

June 1989

54154/DM54154/DM74154 4-Line to 16-Line Decoders/Demultiplexers

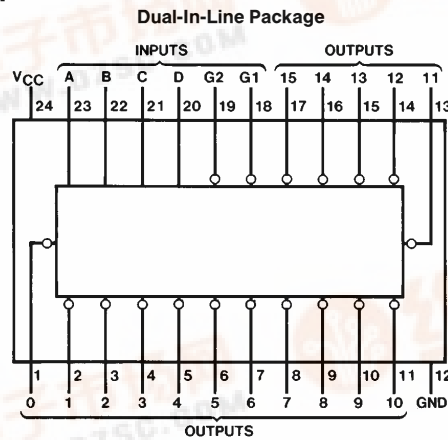
General Description

Each of these 4-line-to-16-line decoders utilizes TTL circuitry to decode four binary-coded inputs into one of sixteen mutually exclusive outputs when both the strobe inputs, G1 and G2, are low. The demultiplexing function is performed by using the 4 input lines to address the output line, passing data from one of the strobe inputs with the other strobe input low. When either strobe input is high, all outputs are high. These demultiplexers are ideally suited for implementing high-performance memory decoders. All inputs are buffered and input clamping diodes are provided to minimize transmission-line effects and thereby simplify system design.

Features

- Decodes 4 binary-coded inputs into one of 16 mutually exclusive outputs
- Performs the demultiplexing function by distributing data from one input line to any one of 16 outputs
- Input clamping diodes simplify system design
- High fan-out, low-impedance, totem-pole outputs
- Typical propagation delay
3 levels of logic 19 ns
Strobe 18 ns
- Typical power dissipation 170 mW
- Alternate Military/Aerospace device (54154) is available. Contact a National Semiconductor Sales Office/Distributor for specifications.

Connection Diagram



Order Number 54154DMQB, 54154FMQB, DM54154J or DM74154N
See NS Package Number J24A, N24A or W24C

54154/DM54154/DM74154 4-Line to 16-Line Decoders/Demultiplexers



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	DM54154			DM74154			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		0.25	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	34	49	mA
			DM74 34	34	56	

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 all 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)

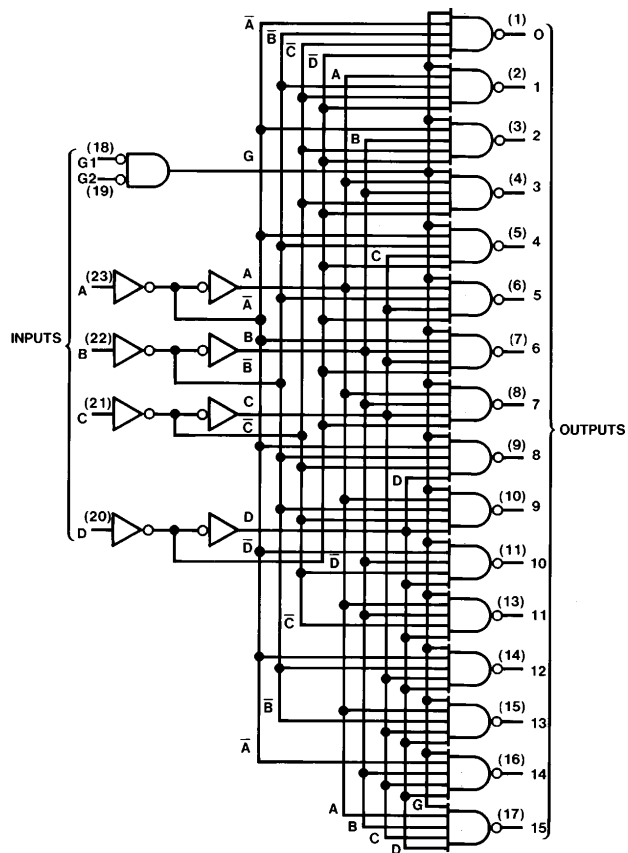
Symbol	Parameter	From (Input) To (Output)	R _L = 400Ω, C _L = 15 pF		Units
			Min	Max	
t _{PLH}	Propagation Delay Time Low to High Level Output	Data to Output		36	ns
t _{PHL}	Propagation Delay Time High to Low Level Output	Data to Output		33	ns
t _{PLH}	Propagation Delay Time Low to High Level Output	Strobe to Output		30	ns
t _{PHL}	Propagation Delay Time High to Low Level Output	Strobe to Output		27	ns

Function Table

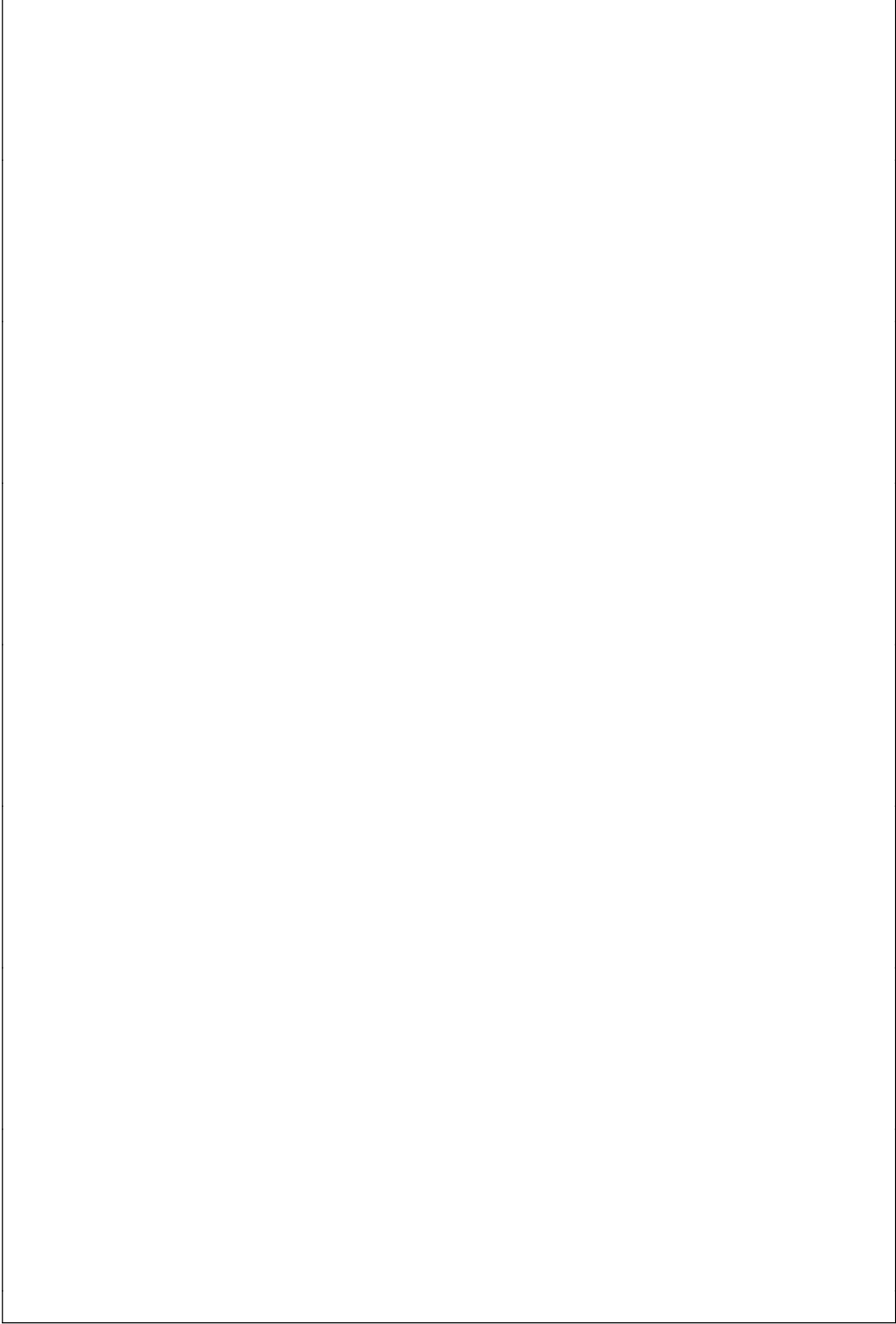
Inputs					Outputs																	
G1	G2	D	C	B	A	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	L	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	L	H	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	L	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	H	L	L	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	H	H	L	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H
L	L	L	H	L	L	L	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H
L	L	L	H	L	L	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H
L	L	L	H	L	L	L	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	H
L	L	L	H	H	L	L	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H
L	L	L	H	H	L	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H
L	L	L	H	H	L	L	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H
L	L	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H
L	L	L	H	H	L	L	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H
L	L	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H
L	L	L	H	H	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H
L	H	X	X	X	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
H	L	X	X	X	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
H	H	X	X	X	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H

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

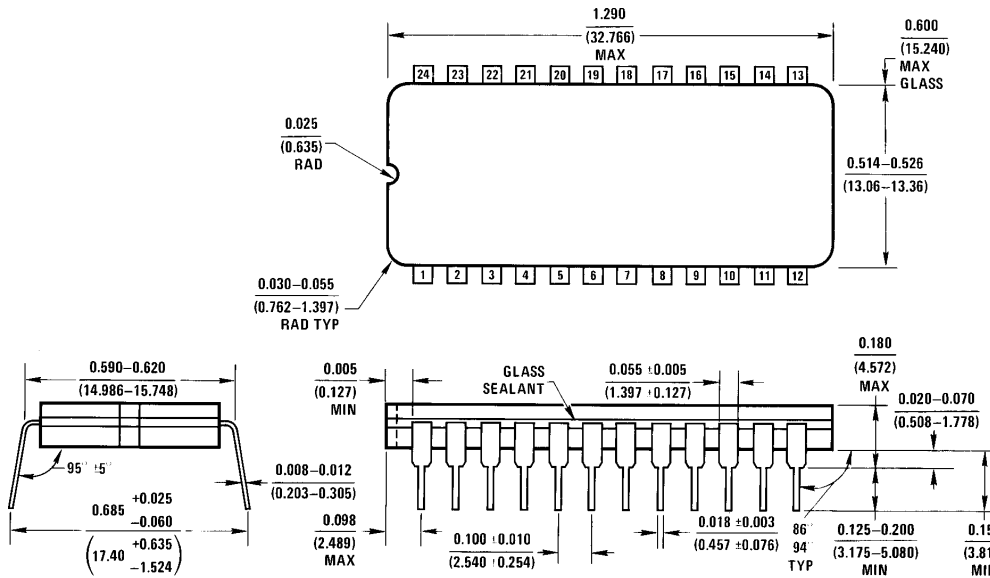
Logic Diagram



TL/F/6548-2

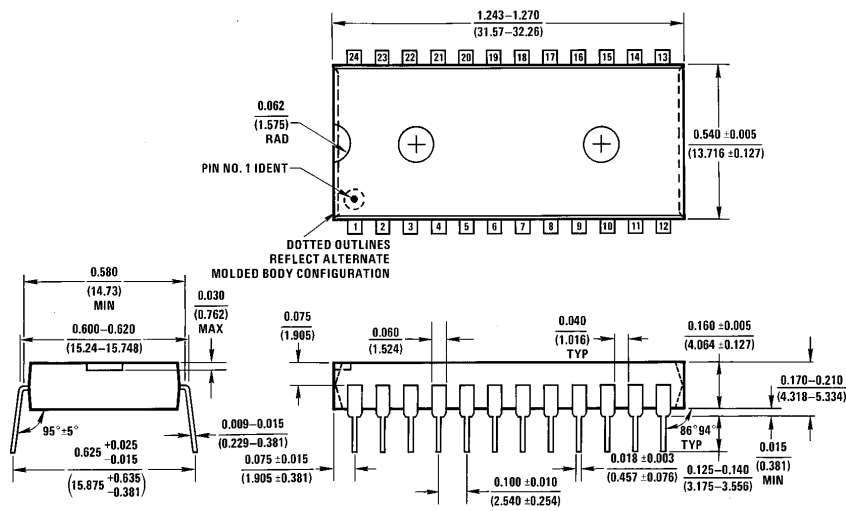


Physical Dimensions inches (millimeters)



J24A (REV H)

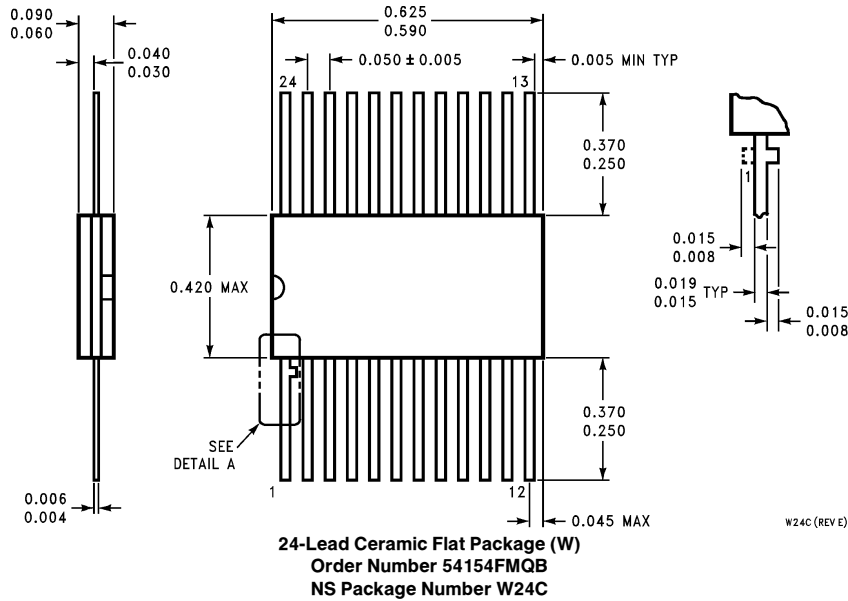
24-Lead Ceramic Dual-In-Line Package (J)
Order Number 54154DMQB or DM54154J
NS Package Number J24A



N24A (REV E)

24-Lead Molded Dual-In-Line Package (N)
Order Number DM74154N
NS Package Number N24A

Physical Dimensions inches (millimeters) (Continued)



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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.



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