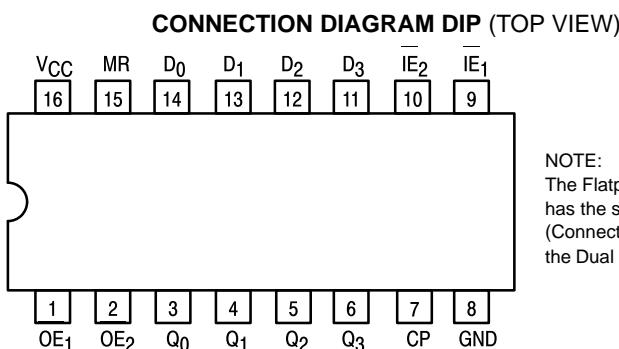


4-BIT D-TYPE REGISTER WITH 3-STATE OUTPUTS

The SN54/74LS173A is a high-speed 4-Bit Register featuring 3-state outputs for use in bus-organized systems. The clock is fully edge-triggered allowing either a load from the D inputs or a hold (retain register contents) depending on the state of the Input Enable Lines (\overline{IE}_1 , \overline{IE}_2). A HIGH on either Output Enable line (OE_1 , OE_2) brings the output to a high impedance state without affecting the actual register contents. A HIGH on the Master Reset (MR) input resets the Register regardless of the state of the Clock (CP), the Output Enable (OE_1 , OE_2) or the Input Enable (\overline{IE}_1 , \overline{IE}_2) lines.

- Fully Edge-Triggered
- 3-State Outputs
- Gated Input and Output Enables
- Input Clamp Diodes Limit High-Speed Termination Effects



PIN NAMES

PIN NAMES	LOADING (Note a)
D ₀ -D ₃	Data Inputs
\overline{IE}_1 - \overline{IE}_2	Input Enable (Active LOW)
OE_1 - OE_2	Output Enable (Active LOW) Inputs
CP	Clock Pulse (Active HIGH Going Edge) Input
MR	Master Reset Input (Active HIGH)
Q ₀ -Q ₃	Outputs (Note b)

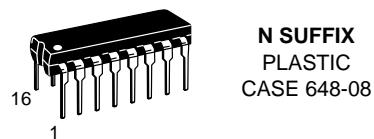
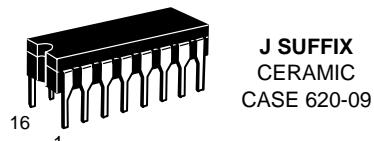
NOTES:

- a TTL Unit Load (U.L.) = 40 μ A HIGH/1.6 mA LOW.
- b. The Output LOW drive factor is 2.5 U.L. for Military (54) and 5 U.L. for Commercial (74) Temperature Ranges.

SN54/74LS173A

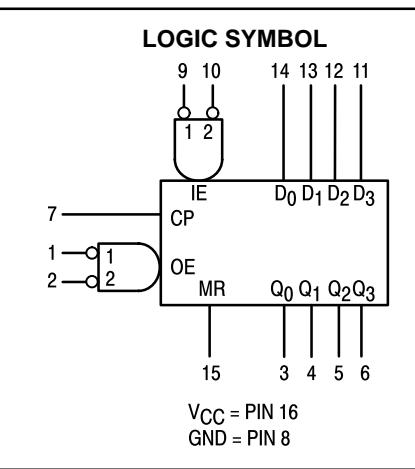
4-BIT D-TYPE REGISTER WITH 3-STATE OUTPUTS

LOW POWER SCHOTTKY



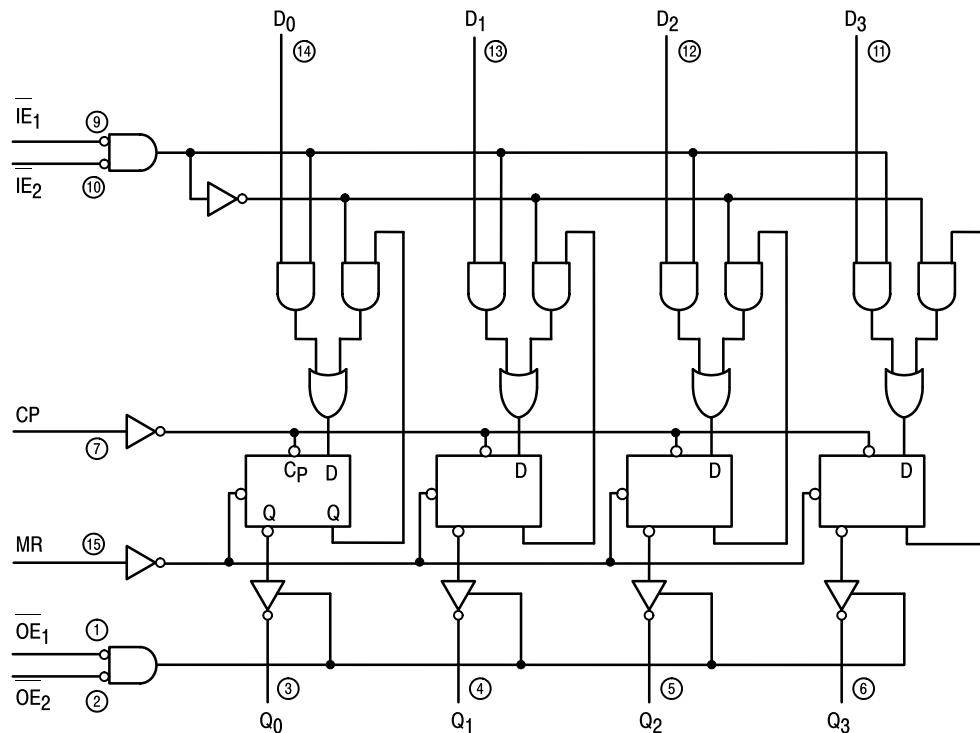
ORDERING INFORMATION

SN54LSXXXJ	Ceramic
SN74LSXXXN	Plastic
SN74LSXXXD	SOIC



SN54/74LS173A

LOGIC DIAGRAM



V_{CC} = PIN 16

GND = PIN 8

○ = PIN NUMBERS

TRUTH TABLE

MR	CP	IE ₁	IE ₂	D _n	Q _n
H	x	x	x	x	L
L	L	x	x	x	Q _n
L	↑	H	x	x	Q _n
L	↑	x	H	x	Q _n
L	↑	L	L	L	L
L	↑	L	L	H	H

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

When either OE₁, or OE₂ are HIGH, the output is in the off state (High Impedance); however this does not affect the contents or sequential operation of the register.

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

SN54/74LS173A

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	V	I _{OL} = 12 mA
		74		0.35	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			20	µA	V _{CC} = MAX, V _{IN} = 2.7 V
				0.1	mA	V _{CC} = MAX, V _{IN} = 7.0 V
I _{IL}	Input LOW Current			-0.4	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			30	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		
f _{MAX}	Maximum Input Clock Frequency	30	50		MHz	V _{CC} = 5.0 V C _L = 45 pF, R _L = 667 Ω
t _{PLH} t _{PHL}	Propagation Delay, Clock to Output		17 22	25 30	ns	
t _{PHL}	Propagation Delay, MR to Output		26	35	ns	
t _{PZH} t _{PZL}	Output Enable Time		15 18	23 27	ns	
t _{PLZ} t _{PHZ}	Output Disable Time		11 11	17 17	ns	C _L = 5.0 pF, R _L = 667 Ω

AC SETUP REQUIREMENTS (T_A = 25°C)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
t _W	Clock or MR Pulse Width	20			ns	V _{CC} = 5.0 V
t _S	Data Enable Setup Time	35			ns	
t _S	Data Setup Time	17			ns	
t _H	Hold Time, Any Input	0			ns	
t _{rec}	Recovery Time	10			ns	

SN54/74LS173A

AC WAVEFORMS

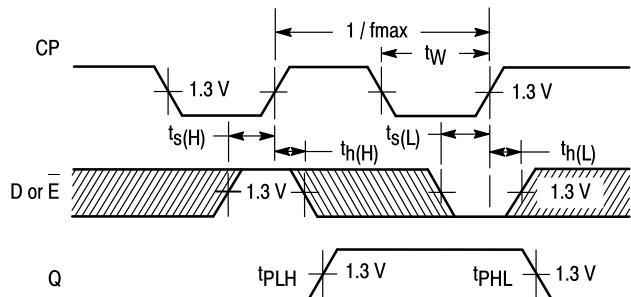


Figure 1

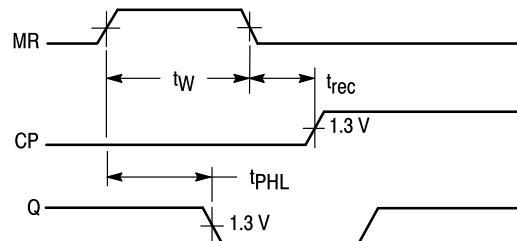


Figure 2

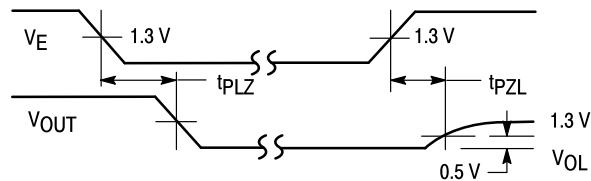


Figure 3

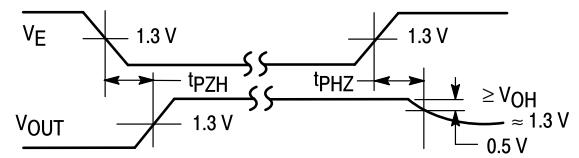
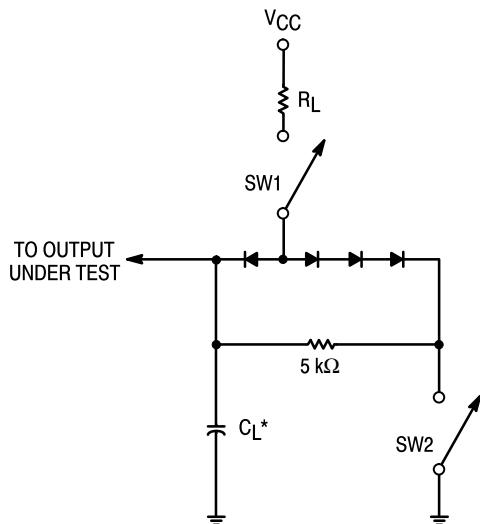


Figure 4

AC LOAD CIRCUIT



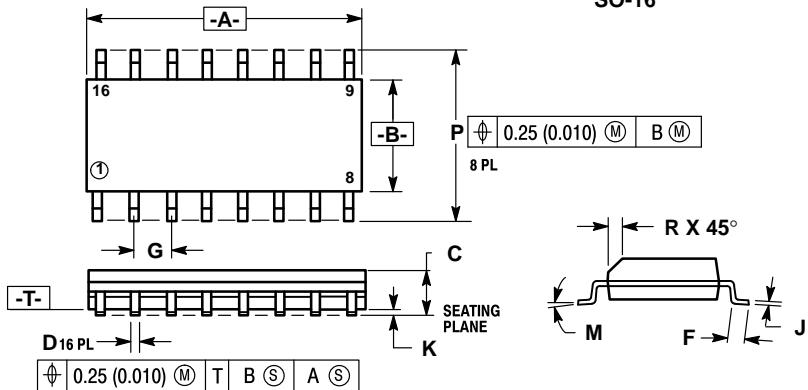
* Includes Jig and Probe Capacitance.

Figure 5

SWITCH POSITIONS

SYMBOL	SW1	SW2
t_{PZH}	Open	Closed
t_{PZL}	Closed	Open
t_{PLZ}	Closed	Closed
t_{PHZ}	Closed	Closed

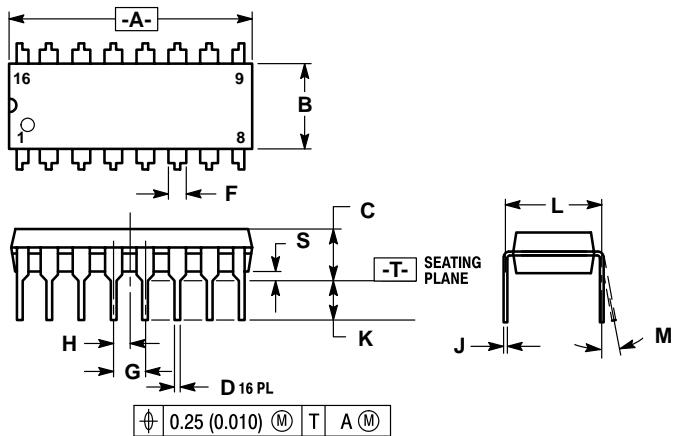
**Case 751B-03 D Suffix
16-Pin Plastic
SO-16**



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

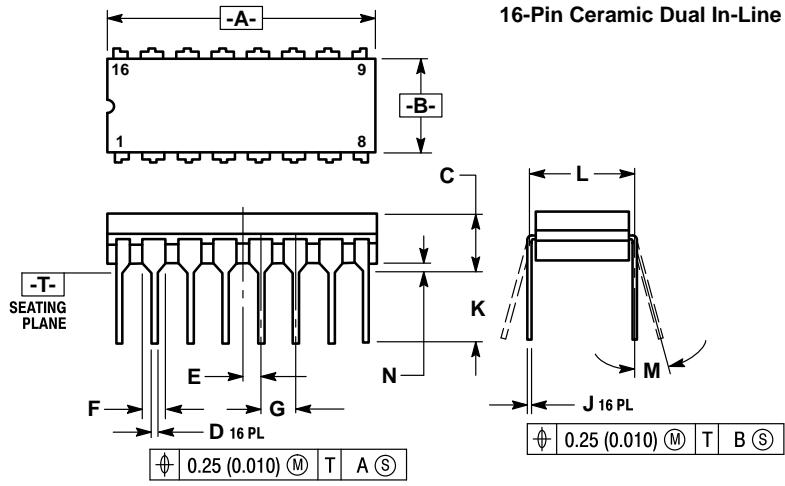
**Case 648-08 N Suffix
16-Pin Plastic**



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		
J	0.23	0.27	0.009	0.011
K	—	5.08	—	0.200
L	7.62 BSC	0.300 BSC		
M	0°	15°	0°	15°
N	0.39	0.88	0.015	0.035

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