

54298 Quad 2-Port Register (Multiplexer With Storage)

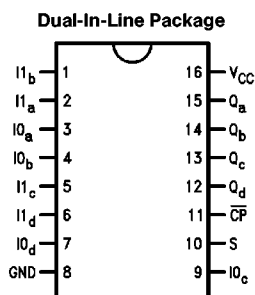
General Description

The '298 is a quad 2-port register. It is the logical equivalent of a quad 2-input multiplexer followed by a quad 4-bit edge-triggered register. A Common Select input selects between two 4-bit input ports (data sources). The selected data is transferred to the output register synchronous with the HIGH-to-LOW transition of the Clock input.

Features

- Select from two data sources
- Fully edge-triggered operation

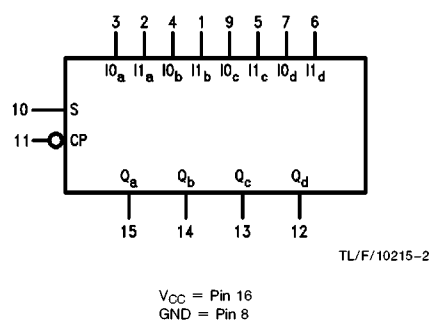
Connection Diagram



TL/F/10215-1

Order Number 54298DMQB or 54298FMQB
See NS Package Number J16A or W16A

Logic Symbol



Pin Names	Description
S	Common Select Input
CP	Clock Pulse Input (Active Falling Edge)
I0a-I0d	Source 0 Data Inputs
I1a-I1d	Source 1 Data Inputs
Qa, Qd	Flip-Flop 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	−55°C to +125°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 operation.

Recommended Operating Conditions

Symbol	Parameter	54298			Units
		Min	Nom	Max	
V _{CC}	Supply Voltage	4.5	5	5.5	V
V _{IH}	High Level Input Voltage	2			V
V _{IL}	Low Level Input Voltage			0.8	V
I _{OH}	High Level Output Current			−0.8	mA
I _{OL}	Low Level Output Current			16	mA
T _A	Free Air Operating Temperature	−55		125	°C
t _s (H) t _s (L)	Setup Time HIGH or LOW S to \overline{CP}	25 25			ns
t _h (H) t _h (L)	Hold Time HIGH or LOW S to \overline{CP}	0 0			ns
t _s (H) t _s (L)	Setup Time HIGH or LOW I _{0x} or I _{1x} to \overline{CP}	15 15			ns
t _h (H) t _h (L)	Hold Time HIGH or LOW I _{0x} or I _{1x} to \overline{CP}	5.0 5.0			ns
t _w (H) t _w (L)	\overline{CP} Pulse Width HIGH or LOW	20 20			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 = −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)	−20		−57	mA
I _{CC}	Supply Current	V _{CC} = Max (Note 3)			65	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.

Switching Characteristics $V_{CC} = +5.0V$, $T_A = +25^\circ C$ (See Section 1 for test waveforms and output load)

Symbol	Parameter	$C_L = 15\text{ pF}$ $R_L = 400\Omega$		Units
		Min	Max	
t_{PLH} t_{PHL}	Propagation Delay, \overline{CP} to Q_n		27 32	ns

Functional Description

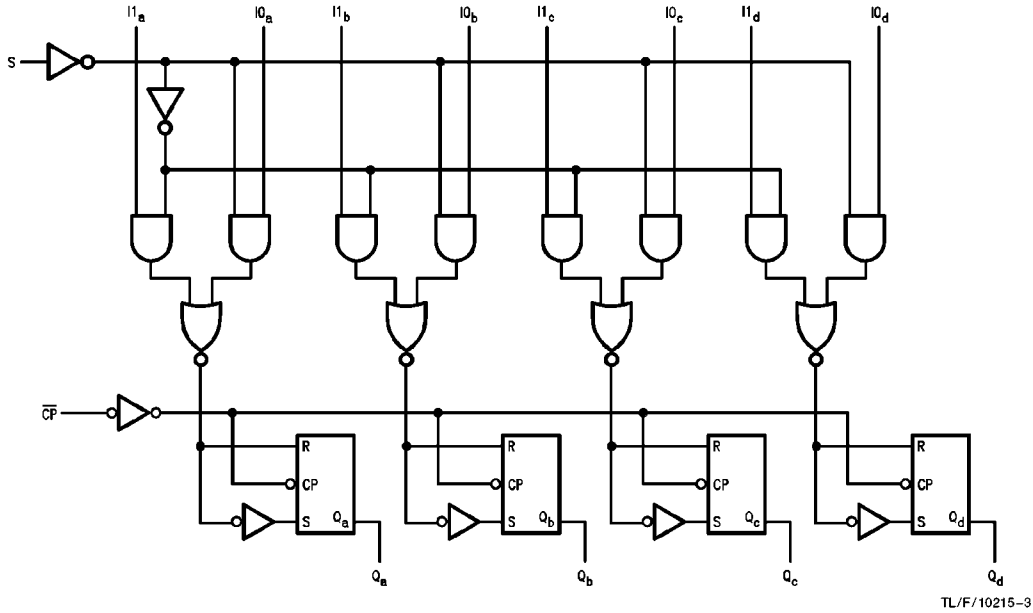
This device is a high speed quad 2-port register. It selects four bits of data from two sources (ports) under the control of a Common Select input (S). The selected data is transferred to the 4-bit output register synchronous with the HIGH-to-LOW transition of the Clock input (\overline{CP}). The 4-bit output register is fully edge-triggered. The Data inputs (I_{nx}) and Select input (S) need be stable only one setup time prior to the HIGH-to-LOW transition of the clock for predictable operation.

Truth Table

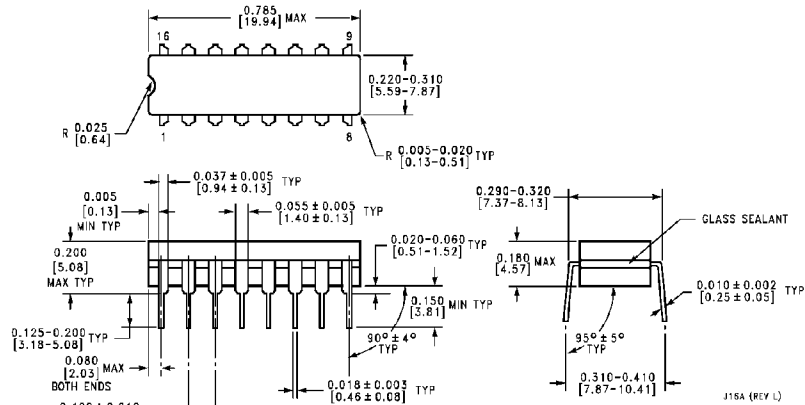
Inputs			Output
S	I_{0x}	I_{1x}	Q_x
l	l	X	L
l	h	X	H
h	X	l	L
h	X	h	H

l = LOW Voltage Level one setup time prior to the HIGH-to-LOW clock transition.
h = HIGH Voltage Level one setup time prior to the HIGH-to-LOW clock transition.
H = HIGH Voltage level
L = LOW Voltage level
X = Immaterial

Logic Diagram



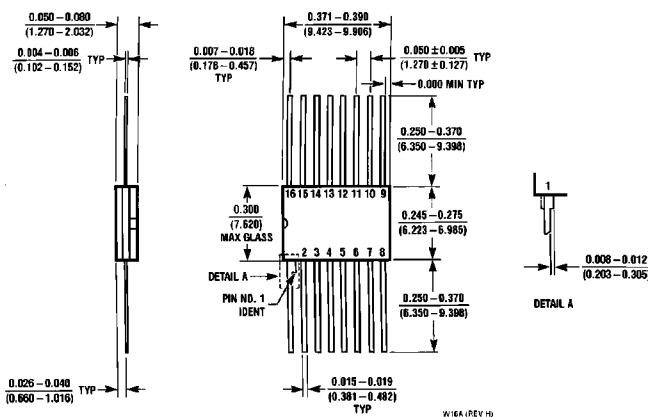
Physical Dimensions inches (millimeters)



16-Lead Ceramic Dual-In-Line Package (J)

Order Number 54298DMQB

NS Package Number J16A



16-Lead Ceramic Flat Package (W)

Order Number 54298FMQB

NS Package Number W16A

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
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 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: cnlwoe@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.
13th 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