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

High-Performance Silicon-Gate CMOS

MC74HC251A

The MC54/74HC251 is identical in pinout to the LS251. The device inputs are compatible with standard CMOS outputs; with pullup resistors, they are compatible with LSTTL outputs.

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 \overline{Y} outputs are in the high-impedance state. This 3-state feature allows the HC251 to be used in bus-oriented systems.

The HC251 is similar in function to the HC251 which does not have 3-state outputs.

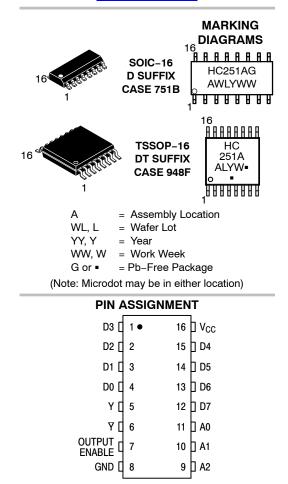
Features

- Output Drive Capability: 10 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2 to 6 V
- Low Input Current: 1 μA
- High Noise Immunity Characteristic of CMOS Devices
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant



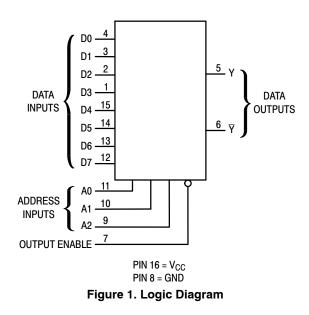
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ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.



FUNCTION TABLE

	Inputs				outs
A2	A1	A0	Output Enabled	Y	Ŧ
X L L L H H H H H	X L L H H L L H H	X L H L H L H L H	I	Z D0 D1 D2 D3 D4 D5 D6 D7	Z D0 D1 D2 D3 D4 D5 D6 D7

Z = high impedance

D0, D1, ..., D7 = the level of the respective D input.

MAXIMUM RATINGS

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
l _{in}	DC Input Current, per Pin		±25	mA
l _{out}	DC Output Current, per Pin		±50	mA
I _{CC}	DC Supply Current, V_{CC} and GN	±75	mA	
P _D	Power Dissipation in Still Air SOIC Package TSSOP Package		500 TBD	mW
T _{stg}	Storage Temperature		-65 to + 150	°C

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{in} and V_{out} should be constrained to the range GND $\leq (V_{in} \text{ or } V_{out}) \leq V_{CC}$.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

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.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Max	Unit
V _{CC}	DC Supply Voltage (Referenced to GND)		2.0	6.0	V
V _{in} , V _{out}	DC Input Voltage, Output Voltage (Referenced to GND)		0	V _{CC}	V
T _A	Operating Temperature, All Package Types		-55	+125	°C
t _r , t _f	Input Rise and Fall Time (Figure 2)	$V_{CC} = 2.0 V$ $V_{CC} = 4.5 V$ $V_{CC} = 6.0 V$	0 0 0	1000 500 400	ns

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

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					Guaranteed Limit		
Symbol	Parameter	Test Conditions	V _{CC} V	- 55 to 25°C	≤ 85 °C	≤ 125°C	Unit
V _{IH}	Minimum High-Level Input Voltage	$\begin{array}{l} V_{out} = 0.1 \text{ V or } V_{CC} - 0.1 \text{ V} \\ I_{out} \leq 20 \; \mu\text{A} \end{array}$	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	$\begin{array}{l} V_{out} = 0.1 \ V \ or \ V_{CC} - 0.1 \ V \\ \left I_{out} \right \ \leq \ 20 \ \mu A \end{array} \end{array} \label{eq:Vout}$	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		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
		$\begin{array}{l l} V_{in} = V_{IH} \text{ or } V_{IL} & \left I_{out}\right \leq 4.0 \text{ mA} \\ \left I_{out}\right \leq 5.2 \text{ mA} \end{array}$	4.5 6.0	3.98 5.48	3.84 5.34	3.70 5.20	
V _{OL}	Maximum Low-Level Output Voltage	$V_{in} = V_{IH} \text{ or } V_{IL}$ $ I_{out} \le 20 \ \mu A$	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
		$\begin{array}{ll} V_{in} = V_{IH} \text{ or } V_{IL} & \left I_{out}\right \leq 4.0 \text{ mA} \\ \left I_{out}\right \leq 5.2 \text{ mA} \end{array}$	4.5 6.0	0.26 0.26	0.33 0.33	0.40 0.40	
l _{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-Impedance State $V_{in} = V_{IL} \text{ or } V_{IH}$ $V_{out} = V_{CC} \text{ or GND}$	6.0	± 0.5	± 5.0	± 10	μA
I _{CC}	Maximum Quiescent Supply Current (per Package)	$V_{in} = V_{CC} \text{ or } GND$ $I_{out} = 0 \ \mu A$	6.0	8	80	160	μA

DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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			Gu	uaranteed Limit		
Symbol	Parameter	V _{CC} V	– 55 to 25°C	≤ 85 °C	≤ 125°C	Unit
t _{PLH} , t _{PHL}	Maximum Propagation Delay, Input D to Output Y or Y (Figures 2, 3 and 6)	2.0 4.5 6.0	185 37 31	230 46 39	280 56 48	ns
t _{PLH} , t _{PHL}	Maximum Propagation Delay, Input A to Output Y or Y (Figures 3 and 6)	2.0 4.5 6.0	205 41 35	255 51 43	310 62 53	ns
t _{PLZ} , t _{PHZ}	Maximum Propagation Delay, Output Enable to Output Y (Figures 5 and 7)	2.0 4.5 6.0	195 39 33	245 49 42	295 59 50	ns
t _{PZL} , t _{PZH}	Maximum Propagation Delay, Output Enable to Output Y (Figures 5 and 7)	2.0 4.5 6.0	145 29 25	180 36 31	220 44 38	ns
t _{PLZ} , t _{PHZ}	Maximum Propagation Delay, Output Enable to Output ▼ (Figures 5 and 7)	2.0 4.5 6.0	220 44 37	275 55 47	330 66 56	ns
t _{PZL} , t _{PZH}	Maximum Propagation Delay, Output Enable to Output ▼ (Figures 5 and 7)	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 (Figures 2 and 6)	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 Capacitance (Output in High-Impedance State)	-	15	15	15	pF

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

		Typical @ 25°C, V _{CC} = 5.0 V	
C _{PD}	Power Dissipation Capacitance (Per Package)	36	pF

PIN DESCRIPTIONS

INPUTS

D0, D1, ..., D7 (Pins 4, 3, 2, 1, 15, 14, 13, 12)

Data inputs. Data on one of these eight binary inputs may be selected to appear on the output.

CONTROL INPUTS

A0, A1, A2 (Pins 11, 10, 9)

Address inputs. The data on these pins are the binary address of the selected input (see the Function Table).

Output Enable (Pin 7)

Output Enable. This input pin must be at a low level for the selected data to appear at the outputs. If the Output Enable pin is high, both the Y and \overline{Y} outputs are taken to the high–impedance state.

OUTPUTS

Y, Y (Pins 5, 6)

Data outputs. The selected data is presented at these pins in both true (Y output) and complemented (\overline{Y} output) forms.

MC74HC251A

SWITCHING WAVEFORMS

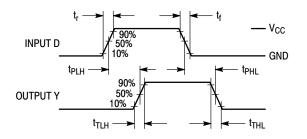
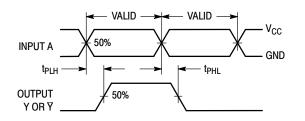
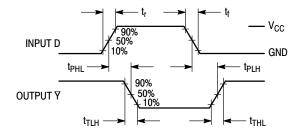


Figure 2.









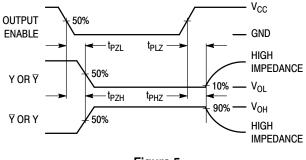


Figure 5.



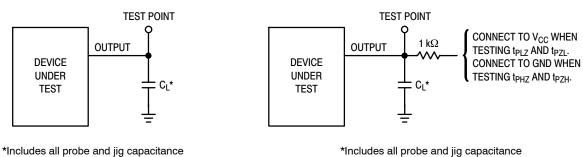


Figure 6.

*Includes all probe and jig capacitance

Figure 7.

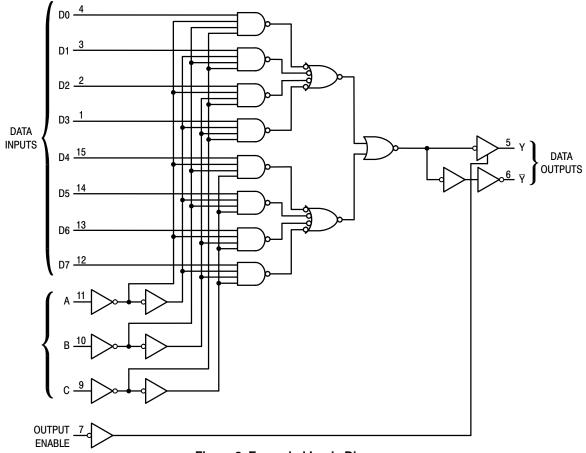


Figure 8. Expanded Logic Diagram

ORDERING INFORMATION

Device	Package	Shipping [†]
MC74HC251ADG		48 Units / Rail
MC74HC251ADR2G	SOIC-16 (Pb-Free)	2500 Tape & Reel
NLV74HC251ADR2G*	()	2500 Tape & Reel
MC74HC251ADTG	TSSOP-16	96 Units / Rail
MC74HC251ADTR2G	(Pb-Free)	2500 Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.





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