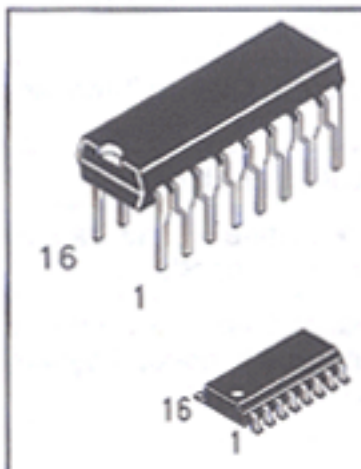
DV74HCT251 Available Q2, 1995

8-Input Data Selector/ Multiplexer with 3-State Outputs

DV74HC251
DV74HCT251

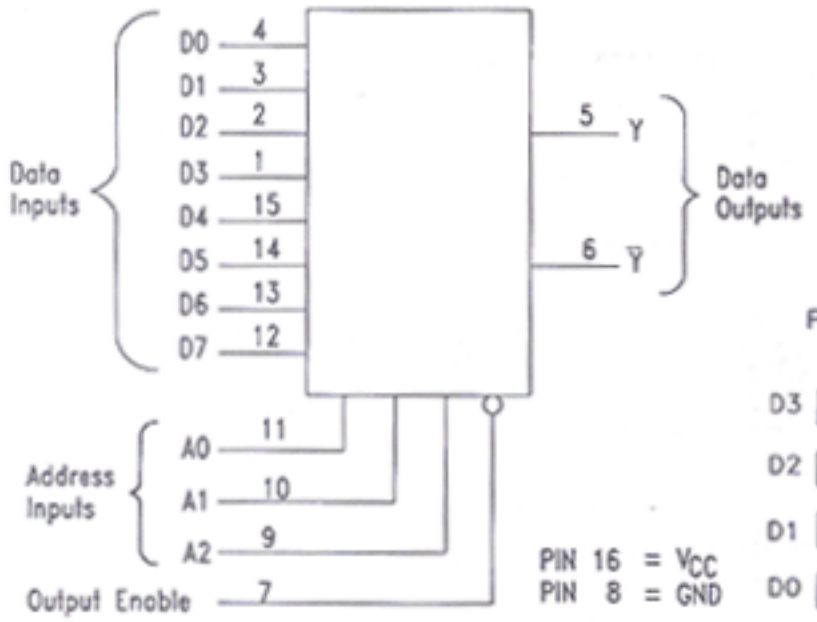
This device selects one of the eight binary Data Inputs, as determined by the Address Inputs. The Output Enable pin must be a low level for the selected data to appear at the outputs. If output Enable is high, both the Y and the Y outputs are in the high-impedance state. This 3-state feature allows the HC251 to be used in bus-oriented systems.

- **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 μA**
- **DC, AC parameters guaranteed from -55°C to 125°C**

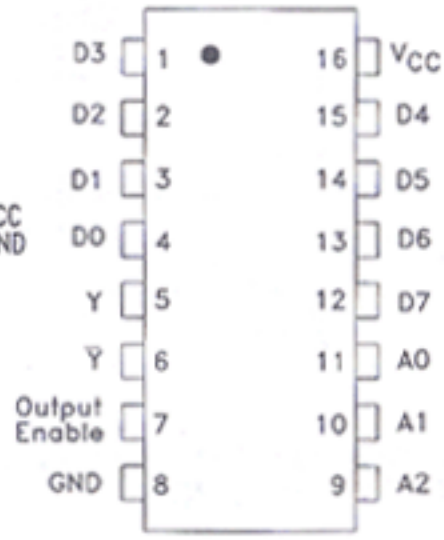


N Suffix
Plastic DIP
AVG-003 Case

D Suffix
Plastic SOP
AVG-004 Case



PIN ASSIGNMENT



TRUTH TABLE

Inputs				Outputs	
A2	A1	A0	Output Enable	Y	$\overline{Y}$
X	X	X	H	Z	Z
L	L	L	L	D0	$\overline{D0}$
L	L	H	L	D1	$\overline{D1}$
L	H	L	L	D2	$\overline{D2}$
L	H	H	L	D3	$\overline{D3}$
H	L	L	L	D4	$\overline{D4}$
H	L	H	L	D5	$\overline{D5}$
H	H	L	L	D6	$\overline{D6}$
H	H	H	L	D7	$\overline{D7}$

H = High Logic Level
L = Low Logic Level
Z = High Impedance State

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	±25	mA
I_{OUT}	DC Output Current, per Pin	±50	mA
I_{CC}	DC Supply Current, V_{CC} and GND Pins	±75	mA
P_D	Power Dissipation in Still Air, Plastic DIP SOP Package	750 500	mW
T_{STG}	Storage Temperature Range	–65 to +150	°C
T_L	Lead Temperature, 1mm from Case for 10 Seconds	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

HC - 251

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	$\|I_{OUT}\| \leq 20\mu A$	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	$\|I_{OUT}\| \leq 20\mu A$	2.0 4.5 6.0	0.3 0.9 1.2	0.3 0.9 1.2	0.3 0.9 1.2	V
V_{OH}	Minimum High-Level Output Voltage	V_{IN} = V_{IH} or V_{IL} $\|I_{OUT}\| \leq$ 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}| \leq$4.0mA $\|I_{OUT}\| \leq$ 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} $\|I_{OUT}\| \leq$ 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}, $\|I_{OUT}\| \leq$ 4.0mA $\|I_{OUT}\| \leq$ 5.2 mA	4.5 6.0	0.26 0.26	0.33 0.33	0.40 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_{OZ}	Maximum Three-State Leakage Current	Output in High-Impedence State V_{IN}=V_{IL} or V_{IH} V_{OUT}=V_{CC} or GND	6.0	±0.5	±5.0	±10.0	µA
I_{CC}	Maximum Quiescent Supply Current	V_{IN} = V_{CC} or GND, $\|I_{OUT}\|$=0 µA (Per Package)	6.0	8.0	80	160	µA

AC ELECTRICAL CHARACTERISTICS over full operating conditions (C_L=50pF, Input t_f=t_r=6ns)

Symbol	Parameter	V_{CC} V	Guaranteed Limit			Unit
			25°C to –55°C	≤85°C	≤125°C	
t_{PLH}, t_{PHL}	Maximum Propogation Delay Time, Input D to Output Y or $\overline{Y}$	2.0 4.5 6.0	185 37 31	230 46 39	280 56 48	ns
t_{PLH}, t_{PHL}	Maximum Propogation Delay Time, Input A to Output Y or $\overline{Y}$	2.0 4.5 6.0	205 41 35	255 51 43	310 62 53	ns
t_{PLZ}, t_{PHZ}	Maximum Propogation Delay Time, Output Enable to Output Y	2.0 4.5 6.0	195 39 33	245 49 42	295 59 50	ns
t_{PZL}, t_{PZH}	Maximum Propogation Delay Time, Output Enable to Output Y	2.0 4.5 6.0	145 29 25	180 36 31	220 44 38	ns

Symbol	Parameter	V_{CC} V	Guaranteed Limit			Unit
			25°C to −55°C	≤85°C	≤125°C	
t_{PLZ}, t_{PHZ}	Maximum Propogation Delay Time, Output Enable to Output Y	2.0 4.5 6.0	220 44 37	275 55 47	330 66 56	ns
t_{PZL}, t_{PZH}	Maximum Propogation Delay Time, Output Enable to Output Y	2.0 4.5 6.0	150 30 26	190 38 33	225 45 38	ns
t_{TLH}, t_{THL}	Maximum Output Transition Time Any Output	2.0 4.5 6.0	75 15 13	95 19 16	110 22 19	ns
C_{IN}	Maximum Input Capacitance	—	10	10	10	pF
C_{OUT}	Maximum Three-State Output Capacitence (Output High-Impedance)	—	15	15	15	pF

C_{PD}	Power Dissipation Capacitance (Per Package) 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 V	pF
		36	

HCT – 251

DC ELECTRICAL CHARACTERISTICS

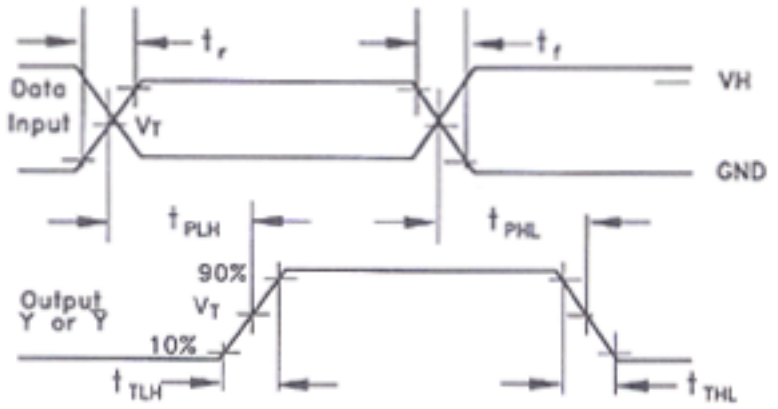
Symbol	Parameter	Conditions	V_{CC} (V)	Guaranteed Limits			Unit
				25°C to -55°C	≤ 85°C	≤ 125°C	
V_{IH}	Minimum High Level Input Voltage	V_{OUT} = V_{CC}–0.1 V $\|I_{OUT}\| \leq 20\ \mu A$	4.5 5.5	2.0 2.0	2.0 2.0	2.0 2.0	V
V_{IL}	Maximum Low Level Input Voltage	V_{OUT} = 0.1V or V_{CC}–0.1 V $\|I_{OUT}\| \leq 20\ \mu A$	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} $\|I_{OUT}\| \leq 20\ \mu A$	4.5 5.5	4.4 5.4	4.4 5.4	4.4 5.4	V
		V_{IN} = V_{IH} $\|I_{OUT}\| \leq 6.0$ mA	4.5	3.98	3.84	3.70	V
V_{OL}	Maximum Low Level Output Voltage	V_{IN} = V_{IL} $\|I_{OUT}\| \leq 20\ \mu A$	4.5 5.5	0.1 0.1	0.1 0.1	0.1 0.1	V
		V_{IN} = V_{IL} $\|I_{OUT}\| \leq 6.0$ mA	4.5	0.26	0.33	0.40	V
I_{IN}	Maximum Input Leakage Current	V_{IN}=V_{CC} or GND, Pins 1 or 19	5.5	±0.1	±1.0	±1.0	µA
I_{OZ}	Maximum 3-State Current (Output in High Impedence State)	V_{IN}=V_{IL} or V_{IH} V_{OUT}=V_{CC} or GND, I/O Pins	5.5	±0.5	±5.0	±10.0	mA
I_{CC}	Maximum Quiescent Supply Current	V_{IN} = V_{CC} or GND I_{OUT} = 0 µA	6.0	4	40	160	µA
ΔI_{CC}	Additional Quiescent Supply Current (per Package)	V_{IN}=2.4 V, Any One Input V_{IN}= V_{CC} or GND, Other Inputs I_{OUT} = 0 µA	5.5		±55°C to 25°C	25°C to 125°C	mA
					2.9	2.4	

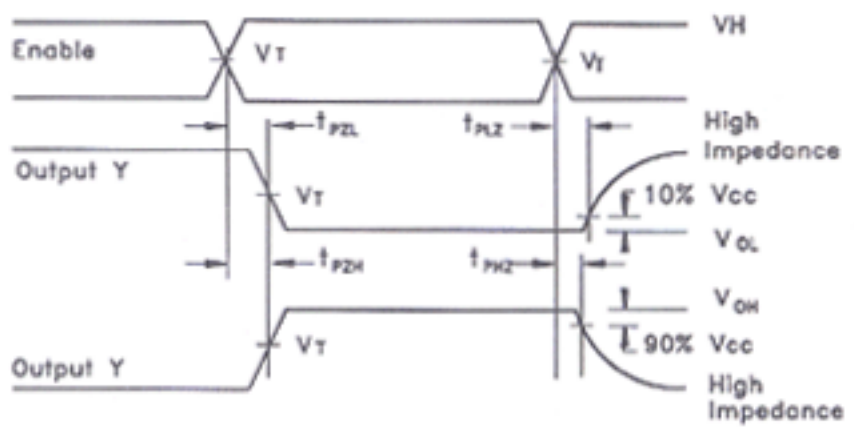
AC ELECTRICAL CHARACTERISTICS over full operating conditions (C_L=50pF, Input t_f=t_r=6ns)

Symbol	Parameter	V_{CC} V	Guaranteed Limit			Unit
			25°C to −55°C	≤85°C	≤125°C	
t_{PLH}, t_{PHL}	Maximum Propogation Delay Time, Input D to Output Y or Y	5.0 ±10%	37	46	56	ns
t_{PLH}, t_{PHL}	Maximum Propogation Delay Time, Input A to Output Y or Y		41	51	62	ns
t_{PLZ}, t_{PHZ}	Maximum Propogation Delay Time, Output Enable to Output Y		39	49	59	ns
t_{PZL}, t_{PZH}	Maximum Propogation Delay Time, Output Enable to Output Y		29	36	44	ns
t_{PLZ}, t_{PHZ}	Maximum Propogation Delay Time, Output Enable to Output Y		44	55	66	ns
t_{PZL}, t_{PZH}	Maximum Propogation Delay Time, Output Enable to Output Y		30	38	45	ns
t_{TLH}, t_{THL}	Maximum Output Transition Time Any Output		15	19	22	ns
C_{IN}	Maximum Input Capacitance	—	10	10	10	pF
C_{OUT}	Maximum Three-State Output Capacitence (Output High-Impedance)	—	15	15	15	pF

C_{PD}	Power Dissipation Capacitance (Per Package) 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 V	pF
		36	

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