54LS256, DM74LS256

Dual 4-Bit Addressable Latch

The 'LS256 is a dual 4-bit addressable latch with common control inputs; these include two Address inputs (A0, A1), an active LOW enable input ($\bar{E}$) and an active LOW Clear input ($\overline{CL}$). Each latch has a data input (D) and four outputs (Q0-Q3).

When the Enable ($\bar{E}$) is HIGH and the Clear input ($\overline{CL}$) is LOW, all outputs (Q0-Q3) are LOW. Dual 4-channel demultiplexing occurs when the $\overline{CL}$ and $\bar{E}$ are both LOW. When $\overline{CL}$ is HIGH and $\bar{E}$ is LOW, the selected output (Q0-Q3), determined by the Address inputs, follows D. When $\bar{E}$ goes HIGH, the contents of the latch are stored. When operating in the addressable latch mode ($\bar{E}$ = LOW, $\overline{CL}$ = HIGH), changing more than one bit of the Address (A0, A1) could impose a transient wrong address. Therefore, this should be done only while in the memory mode ($\bar{E}$ = $\overline{CL}$ = HIGH).

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
  - Class Q Military
  - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
  - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

National Semiconductor

54LS256/DM74LS256
Dual 4-Bit Addressable Latch

General Description

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could impose a transient wrong address. Therefore, this should be done only while in the memory mode ($\overline{E}$ = $\overline{CL}$ = HIGH).

Features
- Serial-to-parallel capability
- Output from each storage bit available
- Random (addressable) data entry
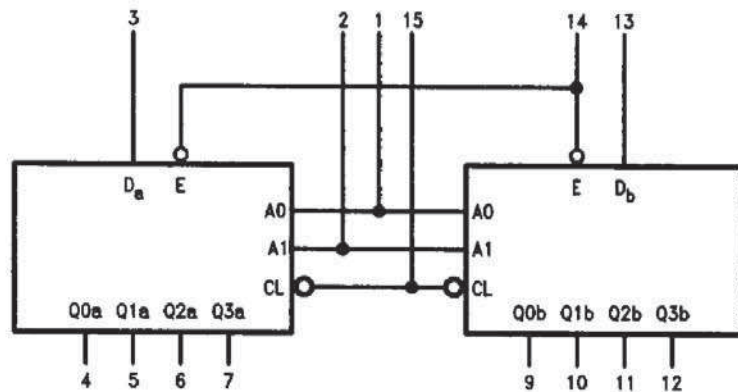- Easily expandable
- Active low common clear

Connection Diagram

Dual-In-Line Package
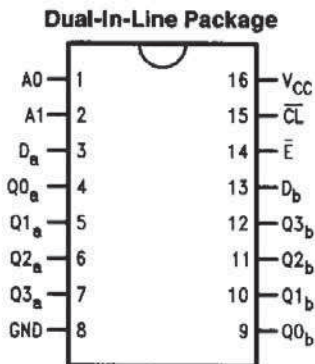
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Order Number 54LS256DMQB, 54LS256FMQB or DM74LS256N
See NS Package Number J16A, N16E or W16A

Logic Symbol

V_{CC} = Pin 16
GND = Pin 8

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| Pin Names	Description
A0, A1	Common Address Inputs
D_a, D_b	Data Inputs
$\overline{E}$	Common Enable Input (Active LOW)
$\overline{CL}$	Conditional Clear Input (Active LOW)
$Q0_a$–Q_3a	Side A Latch Outputs
$Q0_b$–Q_3b	Side B Latch Outputs

Truth Table

Inputs				Outputs				Mode
$\overline{CL}$	$\overline{E}$	A0	A1	Q0	Q1	Q2	Q3	
L	H	X	X	L	L	L	L	Clear
L	L	L	L	D	L	L	L	Demultiplex
L	L	H	L	L	D	L	L	
L	L	L	H	L	L	D	L	
L	L	H	H	L	L	L	D	
H	H	X	X	Q_{t-1}	Q_{t-1}	Q_{t-1}	Q_{t-1}	Memory
H	L	L	L	D	Q_{t-1}	Q_{t-1}	Q_{t-1}	Addressable Latch
H	L	H	L	Q_{t-1}	D	Q_{t-1}	Q_{t-1}	
H	L	L	H	Q_{t-1}	Q_{t-1}	D	Q_{t-1}	
H	L	H	H	Q_{t-1}	Q_{t-1}	Q_{t-1}	D	

$t-1$ = Bit time before address change or rising edge of E
H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

Mode Selection

$\overline{E}$	$\overline{CL}$	Mode
L	H	Addressable Latch
H	H	Memory
L	L	Active HIGH 4-Channel Demultiplexers
H	L	Clear

Logic Diagram

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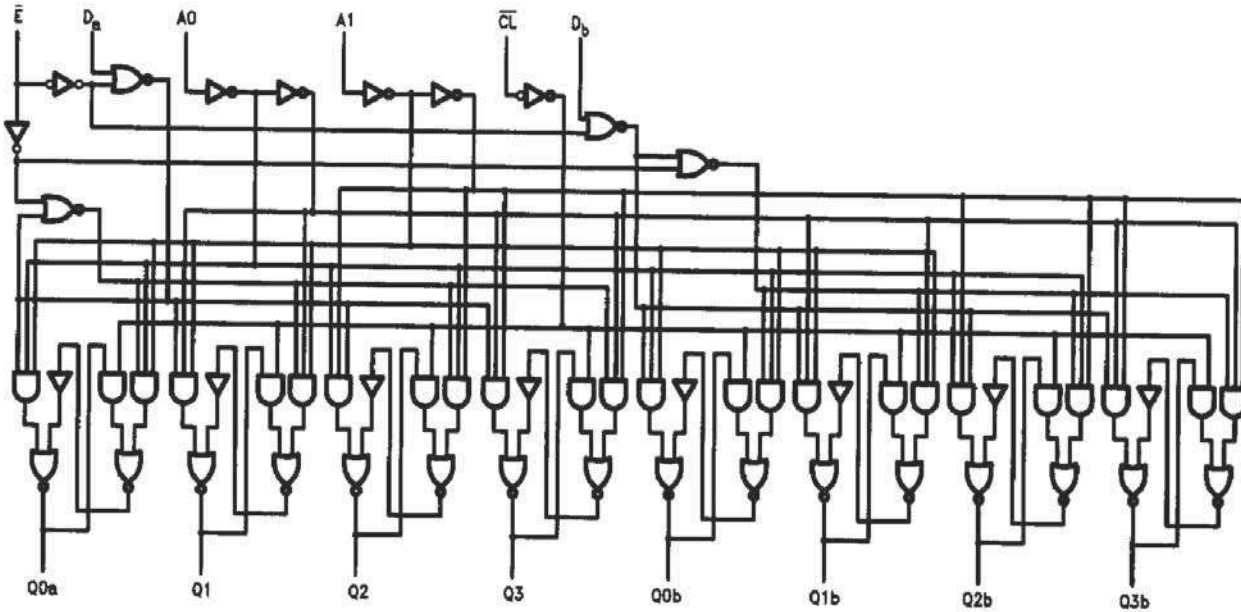
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Absolute Maximum Ratings (Note)

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	
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	54LS256			DM74LS256			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
t_s (H)	Setup Time HIGH, D_n to $\overline{E}$	20			20			ns
t_h (H)	Hold Time HIGH, D_n to $\overline{E}$	0			0			ns
t_s (L)	Setup Time LOW, D_n to $\overline{E}$	15			15			ns
t_h (L)	Hold Time LOW, D_n to $\overline{E}$	0			0			ns
t_s (H) t_s (L)	Setup Time HIGH or LOW, A_n to $\overline{E}$	0			0			ns
t_w (L)	$\overline{E}$ Pulse Width LOW	17			17			ns

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	54LS	2.5			V
			DM74	2.7	3.4		
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max V_{IH} = Min	54LS			0.4	V
			DM74		0.35	0.5	
		I_{OL} = 4 mA, V_{CC} = Min	DM74		0.25	0.4	
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 10V	Inputs			0.1	mA
			$\overline{E}$			0.2	
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 2.7V	Inputs			20	μA
			$\overline{E}$			40	
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.4V	Inputs			−0.4	mA
			$\overline{E}$			−0.8	
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)	54LS	−20		−100	mA
			DM74	−20		−100	
I_{CC}	Supply Current	V_{CC} = Max				25	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.

Switching Characteristics

$V_{CC} = +5.0V$, $T_A = +25°C$ (See Section 1 for waveforms and load configurations)

Symbol	Parameter	$R_L = 2\,k\Omega$ $C_L = 15\,pF$ Max	Units
t_{PLH} t_{PHL}	Propagation Delay $\overline{E}$ to Q_n	27 24	ns
t_{PLH} t_{PHL}	Propagation Delay D_n to Q_n	30 20	ns
t_{PLH} t_{PHL}	Propagation Delay A_n to Q_n	30 29	ns
t_{PLH}	Propagation Delay $\overline{CL}$ to Q_n	18	ns

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