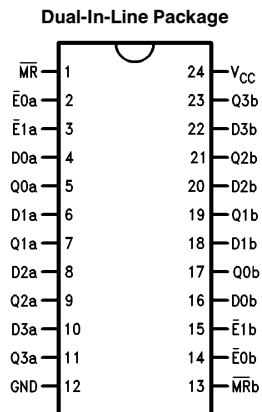


9308/DM9308 Dual 4-Bit Latch

General Description

The 9308 is a dual 4-bit D-type latch designed for general purpose storage applications in digital systems. Each latch contains both an active LOW Master Reset input and an active LOW Enable inputs. The 74116 is a pin for pin equivalent of the 9308.

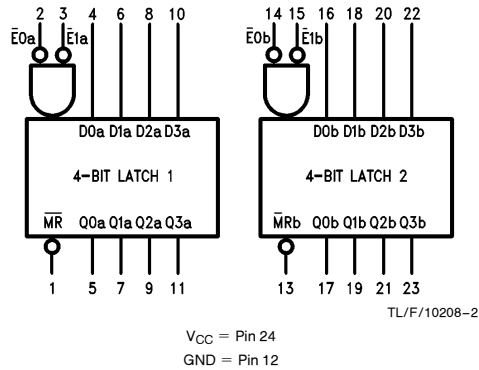
Connection Diagram



TL/F/10208-1

Order Number 9308DMQB, 9308FMQB or DM9308N
See NS Package Number J24A, N24A or W24C

Logic Symbol



Pin Names	Description
$D_{0a}-D_{3a}$ $D_{0b}-D_{3b}$	Parallel Latch Inputs
$\overline{E}_{0a}, \overline{E}_{1a}, \overline{E}_{0b}, \overline{E}_{1b}$	AND Enable Inputs (Active LOW)
$\overline{MR}_a, \overline{MR}_b$	Master Reset Inputs (Active LOW)
$Q_{0a}-Q_{3a}$ $Q_{0b}-Q_{3b}$	Parallel Latch Outputs

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	
MIL	−55°C to +125°C
COM	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	Military			Commercial			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
t _s (H)	Setup Time HIGH, D _n to \bar{E}_n	6			10			ns
t _h (H)	Hold Time HIGH, D _n to \bar{E}_n	4			−2.0			ns
t _s (L)	Setup Time LOW, D _n to \bar{E}_n	10			12			ns
t _h (L)	Hold Time LOW, D _n to \bar{E}_n	4			8			ns
t _w (L)	\bar{E}_n Pulse Width LOW	18			18			ns
t _w (L)	\overline{MR} Pulse Width LOW	18			18			ns
t _{rec}	Recovery Time, \overline{MR} to \bar{E}_n	10			8			ns

Electrical Characteristics over recommended operating free air temperature (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, 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)	MIL −20 COM −20		−70 −57	mA
I _{CC}	Supply Current	V _{CC} = Max (Note 3)			100	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, and the duration should not exceed one second.

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

Functional Description

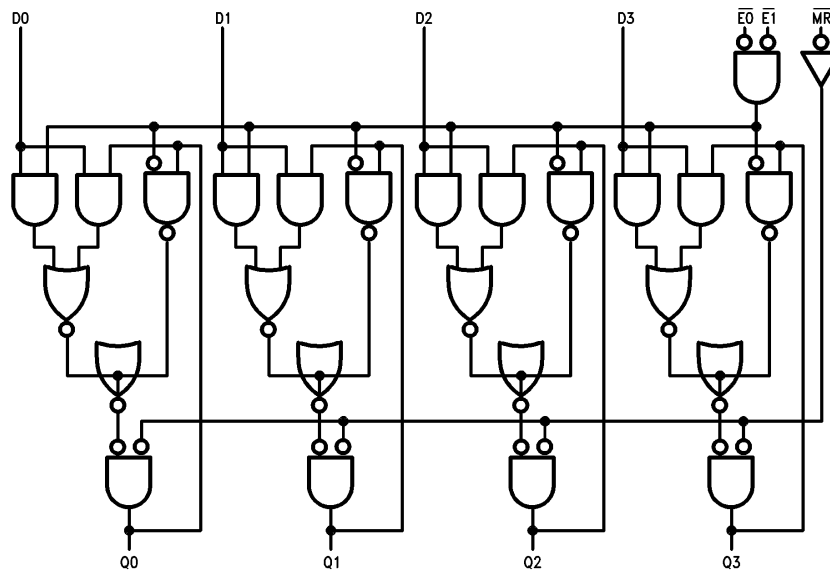
Data can be entered into the latch when both of the enable inputs are LOW. As long as this logic condition exists, the output of the latch will follow the input. If either of the enable inputs goes HIGH, the data present in the latch at that time is held in the latch and is no longer affected by data input. The master reset overrides all other input conditions and forces the outputs of all the latches LOW when a LOW signal is applied to the Master Reset input.

Truth Table

\overline{MR}	$\overline{E0}$	$\overline{E1}$	D	Q_n	Operation
H	L	L	L	L	Data Entry
H	L	L	H	H	Data Entry
H	L	H	X	Q_{n-1}	Hold
H	H	L	X	Q_{n-1}	Hold
H	H	H	X	Q_{n-1}	Hold
L	X	X	X	L	Reset

Q_{n-1} = Previous Output State
 Q_n = Present Output State
 H = HIGH Voltage Level
 L = LOW Voltage Level
 X = Immaterial

Logic Diagram



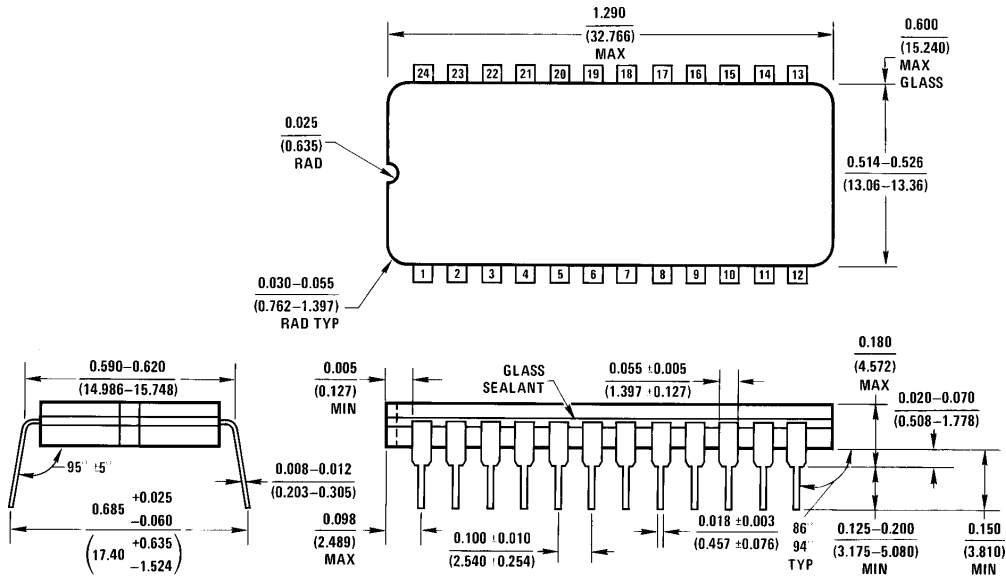
TL/F/10208-3

Switching Characteristics $V_{CC} = +5.0V, T_A = +25^\circ C$ (See Section 5 for test waveforms and output load.)

Symbol	Parameter	9308		Units
		$C_L = 15 \text{ pF}$ $R_L = 400 \Omega$		
		Min	Max	
t_{PLH} t_{PHL}	Propagation Delay \overline{E}_n to Q_n		30 22	ns
t_{PLH} t_{PHL}	Propagation Delay Dn to Q_n		15 18	ns
t_{PHL}	Propagation Delay \overline{MR} to Q_n		22	ns

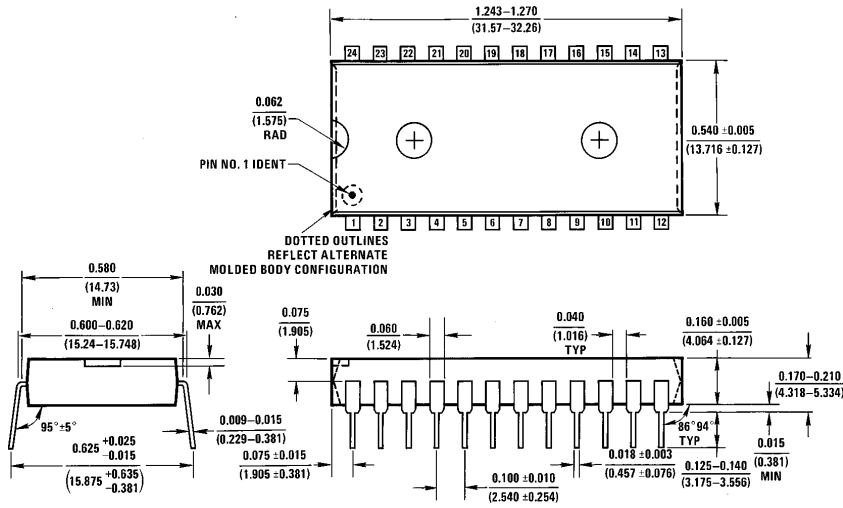


Physical Dimensions inches (millimeters)



J24A (REV H)

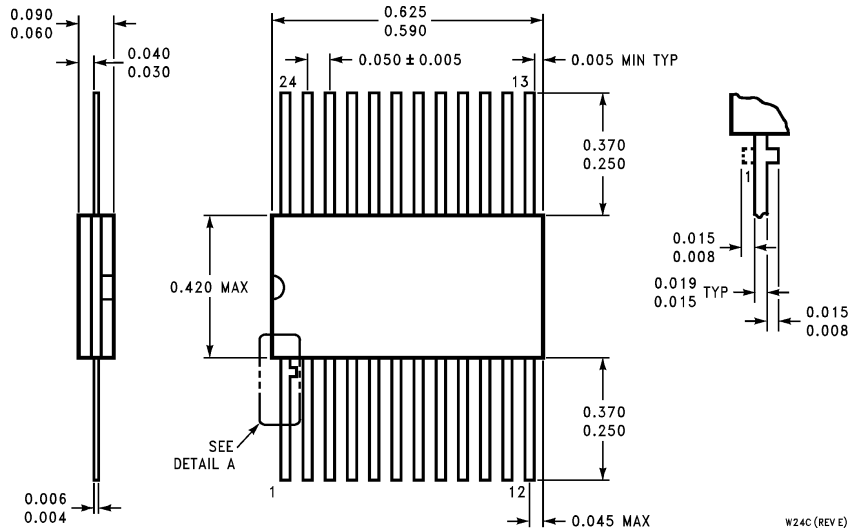
24-Lead Ceramic Dual-In-Line Package (J)
Order Number 9308DMQB
NS Package Number J24A



N24A (REV E)

24-Lead Molded Dual-In-Line Package (N)
Order Number DM9308N
NS Package Number N24A

Physical Dimensions inches (millimeters) (Continued)



24-Lead Ceramic Flat Package (W)
Order Number 9308FMQB
NS Package Number W24C

W24C (REV E)

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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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