

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

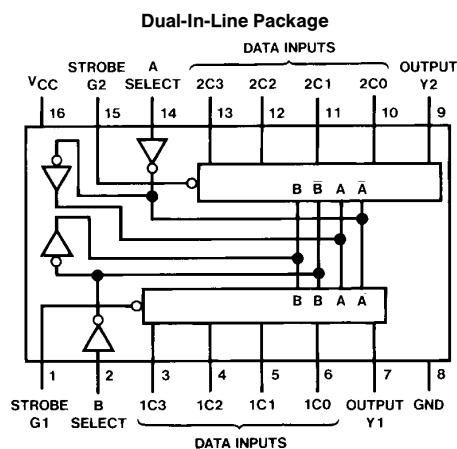
General Description

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



TL/F/6547-1

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

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 DM74 −18		−55 −57	mA
I _{CC}	Supply Current	V _{CC} = Max (Note 3)	DM54 DM74	34 34	52 60	mA

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

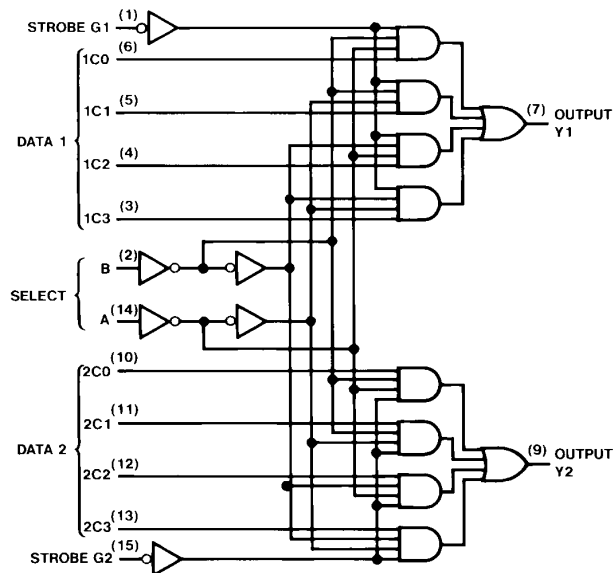
Note 2: Not more than one output should be shorted at a time.

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

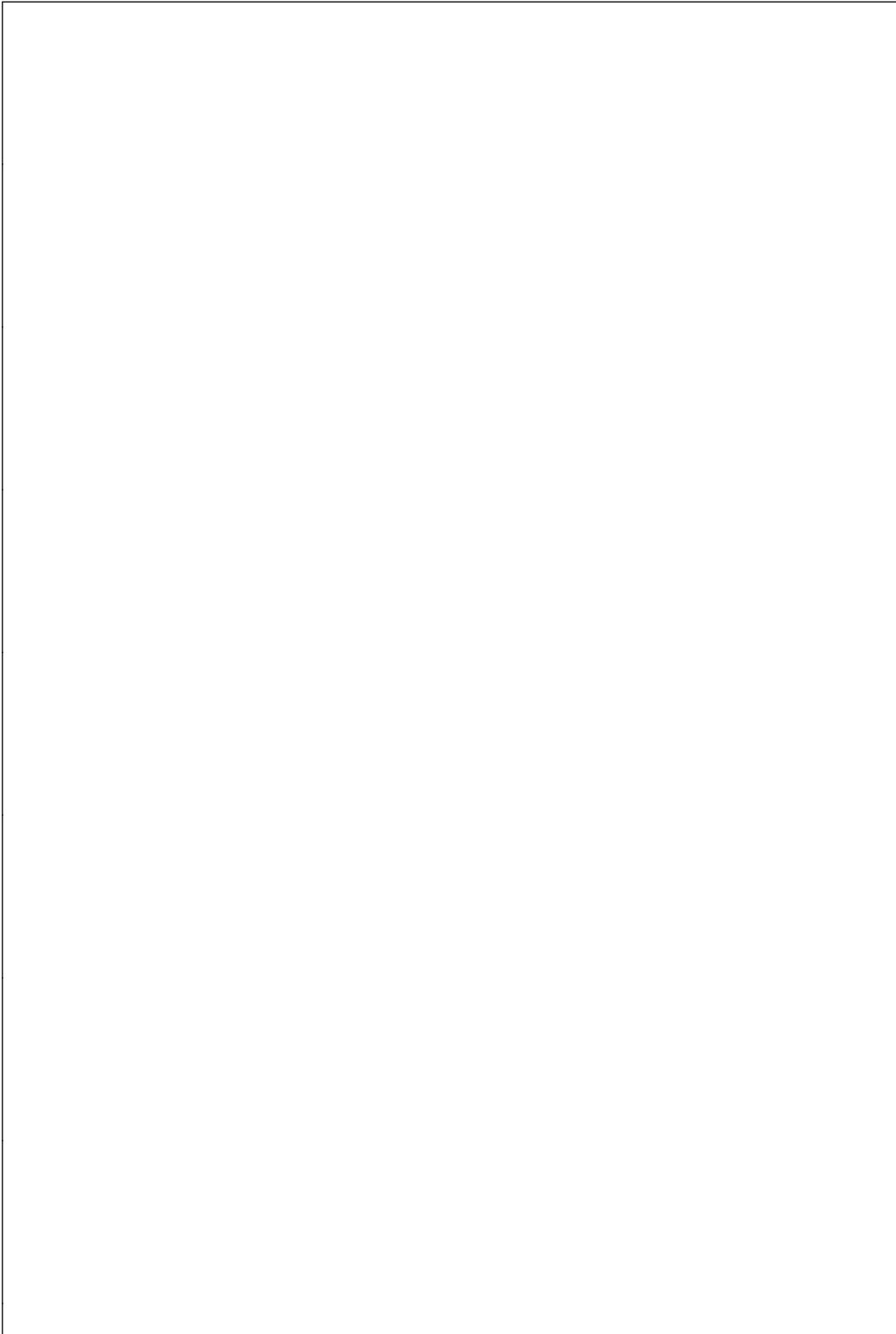
Switching Characteristics at $V_{CC} = 5V$ and $T_A = 25^\circ C$ (See Section 1 for Test Waveforms and Output Load)

Symbol	Parameter	From (Input) To (Output)	$R_L = 400\Omega, C_L = 30\text{ pF}$		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



TL/F/6547-2



The image contains three mechanical drawings of the J16A package:

- Top View:** Shows a rectangular package with 16 pins on the left and 9 pins on the right. Dimensions include a total width of 0.785 ± 0.005 [19.94] MAX, a pin pitch of 0.025 [0.64], and a pin diameter of $0.005-0.020$ TYP [0.13-0.51].
- Side View:** Shows the package height and pin dimensions. Key dimensions include a total height of $0.220-0.310$ [5.59-7.87], a pin height of 0.037 ± 0.005 TYP [0.94 \pm 0.13], and a pin diameter of 0.005 [0.13] MIN TYP.
- Detail View:** Shows a cross-section of the package with a glass sealant. Dimensions include a sealant thickness of 0.010 ± 0.002 [0.25 \pm 0.05], a sealant width of 0.180 [4.57] MAX, and a sealant angle of $95^\circ \pm 5^\circ$ TYP.

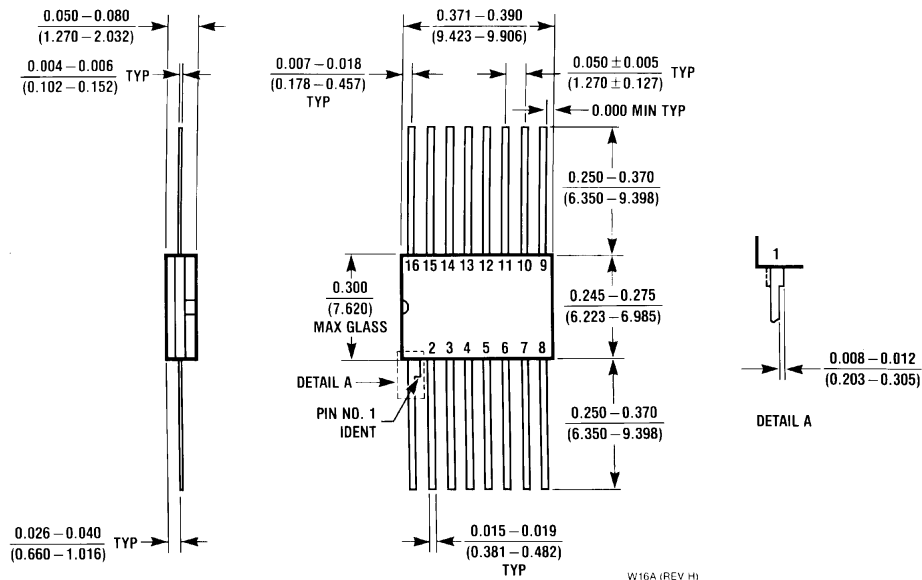
The image displays three mechanical drawings of the N16E connector, showing top, side, and end views with dimensions in inches and millimeters.

Top View:

- Overall width: $0.740 - 0.780$ (18.80 - 19.81)
- Pin 10 to Pin 9 distance: 0.090 (2.286)
- Pin 10 to Pin 8 distance: 0.250 ± 0.010 (6.350 \pm 0.254)
- Pin 10 to Pin 7 distance: 0.130 ± 0.005 (3.302 \pm 0.127)
- Pin 10 to Pin 6 distance: 0.060 (1.524) TYP
- Pin 10 to Pin 5 distance: $0.125 - 0.150$ (3.175 - 3.810)
- Pin 10 to Pin 4 distance: $0.014 - 0.023$ (0.356 - 0.584) TYP
- Pin 10 to Pin 3 distance: 0.050 ± 0.010 (1.270 \pm 0.254) TYP
- Pin 10 to Pin 2 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin 1 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin 0 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -1 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -2 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -3 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -4 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -5 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -6 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -7 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -8 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -9 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -10 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -11 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -12 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -13 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -14 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -15 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -16 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -17 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -18 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -19 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -20 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -21 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -22 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -23 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -24 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -25 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -26 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -27 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -28 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -29 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -30 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -31 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -32 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -33 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -34 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -35 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -36 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -37 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -38 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -39 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -40 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -41 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -42 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -43 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -44 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -45 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -46 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -47 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -48 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -49 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -50 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -51 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -52 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -53 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -54 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -55 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -56 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -57 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -58 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -59 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -60 distance: 0.030 ± 0.015 (0.762 \pm 0.381)
- Pin 10 to Pin -61 distance: 0.100 ± 0.010 (2.540 \pm 0.254) TYP
- Pin 10 to Pin -62 distance: 0.030 ± 0.015 (0.762 $\$

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Physical Dimensions inches (millimeters) (Continued)



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

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National Semiconductor Corporation
 1111 West Bardin Road
 Arlington, TX 76017
 Tel: 1(800) 272-9959
 Fax: 1(800) 737-7018

National Semiconductor Europe
 Fax: (+49) 0-180-530 85 86
 Email: cnjwge@tevm2.nsc.com
 Deutsch Tel: (+49) 0-180-530 85 85
 English Tel: (+49) 0-180-532 78 32
 Français Tel: (+49) 0-180-532 93 58
 Italiano Tel: (+49) 0-180-534 16 80

National Semiconductor Hong Kong Ltd.
 19th Floor, Straight Block,
 Ocean Centre, 5 Canton Rd.
 Tsimshatsui, Kowloon
 Hong Kong
 Tel: (852) 2737-1600
 Fax: (852) 2736-9960

National Semiconductor Japan Ltd.
 Tel: 81-043-299-2309
 Fax: 81-043-299-2408