

SN74LS670

4 x 4 Register File with 3-State Outputs

The TTL/MSI SN74LS670 is a high-speed, low-power 4 x 4 Register File organized as four words by four bits. Separate read and write inputs, both address and enable, allow simultaneous read and write operation.

The 3-state outputs make it possible to connect up to 128 outputs to increase the word capacity up to 512 words. Any number of these devices can be operated in parallel to generate an n-bit length.

- Simultaneous Read/Write Operation
- Expandable to 512 Words by n-Bits
- Typical Access Time to 20 ns
- 3-State Outputs for Expansion
- Typical Power Dissipation of 125 mW

GUARANTEED OPERATING RANGES

Symbol	Parameter	Min	Typ	Max	Unit
V _{CC}	Supply Voltage	4.75	5.0	5.25	V
T _A	Operating Ambient Temperature Range	0	25	70	°C
I _{OH}	Output Current – High			-2.6	mA
I _{OL}	Output Current – Low			24	mA

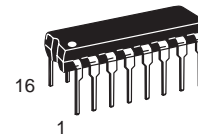


ON Semiconductor

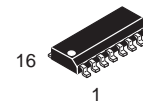
Formerly a Division of Motorola

<http://onsemi.com>

**LOW
POWER
SCHOTTKY**



**PLASTIC
N SUFFIX
CASE 648**



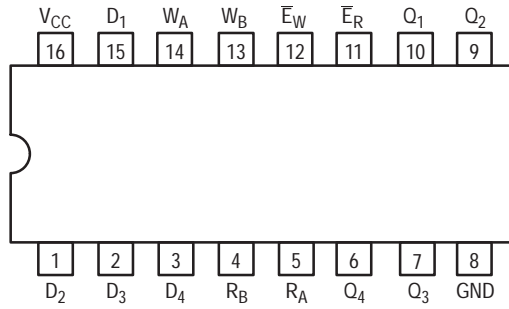
**SOIC
D SUFFIX
CASE 751B**

ORDERING INFORMATION

Device	Package	Shipping
SN74LS670N	16 Pin DIP	2000 Units/Box
SN74LS670D	16 Pin	2500/Tape & Reel

SN74LS670

CONNECTION DIAGRAM DIP (TOP VIEW)



NOTE:
The Flatpak version has the same pinouts (Connection Diagram) as the Dual In-Line Package.

PIN NAMES

D ₁ - D ₄	Data Inputs
W _A , W _B	Write Address Inputs
\bar{E}_W	Write Enable (Active LOW) Input
R _A , R _B	Read Address Inputs
\bar{E}_R	Read Enable (Active LOW) Input
Q ₁ - Q ₄	Outputs

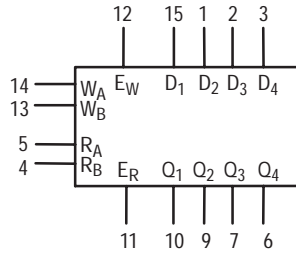
LOADING (Note a)

HIGH	LOW
0.5 U.L.	0.25 U.L.
0.5 U.L.	0.25 U.L.
1.0 U.L.	0.5 U.L.
0.5 U.L.	0.25 U.L.
1.5 U.L.	0.75 U.L.
65 U.L.	15 U.L.

NOTES:

a) 1 TTL Unit Load (U.L.) = 40 μ A HIGH/1.6 mA LOW.

LOGIC SYMBOL

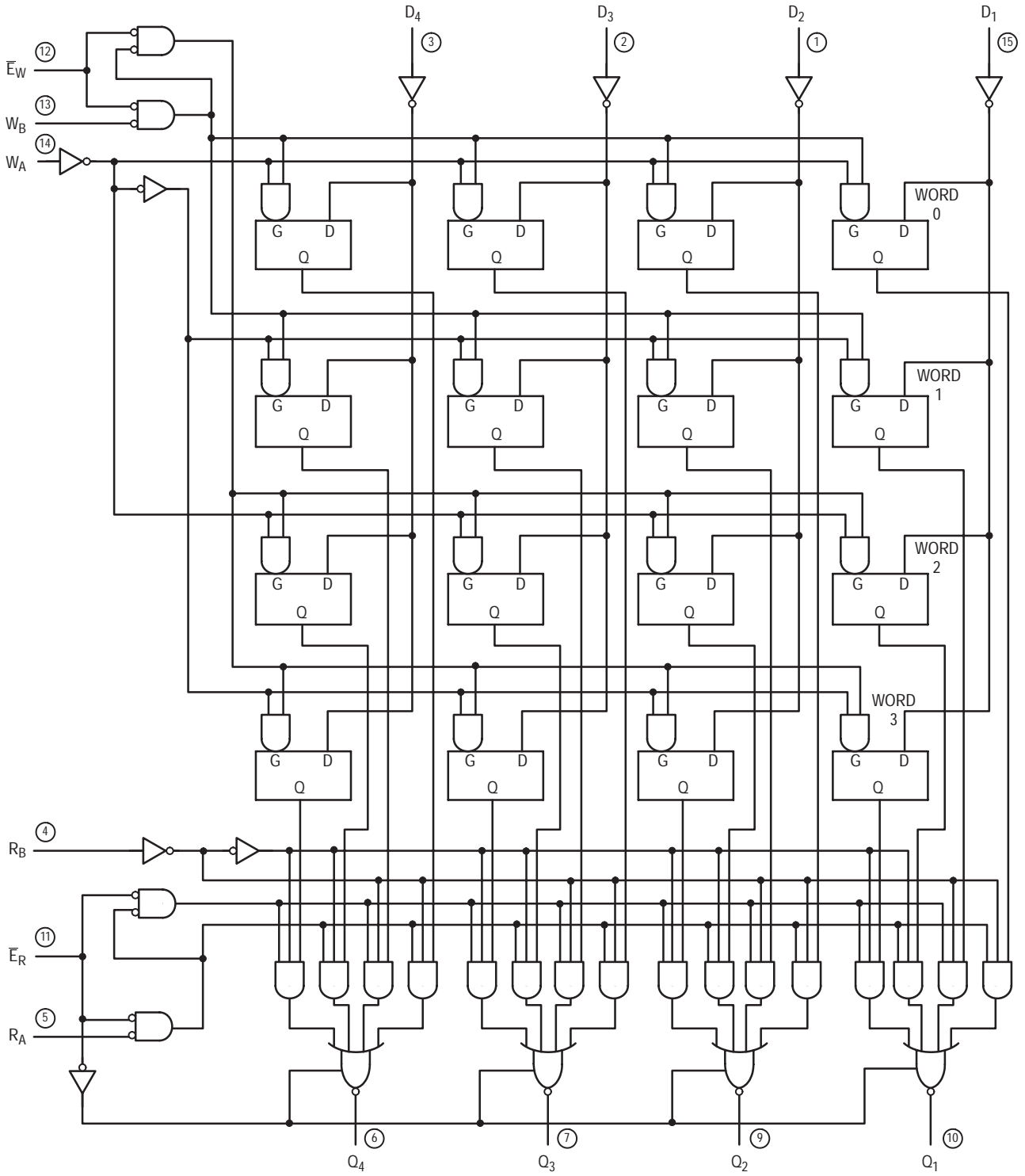


V_{CC} = PIN 16

GND = PIN 8

SN74LS670

LOGIC DIAGRAM



V_{CC} = PIN 16
GND = PIN 8
○ = PIN NUMBERS

SN74LS670

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
V_{IH}	Input HIGH Voltage	2.0			V	Guaranteed Input HIGH Voltage for All Inputs
V_{IL}	Input LOW Voltage			0.8	V	Guaranteed Input LOW Voltage for All Inputs
V_{IK}	Input Clamp Diode Voltage		-0.65	-1.5	V	$V_{CC} = \text{MIN}$, $I_{IN} = -18 \text{ mA}$
V_{OH}	Output HIGH Voltage	2.4	3.1		V	$V_{CC} = \text{MIN}$, $I_{OH} = \text{MAX}$, $V_{IN} = V_{IH}$ or V_{IL} per Truth Table
V_{OL}	Output LOW Voltage		0.25	0.4	V	$I_{OL} = 12 \text{ mA}$ $V_{CC} = V_{CC} \text{ MIN}$, $V_{IN} = V_{IL}$ or V_{IH} per Truth Table
			0.35	0.5	V	
I_{OZH}	Output Off Current HIGH			20	μA	$V_{CC} = \text{MAX}$, $V_O = 2.7 \text{ V}$
I_{OZL}	Output Off Current LOW			-20	μA	$V_{CC} = \text{MAX}$, $V_O = 0.4 \text{ V}$
I_{IH}	Input HIGH Current D, R, W E_W E_R			20 40 60	μA	$V_{CC} = \text{MAX}$, $V_{IN} = 2.7 \text{ V}$
	D, R, W E_W E_R			0.1 0.2 0.3	mA	$V_{CC} = \text{MAX}$, $V_{IN} = 7.0 \text{ V}$
I_{IL}	Input LOW Current D, R, W E_W E_R			-0.4 -0.8 -1.2	mA	$V_{CC} = \text{MAX}$, $V_{IN} = 0.4 \text{ V}$
I_{OS}	Short Circuit Current (Note 1)	-30		-130	mA	$V_{CC} = \text{MAX}$
I_{CC}	Power Supply Current			50	mA	$V_{CC} = \text{MAX}$

Note 1: Not more than one output should be shorted at a time, nor for more than 1 second.

SN74LS670

AC CHARACTERISTICS (T_A = 25°C)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
t _{PLH} t _{PHL}	Propagation Delay, R _A or R _B to Output		23 25	40 45	ns	V _{CC} = 5.0 V, C _L = 45 pF
t _{PLH} t _{PHL}	Propagation Delay, \bar{E}_W to Output		26 28	45 50	ns	
t _{PLH} t _{PHL}	Propagation Delay, Data to Output		25 23	45 40	ns	
t _{PZH} t _{PZL}	Output Enable Time		15 22	35 40	ns	
t _{PLZ} t _{PHZ}	Output Disable Time		16 30	35 50	ns	C _L = 5.0 pF

AC SETUP REQUIREMENTS (T_A = 25°C)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
t _W	Pulse Width	25			ns	V _{CC} = 5.0 V
t _S	Setup Time, (D)	10			ns	
t _S	Setup Time, (W)	15			ns	
t _H	Hold Time, (D)	15			ns	
t _H	Hold Time, (W)	5.0			ns	
t _{rec}	Recovery Time	25			ns	

AC WAVEFORMS

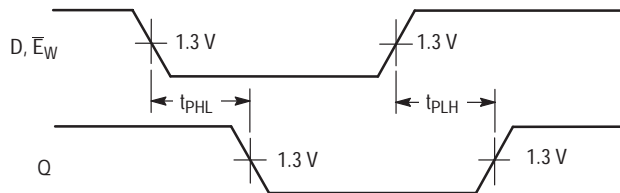


Figure 1.

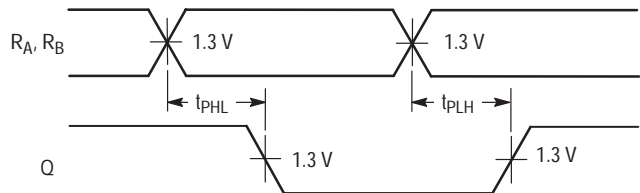


Figure 2.

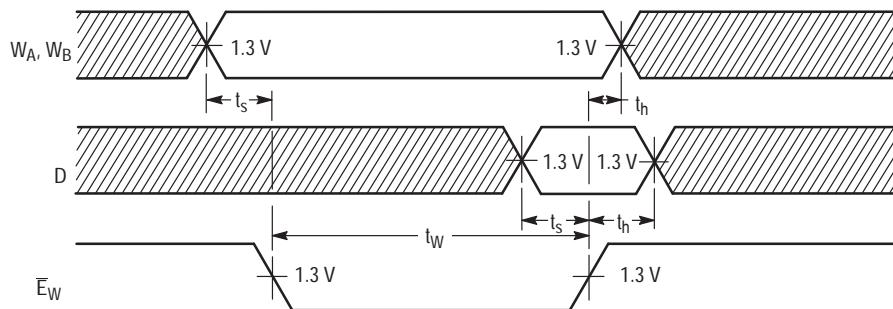
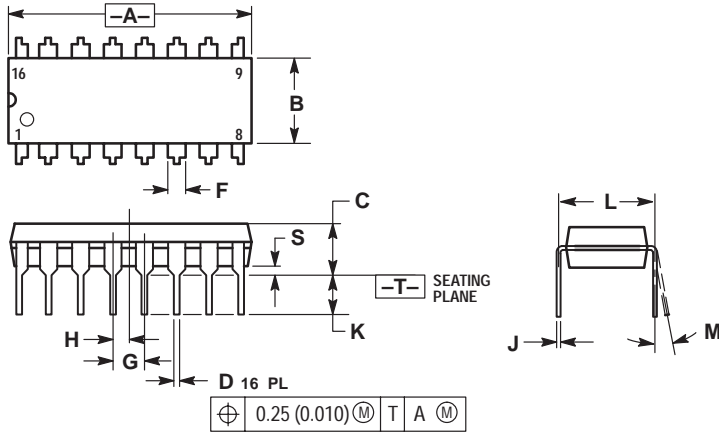


Figure 3.

SN74LS670

PACKAGE DIMENSIONS

N SUFFIX
PLASTIC PACKAGE
CASE 648-08
ISSUE R



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0° 10°		0° 10°	
S	0.020	0.040	0.51	1.01

SN74LS670

PACKAGE DIMENSIONS

D SUFFIX PLASTIC SOIC PACKAGE CASE 751B-05 ISSUE J



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0° 7°		0° 7°	
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer.

PUBLICATION ORDERING INFORMATION

North America Literature Fulfillment:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: ONlit@hibbertco.com

N. American Technical Support: 800-282-9855 Toll Free USA/Canada

EUROPE: LDC for ON Semiconductor – European Support

German Phone: (+1) 303-308-7140 (M-F 2:30pm to 5:00pm Munich Time)
Email: ONlit-german@hibbertco.com
French Phone: (+1) 303-308-7141 (M-F 2:30pm to 5:00pm Toulouse Time)
Email: ONlit-french@hibbertco.com
English Phone: (+1) 303-308-7142 (M-F 1:30pm to 5:00pm UK Time)
Email: ONlit@hibbertco.com

ASIA/PACIFIC: LDC for ON Semiconductor – Asia Support

Phone: 303-675-2121 (Tue-Fri 9:00am to 1:00pm, Hong Kong Time)
Toll Free from Hong Kong 800-4422-3781
Email: ONlit-asia@hibbertco.com

JAPAN: ON Semiconductor, Japan Customer Focus Center

4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan 141-8549
Phone: 81-3-5487-8345
Email: r14153@onsemi.com

Fax Response Line: 303-675-2167
800-344-3810 Toll Free USA/Canada

ON Semiconductor Website: <http://onsemi.com>

For additional information, please contact your local Sales Representative.