

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

- Designed for 2V to 6V V_{CC} Operation
- Over-voltage Tolerant Inputs Accept Voltages to 6V
- $\pm 5.2\text{mA}$ Balanced Output Sink and Source Capability
- CMOS low power consumption
- Schmitt trigger action at input pins
- These Devices are Pb-Free and RoHS Compliant
- ESD Protection Complies with JEDEC Standard
 - HBM: $\pm 4000\text{V}$ Pass (JEDEC JS-001)
 - CDM: $\pm 2000\text{V}$ Pass (JEDEC JS-002)
- Latch-up Performance Exceeds $\pm 100\text{mA}$ per JEDEC JESD78F
- Part No. and Package Information

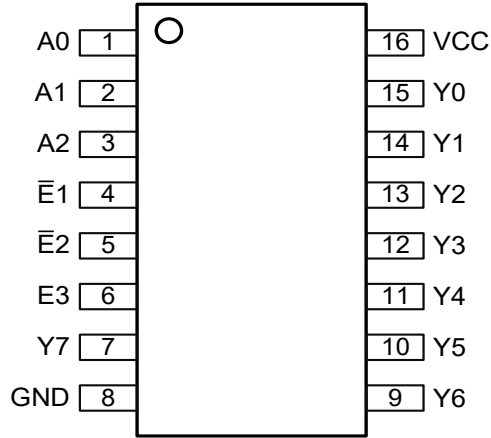
Port No.	Package	MSL
74HC238V	TSSOP16	3

Applications

- Memory chip select decoding
- Data transmission system

74HC238

Pin Configuration



TSSOP16

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	$\overline{E1}$	Enable Input 1(Active Low)
5	$\overline{E2}$	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	VCC	Supply Voltage

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Block Diagram

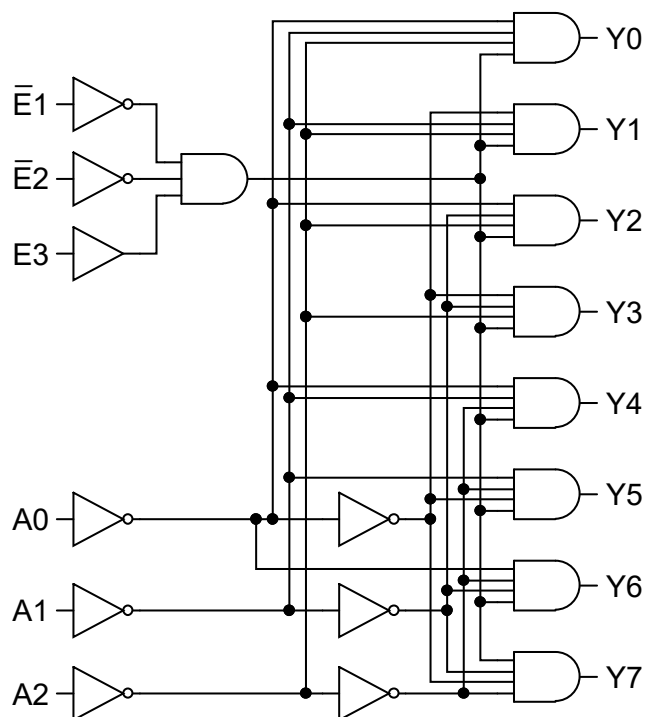


Figure2. Block Diagram

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

H = High voltage level;

L = Low voltage level;

X = Don't care.

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Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V _{CC}	DC Supply Voltage (VCC Pin)		-0.5 to 6.5	V
I _{IK}	DC Input Diode Current		±20	mA
V _I	DC Input Voltage ⁽¹⁾		-0.5 ≤ V _I ≤ 6.5	V
I _{OK}	DC Output Diode Current, V _O < GND		±20	mA
V _O	DC Output Voltage Output in Higher or Low State		-0.5 to V _{CC} + 0.5	V
I _O	DC Output Sink Current, V _O = 0V to V _{CC}		±25	mA
I _{CC}	DC Supply Current per Supply Pin		50	mA
I _{GND}	DC Ground Current per Supply Pin		-500	mA
T _J	Max Junction Temperature		150	°C
T _{STG}	Storage Temperature Range		-65 to 150	°C
V _{ESD}	ESD Classification	Human Body Model ⁽²⁾	±4000	V
		Charged Device Model ⁽³⁾	±2000	
I _{LU}	Max Latch Up Current Above V _{CC} and GND ⁽⁴⁾		±100	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Note1: I_O absolute maximum rating must be observed.

Note2: HBM tested per JEDEC JS-001;

Note3: CDM tested per JEDEC JS-002;

Note4: Latch Up Current Maximum Rating tested per JEDEC JESD78F.

Recommended operating conditions

Symbol	Parameter		Min	Max	Unit
V _{CC}	DC Supply Voltage Operating		2.0	6.0	V
V _I	DC Input Voltage		0	V _{CC}	V
V _O	DC Output Voltage (High or Low State)		0	V _{CC}	V
Δt/Δv	Input Transition Rise and 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 Free-Air Temperature		-40	125	°C

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DC Electrical Characteristics

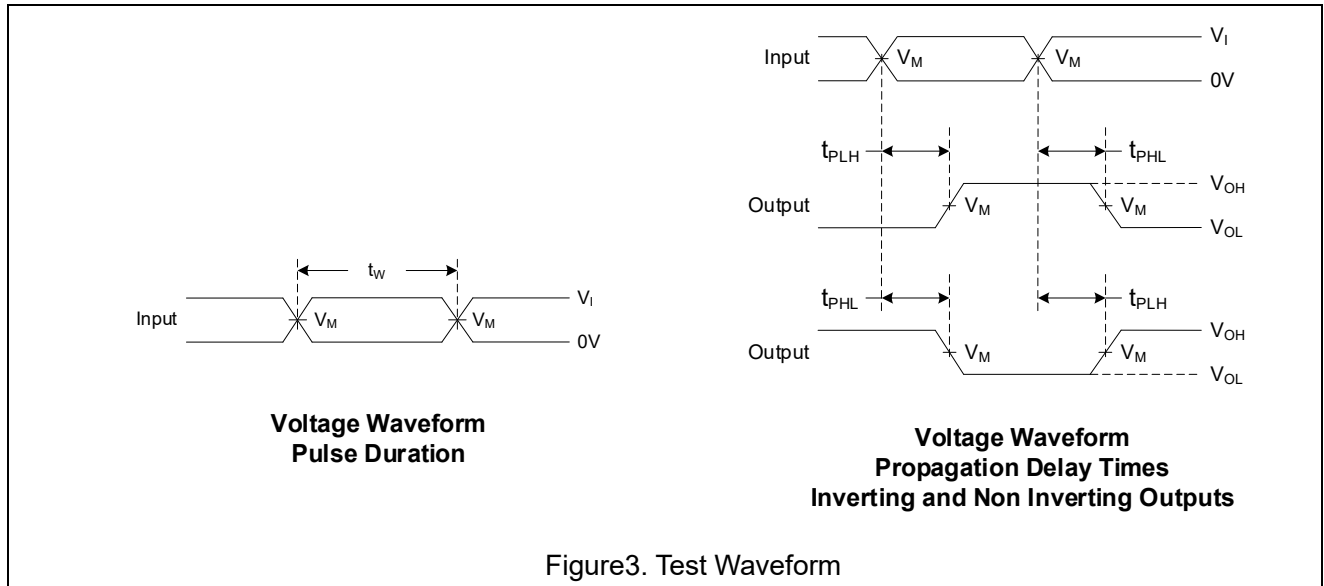
Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			T _A = -40°C to 85°C		T _A = -40°C to 125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V _{IH}	High-Level Input Voltage	-	2.0	1.5	1.2	-	1.5	-	1.5	-	V
		-	4.5	3.15	2.4	-	3.15	-	3.15	-	
		-	6.0	4.2	3.2	-	4.2	-	4.2	-	
V _{IL}	Low-Level Input Voltage	-	2.0	-	0.8	0.5	-	0.5	-	0.5	V
		-	4.5	-	2.1	1.0	-	1.0	-	1.0	
		-	6.0	-	2.8	1.5	-	1.5	-	1.5	
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 = 0mA	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

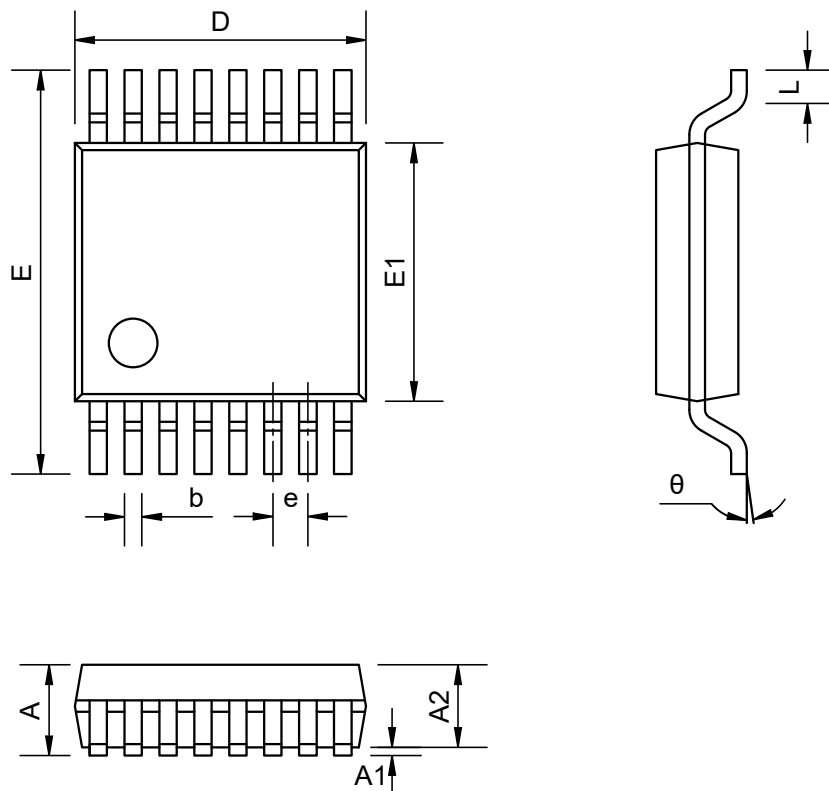
Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			T _A = -40°C to 85°C		T _A = -40°C to 125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t _{PLH} , t _{PLH} Propagation Delay	An to Yn	Figure1	2.0	-	41	150	-	190	-	225	ns
			4.5	-	15	30	-	38	-	45	
			5.0	-	12	-	-	-	-	-	
			6.0	-	12	26	-	33	-	38	
	E3 to Yn	Figure1	2.0	-	47	150	-	190	-	225	
			4.5	-	17	30	-	38	-	45	
			5.0	-	14	-	-	-	-	-	
			6.0	-	14	26	-	33	-	38	
	$\bar{E}_n$ 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 Information

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 liangjun	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 xiaoxu	Ge hao	Liu jiaying
1.2	2026-05-14	Update Format, Correct Words	Xu tao	Yang xiaoxu	Liu jiaying