National Semiconductor

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54298
Quad 2-Port Register (Multiplexer With Storage)

General Description

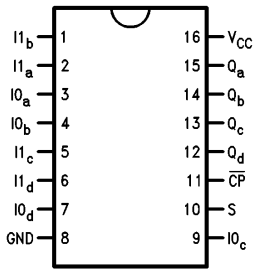
The '298 is a quad 2-port register. It is the logical equivalent of a quad 2-input multiplexer followed by a quad 4-bit edge-triggered register. A Common Select input selects between two 4-bit input ports (data sources). The selected data is transferred to the output register synchronous with the HIGH-to-LOW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

Features

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

Connection Diagram

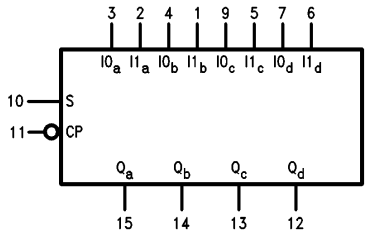
Dual-In-Line Package



TL/F/10215–1

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

Logic Symbol



TL/F/10215–2

V_{CC} = Pin 16
GND = Pin 8

Pin Names	Description
S	Common Select Input
$\overline{CP}$	Clock Pulse Input (Active Falling Edge)
I0a–I0d	Source 0 Data Inputs
I1a–I1d	Source 1 Data Inputs
Qa, Qd	Flip-Flop Outputs

RRD-B30M105/Printed in U. S. A.

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

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

Functional Description

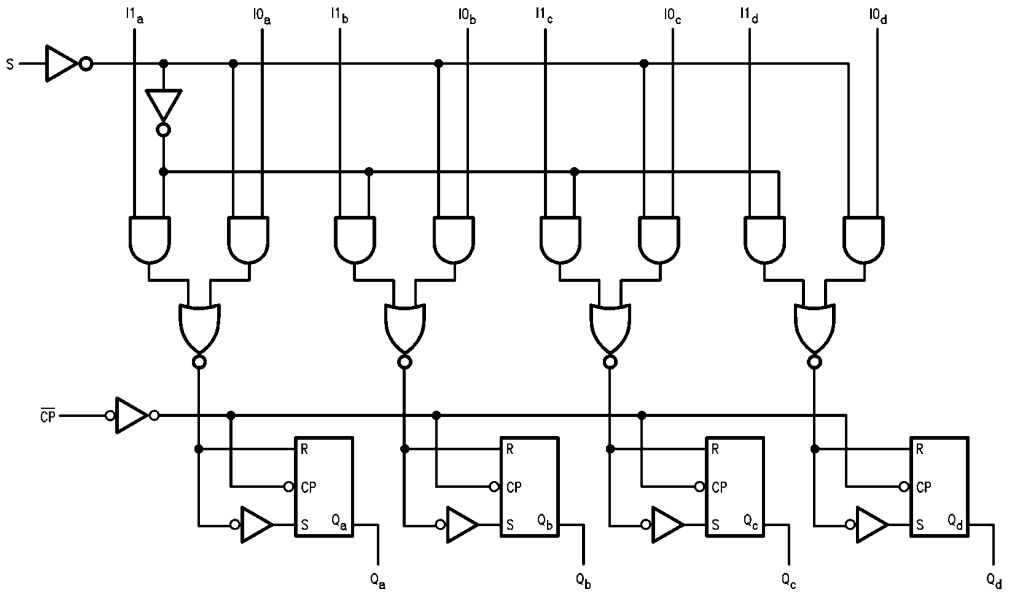
This device is a high speed quad 2-port register. It selects four bits of data from two sources (ports) under the control of a Common Select input (S). The selected data is transferred to the 4-bit output register synchronous with the HIGH-to-LOW transition of the Clock input ($\overline{CP}$). The 4-bit 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

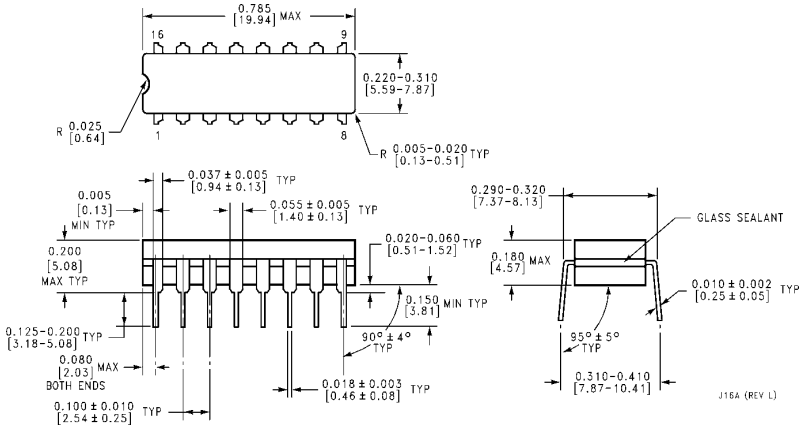
l = LOW Voltage Level one setup time prior to the HIGH-to-LOWclock transition.
h = HIGH Voltage Level one setup time prior to the HIGH-to-LOW clock transition.
H = HIGH Voltage level
L = LOW Voltage level
X = Immaterial

Logic Diagram

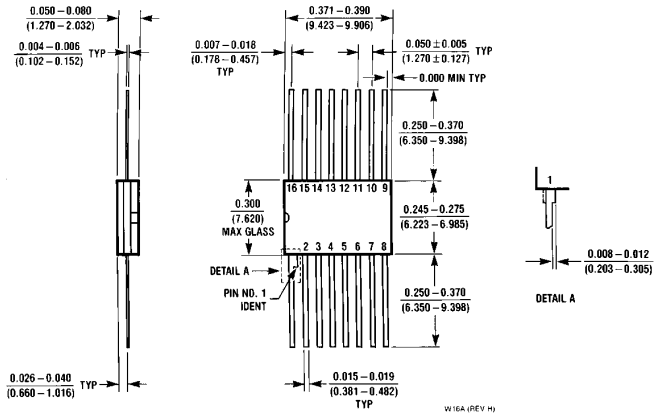


TL/F/10215–3

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

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