National Semiconductor

June 1989

54LS151/DM54LS151/DM74LS151 Data Selector/Multiplexer

General Description

This data selector/multiplexer contains full on-chip decoding to select the desired data source. The 'LS151 selects one-of-eight data sources. The 'LS151 has a strobe input which must be at a low logic level to enable these devices. A high level at the strobe forces the W output high, and the Y output low.

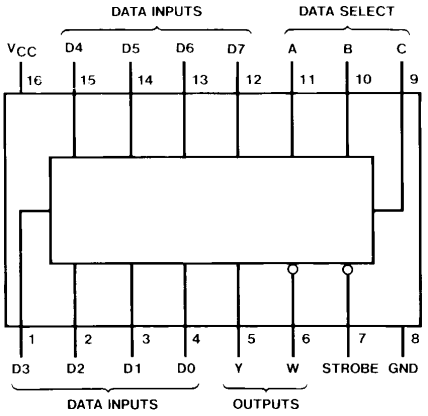
The 'LS151 features complementary W and Y outputs.

Features

- Select one-of-eight data lines
- Performs parallel-to-serial conversion
- Permits multiplexing from N lines to one line
- Also for use as Boolean function generator
- Typical average propagation delay time data input to W output 12.5 ns
- Typical power dissipation 30 mW
- Alternate Military/Aerospace device (54LS151) is available. Contact a National Semiconductor Sales Office/ Distributor for specifications.

Connection Diagram

Dual-In-Line Package



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Order Number 54LS151DMQB, 54LS151FMQB, 54LS151LMQB, DM54LS151J, DM54LS151W, DM74LS151M or DM74LS151N
See NS Package Number E20A, J16A, M16A, N16E or W16A

Truth Table

Inputs				Outputs	
Select			Strobe S	Y	W
C	B	A			
X	X	X	H	L	H
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 Level, L = Low Level, X = Don't Care

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

RRD-B30M105/Printed in U. S. A.

Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	7V
Input Voltage	7V
Operating Free Air Temperature Range	
DM54LS and 54LS	−55°C to +125°C
DM74LS	0°C to +70°C
Storage Temperature Range	−65°C to +150°C

Note: *The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.*

Recommended Operating Conditions

Symbol	Parameter	DM54LS151			DM74LS151			Units
		Min	Nom	Max	Min	Nom	Max	
V_{CC}	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High Level Input Voltage	2			2			V
V_{IL}	Low Level Input Voltage			0.7			0.8	V
I_{OH}	High Level Output Current			−0.4			−0.4	mA
I_{OL}	Low Level Output Current			4			8	mA
T_A	Free Air Operating Temperature	−55		125	0		70	°C

Electrical Characteristics over recommended operating free air temperature range (unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ (Note 1)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −18 mA				−1.5	V
V_{OH}	High Level Output Voltage	V_{CC} = Min, I_{OH} = Max, V_{IL} = Max, V_{IH} = Min	DM54	2.5	3.4		V
			DM74	2.7	3.4		
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IL} = Max, V_{IH} = Min	DM54		0.25	0.4	V
			DM74		0.35	0.5	
		I_{OL} = 4 mA, V_{CC} = Min	DM74		0.25	0.4	
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 7V				0.1	mA
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 2.7V				20	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.4V				−0.4	mA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)	DM54	−20		−100	mA
			DM74	−20		−100	
I_{CC}	Supply Current	V_{CC} = Max (Note 3)			6	10	mA

Note 1: All typicals are at V_{CC} = 5V, T_A = 25°C.

Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.

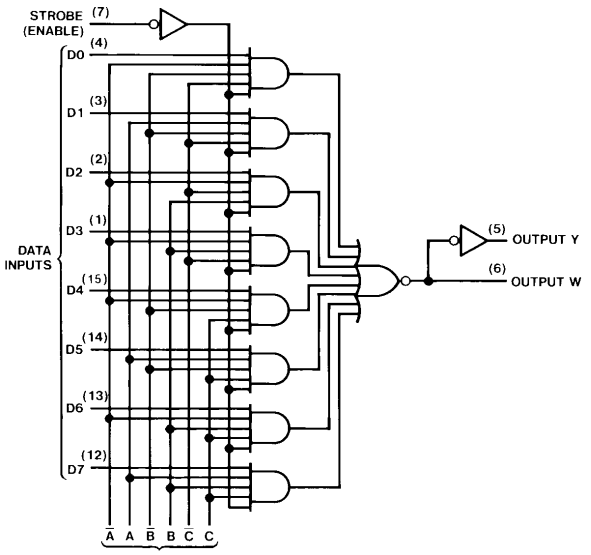
Note 3: I_{CC} is measured with all outputs open, strobe and data select inputs at 4.5V, and all other inputs open.

Switching Characteristics at V_{CC} = 5V and T_A = 25°C (See Section 1 for Test Waveforms and Output Load)

Symbol	Parameter	From (Input) To (output)	R_L = 2 kΩ				Units
			C_L = 15 pF		C_L = 50 pF		
			Min	Max	Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output	Select (4 Levels) to Y		43		46	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Select (4 Levels) to Y		30		36	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Select (3 Levels) to W		23		25	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Select (3 Levels) to W		32		40	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Strobe to Y		42		44	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Strobe to Y		32		40	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Strobe to W		24		27	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Strobe to W		30		36	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	D0 thru D7 to Y		32		35	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	D0 thru D7 to Y		26		33	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	D0 thru D7 to W		21		25	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	D0 thru D7 to W		20		27	ns

Logic Diagram

LS151



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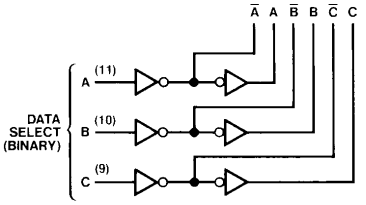
See Address Buffers to the Right

Address Buffers for 54LS151/74LS151



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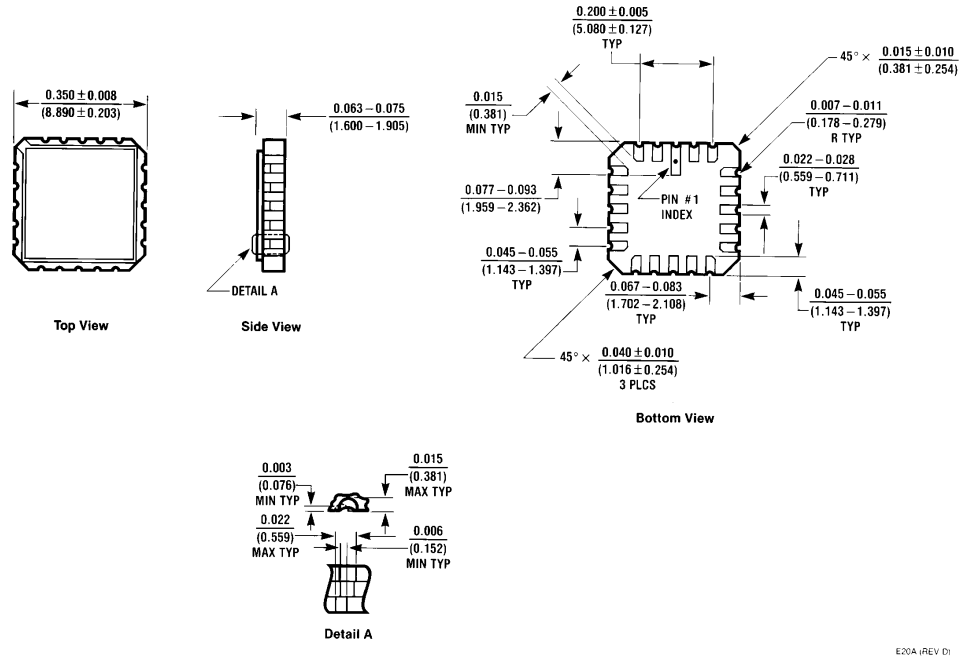
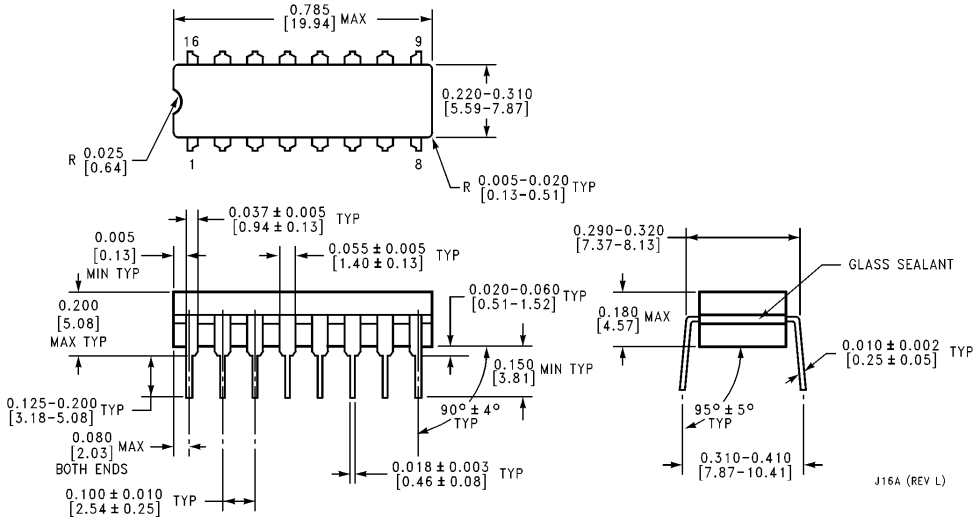
Physical Dimensions inches (millimeters)

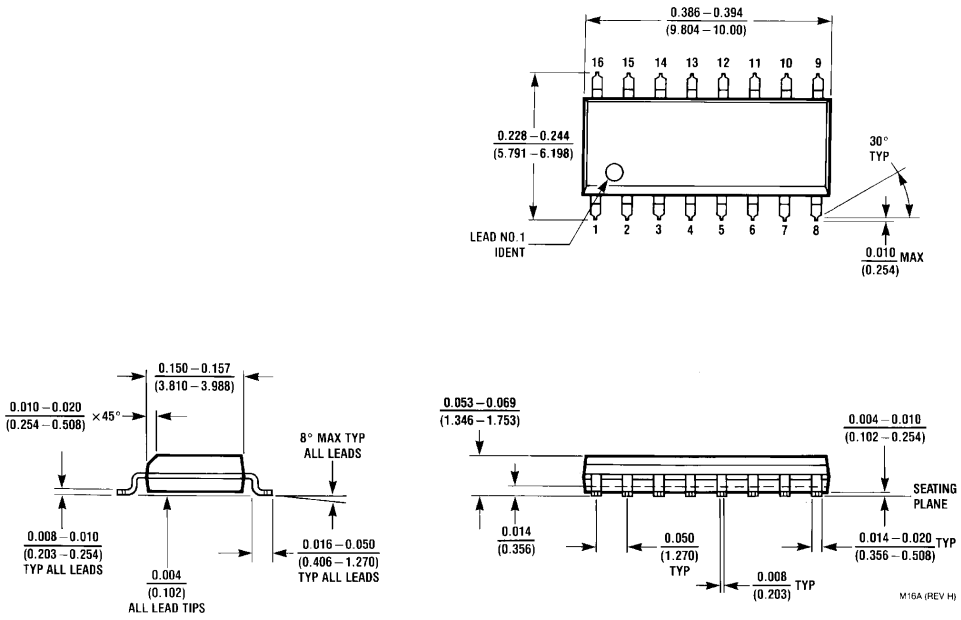


Ceramic Leadless Chip Carrier Package (E)
Order Number 54LS151LMQB
NS Package Number E20A

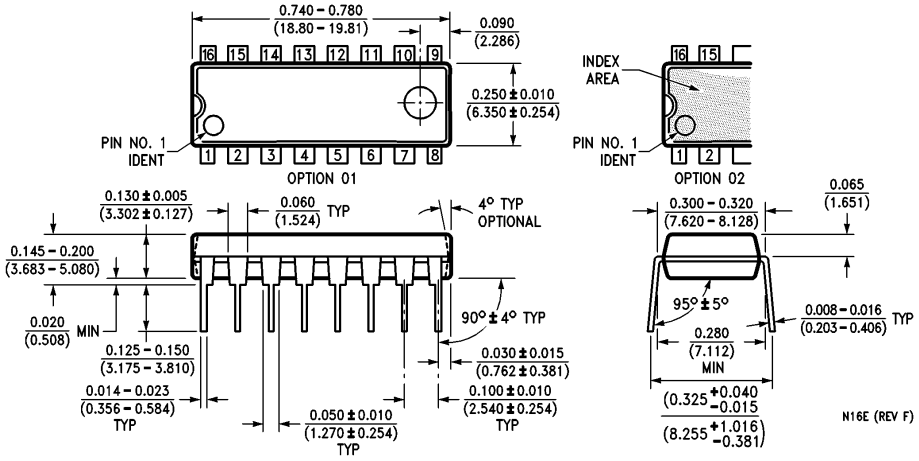


Ceramic Dual-In-Line Package (J)
Order Number 54LS151DMQB or DM54LS151J
NS Package Number J16A

Physical Dimensions inches (millimeters) (Continued)

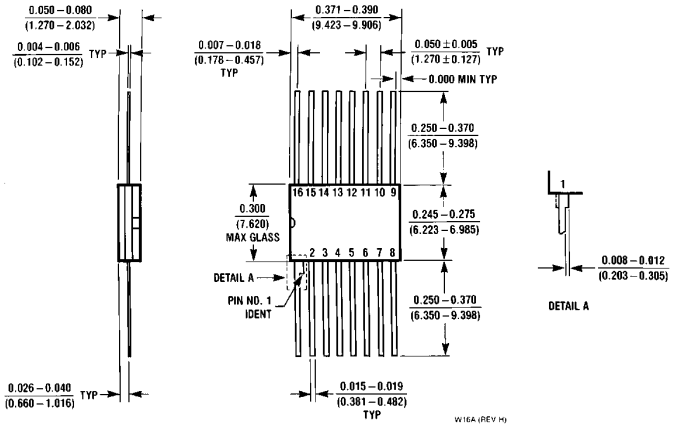


16-Lead Small Outline Molded Package (M)
Order Number DM74LS151M
NS Package Number M16A



16-Lead Molded Dual-In-Line Package (N)
Order Number DM74LS151N
NS Package Number N16E

Physical Dimensions inches (millimeters) (Continued)



16-Lead Ceramic Flat Package (W)
Order Number 54LS151FMQB or DM54LS151W
NS Package Number W16A

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