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

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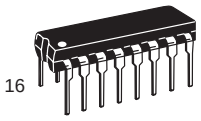
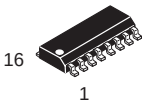
LOW POWER SCHOTTKY



PLASTIC
N SUFFIX
CASE 648

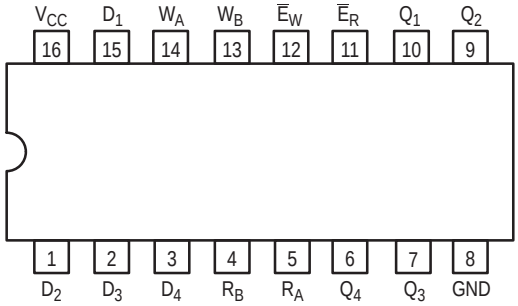


SOIC
D SUFFIX
CASE 751B

ORDERING INFORMATION

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

CONNECTION DIAGRAM DIP (TOP VIEW)

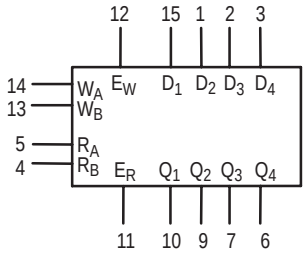


NOTE:
The Flatpak version has the same pinouts (Connection Diagram) as the Dual In-Line Package.

PIN NAMES		LOADING (Note a) HIGH	LOW
$D_1 – D_4$	Data Inputs	0.5 U.L.	0.25 U.L.
W_A, W_B	Write Address Inputs	0.5 U.L.	0.25 U.L.
$\overline{E}_W$	Write Enable (Active LOW) Input	1.0 U.L.	0.5 U.L.
R_A, R_B	Read Address Inputs	0.5 U.L.	0.25 U.L.
$\overline{E}_R$	Read Enable (Active LOW) Input	1.5 U.L.	0.75 U.L.
$Q_1 – Q_4$	Outputs	65 U.L.	15 U.L.

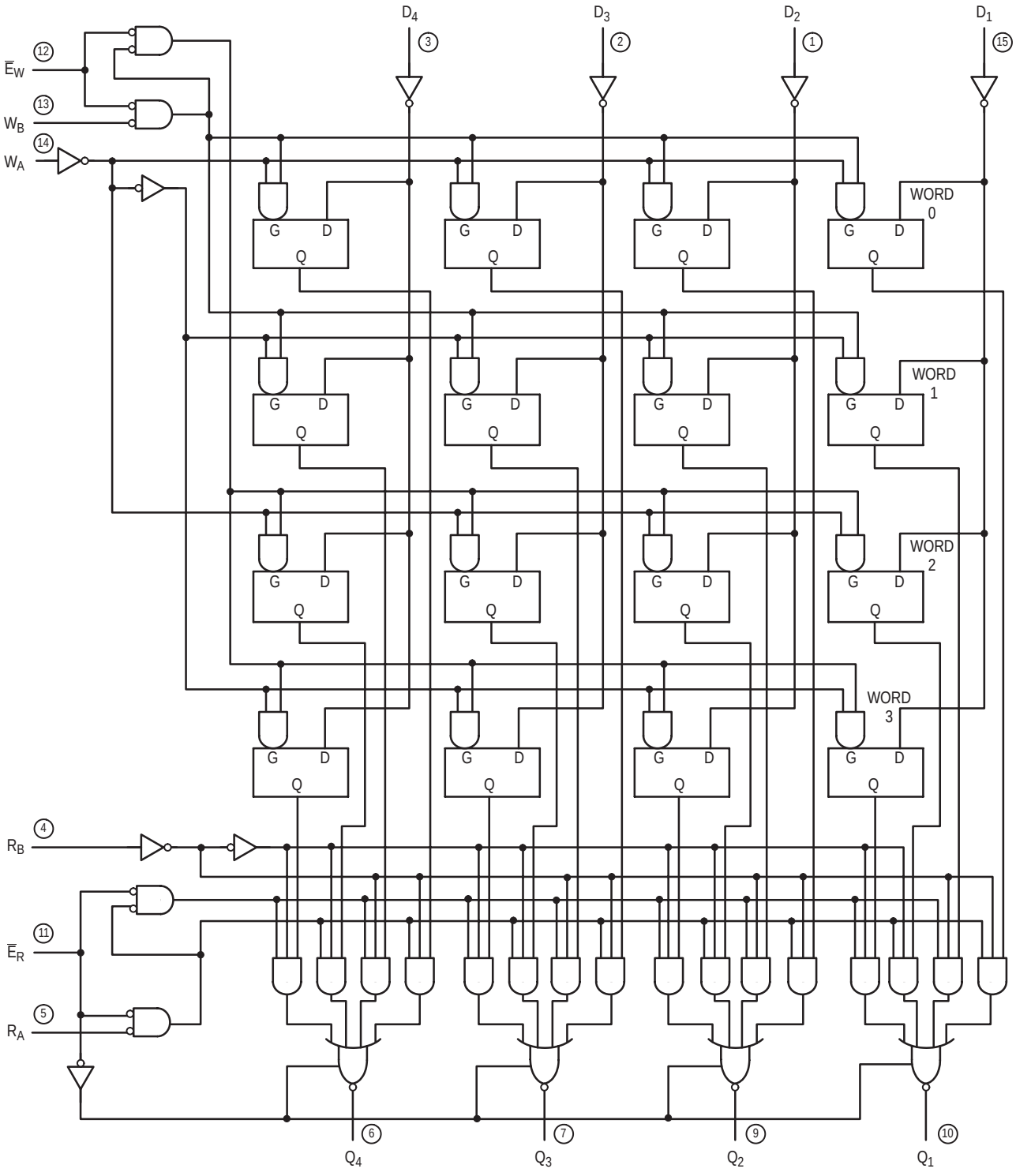
NOTES:
a) 1 TTL Unit Load (U.L.) = 40 μA HIGH/1.6 mA LOW.

LOGIC SYMBOL



V_{CC} = PIN 16
GND = PIN 8

LOGIC DIAGRAM



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

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} = MIN, I_{IN} = –18 mA	
V_{OH}	Output HIGH Voltage	2.4	3.1		V	V_{CC} = MIN, I_{OH} = MAX, V_{IN} = V_{IH} or V_{IL} per Truth Table	
V_{OL}	Output LOW Voltage		0.25	0.4	V	I_{OL} = 12 mA	V_{CC} = V_{CC} MIN, V_{IN} = V_{IL} or V_{IH} per Truth Table
			0.35	0.5	V	I_{OL} = 24 mA	
I_{OZH}	Output Off Current HIGH			20	μA	V_{CC} = MAX, V_O = 2.7 V	
I_{OZL}	Output Off Current LOW			–20	μA	V_{CC} = MAX, V_O = 0.4 V	
I_{IH}	Input HIGH Current D, R, W $\overline{E}_W$ $\overline{E}_R$			 20 40 60	μA	V_{CC} = MAX, V_{IN} = 2.7 V	
	D, R, W $\overline{E}_W$ $\overline{E}_R$			0.1 0.2 0.3	mA	V_{CC} = MAX, V_{IN} = 7.0 V	
I_{IL}	Input LOW Current D, R, W $\overline{E}_W$ $\overline{E}_R$			 –0.4 –0.8 –1.2	mA	V_{CC} = MAX, V_{IN} = 0.4 V	
I_{OS}	Short Circuit Current (Note 1)	–30		–130	mA	V_{CC} = MAX	
I_{CC}	Power Supply Current			50	mA	V_{CC} = MAX	

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

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, $\overline{E}_W$ 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

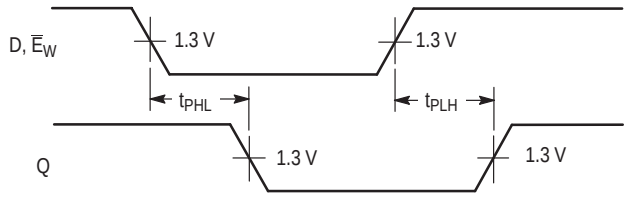


Figure 1.

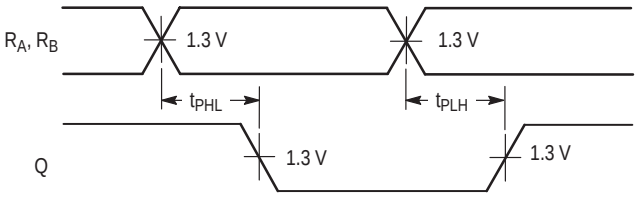


Figure 2.

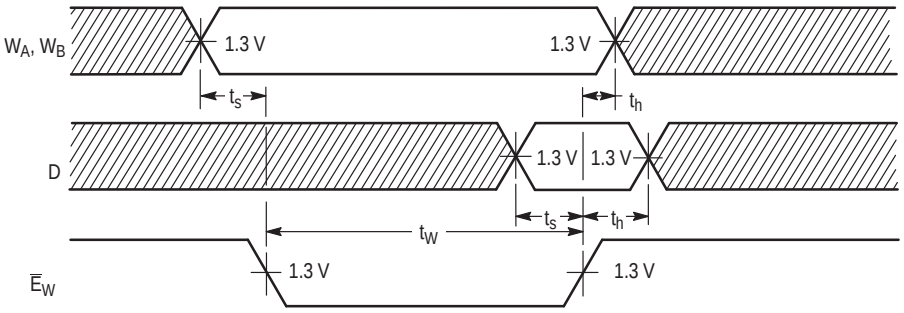
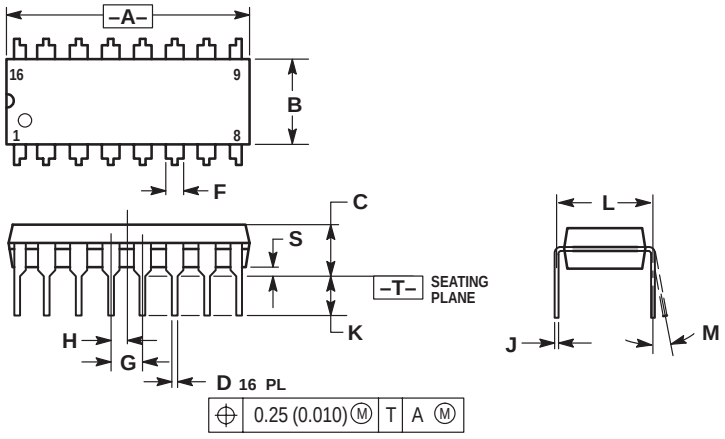


Figure 3.

PACKAGE DIMENSIONS

N SUFFIX
PLASTIC PACKAGE
CASE 648–08
ISSUE R

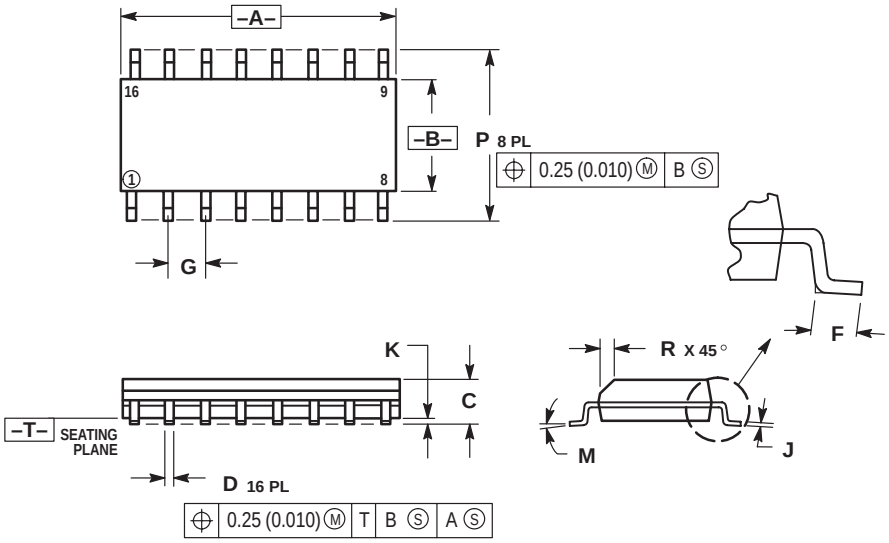


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

	INCHES		MILLIMETERS	
DIM	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

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.

	MILLIMETERS		INCHES	
DIM	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

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