

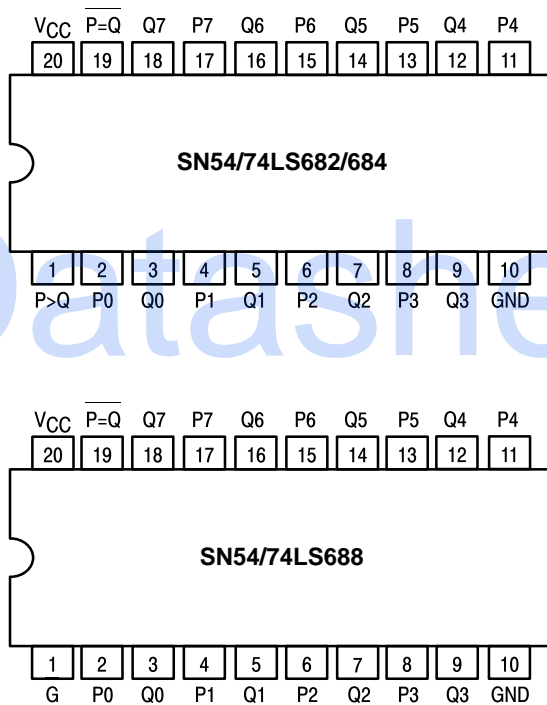


# 8-BIT MAGNITUDE COMPARATORS

The SN54/74LS682, 684, 688 are 8-bit magnitude comparators. These device types are designed to perform comparisons between two eight-bit binary or BCD words. All device types provide P = Q outputs and the LS682 and LS684 have P > Q outputs also.

The LS682, LS684 and LS688 are totem pole devices. The LS682 has a 20 kΩ pullup resistor on the Q inputs for analog or switch data.

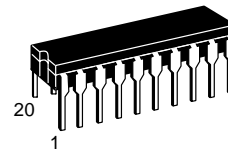
## CONNECTION DIAGRAMS (TOP VIEW)



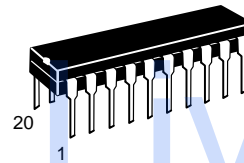
**SN54/74LS682**  
**SN54/74LS684**  
**SN54/74LS688**

**8-BIT MAGNITUDE COMPARATORS**

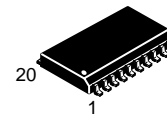
**LOW POWER SCHOTTKY**



**J SUFFIX**  
**CERAMIC**  
**CASE 732-03**



**N SUFFIX**  
**PLASTIC**  
**CASE 738-03**



**DW SUFFIX**  
**SOIC**  
**CASE 751D-03**

## ORDERING INFORMATION

SN54LSXXXJ Ceramic  
 SN74LSXXXN Plastic  
 SN74LSXXXDW SOIC

## FUNCTION TABLE

TYPE	$\overline{P = Q}$	$\overline{P > Q}$	OUTPUT ENABLE	OUTPUT CONFIGURATION	PULLUP
LS682	yes	yes	no	totem-pole	yes
LS684	yes	yes	no	totem-pole	no
LS688	yes	no	yes	totem-pole	no

INPUTS			OUTPUTS	
DATA	ENABLES		$\overline{P = Q}$	$\overline{P > Q}$
P, Q	$\overline{G}$ , $\overline{GT}$	$\overline{G2}$	$\overline{P = Q}$	$\overline{P > Q}$
P = Q	L	L	L	H
P > Q	L	L	H	L
P < Q	L	L	H	H
X	H	H	H	H

H = HIGH Level, L = LOW Level, X = Irrelevant

# SN54/74LS682 • SN54/74LS684 • SN54/74LS688

## GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V <sub>CC</sub>	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
T <sub>A</sub>	Operating Ambient Temperature Range	54 74	-55 0	25 25	125 70	°C
I <sub>OH</sub>	Output Current — High	54, 74			-0.4	mA
I <sub>OL</sub>	Output Current — Low	54 74			12 24	mA

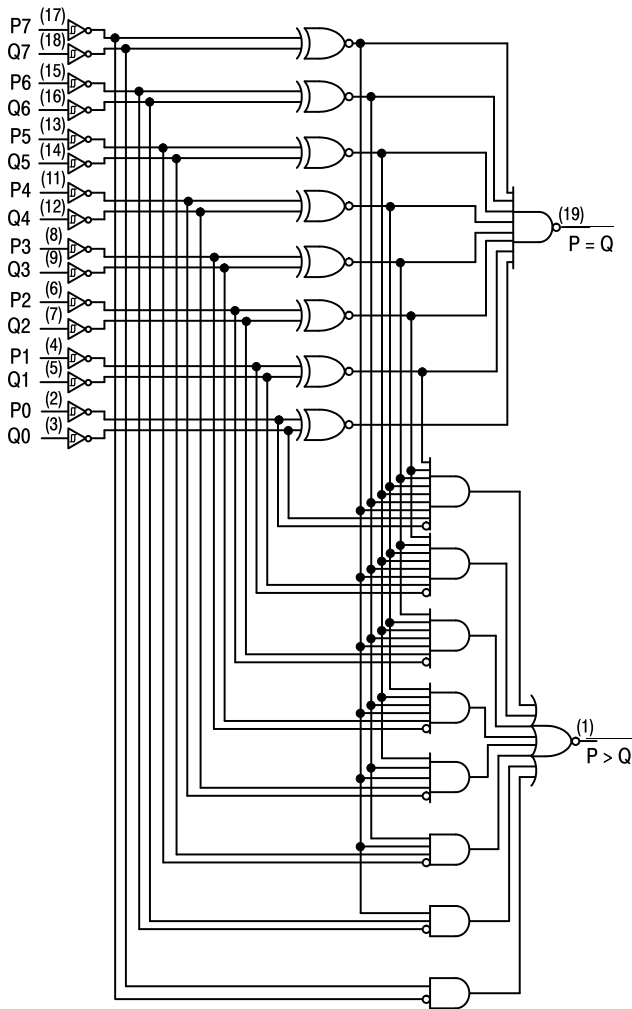
## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter		Limits			Unit	Test Conditions
			Min	Typ	Max		
V <sub>IH</sub>	Input HIGH Voltage		2.0			V	Guaranteed Input HIGH Voltage for All Inputs
V <sub>IL</sub>	Input LOW Voltage	54			0.7	V	Guaranteed Input LOW Voltage for All Inputs
		74			0.8		
V <sub>IK</sub>	Input Clamp Diode Voltage			-0.65	-1.5	V	V <sub>CC</sub> = MIN, I <sub>IN</sub> = -18 mA
V <sub>OH</sub>	Output HIGH Voltage	54	2.5	3.5		V	V <sub>CC</sub> = MIN, I <sub>OH</sub> = MAX, V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> per Truth Table
		74	2.7	3.5		V	
V <sub>OL</sub>	Output LOW Voltage	54, 74		0.25	0.4	V	I <sub>OL</sub> = 12 mA V <sub>CC</sub> = V <sub>CC</sub> MIN, V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> per Truth Table
		74		0.35	0.5	V	
I <sub>IH</sub>	Input HIGH Current				20	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V
		LS628-Q Inputs			0.1	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 5.5 V
		Others			0.1	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V
I <sub>IL</sub>	Input LOW Current	LS682-Q Inputs			-0.4	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.4 V
		Others			-0.2	mA	
I <sub>OS</sub>	Short Circuit Current (Note 1)		-30		-130	mA	V <sub>CC</sub> = MAX
I <sub>CC</sub>	Power Supply Current	LS682			70	mA	V <sub>CC</sub> = MAX
		LS684			65	mA	
		LS688			65	mA	

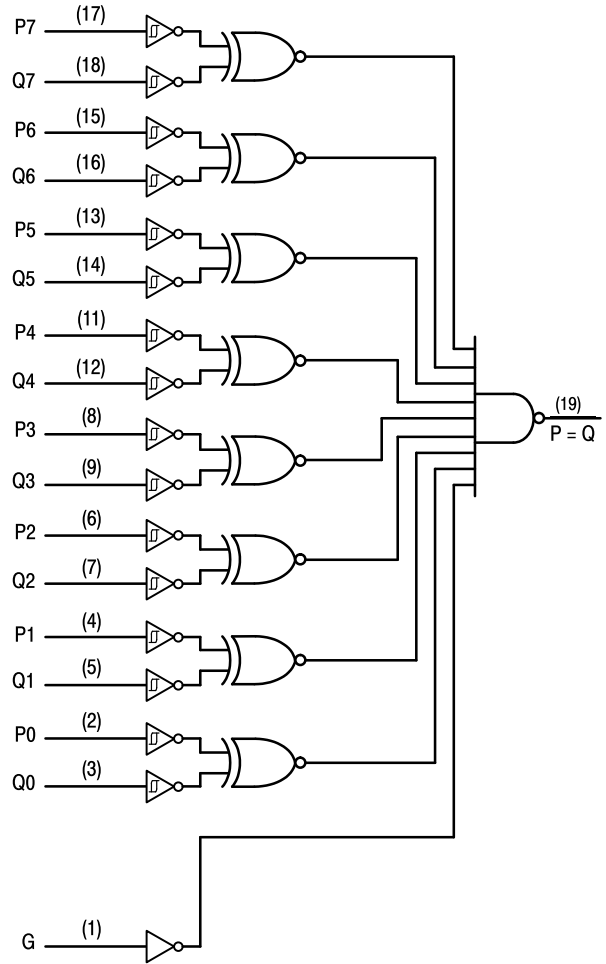
Note 1: Not more than one output should be shorted at a time, nor for more than 1 second.

# SN54/74LS682 • SN54/74LS684 • SN54/74LS688

## LOGIC DIAGRAMS



SN54/74LS682 thru LS684



SN54/74LS688

# SN54/74LS682•SN54/74LS684•SN54/74LS688

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

## SN54/74LS682

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, P to $\overline{\overline{P=Q}}$		13 15	25 25	ns	$V_{CC} = 5.0\text{ V}$ $C_L = 45\text{ pF}$ $R_L = 667\ \Omega$
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, Q to $\overline{\overline{P=Q}}$		14 15	25 25	ns	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, P to $\overline{\overline{P>Q}}$		20 15	30 30	ns	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, Q to $\overline{\overline{P>Q}}$		21 19	30 30	ns	

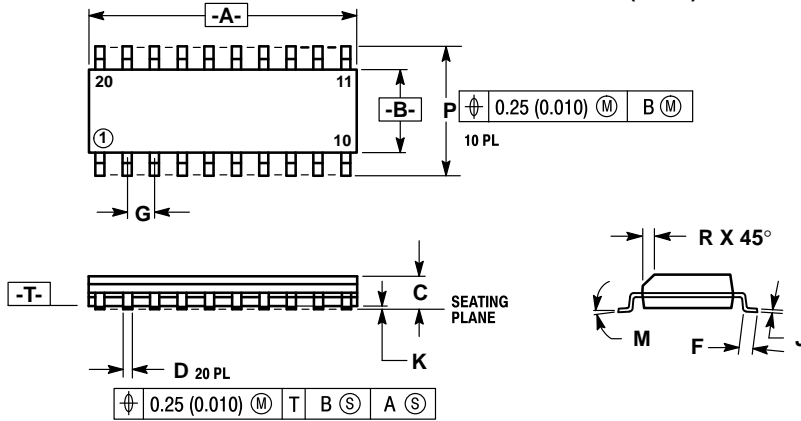
## SN54/74LS684

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, P to $\overline{\overline{P=Q}}$		15 17	25 25	ns	$V_{CC} = 5.0\text{ V}$ $C_L = 45\text{ pF}$ $R_L = 667\ \Omega$
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, Q to $\overline{\overline{P=Q}}$		16 15	25 25	ns	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, P to $\overline{\overline{P>Q}}$		22 17	30 30	ns	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, Q to $\overline{\overline{P>Q}}$		24 20	30 30	ns	

## SN54/74LS688

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, P to $\overline{\overline{P=Q}}$		12 17	18 23	ns	$V_{CC} = 5.0\text{ V}$ $C_L = 45\text{ pF}$ $R_L = 667\ \Omega$
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, Q to $\overline{\overline{P=Q}}$		12 17	18 23	ns	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, $\overline{\overline{G}}$ , $\overline{\overline{G1}}$ to $\overline{\overline{P=Q}}$		12 13	18 20	ns	

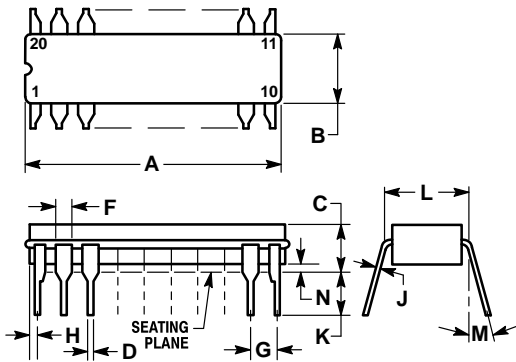
**Case 751D-03 DW Suffix  
20-Pin Plastic  
SO-20 (WIDE)**



- 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. 751D-01, AND -02 OBSOLETE, NEW STANDARD 751D-03.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.65	12.95	0.499	0.510
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

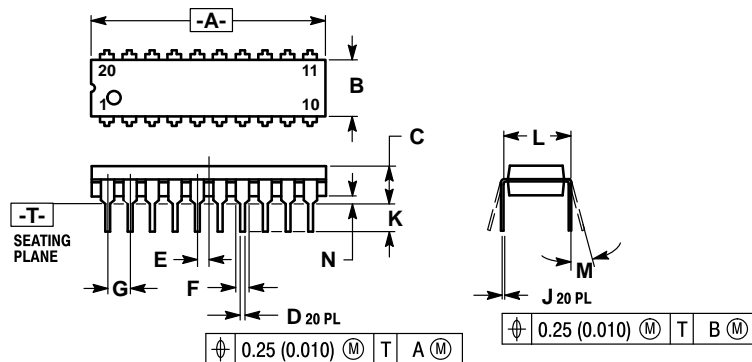
**Case 732-03 J Suffix  
20-Pin Ceramic Dual In-Line**



- NOTES:
1. LEADS WITHIN 0.25 mm (0.010) DIA., TRUE POSITION AT SEATING PLANE, AT MAXIMUM MATERIAL CONDITION.
  2. DIM L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  3. DIM A AND B INCLUDES MENISCUS.


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	23.88	25.15	0.940	0.990
B	6.60	7.49	0.260	0.295
C	3.81	5.08	0.150	0.200
D	0.38	0.56	0.015	0.022
F	1.40	1.65	0.055	0.065
G	2.54 BSC		0.100 BSC	
H	0.51	1.27	0.020	0.050
J	0.20	0.30	0.008	0.012
K	3.18	4.06	0.125	0.160
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.25	1.02	0.010	0.040

**Case 738-03 N Suffix  
20-Pin Plastic**



- 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. DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
  5. 738-02 OBSOLETE, NEW STANDARD 738-03.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	25.66	27.17	1.010	1.070
B	6.10	6.60	0.240	0.260
C	3.81	4.57	0.150	0.180
D	0.39	0.55	0.015	0.022
E	1.27 BSC		0.050 BSC	
F	1.27	1.77	0.050	0.070
G	2.54 BSC		0.100 BSC	
J	0.21	0.38	0.008	0.015
K	2.80	3.55	0.110	0.140
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.01	0.020	0.040

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SYMBOL	SW1	SW2
tpZH	Open	Closed
tpZL	Closed	Open
tpLZ	Closed	Closed

