National Semiconductor

June 1989

54153/DM54153/DM74153 Dual 4-Line to 1-Line Data Selectors/Multiplexers

General Description

Each of these data selectors/multiplexers contains inverters and drivers to supply fully complementary, on-chip, binary decoding data selection to the AND-OR-invert gates. Separate strobe inputs are provided for each of the two four-line sections.

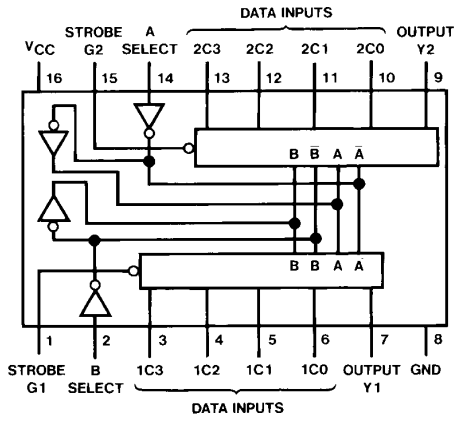
Features

- Permits multiplexing from N lines to 1 line
- Performs parallel-to-serial conversion
- Strobe (enable) line provided for cascading (N lines to n lines)
- High fan-out, low-impedance, totem-pole outputs
- Typical average propagation delay times

  From data 11 ns
  From strobe 18 ns
  From select 20 ns
- Typical power dissipation 170 mW
- Alternate Military/Aerospace device (54153) is available. Contact a National Semiconductor Sales Office/ Distributor for specifications.

Connection Diagram

Dual-In-Line Package



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Order Number 54153DMQB, 54153FMQB, DM54153J, DM54153W or DM74153N
See NS Package Number J16A, N16E or W16A

Function Table

Select Inputs		Data Inputs				Strobe	Output
B	A	C0	C1	C2	C3	G	Y
X	X	X	X	X	X	H	L
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
L	H	X	L	X	X	L	L
L	H	X	H	X	X	L	H
H	L	X	X	L	X	L	L
H	L	X	X	H	X	L	H
H	H	X	X	X	L	L	L
H	H	X	X	X	H	L	H

Select inputs A and B are common to both sections.

H = High Level, L = Low Level, X = Don't Care

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	5.5V
Operating Free Air Temperature Range	
DM54 and 54	−55°C to +125°C
DM74	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	DM54153			DM74153			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			0.8			0.8	V
I_{OH}	High Level Output Current			−0.8			−0.8	mA
I_{OL}	Low Level Output Current			16			16	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 = −12 mA				−1.5	V
V_{OH}	High Level Output Voltage	V_{CC} = Min, I_{OH} = Max V_{IL} = Max, V_{IH} = Min		2.4	3.2		V
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max V_{IH} = Min, V_{IL} = Max			0.2	0.4	V
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 5.5V				1	mA
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 2.4V				40	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.4V				−1.6	mA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)	DM54	−20		−55	mA
			DM74	−18		−57	
I_{CC}	Supply Current	V_{CC} = Max (Note 3)	DM54		34	52	mA
			DM74		34	60	

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

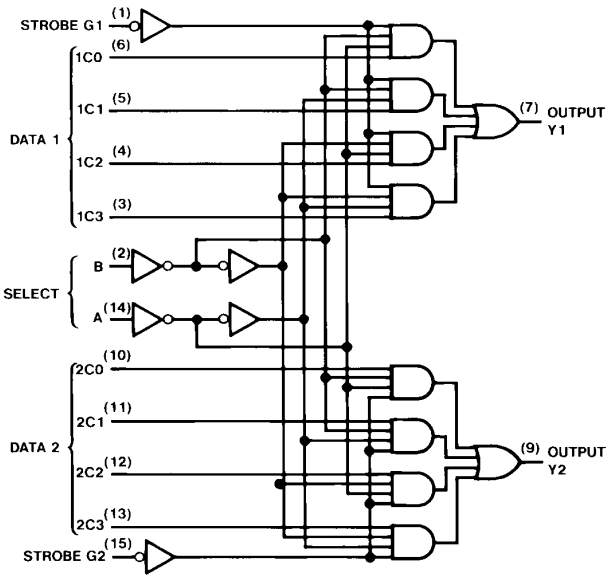
Note 2: Not more than one output should be shorted at a time.

Note 3: I_{CC} is measured with the outputs open and all inputs grounded.

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 = 400Ω, C_L = 30 pF		Units
			Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output	Data to Y		18	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Data to Y		23	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Select to Y		34	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Select to Y		34	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Strobe to Y		30	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Strobe to Y		23	ns

Logic Diagram



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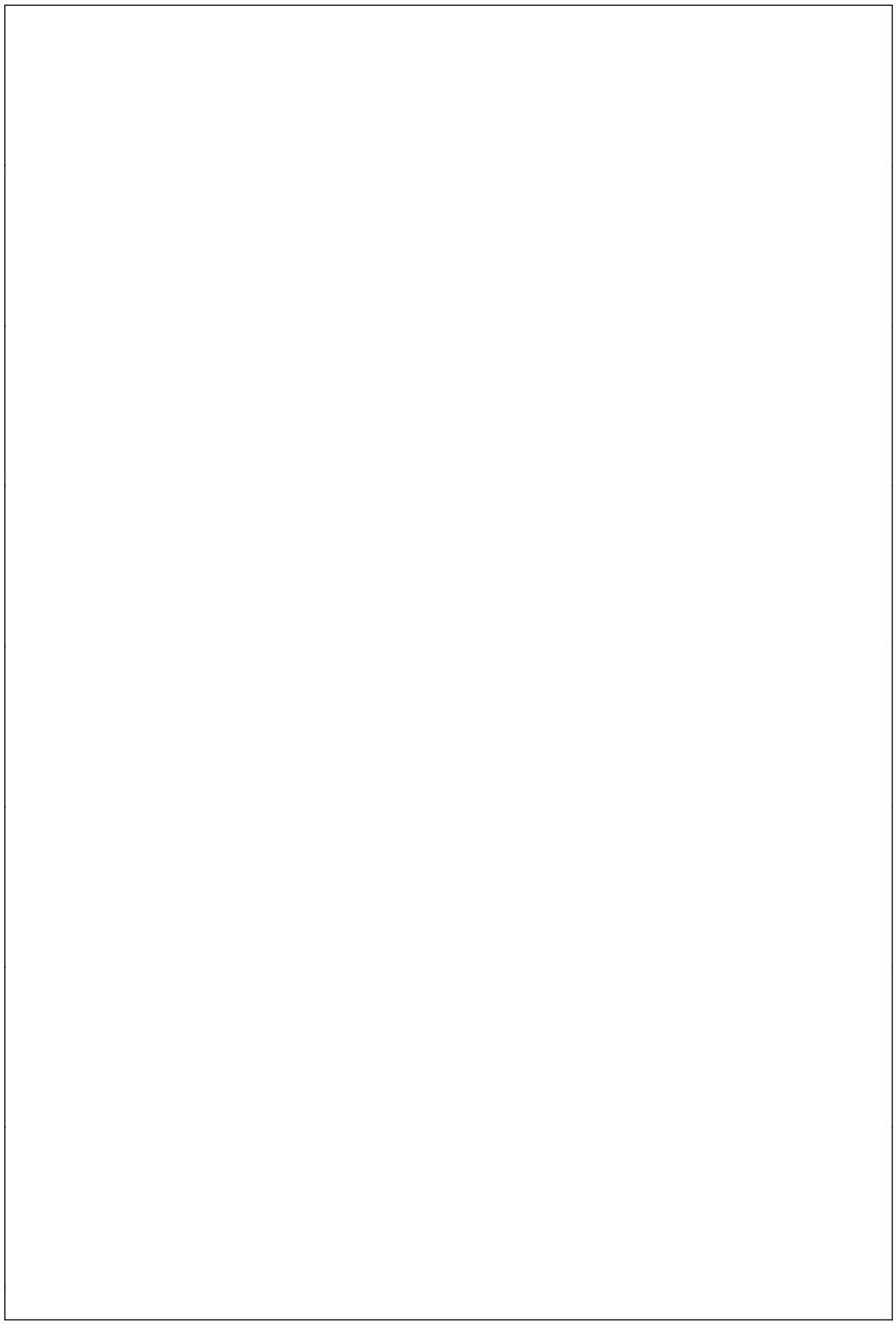
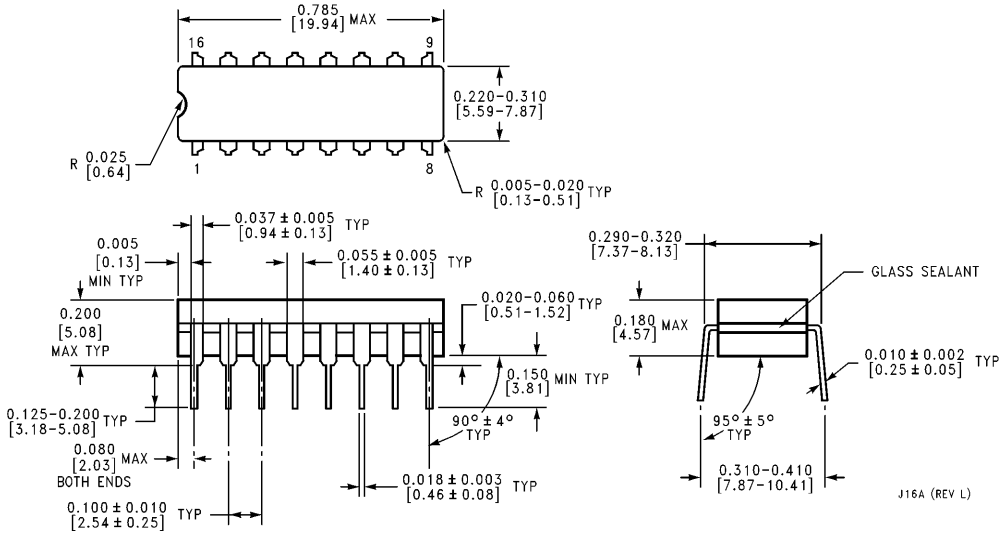
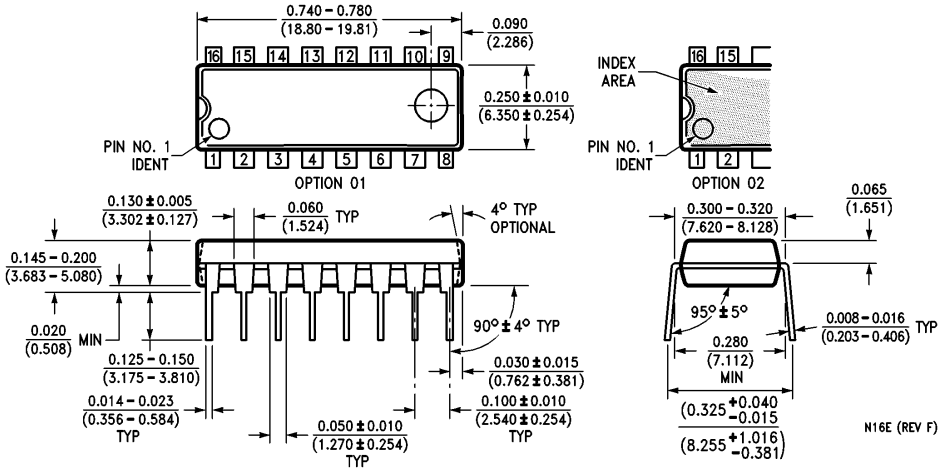


Physical Dimensions inches (millimeters)

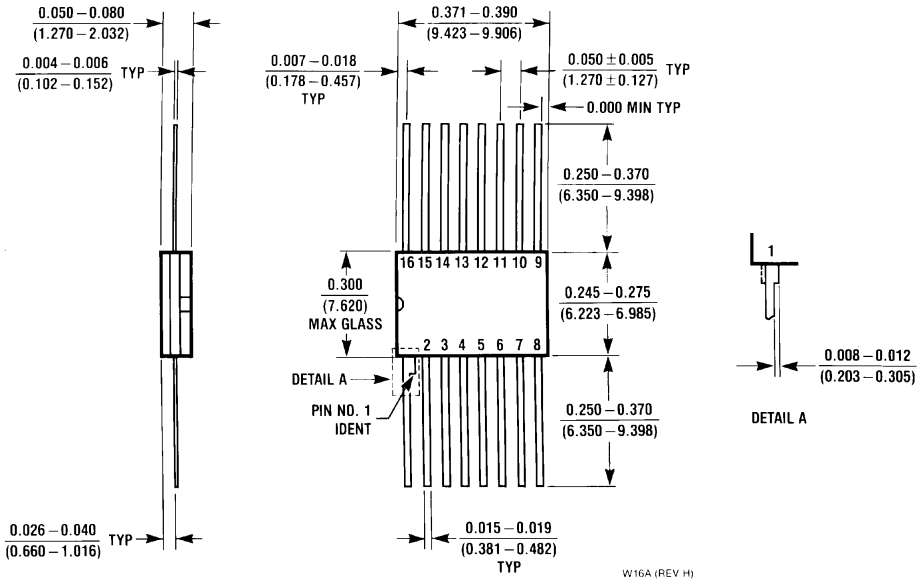


16-Lead Ceramic Dual-In-Line Package (J)
Order Number 54153DMQB or DM54153J
NS Package Number J16A



16-Lead Molded Dual-In-Line Package (N)
Order Number DM74153N
NS Package Number N16E

Physical Dimensions inches (millimeters) (Continued)



16-Lead Ceramic Flat Package (W)
Order Number 54153FMQB or DM54153W
NS Package Number W16A

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