



4 x 4 REGISTER FILE WITH 3-STATE OUTPUTS

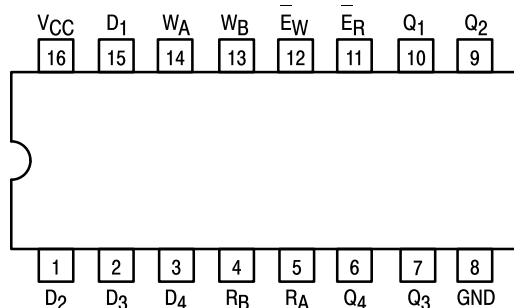
The TTL/MSI SN54/74LS670 is a high-speed, low-power 4 x 4 Register File organized as four words by four bits. Separate read and write inputs, both address and enable, allow simultaneous read and write operation.

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.

The SN54/74LS170 provides a similar function to this device but it features open-collector outputs.

- 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

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
E _W	Write Enable (Active LOW) Input
R _A , R _B	Read Address Inputs
E _R	Read Enable (Active LOW) Input
Q ₁ – Q ₄	Outputs (Note b)

LOADING (Note a)

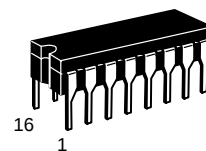
	HIGH	LOW
D ₁ – D ₄	0.5 U.L.	0.25 U.L.
W _A , W _B	0.5 U.L.	0.25 U.L.
E _W	1.0 U.L.	0.5 U.L.
R _A , R _B	0.5 U.L.	0.25 U.L.
E _R	1.5 U.L.	0.75 U.L.
Q ₁ – Q ₄	65 (25) U.L.	15 (7.5) U.L.

NOTES:

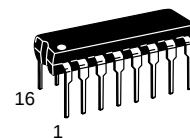
- a) 1 TTL Unit Load (U.L.) = 40 μ A HIGH/1.6 mA LOW.
b) The Output LOW drive factor is 7.5 U.L. for Military (54) and 15 U.L. for Commercial (74) Temperature Ranges. The Output HIGH drive factor is 25 U.L. for Military and 65 U.L. for Commercial Temperature Ranges.

SN54/74LS670

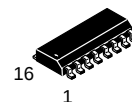
4 x 4 REGISTER FILE WITH 3-STATE OUTPUTS LOW POWER SCHOTTKY



J SUFFIX
CERAMIC
CASE 620-09



N SUFFIX
PLASTIC
CASE 648-08

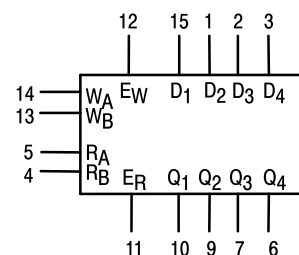


D SUFFIX
SOIC
CASE 751B-03

ORDERING INFORMATION

SN54LSXXXJ	Ceramic
SN74LSXXXN	Plastic
SN74LSXXXD	SOIC

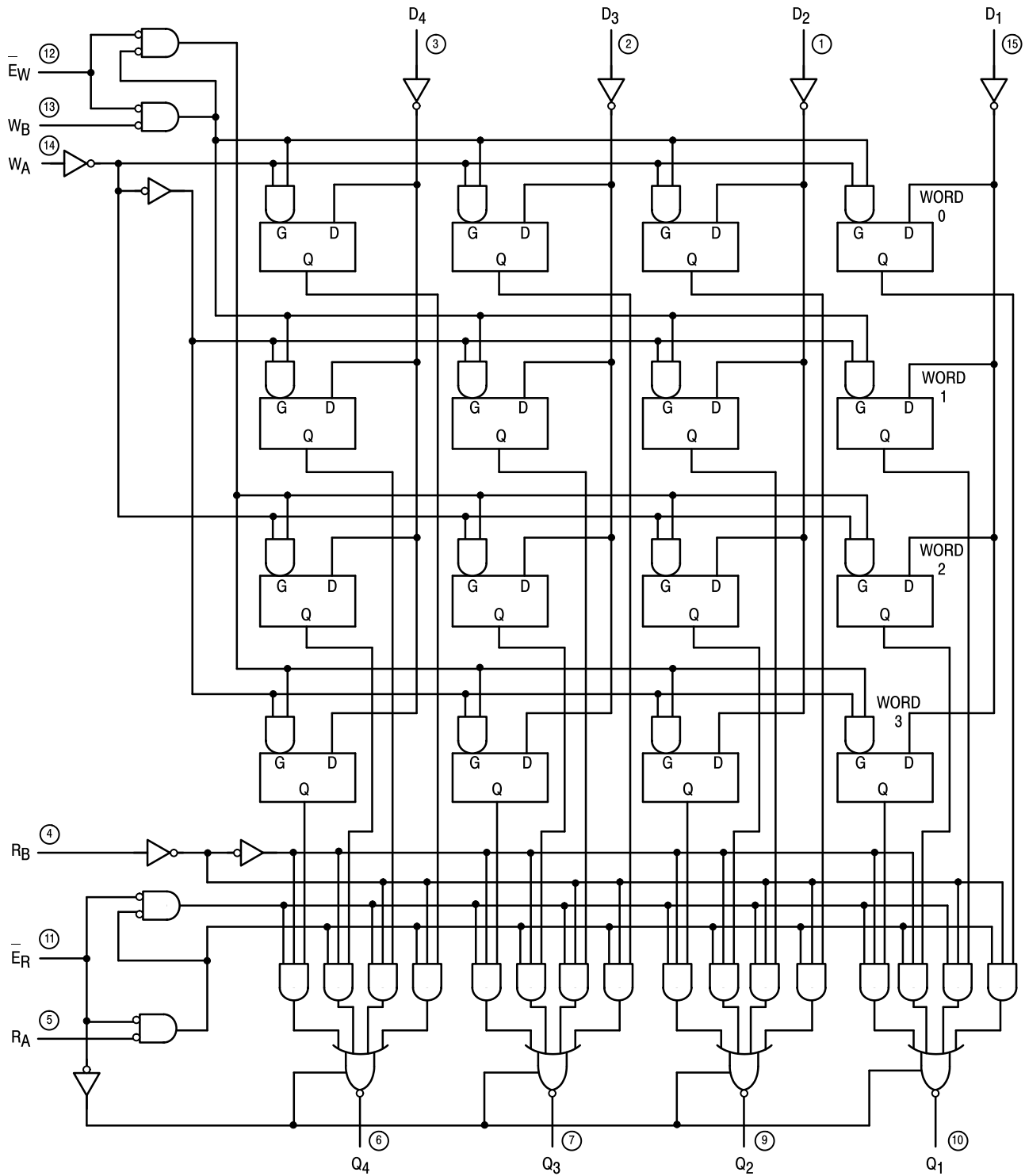
LOGIC SYMBOL



V_{CC} = PIN 16
GND = PIN 8

SN54/74LS670

LOGIC DIAGRAM



VCC = PIN 16
 GND = PIN 8
 ○ = PIN NUMBERS

SN54/74LS670

GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V _{CC}	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
T _A	Operating Ambient Temperature Range	54 74	−55 0	25 25	125 70	°C
I _{OH}	Output Current — High	54 74			−1.0 −2.6	mA
I _{OL}	Output Current — Low	54 74			12 24	mA

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	54			0.7	V	Guaranteed Input LOW Voltage for All Inputs
		74			0.8		
V _{IK}	Input Clamp Diode Voltage			−0.65	−1.5	V	V _{CC} = MIN, I _{IN} = −18 mA
V _{OH}	Output HIGH Voltage	54	2.4	3.4		V	V _{CC} = MIN, I _{OH} = MAX, V _{IN} = V _{IH} or V _{IL} per Truth Table
		74	2.4	3.1		V	
V _{OL}	Output LOW Voltage	54, 74		0.25	0.4	V	I _{OL} = 12 mA
		74		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 E _W E _R				20 40 60	μA	V _{CC} = MAX, V _{IN} = 2.7 V
	D, R, W E _W 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 E _W 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.

SN54/74LS670

AC CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

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	$V_{CC} = 5.0\text{ V}$, $C_L = 45\text{ pF}$
t_{PLH} t_{PHL}	Propagation Delay, 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	$C_L = 5.0\text{ pF}$

AC SETUP REQUIREMENTS ($T_A = 25^\circ\text{C}$)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
t_W	Pulse Width	25			ns	$V_{CC} = 5.0\text{ V}$
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

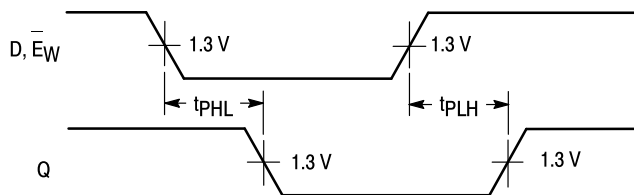


Figure 1

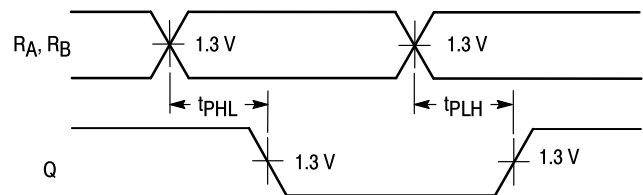


Figure 2

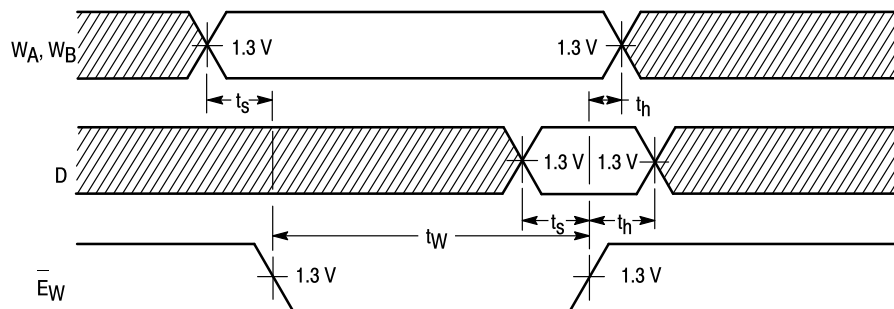
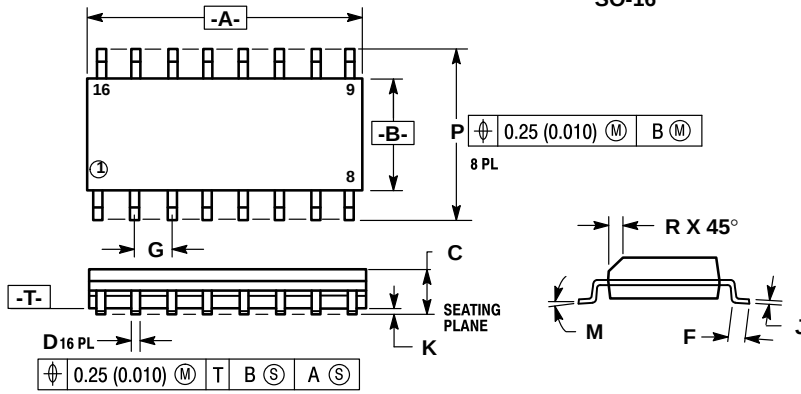


Figure 3

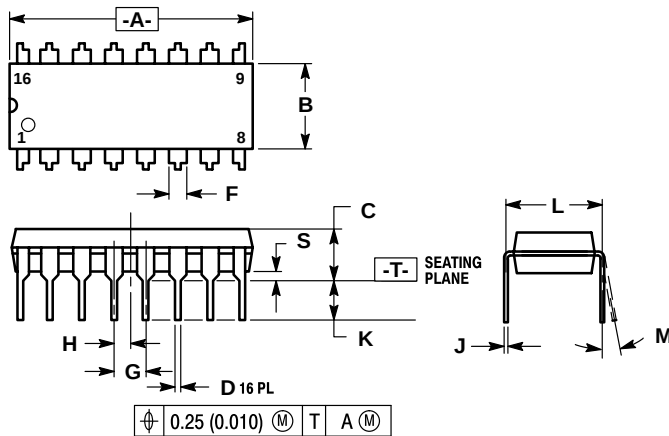
Case 751B-03 D Suffix
16-Pin Plastic
SO-16



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
 3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
 4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
 5. 751B-01 IS OBSOLETE, NEW STANDARD 751B-03.

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

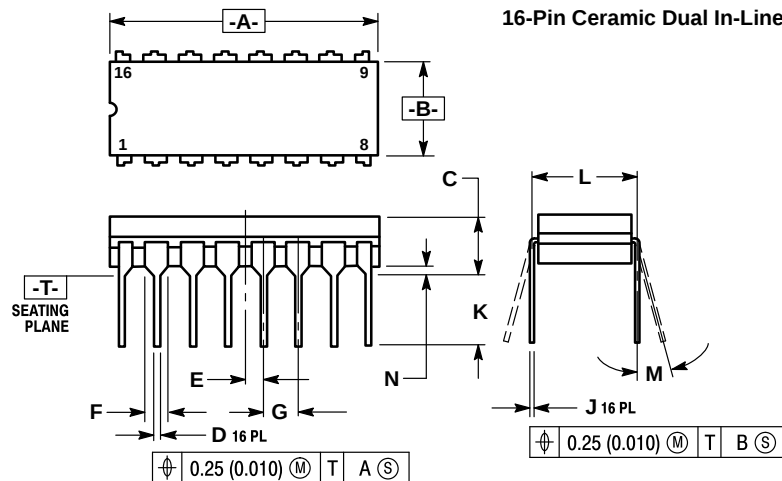
Case 648-08 N Suffix
16-Pin Plastic



- 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.
 6. 648-01 THRU -07 OBSOLETE, NEW STANDARD 648-08.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.80	19.55	0.740	0.770
B	6.35	6.85	0.250	0.270
C	3.69	4.44	0.145	0.175
D	0.39	0.53	0.015	0.021
F	1.02	1.77	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	1.27 BSC		0.050 BSC	
J	0.21	0.38	0.008	0.015
K	2.80	3.30	0.110	0.130
L	7.50	7.74	0.295	0.305
M	0°	10°	0°	10°
S	0.51	1.01	0.020	0.040

Case 620-09 J Suffix
16-Pin Ceramic Dual In-Line



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
 4. DIM F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.
 5. 620-01 THRU -08 OBSOLETE, NEW STANDARD 620-09.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	19.05	19.55	0.750	0.770
B	6.10	7.36	0.240	0.290
C	—	4.19	—	0.165
D	0.39	0.53	0.015	0.021
E	1.27 BSC		0.050 BSC	
F	1.40	1.77	0.055	0.070
G	2.54 BSC		0.100 BSC	
H	0.23	0.27	0.009	0.011
J	—	5.08	—	0.200
K	7.62 BSC		0.300 BSC	
L	0°	15°	0°	15°
M	0.39	0.88	0.015	0.035

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