General Description

The 74HC238 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74HC238 decoders accept three binary weighted address inputs (A0, A1, A2) and when enabled,provide 8 mutually exclusive active HIGH outputs (Y0 to Y7).

The 74HC238 features three enable inputs: two active LOW (1 and 2) and one active HIGH (E3).

Every output will be LOW unless E1 and E2 are LOW and E3 is HIGH.

This multiple enable function allows easy parallel expansion of the HC238 to a 1-of-32 (5 lines to 32 lines) decoder with just four HC238 ICs and one inverter.

The 74HC238 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. Unused enable inputs must be permanently tied to their appropriate active HIGH or LOW state.

The 74HC238 is identical to the 74HC138 but has non-inverting outputs.
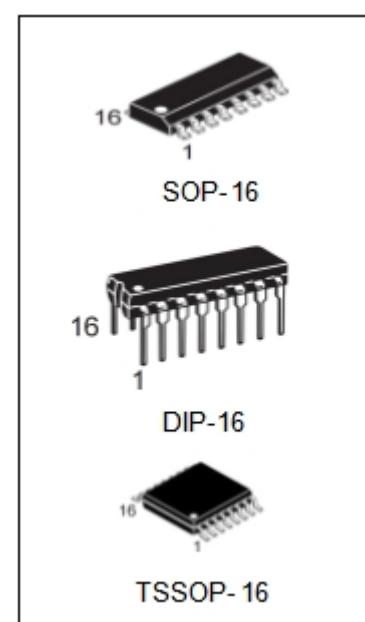
FEATURES

➢ Demultiplexing capability

➢ Multiple input enable for easy expansion

➢ Ideal for memory chip select decoding

➢ Active HIGH mutually exclusive outputs

➢ Output capability: standard

➢ ICC category: MSI

ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
74HC238N	DIP-16	74HC238	TUBE	1000pcs/box
74HC238M/TR	SOP-16	74HC238	REEL	2500pcs/reel
74HC238MT/TR	TSSOP-16	HC238	REEL	2500pcs/reel

PIN DESCRIPTION

| PIN NO.	SYMBOL	NAME AND FUNCTION
1, 2, 3	A_0 to A_2	address inputs
4, 5	E_1, E_2	enable inputs (active LOW)
6	E_3	enable input (active HIGH)
8	GND	ground (0 V)
15, 14, 13, 12, 11, 10, 9, 7	Y_0 to Y_7	outputs (active HIGH)
16	VCC	positive supply voltage
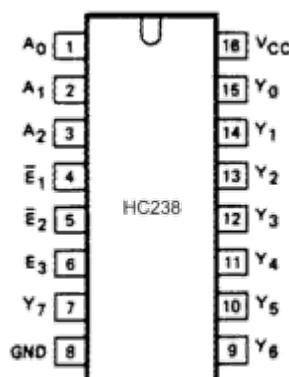
Fig. 1 Pin configuration.
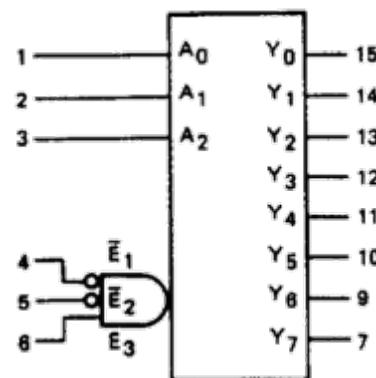


Fig. 2 Logic symbol.
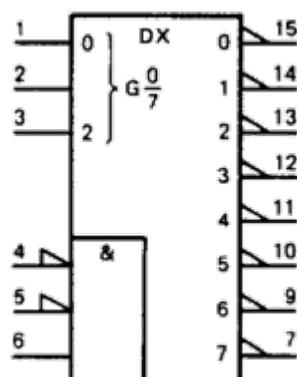

Fig. 3 IEC logic symbol.
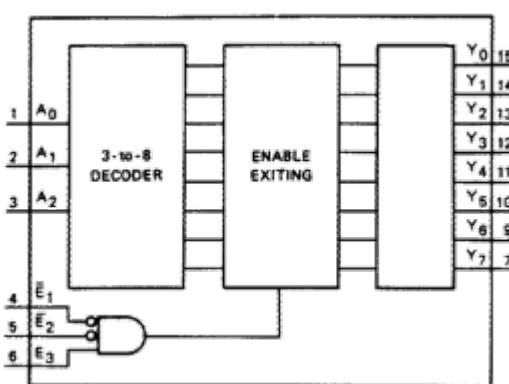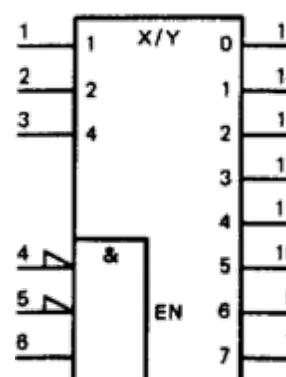
Fig. 4 Functional diagram.
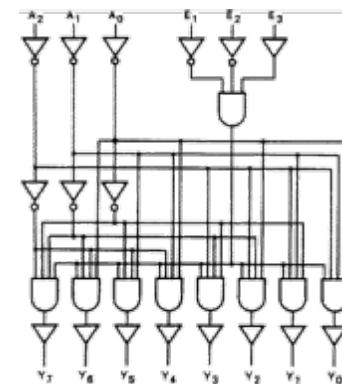
Fig. 5 Logic diagram.

FUNCTION TABLE

INPUTS						OUTPUTS							
$\overline{E_1}$	$\overline{E_2}$	E_3	A_0	A_1	A_2	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7
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

Note

1. H = HIGH voltage level

2. L = LOW voltage level

3. X = don't care

QUICK REFERENCE DATA

GND = 0 V; T_{amb} = 25°C; t_r = t_f = 6 ns

SYMBOL	PARAMETER	CONDITIONS	TYPICAL	UNIT
t_{PHL}/ t_{PLH}	propagation delay A_n to Y_n E_3 to Y_n $\overline{E}_n$ to Y_n	C_L = 15 pF; V_{CC} = 5 V	14 16 17	ns ns ns
C_I	input capacitance		3.5	pF
CPD	power dissipation capacitance per package	notes 1and 2	72	pF

Notes

CPD is used to determine the dynamic power dissipation (PD in μW):

$P_D = C_{PD} \times V_{CC2} \times f_i + \sum(C_L \times V_{CC2} \times f_o)$ where:

   f_i = input frequency in MHz

   f_o = output frequency in MHz

   $\sum(C_L \times V_{CC} \times f_o)$ = sum of outputs

 C_L = output load capacitance in pF

   V_{CC} = supply voltage in V

   For HC238 the condition is V_I = GND to VCC

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AC CHARACTERISTICS FOR

GND = 0 V; tr = tf = 6 ns; CL = 50 pF

SYMBOL	PARAMETER	T_{amb}(℃)						UNIT	TEST CONDITIONS	
		74HC238								
		+25			-40 to +85		-40 to +125		VCC(V)	WAVEFORMS
		min.	typ.	max.	min.	max.	min.	max.		
$tPHL/ tPLH$	propagation delayA_n toY_n		47	150		190		225	ns	2.0	Fig.6
			17	30		38		45		4.5	
			14	26		33		38		6.0	
$tPHL/ tPLH$	propagation delayE_3 toY_n		52	160		200		240	ns	2.0	Fig.6
			19	32		40		48		4.5	
			15	27		34		41		6.0	
$tPHL/ tPLH$	propagation delayE_n toY_n		50	155		195		235	ns	2.0	Fig.7
			18	31		39		47		4.5	
			14	26		33		40		6.0	
$tTHL/ tTLH$	output transition time		19	75		95		110	ns	2.0	Figs 6 and 7
			7	15		19		22		4.5	
			6	13		16		19		6.0	
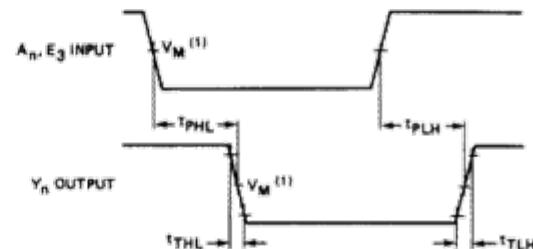
AC WAVEFORMS

(1)HC238: V_M = 50%; V_I = GND to V_{CC}.

Fig.6   Waveforms showing the address input (A_n) and enable input (E_3) to output (Y_n) propagation delays and the output transition times.
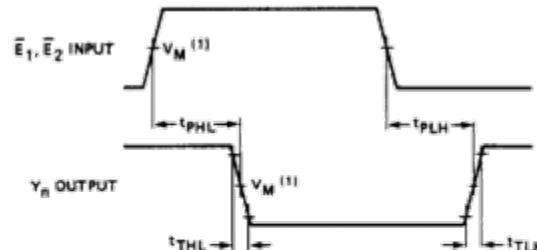
(1)HC238: V_M = 50%; V_I = GND to V_{CC}.

Fig.7   Waveforms showing the enable input ($\overline{E}_n$) to output (Y_n) propagation delays and the output transition times.

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PHYSICAL DIMENSIONS
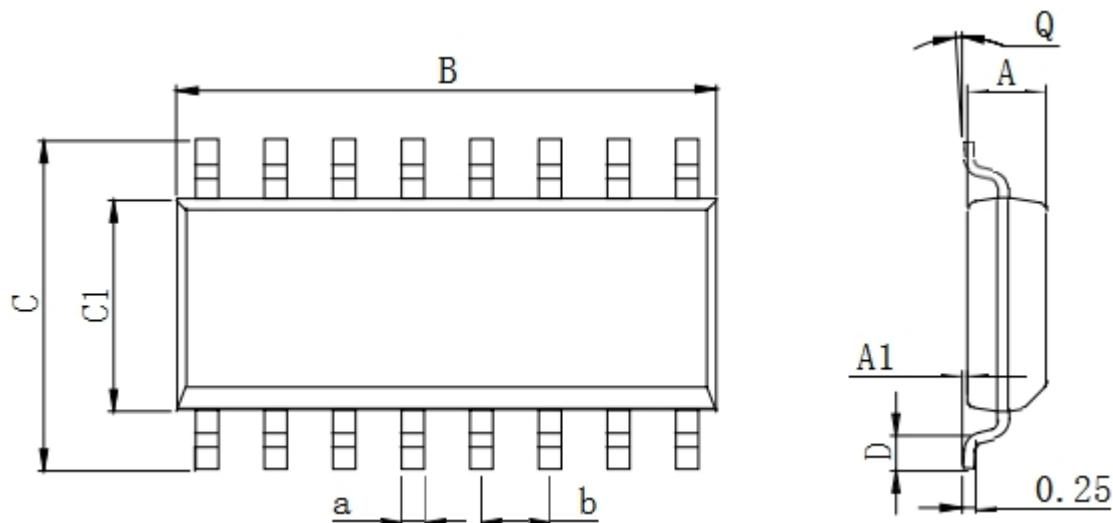
SOP−16

Dimensions In Millimeters(SOP-16)								
Symbol :	A	A1	B	C	C1	D	Q	a	b
Min :	1.35	0.05	9.80	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max :	1.55	0.20	10.0	6.20	4.00	0.80	8°	0.45	1.27 BSC
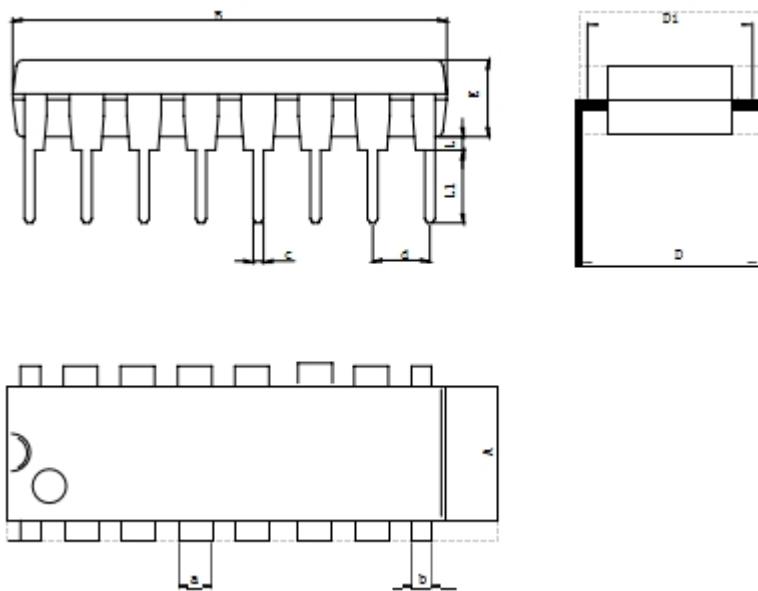
DIP−16

Dimensions In Millimeters(DIP-16)										
Symbol :	A	B	D	D1	E	L	L1	a	b	c	d
Min :	6.10	18.94	8.10	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max :	6.68	19.56	10.9	7.82	3.55	0.70	3.60	1.55	0.90	0.50	2.54 BSC

PHYSICAL DIMENSIONS

TSSOP-16
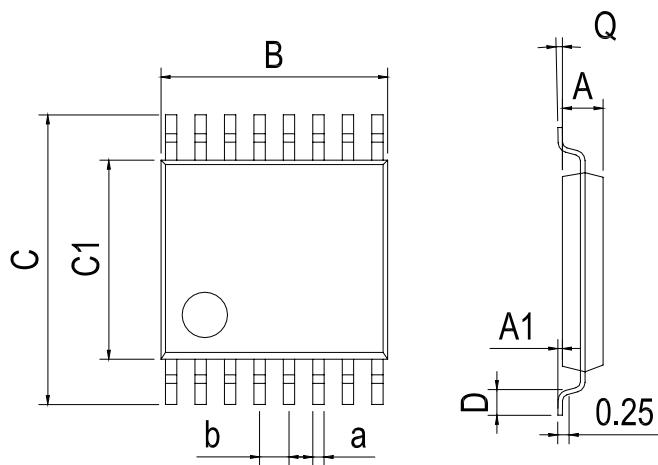
Dimensions In Millimeters(TSSOP-16)									
Symbol :	A	A1	B	C	C1	D	Q	a	b
Min :	0.85	0.05	4.90	6.20	4.30	0.40	0°	0.20	0.65 BSC
Max :	0.95	0.20	5.10	6.60	4.50	0.80	8°	0.25	