74HC238 High-Speed CMOS Logic 3- to 8-Line Decoder / Demultiplexer

1. General Description

1.1 Description

The 74HC238 is three to eight decoders with one standard output strobe (G2) and two active low output strobes ($\overline{G}1$, and $\overline{G}0$). When the outputs are gated by any of the strobe inputs, they are all forced into the low state. When the outputs are not disabled by the strobe inputs, only the selected output is high while all others are low.

1.2 Features

- Select one of eight data outputs.
  -Active high
- Wide operating voltage range VCC=2V to 6V
- I/O port or memory selector
- Three enable inputs to simplify cascading
- Wide operating temp range: -40℃ to 85℃

1.3 Device Information

PART NUMBER	PACKAGE
74HC238	DIP
	SOP
	TSSOP

2. Connection Diagrams and Pin Description

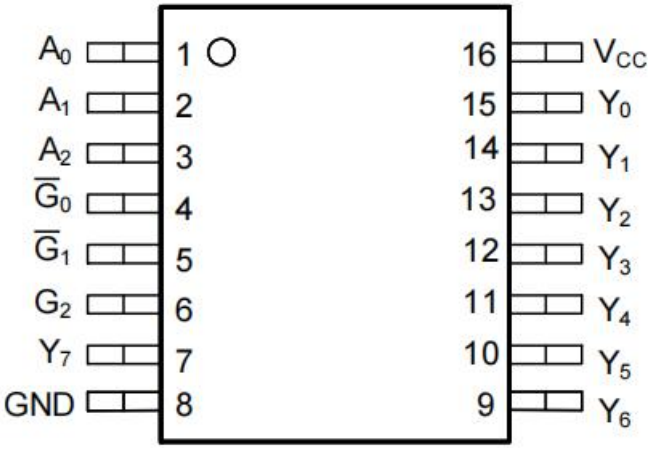


Figure 2.1: Top View

PIN No.	NAME	I/O	FUNCTION
1	A0	I	Address select 0
2	A1	I	Address select 1
3	A2	I	Address select 2
4	$\overline{G}0$	I	Output strobe 0,active low
5	$\overline{G}1$	I	Output strobe 1,active low
6	G2	I	Output strobe 2
7	Y7	O	Output 7
8	GND	-	Ground
9	Y6	O	Output 6
10	Y5	O	Output 5
11	Y4	O	Output 4
12	Y3	O	Output 3
13	Y2	O	Output 2
14	YI	O	Output I
15	Yo	O	Output 0
16	Vcc	-	Positive supply

3. System Diagram

3.1 Logic Diagram

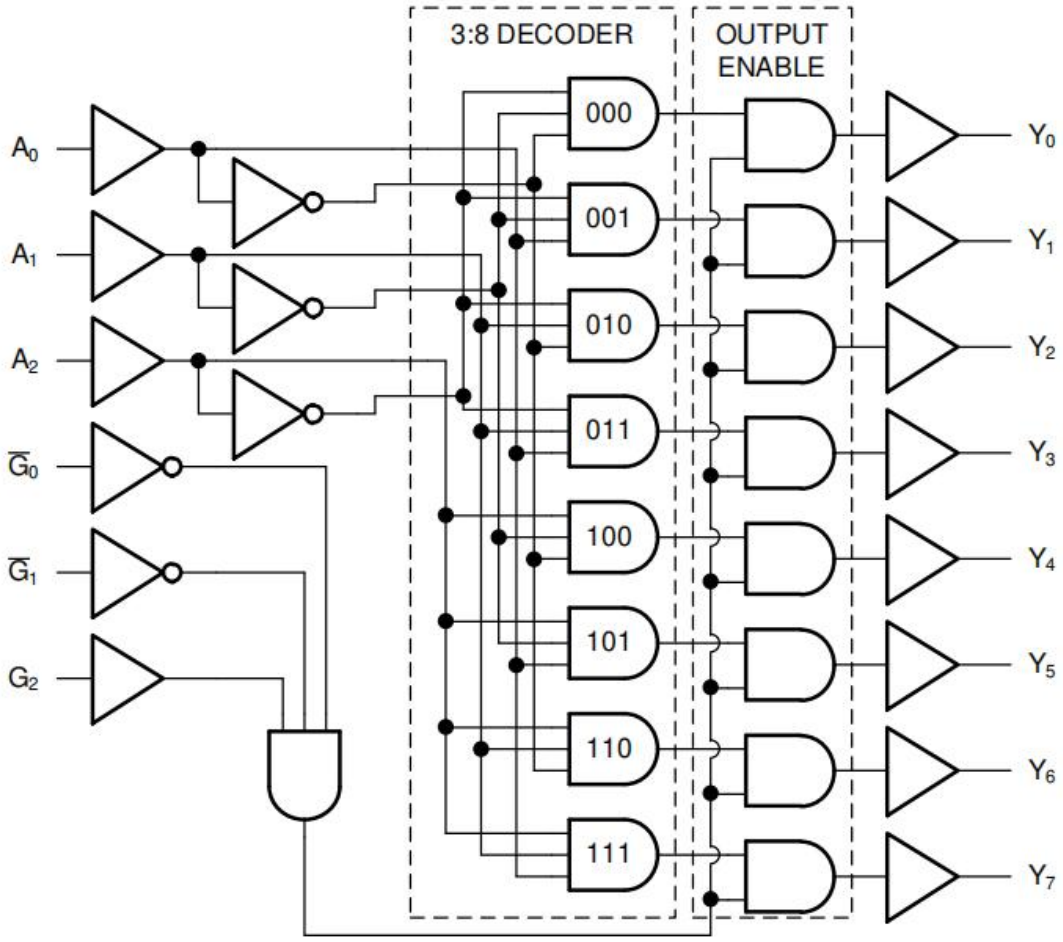


Figure 3.1: 74HC238 Logic Diagram

3.2 Function Table

INPUTS						OUTPUTS							
STROBE			ADDRESS										
G2	G1	G0	A2	A1	A0	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	X	1	X	X	X	0	0	0	0	0	0	0	0
1	X	X	X	X	X	0	0	0	0	0	0	0	0
X	1	X	X	X	X	0	0	0	0	0	0	0	0
1	0	0	0	0	0	1	0	0	0	0	0	0	0
1	0	0	0	0	1	0	1	0	0	0	0	0	0
1	0	0	0	1	0	0	0	1	0	0	0	0	0
1	0	0	0	1	1	0	0	0	1	0	0	0	0
1	0	0	1	0	0	0	0	0	0	1	0	0	0
1	0	0	1	0	1	0	0	0	0	0	1	0	0
1	0	0	1	1	0	0	0	0	0	0	0	1	0
1	0	0	1	1	1	0	0	0	0	0	0	0	1

1= High Voltage Level, 0= Low Voltage Level, X= Don't Care

4. Specifications

4.1 Absolute Maximum Ratings

Symbol	Parameter	MIN	MAX	Unit
V_{CC}	Supply Voltage	-0.5	7	V
P_D	Power Dissipation		500	mW
T_J	Junction Temperature		125	℃
T_{OP}	Operating Temperature	-40	85	℃

Absolute maximum ratings are those values beyond which the device could be permanently damaged,These are stress ratings only,which do not imply functional operation of the device at these or any other conditions beyond those indicated under normal operating conditions.

4.2 Recommended Operating Conditions

Symbol	Parameter	Test Condition	MIN	NOM	MAX	Unit
V_{CC}	Supply Voltage		2	5	6	V
V_{IH}	High Level Input Voltage	V_{CC}=2V	1.5			V
		V_{CC}=4.5V	3.15			V
		V_{CC}=6V	4.2			V
V_{IL}	Low Level Input Voltage	V_{CC}=2V			0.5	V
		V_{CC}=4.5V			1.35	V
		V_{CC}=6V			1.8	V
V_I	Input voltage		0		V_{CC}	V

4.3 Electrical Characteristics

(T_a=25℃, voltages are referenced to GND (ground=0V), unless otherwise specified)

Symbol	Parameter	Test Condition	MIN	TYP	MAX	Unit
V_{OH}	High Level Output Voltage	V_{CC}=2V,I_O=-20uA	1.9	--	--	V
		V_{CC}=4.5V,I_O=-20uA	4.4	--	--	V
		V_{CC}=6V,I_O=-20uA	5.9	--	--	V
		V_{CC}=4.5V,I_O=-4mA	4.0	--	--	V
		V_{CC}=6V,I_O=-5.2mA	5.5	--	--	V
V_{OL}	Low Level Output Voltage	V_{CC}=2V,I_O=20uA	--	--	0.1	V
		V_{CC}=4.5V,I_O=20uA	--	--	0.1	V
		V_{CC}=6V,I_O=20uA	--	--	0.1	V
		V_{CC}=4.5V,I_O=4mA	--	--	0.3	V
		V_{CC}=6V,I_O=5.2mA	--	--	0.3	V
I_I	Input Leakage Current	V_{CC}=6V,V_I=V_{CC} or GND	--	0	±1	uA
I_{CC}	Quiescent Supply Current	V_{CC}=6V,V_I=V_{CC}/GND	--	0	10	uA

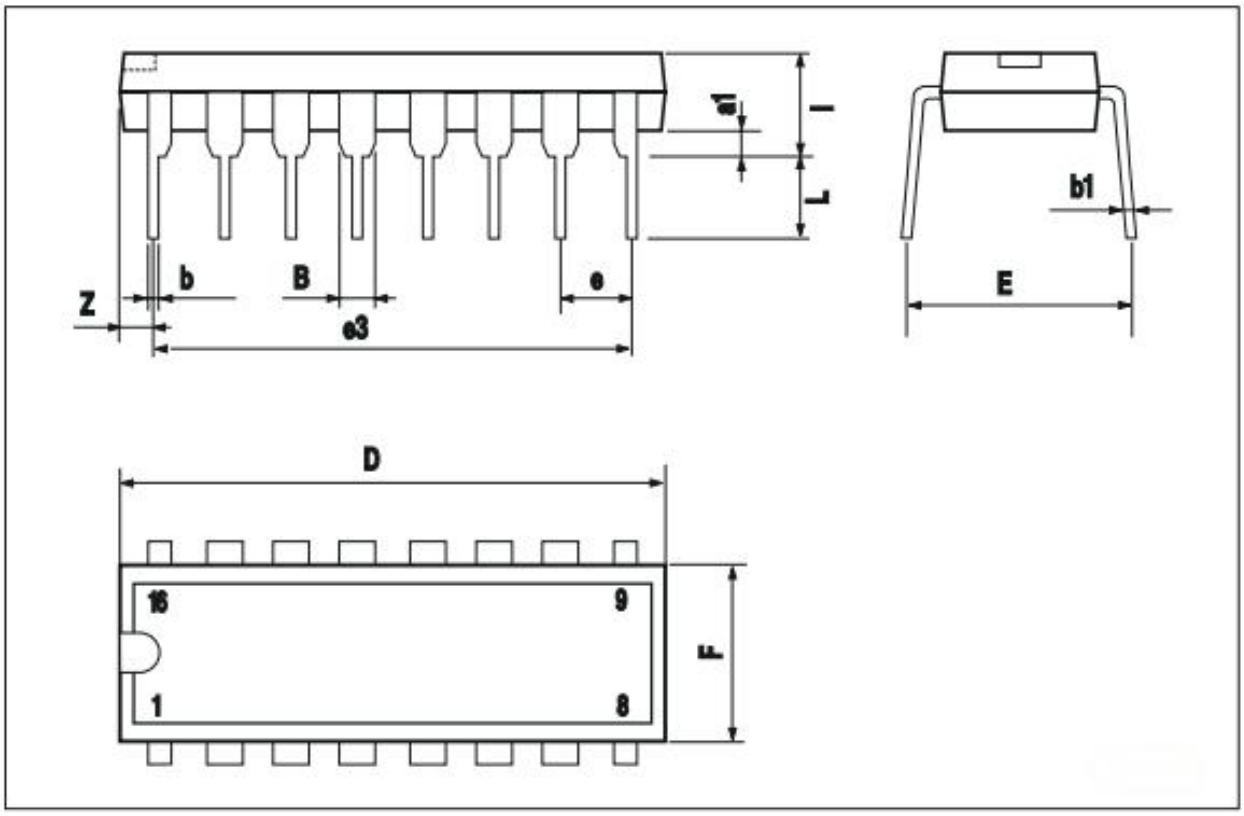
5. Ordering Information

Orderable Device	Package Type	Pins	Packing	Package Qty
74HC238ND16ATBE	DIP	16	Tube	25
74HC238NS16ARDQ	SOP	16	Tape & Reel	4000
74HC238TS16ARDQ	TSSOP	16	Tape & Reel	4000

6. Package Information

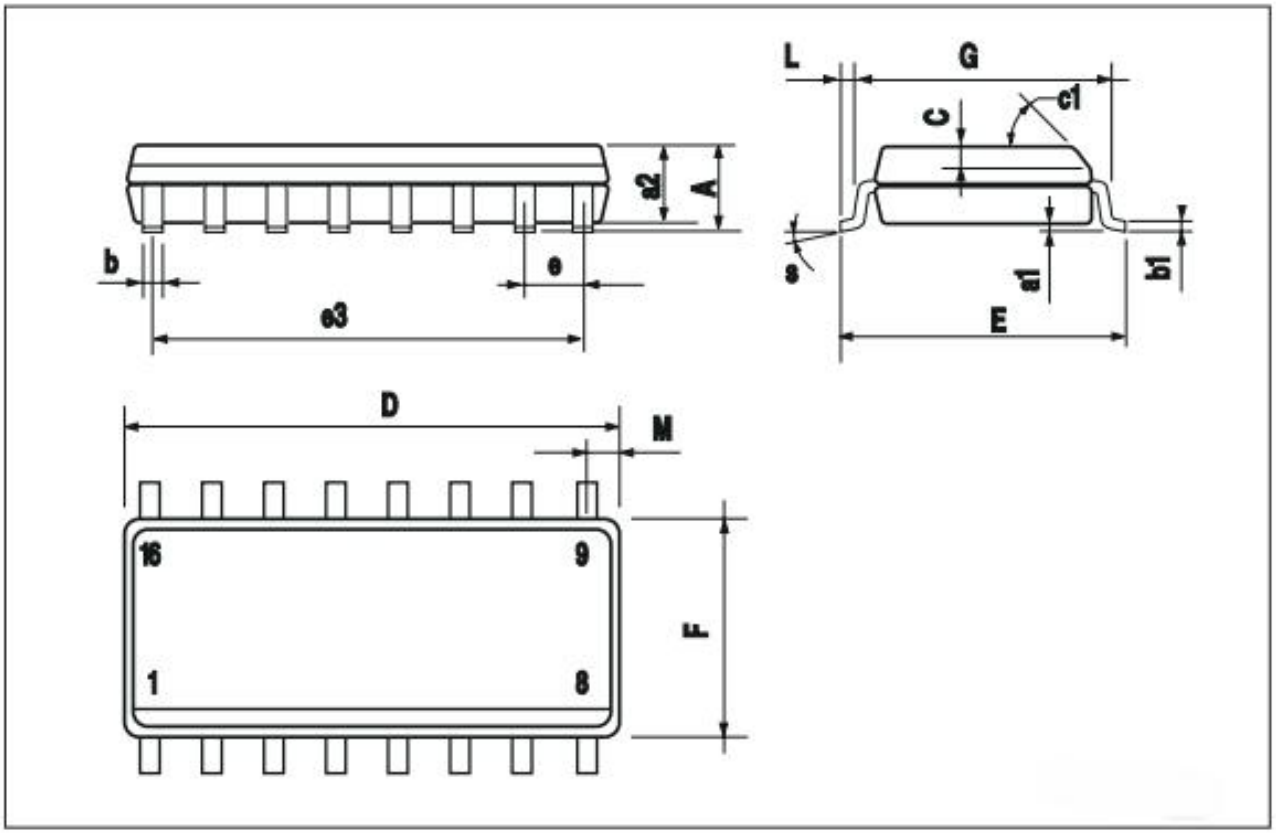
6.1 DIP16

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



6.2 SOP16

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.068
a1	0.1		0.25	0.004		0.010
a2			1.64			0.063
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.62			0.024
S	8° (max.)					



6.3 TSSOP16

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.2			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.8	1	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0079
D	4.9	5	5.1	0.193	0.197	0.201
E	6.2	6.4	6.6	0.244	0.252	0.260
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030