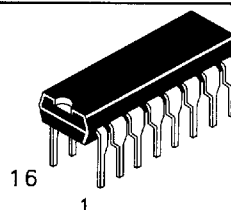


1-of-8 Decoder/Demultiplexer

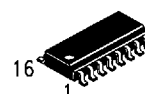
This device decodes a three-bit Address to one-of-eight active-low outputs. This device features three Chip Select Inputs, two active LOW, one active HIGH

- Output Drive Capability: 10 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2 to 6 V for HC devices
- Low Input Current: 1 μ A
- DC, AC parameters guaranteed from -55°C to 125°C

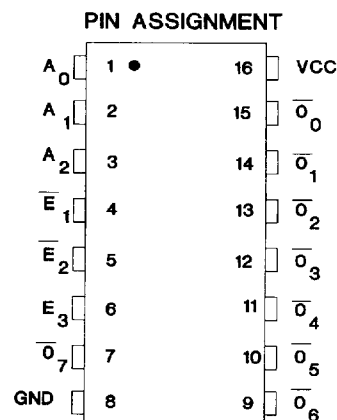
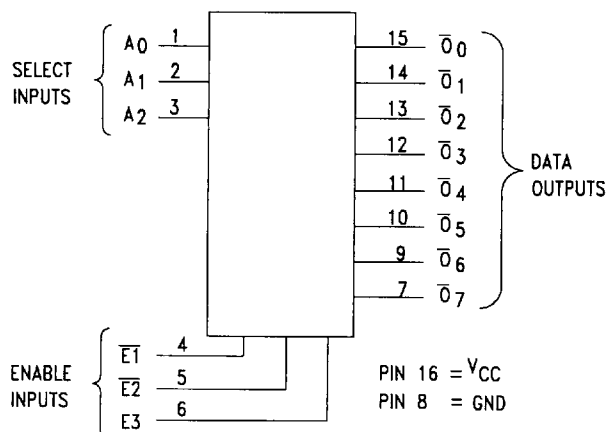
DV74HC138A DV74HCT138A



N Suffix
Plastic DIP
AVG-003 Case



D Suffix
Plastic SOP
AVG-004 Case



TRUTH TABLE

Inputs						Outputs							
E3	E2	E1	A2	A1	A0	O0	O1	O2	O3	O4	O5	O6	O7
X	X	H	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	L	H	L	H	H	H	H	H	H	H
H	L	L	L	H	L	H	L	H	H	H	H	H	H
H	L	L	L	H	H	H	L	H	H	H	H	H	H
H	L	L	H	L	L	H	H	H	H	L	H	H	H
H	L	L	H	H	L	H	H	H	H	H	L	H	H
H	L	L	H	H	H	H	H	H	H	H	H	L	H

H=high level (steady state), L=low level (steady state), X=don't care

ABSOLUTE MAXIMUM RATINGS

Maximum ratings are those values beyond which damage to the device may occur.

Symbol	Parameter	Value	Unit
V _{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
V _{IN}	DC Input Voltage (Referenced to GND)	-1.5 to V _{CC} +1.5	V
V _{OUT}	DC Output Voltage (Referenced to GND)	-0.5 to V _{CC} +0.5	V
I _{IN}	DC Input Current, per Pin	± 20	mA
I _{OUT}	DC Output Current, per Pin	± 25	mA
I _{CC}	DC Supply Current, V _{CC} and GND Pins	± 50	mA
P _D	Power Dissipation in Still Air, Plastic DIP SOP Package	750 500	mW
T _{STG}	Storage Temperature Range	-65 to +150	°C
TL	Lead Temperature, 1mm from Case for 10 Seconds (Plastic DIP or Sop Package)	260	°C

GUARANTEED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V _{CC}	DC Supply Voltage, HC (HCT), Referenced to GND	2.0 (4.5)	6.0 (5.5)	V
V _{IN} , V _{OUT}	DC Input Voltage, Output Voltage, Referenced to GND	0	V _{CC}	V
T _A	Ambient Temperature	-55	+125	°C
t _r , t _f	Input Rise and Fall Time: HC: V _{CC} =2.0V HCT: V _{CC} =5.5V / HC: V _{CC} =4.5V HC: V _{CC} =6.0V	0 0 0	1000 500 400	ns

138

HC-138A

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} V	Guaranteed Limits			Unit
				25°C to -55°C	≤85°C	≤125°C	
V _{IH}	Minimum High-Level Input Voltage	V _{OUT} = 0.1 V, or V _{OUT} = V _{CC} - 0.1 V I _{OUT} ≤ 20 μA	2.0 4.5 6.0	1.5 3.15 4.2	1.5 3.15 4.2	1.5 3.15 4.2	V
V _{IL}	Maximum Low- Level Input Voltage	V _{OUT} = 0.1 V, or V _{OUT} = V _{CC} - 0.1 V I _{OUT} ≤ 20 μA	2.0 4.5 6.0	0.5 1.35 1.8	0.5 1.35 1.8	0.5 1.35 1.8	V
V _{OH}	Minimum High-Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 20 μA	2.0 4.5 6.0	1.9 4.4 5.9	1.9 4.4 5.9	1.9 4.4 5.9	V
		V _{IN} = V _{IH} or V _{IL} , I _{OUT} ≤ 4.0 mA I _{OUT} ≤ 5.2 mA	4.5 6.0	3.98 5.48	3.84 5.34	3.7 5.2	
V _{OL}	Maximum Low Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 20 μA	2.0 4.5 6.0	0.1 0.1 0.1	0.1 0.1 0.1	0.1 0.1 0.1	V
		V _{IN} = V _{IH} or V _{IL} , I _{OUT} ≤ 4.0 mA I _{OUT} ≤ 5.2 mA	4.5 6.0	0.26 0.26	0.33 0.33	0.40 0.40	
I _{IN}	Maximum Input Leakage Current	V _{IN} = V _{CC} or GND	6.0	± 0.1	± 1.0	± 1.0	μA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND, I _{OUT} ≤ 0 μA (Per Package)	6.0	4.0	40	160	μA

AC ELECTRICAL CHARACTERISTICS over full operating conditions (CL=50 pF, Input $t_r=t_f=6\text{ns}$)

Symbol	Parameter	Vcc V	Guaranteed Limit			Unit
			25°C to -55°C	≤85°C	≤125°C	
tPLH, tPHL	Maximum Propagation Delay Time, Input A to Output Y	2.0	135	170	205	ns
		4.5	27	34	41	
		6.0	23	29	35	
tPLH, tPHL	Maximum Propagation Delay Time, CS1 to OutputY	2.0	110	140	165	ns
		4.5	22	28	33	
		6.0	19	24	28	
tPLH, tPHL	Maximum Propagation Delay Time, CS2 orCS3 to Output Y	2.0	120	150	180	ns
		4.5	24	30	36	
		6.0	20	26	31	
tTLH, tTHL	Maximum Output Transition Time Any Output	2.0	75	95	110	ns
		4.5	15	19	22	
		6.0	13	16	19	
CIN	Maximum Input Capacitance	—	10	10	10	pF

CPD	Power Dissipation Capacitance (Per Package) Used to determine the no-load dynamic power consumption, PD = CPD VCC²f + ICC VCC	Typical @ 25°C, VCC = 5 V			pF
		55			

HCT-138A
DC ELECTRICAL CHARACTERISTICS

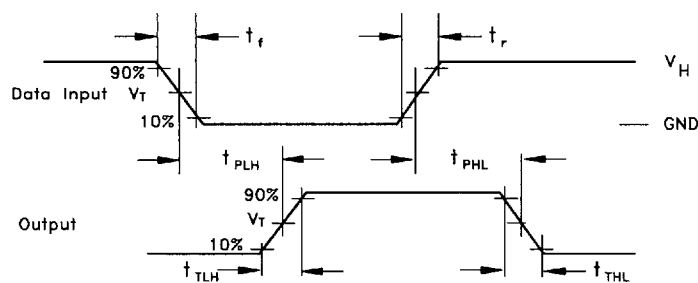
Symbol	Parameter	Conditions	V _{CC} V	Guaranteed Limits			Unit
				25°C to -55°C	≤85°C	≤125°C	
V _{IH}	Minimum High-Level Input Voltage	V _{OUT} = 0.1 V, or V _{out} = V _{CC} - 0.1 V I _{OUT} ≤ 20 μA	4.5 5.5	2.0 2.0	2.0 2.0	2.0 2.0	V
V _{IL}	Maximum Low- Level Input Voltage	V _{OUT} = 0.1 V, or V _{out} = V _{CC} - 0.1 V I _{OUT} ≤ 20 μA	4.5 5.5	0.8 0.8	0.8 0.8	0.8 0.8	V
V _{OH}	Minimum High-Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 20 μA	4.5 5.5	4.4 5.4	4.4 5.4	4.4 5.4	V
		V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 4.0 mA	4.5	3.98	3.84	3.7	
V _{OL}	Maximum Low Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 20 μA	4.5 5.5	0.1 0.1	0.1 0.1	0.1 0.1	V
		V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 4.0 mA	4.5	0.26	0.33	0.40	V
I _{IN}	Maximum Input Leakage Current	V _{IN} = V _{CC} or GND	6.0	± 0.1	± 1.0	± 1.0	μA
I _{CC}	Maximum Quiescent Supply Current (Per Package)	V _{IN} = V _{CC} or GND I _{OUT} = 0 μA	6.0	4.0	40	160	μA

ΔI _{CC}	Additional Quiescent Supply Current	V _{IN} = 2.4 V, Any one Input V _{IN} = V _{CC} or GND, Other Inputs I _{OUT} = 0 mA	5.5	> -55°C	25°C to 125°C	mA
				2.9	2.4	

AC ELECTRICAL CHARACTERISTICS over full operating conditions($C_L=50\text{ pF}$, Input $t_f=t_r=6\text{ ns}$)

Symbol	Parameter	V _{CC} V	Guaranteed Limit			Unit
			25°C to -55°C	≤85°C	≤125°C	
t_{PLH} , t_{PHL}	Maximum Propagation Delay Time, Input A to Output Y	5.0 ±10%	30	38	45	ns
t_{PLH} , t_{PHL}	Maximum Propagation Delay Time, CS1 to Output Y	5.0 ±10%	27	34	41	ns
t_{PLH} , t_{PHL}	Maximum Propagation Delay Time, CS2 or CS3 to Output Y	5.0 ±10%	30	38	45	ns
t_{TLH} , t_{THL}	Maximum Output Transition Time Any Output	5.0 ±10%	15	19	22	ns
C_{IN}	Maximum Input Capacitance	—	10	10	10	pF

CPD	Power Dissipation Capacitance (Per Gate) Used to determine the no-load dynamic power consumption, $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$	Typical @ 25°C, $V_{CC} = 5\text{ V}$	pF
		51	

SWITCHING WAVEFORMS


Input and Output Threshold Voltage: $V_T = 50\% V_{CC}$ for HC,
1.3V for HCT, $V_H = V_{CC}$ for HC, 3V for HCT