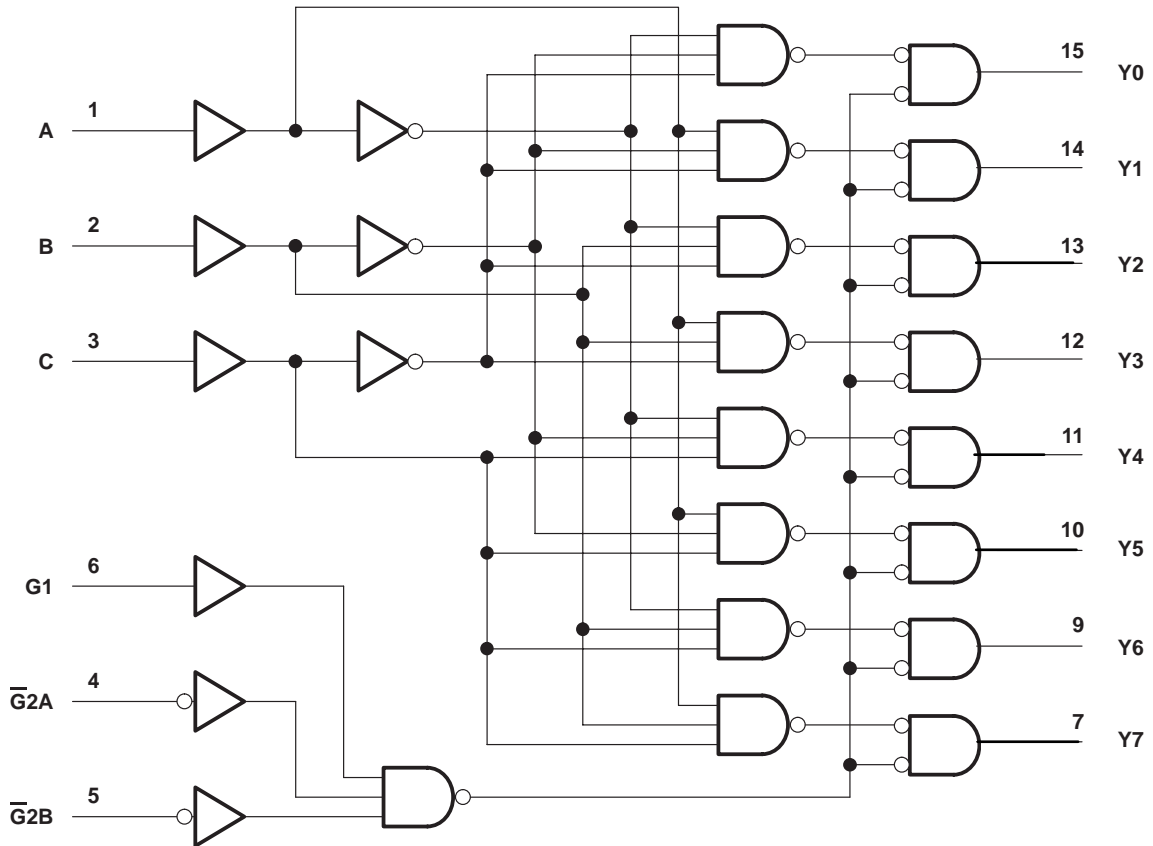
### description/ordering information (continued)

The conditions at the binary-select inputs at the three enable inputs select one of eight output lines. Two active-low and one active-high enable inputs reduce the need for external gates or inverters when expanding. A 24-line decoder can be implemented without external inverters, and a 32-line decoder requires only one inverter. An enable input can be used as a data input for demultiplexing applications.

FUNCTION TABLE

INPUTS						OUTPUTS							
ENABLE			SELECT										
G1	$\overline{G2A}$	$\overline{G2B}$	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	X	L	L	L	L	L	L	L	L
X	X	H	X	X	X	L	L	L	L	L	L	L	L
L	X	X	X	X	X	L	L	L	L	L	L	L	L
H	L	L	L	L	L	H	L	L	L	L	L	L	L
H	L	L	L	L	H	L	H	L	L	L	L	L	L
H	L	L	L	H	L	L	L	H	L	L	L	L	L
H	L	L	L	H	H	L	L	L	H	L	L	L	L
H	L	L	H	L	L	L	L	L	L	H	L	L	L
H	L	L	H	H	L	L	L	L	L	L	H	L	L
H	L	L	H	H	H	L	L	L	L	L	L	L	H

logic diagram (positive logic)



Pin numbers shown are for the N packages.

**absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†**

Supply voltage range, $V_{CC}$ .....	-0.5 V to 7 V
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ) (see Note 1) .....	$\pm 20$ mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) (see Note 1) .....	$\pm 20$ mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	$\pm 25$ mA
Continuous current through $V_{CC}$ or GND .....	$\pm 50$ mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): N package .....	67°C/W

Storage temperature range,  $T_{stg}$  .....

-65°C to 150°C

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

recommended operating conditions (see Note 3)

		SN74HC238			UNIT
		MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	2	5	6	V
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 2 V	1.5		V
		V <sub>CC</sub> = 4.5 V	3.15		
		V <sub>CC</sub> = 6 V	4.2		
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 2 V		0.3	V
		V <sub>CC</sub> = 4.5 V		0.9	
		V <sub>CC</sub> = 6 V		1.2	
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/fall time	V <sub>CC</sub> = 2 V		1000	ns
		V <sub>CC</sub> = 4.5 V		500	
		V <sub>CC</sub> = 6 V		400	
T <sub>A</sub>	Operating free-air temperature	-40		85	°C

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			SN74HC238		UNIT	
			MIN	TYP	MAX	MIN	MAX		
V <sub>OH</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -20 μA	2 V	1.9	1.998		1.9	V	
			4.5 V	4.4	4.499		4.4		
			6 V	5.9	5.999		5.9		
		I <sub>OH</sub> = -4 mA	4.5 V	3.98	4.3		3.84		
		I <sub>OH</sub> = -5.2 mA	6 V	5.48	5.8		5.34		
V <sub>OL</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 μA	2 V		0.002	0.1		0.1	V
			4.5 V		0.001	0.1		0.1	
			6 V		0.001	0.1		0.1	
		I <sub>OL</sub> = 4 mA	4.5 V		0.17	0.26		0.33	
		I <sub>OL</sub> = 5.2 mA	6 V		0.15	0.26		0.33	
I <sub>I</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0	6 V		±0.1	±100		±1000	nA	
I <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0, I <sub>O</sub> = 0	6 V			8		80	μA	
C <sub>i</sub>		2 V to 6 V		3	10		10	pF	

# SN74HC238 3-LINE TO 8-LINE DECODERS/DEMULTIPLEXERS

switching characteristics over recommended operating free-air temperature range,  $C_L = 50$  pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC}$	$T_A = 25^\circ\text{C}$			SN74HC238		UNIT
				MIN	TYP	MAX	MIN	MAX	
$t_{pd}$	A, B, or C	Any Y	2 V		67	180		225	ns
			4.5 V		20	35		45	
			6 V		15	31		38	
	Enable	Any Y	2 V		66	155		195	
			4.5 V		17	31		39	
			6 V		13	26		33	
$t_t$		Any	2 V		38	75		95	ns
			4.5 V		8	15		19	
			6 V		6	13		16	

operating characteristics,  $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
$C_{pd}$ Power dissipation capacitance	No load	85	pF

## PARAMETER MEASUREMENT INFORMATION

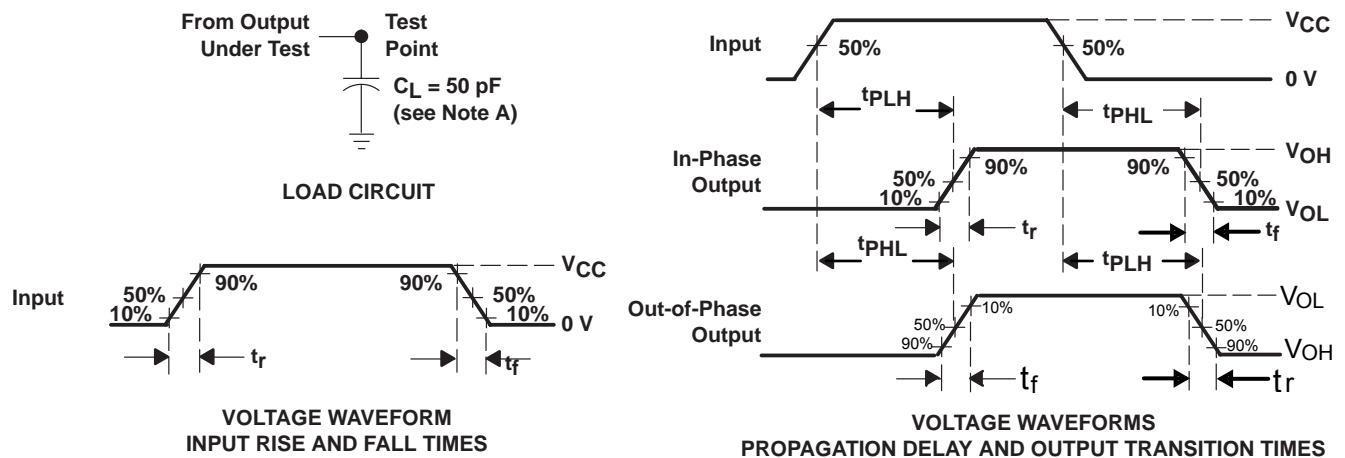


Figure 1. Load Circuit and Voltage Waveforms

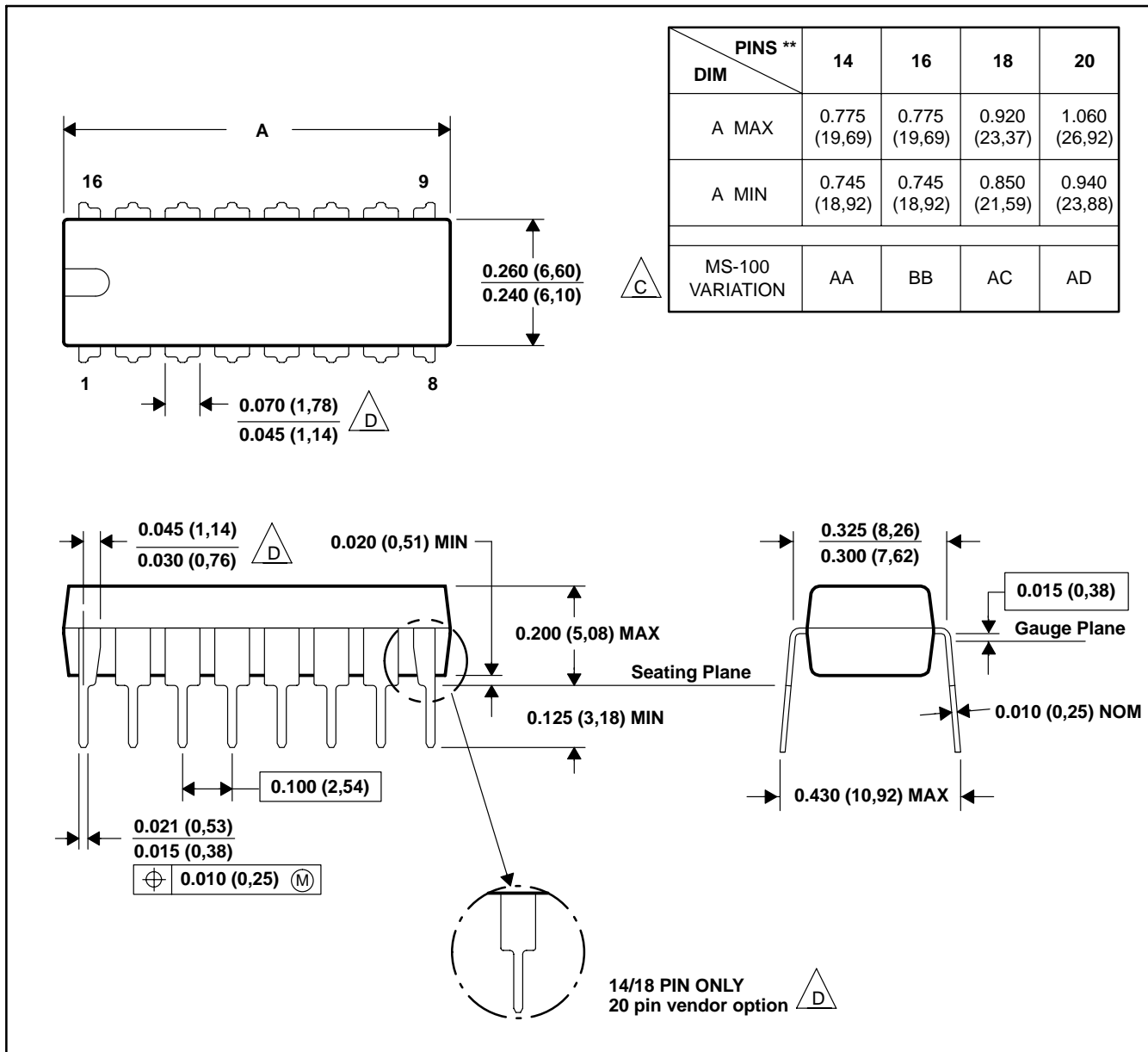
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## 3-LINE TO 8-LINE DECODERS/DEMULTIPLEXERS

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



NOTES: A. All linear dimensions are in inches (millimeters).

B. This drawing is subject to change without notice.

Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).

The 20 pin end lead shoulder width is a vendor option, either half or full width.