

# SN74LS682, SN74LS684, SN74LS688



**ON Semiconductor**

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## 8-Bit Magnitude Comparators

The SN74LS682, 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  $\overline{P} = \overline{Q}$  outputs and the LS682 and LS684 have  $\overline{P} > \overline{Q}$  outputs also.

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

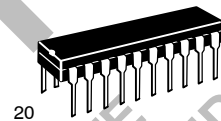
TYPE	$\overline{P} = \overline{Q}$	$\overline{P} > \overline{Q}$	OUTPUT ENABLE	OUTPUT CONFIGURATION	PULLUP
LS682	yes	yes	no	totem-pole	yes
LS684	yes	yes	no	totem-pole	no
LS688	yes	no	yes	totem-pole	no

### GUARANTEED OPERATING RANGES

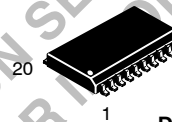
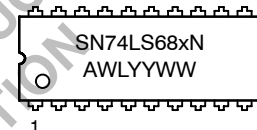
Symbol	Parameter	Min	Typ	Max	Unit
V <sub>CC</sub>	Supply Voltage	4.75	5.0	5.25	V
T <sub>A</sub>	Operating Ambient Temperature Range	0	25	70	°C
I <sub>OH</sub>	Output Current – High			-0.4	mA
I <sub>OL</sub>	Output Current – Low			24	mA

**LOW  
POWER  
SCHOTTKY**

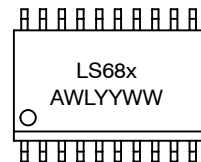
### MARKING DIAGRAMS



PDIP-20  
N SUFFIX  
CASE 738



SOIC-20  
DW SUFFIX  
CASE 751D



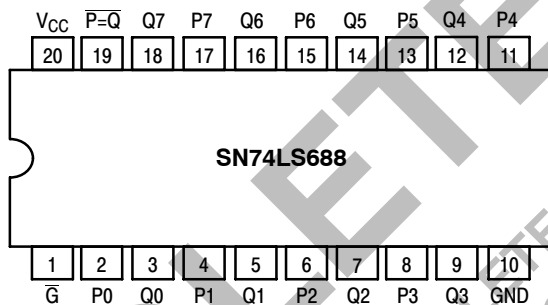
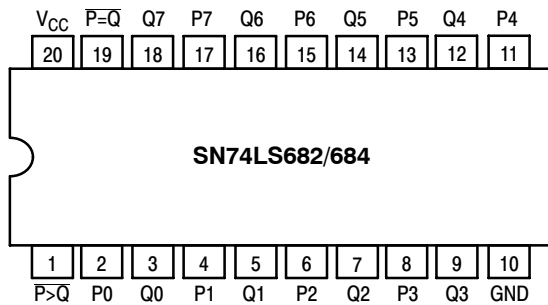
x = 2, 4, or 8  
A = Assembly Location  
WL = Wafer Lot  
YY = Year  
WW = Work Week

### ORDERING INFORMATION

Device	Package	Shipping
SN74LS682N	PDIP-20	1440 Units/Box
SN74LS682DW	SOIC-WIDE	38 Units/Rail
SN74LS682DWR2	SOIC-WIDE	2500/Tape & Reel
SN74LS684N	PDIP-20	1440 Units/Box
SN74LS684DW	SOIC-WIDE	38 Units/Rail
SN74LS684DWR2	SOIC-WIDE	2500/Tape & Reel
SN74LS688N	PDIP-20	1440 Units/Box
SN74LS688DW	SOIC-WIDE	38 Units/Rail
SN74LS688DWR2	SOIC-WIDE	2500/Tape & Reel

# SN74LS682, SN74LS684, SN74LS688

## CONNECTION DIAGRAMS (TOP VIEW)



## FUNCTION TABLE

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

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

# SN74LS682, SN74LS684, SN74LS688

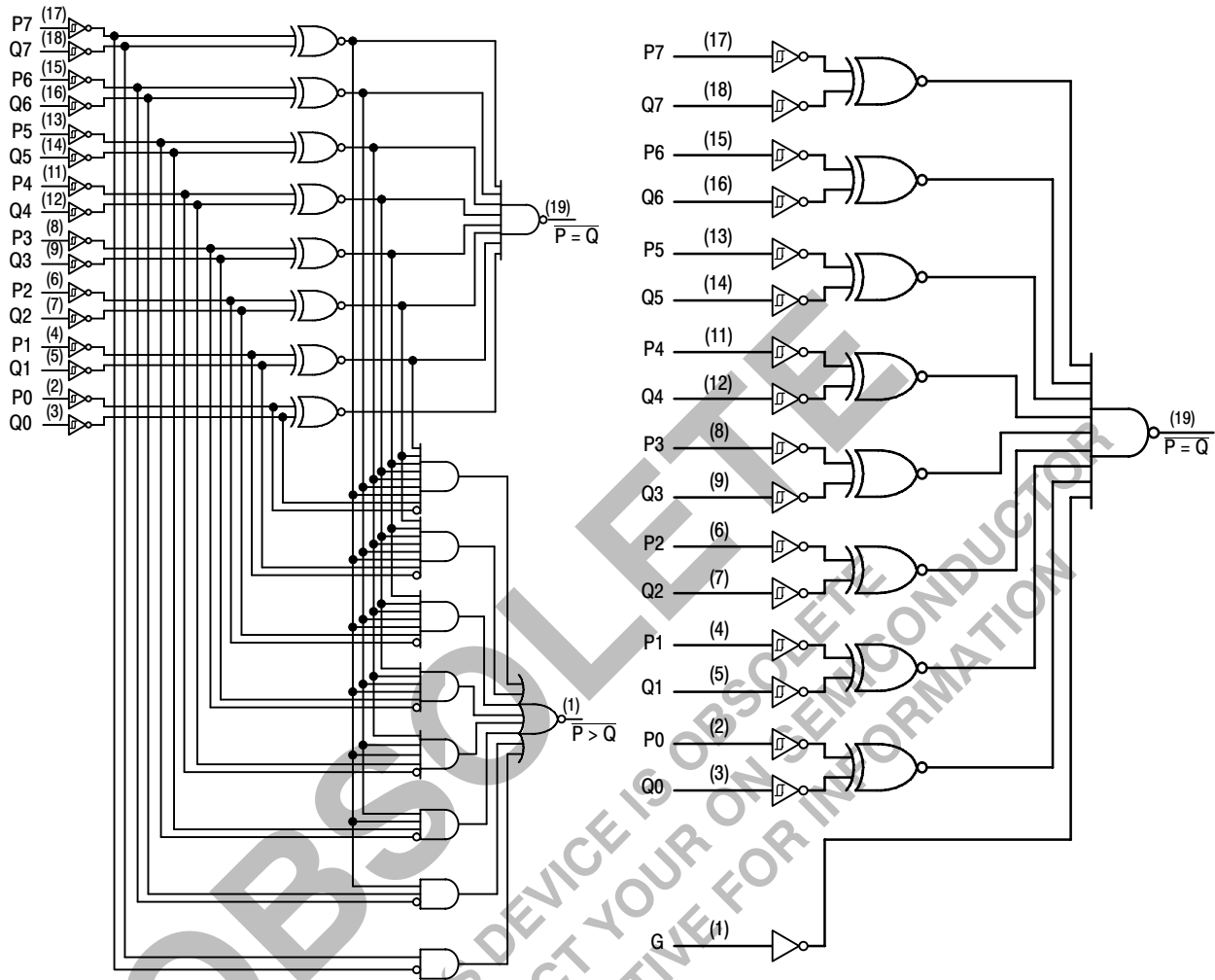
## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

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	2.7	3.5		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	$I_{OL} = 12 \text{ mA}$	
			0.35	0.5	V	$I_{OL} = 24 \text{ mA}$	
$I_{IH}$	Input HIGH Current			20	$\mu\text{A}$	$V_{CC} = \text{MAX}$ , $V_{IN} = 2.7 \text{ V}$	
		LS682-Q Inputs			0.1	mA	$V_{CC} = \text{MAX}$ , $V_{IN} = 5.5 \text{ V}$
		Others			0.1	mA	$V_{CC} = \text{MAX}$ , $V_{IN} = 7.0 \text{ V}$
$I_{IL}$	Input LOW Current	LS682-Q Inputs			-0.4	mA	$V_{CC} = \text{MAX}$ , $V_{IN} = 0.4 \text{ V}$
		Others			-0.2	mA	
$I_{OS}$	Short Circuit Current (Note 1)	-30		-130	mA	$V_{CC} = \text{MAX}$	
$I_{CC}$	Power Supply Current	LS682			70	mA	$V_{CC} = \text{MAX}$
		LS684			65	mA	
		LS688			65	mA	

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

# SN74LS682, SN74LS684, SN74LS688

## LOGIC DIAGRAMS



SN74LS682 and LS684

SN74LS688

# SN74LS682, SN74LS684, SN74LS688

## AC CHARACTERISTICS (T<sub>A</sub> = 25°C)

### SN74LS682

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

### SN74LS684

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

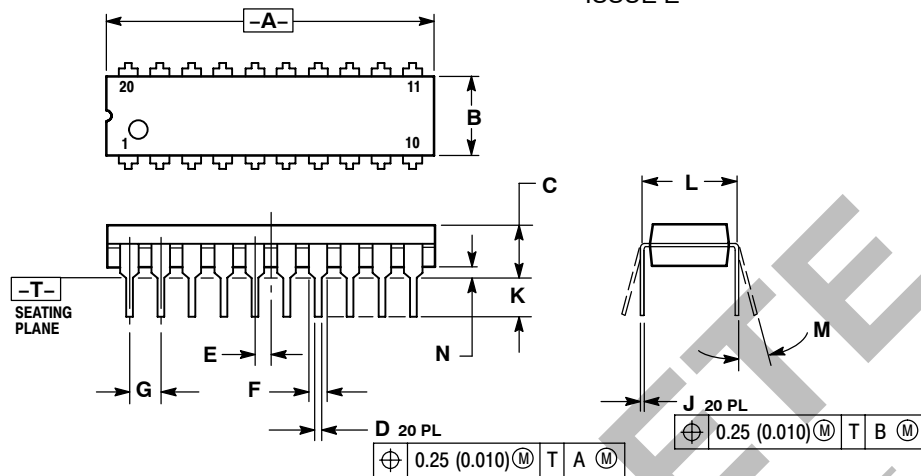
### SN74LS688

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

# SN74LS682, SN74LS684, SN74LS688

## PACKAGE DIMENSIONS

**N SUFFIX**  
**PLASTIC PACKAGE**  
 CASE 738-03  
 ISSUE E



**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.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.010	1.070	25.66	27.17
B	0.240	0.260	6.10	6.60
C	0.150	0.180	3.81	4.57
D	0.015	0.022	0.39	0.55
E	0.050 BSC		1.27 BSC	
F	0.050 0.070		1.27 1.77	
G	0.100 BSC		2.54 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.140	2.80	3.55
L	0.800 BSC		7.62 BSC	
M	0°	15°	0°	15°
N	0.020	0.040	0.51	1.01

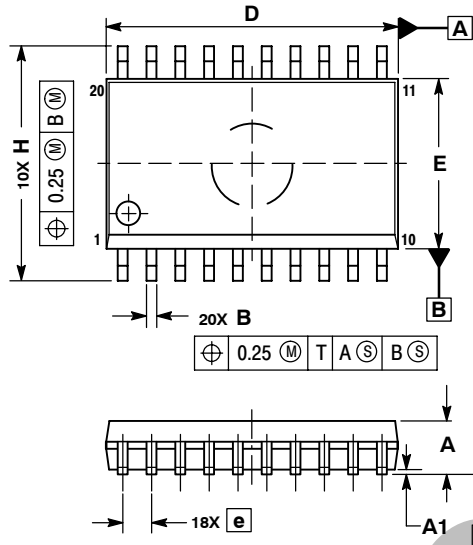
OBSOLETE

THIS DEVICE IS OBSOLETE  
 PLEASE CONTACT YOUR ON SEMICONDUCTOR  
 REPRESENTATIVE FOR INFORMATION

# SN74LS682, SN74LS684, SN74LS688

## PACKAGE DIMENSIONS

DW SUFFIX  
 PLASTIC SOIC PACKAGE  
 CASE 751D-05  
 ISSUE F



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS	
	MIN	MAX
A	2.35	2.65
A1	0.10	0.25
B	0.35	0.49
C	0.23	0.32
D	12.65	12.95
E	7.40	7.60
e	1.27 BSC	
H	10.05	10.55
h	0.25	0.75
L	0.50	0.90
θ	0°	7°

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SN74LS682/D