

54LS02/DM54LS02/DM74LS02 Quad 2-Input NOR Gates

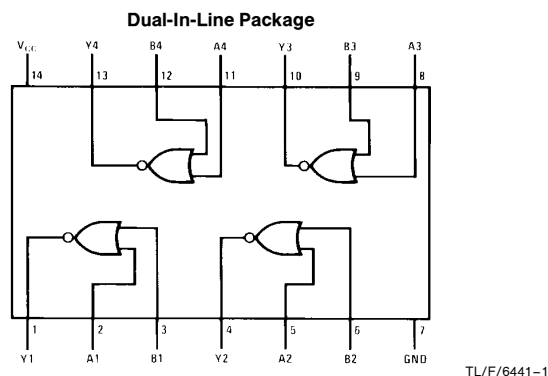
General Description

This device contains four independent gates each of which performs the logic NOR function.

Features

- Alternate Military/Aerospace device (54LS02) is available. Contact a National Semiconductor Sales Office/Distributor for specifications

Connection Diagram



Order Number 54LS02DMQB, 54LS02FMQB, 54LS02LMQB, DM54LS02J, DM54LS02W, DM74LS02M or DM74LS02N
See NS Package Number E20A, J14A, M14A, N14A or W14B

Function Table

$$Y = \overline{A + B}$$

Inputs		Output
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	L

H = High Logic Level

L = Low Logic Level

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	DM54LS02			DM74LS02			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	DM54 2.5 DM74 2.7	3.4 3.4		V
V _{OL}	Low Level Output Voltage	V _{CC} = Min, I _{OL} = Max, V _{IH} = Min	DM54 DM74	0.25 0.35	0.4 0.5	V
		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			−0.40	mA
I _{OS}	Short Circuit Output Current	V _{CC} = Max (Note 2)	DM54 −20 DM74 −20		−100 −100	mA
I _{CCH}	Supply Current with Outputs High	V _{CC} = Max		1.6	3.2	mA
I _{CCL}	Supply Current with Outputs Low	V _{CC} = Max		2.8	5.4	mA

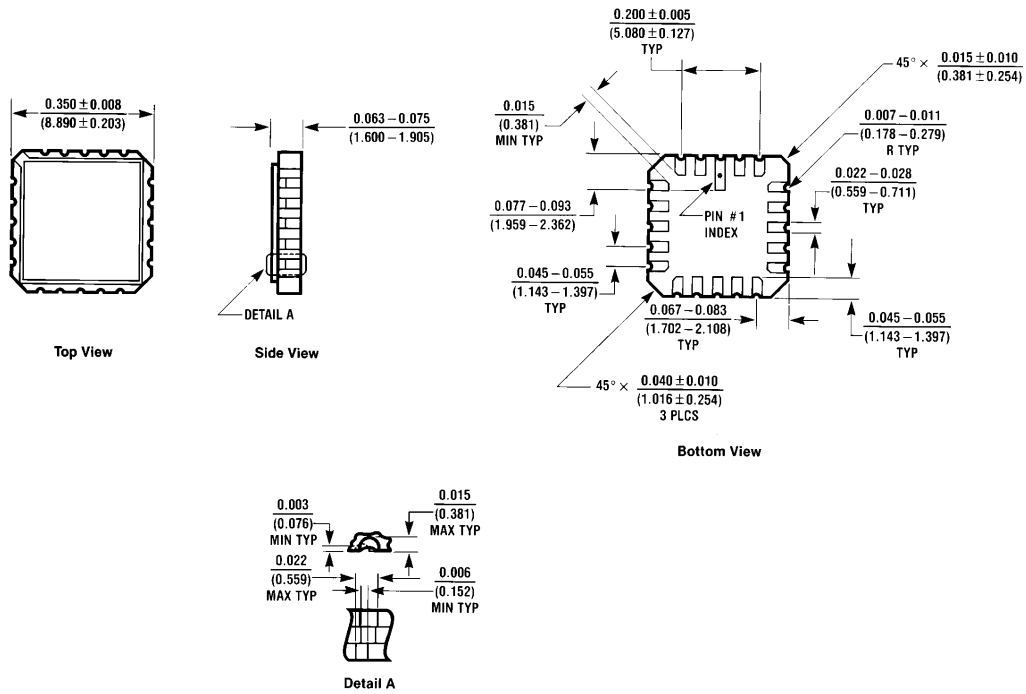
Switching Characteristics at V_{CC} = 5V and T_A = 25°C (See Section 1 for Test Waveforms and Output Load)

Symbol	Parameter	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		13		18	ns
t _{PHL}	Propagation Delay Time High to Low Level Output		10		15	ns

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.

Physical Dimensions inches (millimeters)



Ceramic Leadless Chip Carrier Package (E)
Order Number 54LS02LMQB
NS Package Number E20A

E20A (REV. D)

The image contains two technical drawings of electronic packages, each with top, side, and detail views.

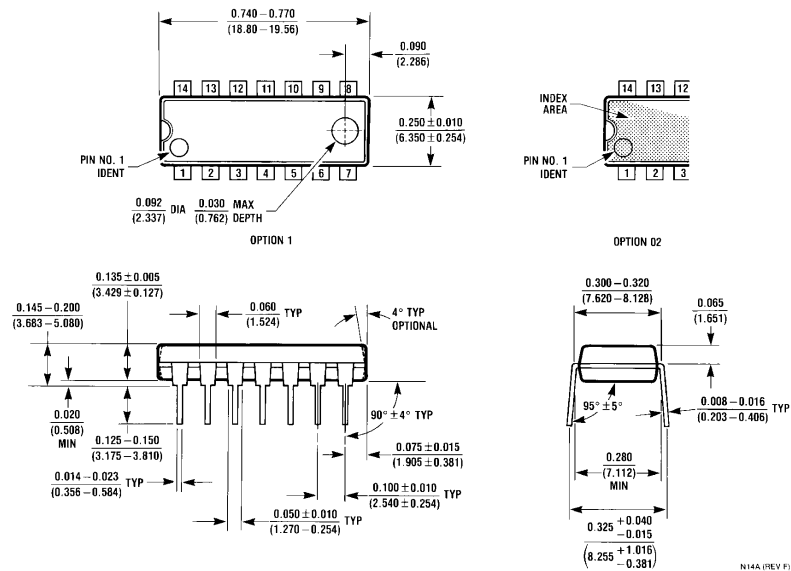
Top Package: 14-Lead Ceramic Dual-In-Line Package (J)

- Top View:** Shows a rectangular package with 14 leads. Dimensions include a width of 0.785 (19.939) MAX, a length of 0.220-0.310 (5.588-7.874), and a lead pitch of 0.025 (0.635) RAD. Lead numbers 1-14 are indicated.
- Side View:** Shows the package height and lead profile. Dimensions include a maximum height of 0.180 (4.572), a lead height of 0.008-0.012 (0.203-0.305), and a lead angle of 95° ± 5°. The lead width is 0.0310-0.410 (7.874-10.41).
- Detail View:** Shows the lead profile with dimensions for the lead width (0.008-0.012), lead height (0.005 MIN), and lead angle (86°-94° TYP). The lead pitch is 0.018 ± 0.003 (0.457 ± 0.076). The lead width is 0.100-0.010 (2.540 ± 0.254). The lead height is 0.125-0.200 (3.175-5.080). The lead width is 0.150 (3.81) MIN. The lead height is 0.200 (5.080) MAX. The lead width is 0.020-0.060 (0.508-1.524).

Bottom Package: 14-Lead Small Outline Molded Package (M)

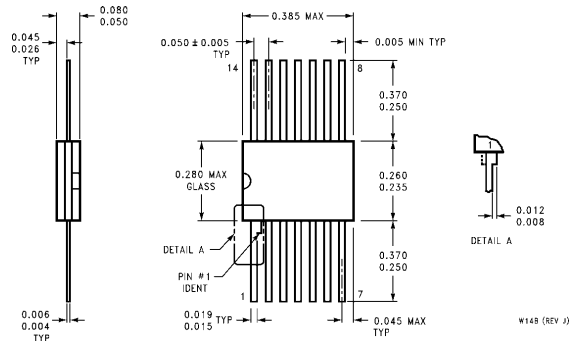
- Top View:** Shows a rectangular package with 14 leads. Dimensions include a width of 0.335-0.344 (8.509-8.738), a length of 0.228-0.244 (5.791-6.198), and a lead pitch of 0.010 (0.254) MAX. Lead numbers 1-14 are indicated.
- Side View:** Shows the package height and lead profile. Dimensions include a maximum height of 0.010 (0.254) MAX, a lead height of 0.008-0.010 (0.203-0.254) TYP ALL LEADS, and a lead angle of 45°. The lead width is 0.004 (0.102). The lead height is 0.016-0.050 (0.406-1.270) TYP ALL LEADS. The lead width is 0.004 (0.102). The lead height is 0.016-0.050 (0.406-1.270) TYP ALL LEADS.
- Detail View:** Shows the lead profile with dimensions for the lead width (0.008-0.010), lead height (0.005 MIN), and lead angle (86°-94° TYP). The lead pitch is 0.018 ± 0.003 (0.457 ± 0.076). The lead width is 0.100-0.010 (2.540 ± 0.254). The lead height is 0.125-0.200 (3.175-5.080). The lead width is 0.150 (3.81) MIN. The lead height is 0.200 (5.080) MAX. The lead width is 0.020-0.060 (0.508-1.524).

Physical Dimensions inches (millimeters) (Continued)



14-Lead Molded Dual-In-Line Package (N)
Order Number DM74LS02N
NS Package Number N14A

N14A (REV F)

Physical Dimensions inches (millimeters) (Continued)

14-Lead Ceramic Flat Package (W)
Order Number 54LS02FMQB or DM54LS02W
NS Package Number W14B

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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

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