

3 To 8 Line Decoder Demultiplexer

Description

74HC238V is a high-speed CMOS decoder circuit, it accepts a three-bit binary weighed address on input pins A0, A1, A2 and when enabled will produce one active high output and other seven output low level.

In addition, the circuit has two low-level enable pins $\overline{E1}$ and $\overline{E2}$ and high-level enable pin E3. When the circuit is in the non-enable state, all output pins output low level; When the circuit is enabled, $\overline{E1}$ and $\overline{E2}$ are low level and E3 is high level.

The circuit uses multiple enable signals to realize the expansion of the decoder. Without using additional devices, it can be expanded into a 4-16 decoder, while expanding 5-32 decoding requires an inverter.

Features

- Supply voltage range: 2.0V to 6.0V
- Sinks or sources current 8mA@V_{CC} = 4.5V
- CMOS low power consumption
- Schmitt trigger action at input pins
- Inputs accepts up to 6.0V
- Part No. and Package Information

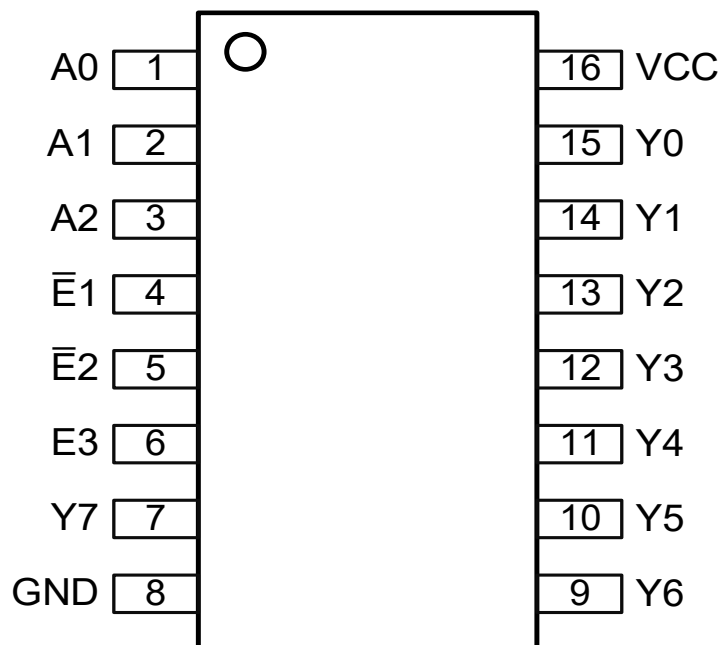
Product Name	Package	MSL
74HC238V	TSSOP16	Level 3

Applications

- Memory chip select decoding
- Data transmission system

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Pin Configuration



TOP VIEW

Figure1. Pin Configuration

Pin Function

Pin Number	Symbol	Description
1	A0	Address Input 0
2	A1	Address Input 1
3	A2	Address Input 2
4	$\bar{E}1$	Enable Input 1(Active Low)
5	$\bar{E}2$	Enable Input 2(Active Low)
6	E3	Enable Input 3(Active High)
7	Y7	Output 7(Active High)
8	GND	Ground
9	Y6	Output 6(Active High)
10	Y5	Output 5(Active High)
11	Y4	Output 4(Active High)
12	Y3	Output 3(Active High)
13	Y2	Output 2(Active High)
14	Y1	Output 1(Active High)
15	Y0	Output 0(Active High)
16	V _{CC}	Supply Voltage

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Block Diagram

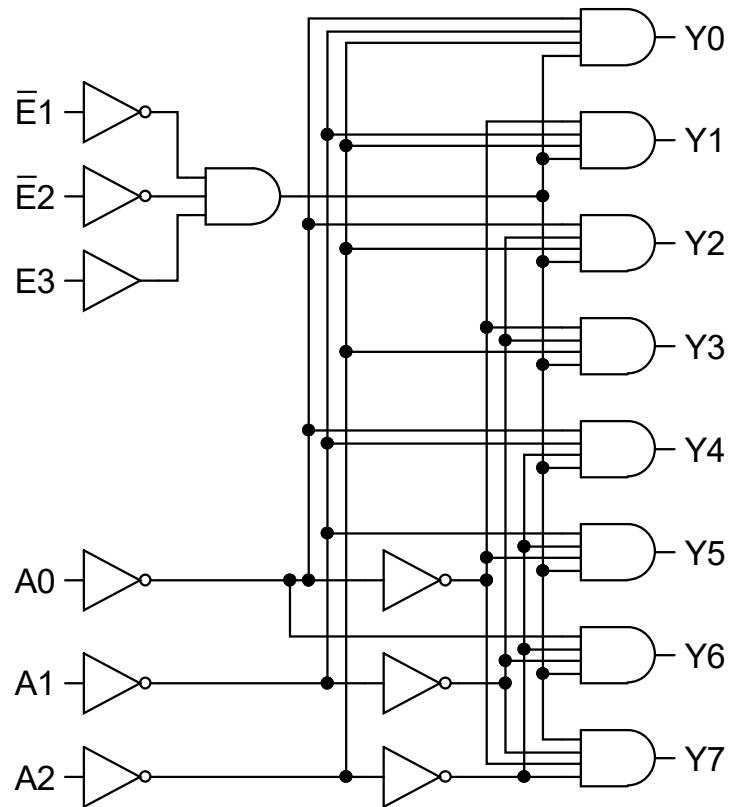


Figure2. Block Diagram

Functional Description

Chip Select			Address			Output							
$\overline{E1}$	$\overline{E2}$	E3	A2	A1	A0	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
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	L	L	L	L	L	L	L	H
L	L	H	L	L	H	L	L	L	L	L	L	H	L
L	L	H	L	H	L	L	L	L	L	L	H	L	L
L	L	H	L	H	H	L	L	L	L	H	L	L	L
L	L	H	H	L	L	L	L	L	H	L	L	L	L
L	L	H	H	L	H	L	L	H	L	L	L	L	L
L	L	H	H	H	L	L	H	L	L	L	L	L	L
L	L	H	H	H	H	H	L	L	L	L	L	L	L

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Absolute Maximum Ratings

Symbol	Parameter	Conditions	Rating	Unit
V_{CC}	Supply Voltage		-0.5~7.0	V
V_I	Input Voltage		-0.5~7.0	V
V_O	Output Voltage		-0.3~ $V_{CC} + 0.5$	V
I_{IK}	Input Diode Current	$V_I < -0.5V$	-20	mA
I_{IK}	Input Diode Current	$V_I > V_{CC} + 0.5V$	20	mA
I_{OK}	Output Diode Current	$V_O < -0.5V$	-20	mA
I_{OK}	Output Diode Current	$V_O > V_{CC} + 0.5V$	20	mA
I_O	Output Source/Sink Current		± 25	mA
I_{CC}	Supply Current		50	mA
I_{GND}	Ground Current		-50	mA
T_J	Operate Temperature Range		-40~150	°C
T_{STG}	Storage Temperature Range		-65~150	°C

Recommended Operating Conditions ($T_A=25^{\circ}C$ without instruction):

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	Supply Voltage		2.0	6.0	V
V_I	Input Voltage		0	V_{CC}	V
V_O	Output Voltage	Active	0	V_{CC}	V
$\Delta t/\Delta v$	Input Transition Rise or Fall Rate	$V_{CC} = 2.0V$		1000	ns/V
		$V_{CC} = 4.5V$		500	ns/V
		$V_{CC} = 6.0V$		400	ns/V
T_A	Operating Temperature		-40	125	°C

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DC Electrical Characteristics

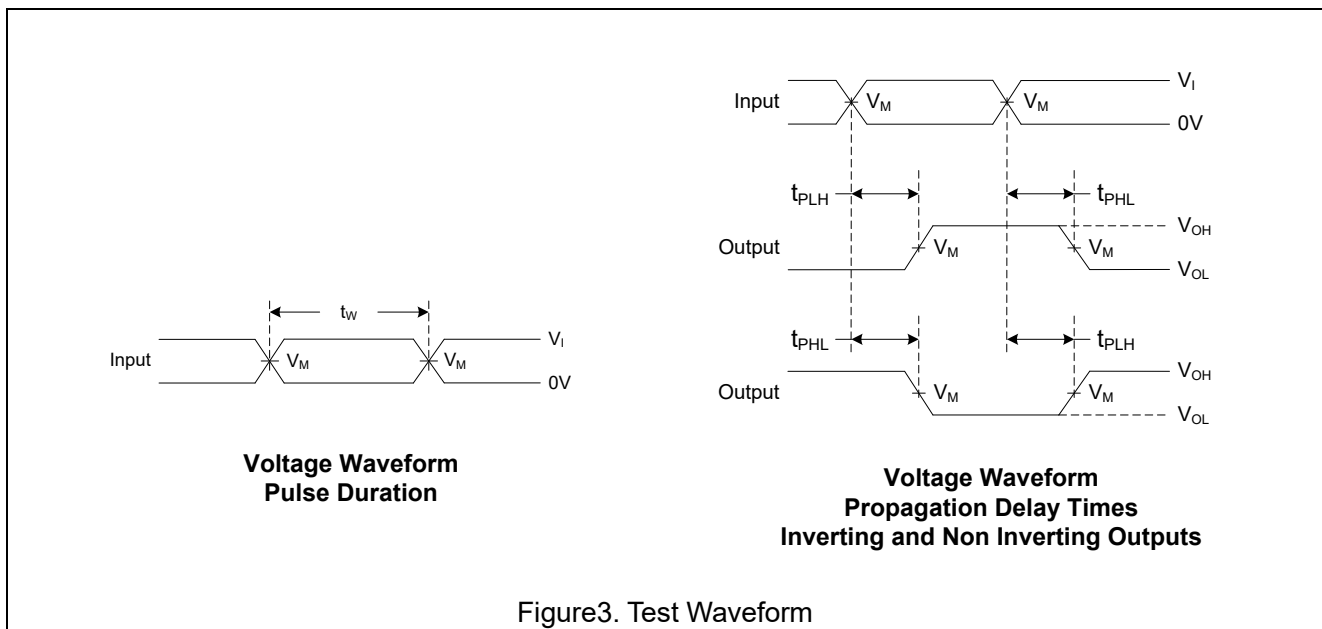
Symbol	Characteristic	Condition	V _{CC} (V)	T _A = +25°C			T _A = -40°C to +85°C		T _A = -40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V _{IH}	High-Level Input Voltage	-	2.0	1.5	1.2	-	1.5	-	1.5	-	V
		-	4.5	3.15	2.4	-	3.15	-	3.15	-	
		-	6.0	4.2	3.2	-	4.2	-	4.2	-	
V _{IL}	Low-Level Input Voltage	-	2.0	-	0.8	0.5	-	0.5	-	0.5	V
		-	4.5	-	2.1	1.35	-	1.35	-	1.35	
		-	6.0	-	2.8	1.8	-	1.8	-	1.8	
V _{OH}	High-Level Output Voltage	I _{OH} = -20μA All Outputs	2.0	1.9	2.0	-	1.9	-	1.9	-	V
			4.5	4.4	4.5	-	4.4	-	4.4	-	
			6.0	5.9	6.0	-	5.9	-	5.9	-	
		I _{OH} = -4mA	2.0	3.98	4.32	-	3.84	-	3.7	-	
		I _{OH} = -5.2mA	4.5	5.48	5.81	-	5.34	-	5.2	-	
V _{OL}	Low-Level Output Voltage	I _{OL} = 20μA All outputs	2.0	-	0	0.1	-	0.1	-	0.1	V
			4.5	-	0	0.1	-	0.1	-	0.1	
			6.0	-	0	0.1	-	0.1	-	0.1	
		I _{OL} = 4mA	2.0	-	0.15	0.26	-	0.33	-	0.4	
		I _{OL} = 5.2mA	4.5	-	0.16	0.26	-	0.33	-	0.4	
I _I	Input Current	V _I = GND or 6.0V	6.0	-	-	±0.1	-	±1	-	±1	μA
I _{CC}	Supply Current	V _I = GND or V _{CC} , I _O = 0 mA	6.0	-	-	8.0	-	80	-	160	μA
C _I	Input Capacitance	V _I = V _{CC} or GND	6.0	-	4	10	-	10	-	10	pF

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AC Electrical Characteristics

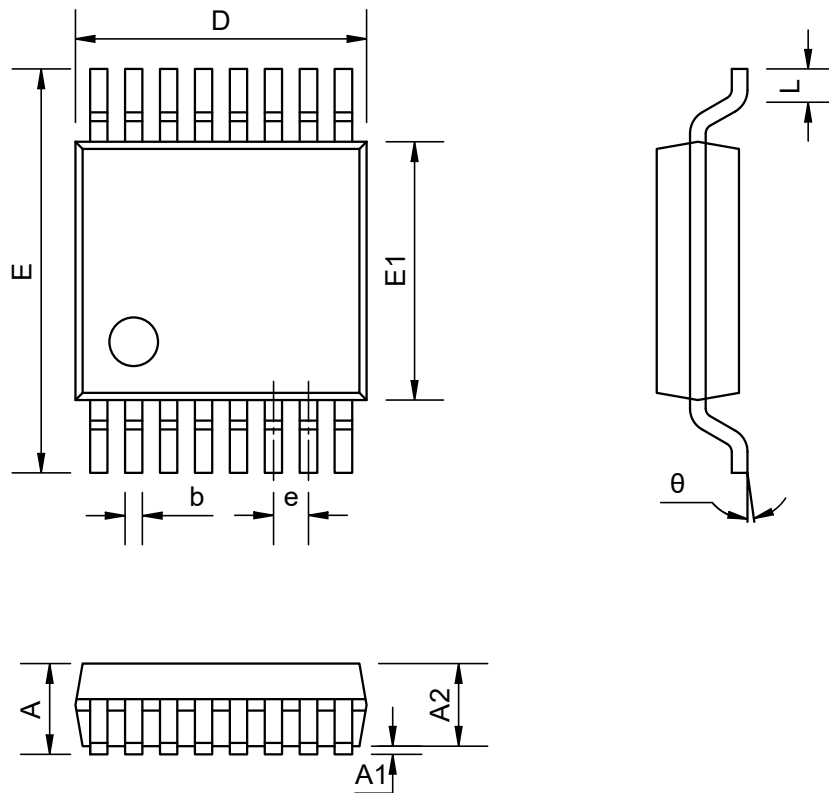
Symbol	Pin	Condition	Voltage	T _A = +25°C			T _A = -40°C to +85°C		T _A = -40°C to +125°C		Unit
				Min	Typ	Max	Min	Typ	Min	Max	
t _{PLH} , t _{PLH} Propagation Delay	An to Yn	Figure1	2.0	-	41	150	-	190	-	225	ns
			4.5	-	15	30	-	38	-	45	
			5.0	-	12	-	-	-	-	-	
			6.0	-	12	26	-	33	-	38	
	E3 to Yn	Figure1	2.0	-	47	150	-	190	-	225	
			4.5	-	17	30	-	38	-	45	
			5.0	-	14	-	-	-	-	-	
			6.0	-	14	26	-	33	-	38	
	$\overline{E}n$ to Yn	Figure1	2.0	-	47	150	-	190	-	225	
			4.5	-	17	30	-	38	-	45	
			5.0	-	14	-	-	-	-	-	
			6.0	-	14	26	-	33	-	38	
t _{TLH} , t _{THL} Transition Time	Yn	Figure1	2.0	-	19	75	-	95	-	110	ns
			5.0	-	7	15	-	19	-	22	
			6.0	-	6	13	-	16	-	19	

Parameter Test Input/Output Waveform



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Package Dimension



COMMON DIMENSIONS
(Units: mm)

SYMBOL	MIN	NOM	MAX
A	--	--	1.20
A1	0.05	--	0.15
A2	0.90	--	1.05
b	0.20	--	0.28
D	4.86	4.96	5.06
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65BSC		
L	0.45	0.60	0.75
θ	0°	--	8°

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Marking

74HC238V
XXXXX
●

74HC238V = Part Number
XXXXX = Tracking Number

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2022-07-19	Original Version	Shi Bo	Shi Liang Jun	Shi Bo
1.1	2023-07-24	Update EC Table	Shi Bo	Ge Hao	Shi Bo
1.1.a	2025-11-19	Add Marking	Yang Xiao Xu	Ge Hao	Liu Jia Ying