National **S**emiconductor

June 1989

54150/DM54150/DM74150, 54151A/DM54151A/DM74151A Data Selectors/Multiplexers

General Description

These data selectors/multiplexers contain full on-chip decoding to select the desired data source. The 150 selects one-of-sixteen data sources; the 151A selects one-of-eight data sources. The 150 and 151A have 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 (as applicable) low.

The 151A features complementary W and Y outputs, whereas the 150 has an inverted (W) output only.

The 151A incorporates address buffers which have symmetrical propagation delay times through the complementary paths. This reduces the possibility of transients occurring at the output(s) due to changes made at the select inputs, even when the 151A outputs are enabled (i.e., strobe low).

Features

- 150 selects one-of-sixteen data lines
- 151A selects 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
 150   11 ns
  151A   9 ns
- Typical power dissipation
  150   200 mW
  151A   135 mW
- Alternate Military/Aerospace device (54150, 54151A) is available. Contact a National Semiconductor Sales Office/Distributor for specifications.

Connection Diagrams

Dual-In-Line Package

TL/F/6546–1
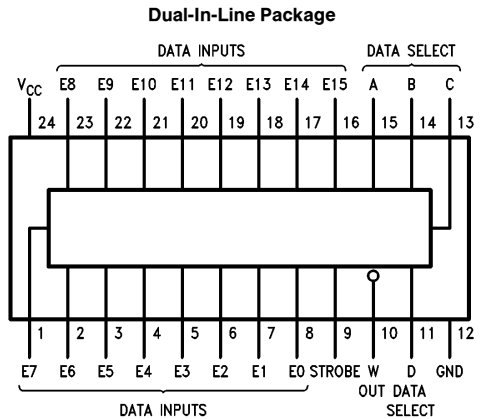
Order Number 54150DQMB, 54150FMQB, DM54150J or DM74150N
See NS Package Number J24A, N24A or W24C

Dual-In-Line Package

TL/F/6546–2
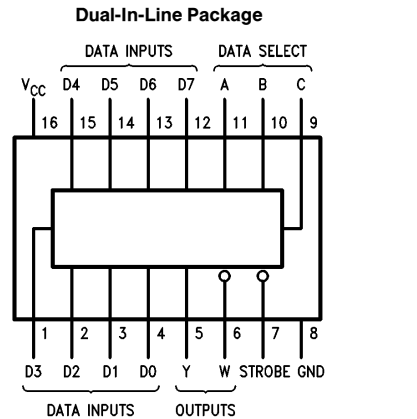
Order Number 54151ADMQB, 54151AFMQB, DM54151AJ, DM54151AW or DM74151AN
See NS Package Number J16A, N16E or W16A

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	DM54150			DM74150			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

'150 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			V
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max V_{IH} = Min, V_{IL} = Max				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		−55	
I_{CC}	Supply Current	V_{CC} = Max, (Note 3)			40	68	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 strobe and data select inputs at 4.5V, all other inputs and outputs open.

'150 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)	$R_L = 400\Omega, C_L = 15$ pF		Units
			Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output	Select to W		35	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Select to W		33	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Strobe to W		24	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Strobe to W		30	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	E0-E15 to W		20	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	E0-E15 to W		14	ns

Recommended Operating Conditions

Symbol	Parameter	DM54151A			DM74151A			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

'151A 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			V
V_{OL}	Low Level Output Voltage	$V_{CC} = $ Min, $I_{OL} = $ Max $V_{IH} = $ Min, $V_{IL} = $ Max				0.4	V
I_I	Input Current @ Max Input Voltage	$V_{CC} = $ Max, $V_I = 5.5$V				1	mA
I_{IH}	High Level Input Current	$V_{CC} = $ Max, $V_I = 2.4$V				40	μA
I_{IL}	Low Level Input Current	$V_{CC} = $ Max, $V_I = 0.4$V				-1.6	mA
I_{OS}	Short Circuit Output Current	$V_{CC} = $ Max (Note 2)	DM54	-20		-55	mA
			DM74	-18		-55	
I_{CC}	Supply Current	$V_{CC} = $ Max, (Note 3)			27	48	mA

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

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

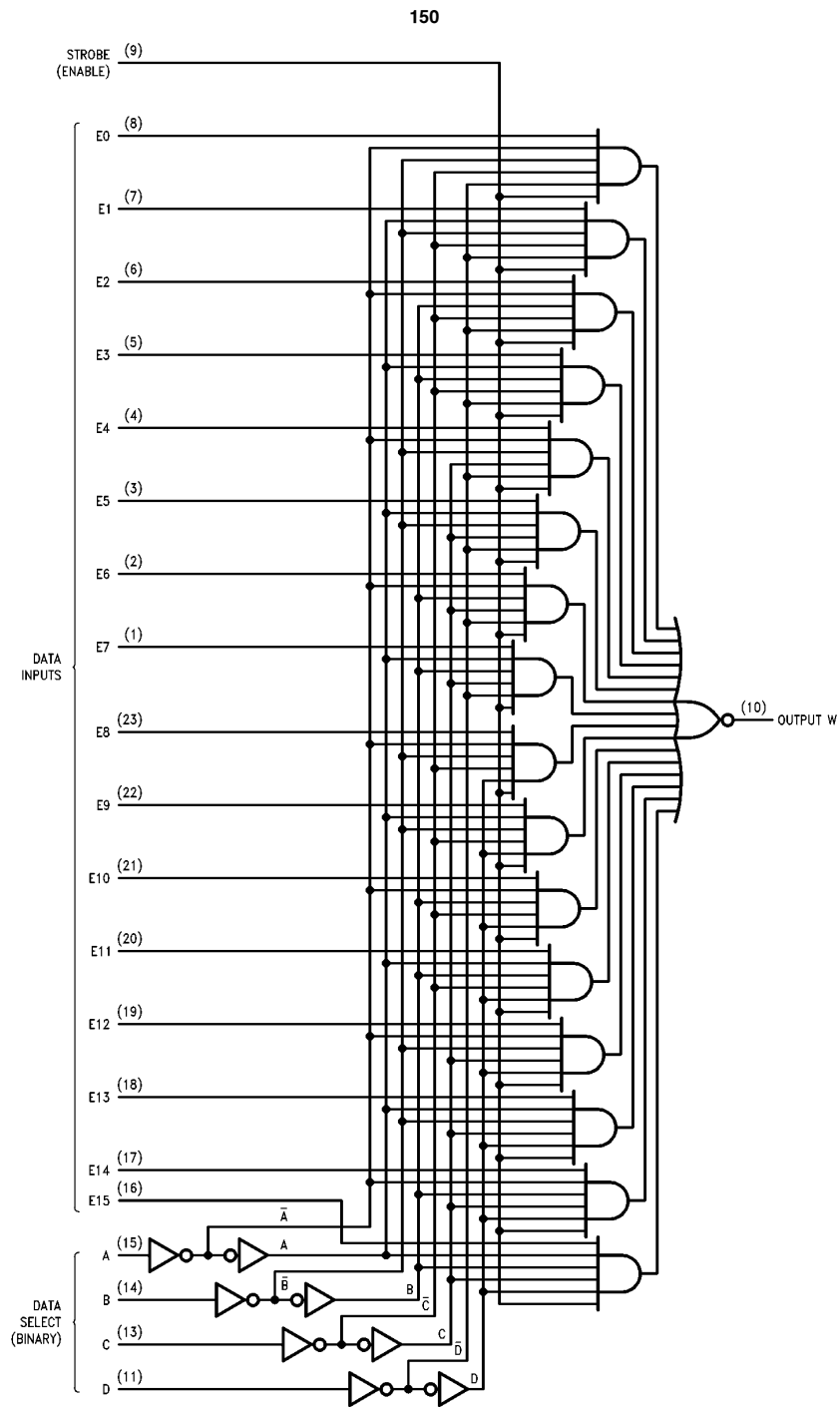**Note 3:** I_{CC} is measured with the strobe and data select inputs at 4.5V, all other inputs and outputs open.

'151A Switching Characteristics
at $V_{CC} = 5$V and $T_A = 25°$C (See Section 1 for Test Waveforms and Output Load)

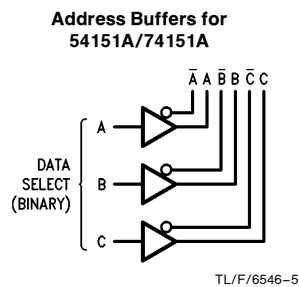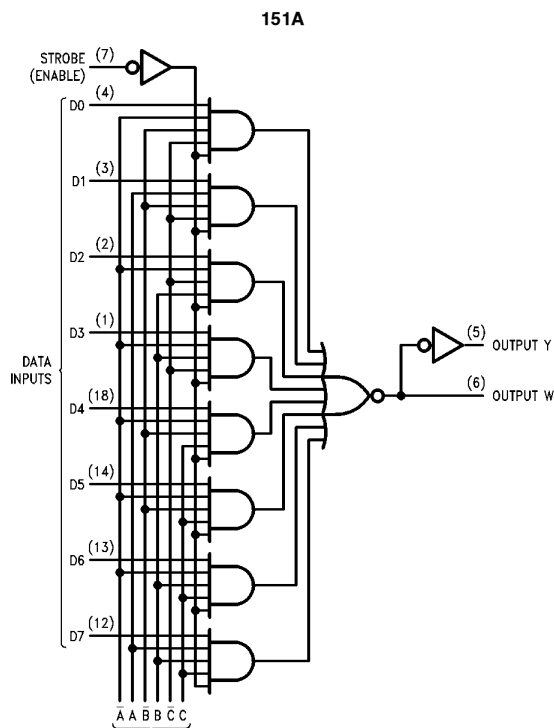| Symbol	Parameter	From (Input) To (Output)	$R_L = 400\Omega$, $C_L = 15$ pF		Units
			Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output	Select (4 Levels) to Y		38	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Select (4 Levels) to Y		30	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Select (3 Levels) to W		26	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Select (3 Levels) to W		30	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Strobe to Y		33	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Strobe to Y		30	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Strobe to W		21	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Strobe to W		25	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	D0-D7 to Y		24	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	D0-D7 to Y		24	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	D0-D7 to W		14	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	D0-D7 to W		14	ns

Logic Diagrams

150

TL/F/6546–3

Logic Diagrams

151A

STROBE (ENABLE) (7)

(4) D0
(3) D1
(2) D2
(1) D3
DATA INPUTS
(18) D4
(14) D5
(13) D6
(12) D7

(5) OUTPUT Y
(6) OUTPUT W

Ā A B̄ B C̄ C

See Address Buffers Below

TL/F/6546–4

Address Buffers for 54151A/74151A

Ā A B̄ B C̄ C

DATA SELECT (BINARY)

A
B
C

TL/F/6546–5

Function Tables

54150/74150

Inputs					Outputs W
Select				Strobe S	
D	C	B	A		
X	X	X	X	H	H
L	L	L	L	L	$\overline{E0}$
L	L	L	H	L	$\overline{E1}$
L	L	H	L	L	$\overline{E2}$
L	L	H	H	L	$\overline{E3}$
L	H	L	L	L	$\overline{E4}$
L	H	L	H	L	$\overline{E5}$
L	H	H	L	L	$\overline{E6}$
L	H	H	H	L	$\overline{E7}$
H	L	L	L	L	$\overline{E8}$
H	L	L	H	L	$\overline{E9}$
H	L	H	L	L	$\overline{E10}$
H	L	H	H	L	$\overline{E11}$
H	H	L	L	L	$\overline{E12}$
H	H	L	H	L	$\overline{E13}$
H	H	H	L	L	$\overline{E14}$
H	H	H	H	L	$\overline{E15}$

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

$\overline{E0}, \overline{E1} \ldots \overline{E15}$ = the complement of the level of the respective E input

54151A/75151A

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

Physical Dimensions inches (millimeters)

0.785
[19.94] MAX

16   9

0.220-0.310
[5.59-7.87]

R 0.025
[0.64]

1   8

R 0.005-0.020
[0.13-0.51] TYP

0.037 ± 0.005
[0.94 ± 0.13] TYP

0.005
[0.13]
MIN TYP

0.055 ± 0.005
[1.40 ± 0.13] TYP

0.290-0.320
[7.37-8.13]

GLASS SEALANT

0.020-0.060
[0.51-1.52] TYP

0.200
[5.08]
MAX TYP

0.180 MAX
[4.57]

0.010 ± 0.002
[0.25 ± 0.05] TYP

0.150
[3.81] MIN TYP

0.125-0.200
[3.18-5.08] TYP

90° ± 4°
TYP

95° ± 5°
TYP

0.080
[2.03] MAX
BOTH ENDS

0.018 ± 0.003
[0.46 ± 0.08] TYP

0.310-0.410
[7.87-10.41]

J16A (REV L)

0.100 ± 0.010
[2.54 ± 0.25] TYP

16-Lead Ceramic Dual-In-Line Package (J)
Order Number 54151ADMQB or DM54151AJ
NS Package Number J16A

1.290
(32.766)
MAX

0.600
(15.240)
MAX
GLASS

24 23 22 21 20 19 18 17 16 15 14 13

0.025
(0.635)
RAD

0.514-0.526
(13.06-13.36)

0.030-0.055
(0.762-1.397)
RAD TYP

1 2 3 4 5 6 7 8 9 10 11 12

0.590-0.620
(14.986-15.748)

0.005
(0.127)
MIN

GLASS
SEALANT

0.055 ±0.005
(1.397 ±0.127)

0.180
(4.572)
MAX

0.020-0.070
(0.508-1.778)

95° ±5°

0.008-0.012
(0.203-0.305)

0.685 +0.025
        -0.060

(17.40 +0.635
         -1.524)

0.098
(2.489)
MAX

0.100 ±0.010
(2.540 ±0.254)

0.018 ±0.003
(0.457 ±0.076)

86°
94°
TYP

0.125-0.200
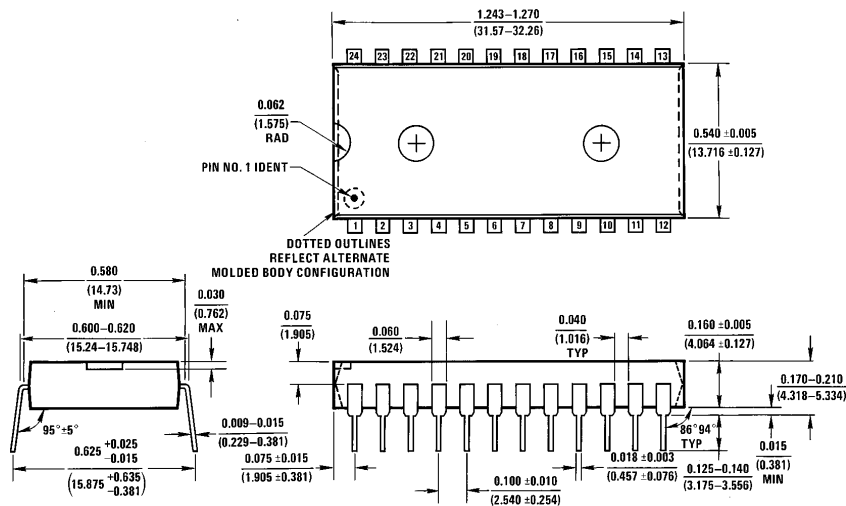(3.175-5.080)
MIN

0.150
(3.810)
MIN

J24A (REV H)

24-Lead Ceramic Dual-In-Line Package (J)
Order Number 54150DMQB or DM54150J
NS Package Number J24A

Physical Dimensions inches (millimeters) (Continued)
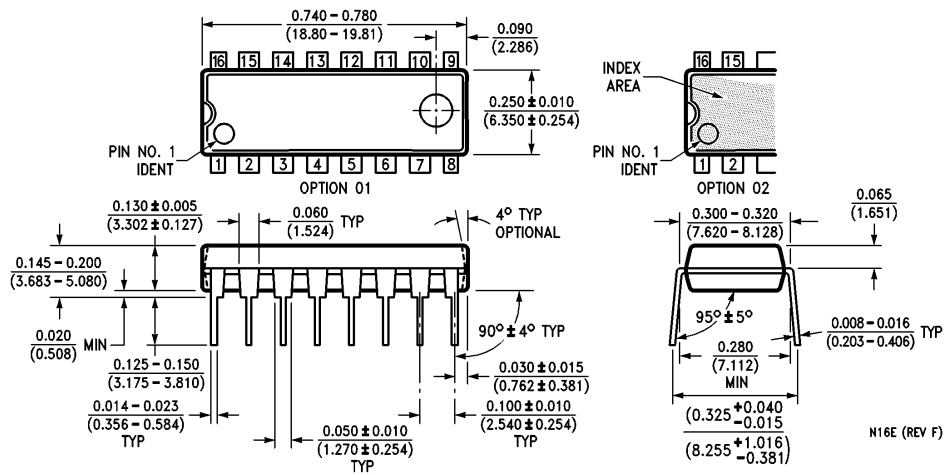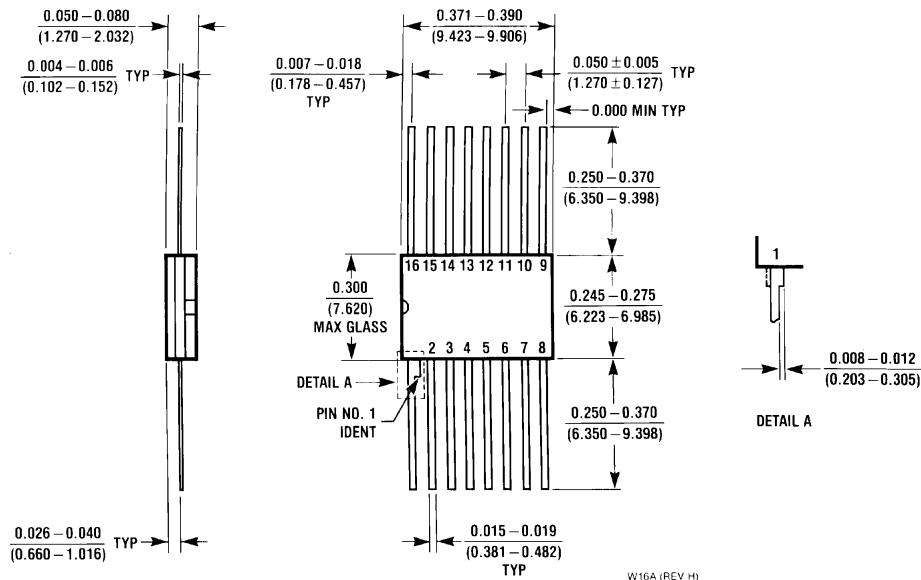

16-Lead Molded Dual-In-Line Package (N)
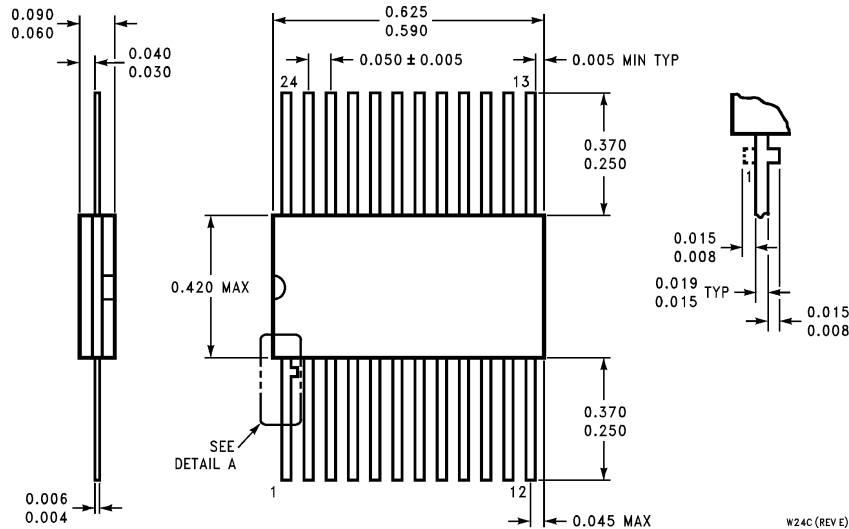**Order Number DM74151AN**
NS Package Number N16E

24-Lead Molded Dual-In-Line Package (N)
Order Number DM74150N
NS Package Number N24A

Physical Dimensions inches (millimeters) (Continued)

$$\frac{0.050-0.080}{(1.270-2.032)}$$

$$\frac{0.004-0.006}{(0.102-0.152)} \text{ TYP}$$

$$\frac{0.007-0.018}{(0.178-0.457)} \text{ TYP}$$

$$\frac{0.371-0.390}{(9.423-9.906)}$$

$$\frac{0.050\pm0.005}{(1.270\pm0.127)} \text{ TYP}$$

0.000 MIN TYP

$$\frac{0.250-0.370}{(6.350-9.398)}$$

16 15 14 13 12 11 10 9

$$\frac{0.300}{(7.620)} \text{ MAX GLASS}$$

$$\frac{0.245-0.275}{(6.223-6.985)}$$

2 3 4 5 6 7 8

DETAIL A

PIN NO. 1
IDENT

$$\frac{0.250-0.370}{(6.350-9.398)}$$

$$\frac{0.026-0.040}{(0.660-1.016)} \text{ TYP}$$

$$\frac{0.015-0.019}{(0.381-0.482)} \text{ TYP}$$

W16A (REV H)

1

$$\frac{0.008-0.012}{(0.203-0.305)}$$

DETAIL A

16-Lead Ceramic Flat Package (W)
Order Number 54151AFMQB or DM54151AW
NS Package Number W16A

9

Physical Dimensions inches (millimeters) (Continued)

0.090
0.060

0.040
0.030

0.625
0.590

0.050 ± 0.005

0.005 MIN TYP

24   13

0.370
0.250

0.420 MAX

0.015
0.008

0.019
0.015 TYP

0.015
0.008

SEE
DETAIL A

0.370
0.250

0.006
0.004

1   12

0.045 MAX

W24C (REV E)

24-Lead Ceramic Flat Package (W)
Order Number 54150FMQB
NS Package Number W24C

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

 National Semiconductor Company

Design   **Purchasing**   **Quality**   **Company**   **Jobs**

Products > **Military/Aerospace** > **Logic** > **TTL** > **DM54150**

 Product Folder

DM54150   **1-of-16 Line Data Selector/Multiplexer**

Generic P/N 54150

Contents

- General Description
- Features
- Datasheet
- Package Availability, Models, Samples
  & Pricing

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- Also for use as Boolean function generator
- Typical average propagation delay time, data input to W output 150 11 ns 151A 9 ns
- Typical power dissipation 150200 mW 151A135 mW
- Alternate Military/Aerospace device (54150, 54151A) is available. Contact a National Semiconductor Sales Office/Distributor for specifications.

Datasheet

Title	Size (in Kbytes)	Date	View Online	Download	Receive via Email
DM54150/DM54151A/54150/54151A 1-of-16 Line Data Selector/Multiplexer	182 Kbytes	9-Jan-98	View Online	Download	Receive via Email

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If you have trouble printing, see Printing Problems.

Package Availability, Models, Samples & Pricing

Part Number	Package		Status	Models		Samples & Electronic Orders	Budgetary Pricing		Std Pack Size	Package Marking
	Type	# pins		SPICE	IBIS		Quantity	$US each		
DM54150J/883	Cerdip	24	Full production	N/A	N/A	. [x] Order Parts	50+	$4.0000	tube of 14	[logo]¢Z¢S¢4¢A$E DM54150J/883Q¢M
DM54150W/883	Cerpack	24	Full production	N/A	N/A	.	50+	$6.0000	tube of 19	[logo]¢Z¢S¢4¢A$E DM54150W /883Q¢M

[Information as of 11-Sep-2000]

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