



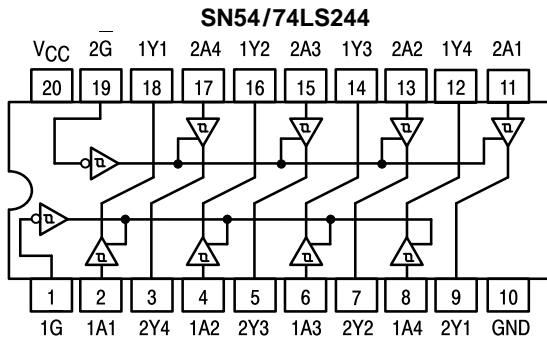
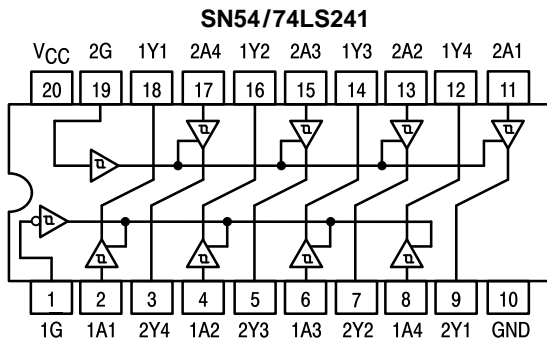
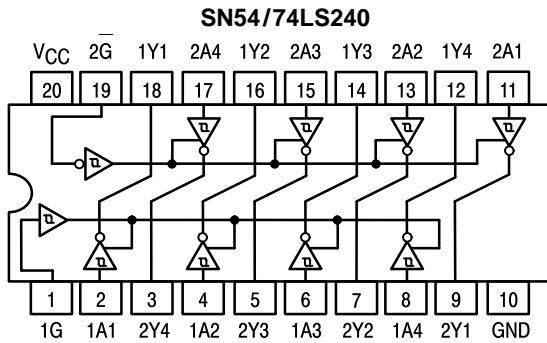
**MOTOROLA**

# OCTAL BUFFER/LINE DRIVER WITH 3-STATE OUTPUTS

The SN54/74LS240, 241 and 244 are Octal Buffers and Line Drivers designed to be employed as memory address drivers, clock drivers and bus-oriented transmitters/receivers which provide improved PC board density.

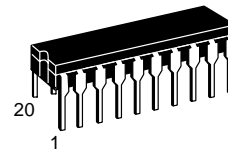
- Hysteresis at Inputs to Improve Noise Margins
- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- Input Clamp Diodes Limit High-Speed Termination Effects

## LOGIC AND CONNECTION DIAGRAMS DIP (TOP VIEW)

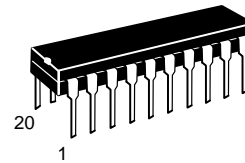


**SN54/74LS240  
SN54/74LS241  
SN54/74LS244**

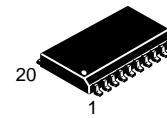
**OCTAL BUFFER/LINE DRIVER  
WITH 3-STATE OUTPUTS  
LOW POWER SCHOTTKY**



**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

# SN54/74LS240 • SN54/74LS241 • SN54/74LS244

## TRUTH TABLES

SN54/74LS240

INPUTS		OUTPUT
1G, 2G	D	
L	L	H
L	H	L
H	X	(Z)

SN54/74LS244

INPUTS		OUTPUT
1G, 2G	D	
L	L	L
L	H	H
H	X	(Z)

SN54/74LS241

INPUTS		OUTPUT	INPUTS		OUTPUT
1G	D		2G	D	
L	L	L	H	L	L
L	H	H	H	H	H
H	X	(Z)	L	X	(Z)

H = HIGH Voltage Level

L = LOW Voltage Level

X = Immaterial

Z = HIGH Impedance

## GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V <sub>CC</sub>	Supply Voltage	54	4.5	5.0	5.5	V
		74	4.75	5.0	5.25	
T <sub>A</sub>	Operating Ambient Temperature Range	54	-55	25	125	°C
		74	0	25	70	
I <sub>OH</sub>	Output Current — High	54, 74			-3.0	mA
		54 74			-12 -15	
I <sub>OL</sub>	Output Current — Low	54			12	mA
		74			24	

# SN54/74LS240 • SN54/74LS241 • SN54/74LS244

## 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>T+</sub> -V <sub>T-</sub>	Hysteresis		0.2	0.4		V	V <sub>CC</sub> = MIN
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, 74	2.4	3.4		V	V <sub>CC</sub> = MIN, I <sub>OH</sub> = -3.0 mA
		54, 74	2.0			V	V <sub>CC</sub> = MIN, I <sub>OH</sub> = MAX
V <sub>OL</sub>	Output LOW Voltage	54, 74		0.25	0.4	V	I <sub>OL</sub> = 12 mA
		74		0.35	0.5	V	I <sub>OL</sub> = 24 mA
I <sub>OZH</sub>	Output Off Current HIGH				20	μA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 2.7 V
I <sub>OZL</sub>	Output Off Current LOW				-20	μA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 0.4 V
I <sub>IH</sub>	Input HIGH Current				20	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V
					0.1	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V
I <sub>IL</sub>	Input LOW Current				-0.2	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.4 V
I <sub>OS</sub>	Output Short Circuit Current (Note 1)		-40		-225	mA	V <sub>CC</sub> = MAX
I <sub>CC</sub>	Power Supply Current Total, Output HIGH				27	mA	V <sub>CC</sub> = MAX
	Total, Output LOW	LS240			44		
		LS241/244			46		
	Total at HIGH Z	LS240			50		
LS241/244				54			

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

## AC CHARACTERISTICS (T<sub>A</sub> = 25°C, V<sub>CC</sub> = 5.0 V)

Symbol	Parameter		Limits			Unit	Test Conditions
			Min	Typ	Max		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, Data to Output LS240			9.0 12	14 18	ns	C <sub>L</sub> = 45 pF, R <sub>L</sub> = 667 Ω
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay, Data to Output LS241/244			12 12	18 18	ns	
t <sub>PZH</sub>	Output Enable Time to HIGH Level			15	23	ns	
t <sub>PZL</sub>	Output Enable Time to LOW Level			20	30	ns	
t <sub>PLZ</sub> t <sub>PHZ</sub>	Output Disable Time from LOW Level Output Disable Time from HIGH Level			15 10	25 18	ns	

# SN54/74LS240 • SN54/74LS241 • SN54/74LS244

## AC WAVEFORMS

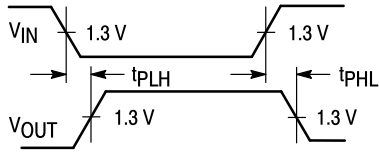


Figure 1

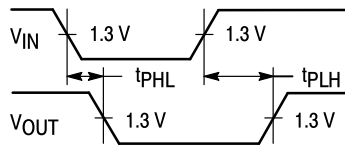


Figure 2

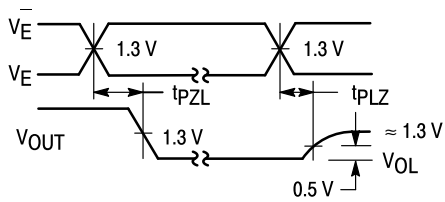


Figure 3

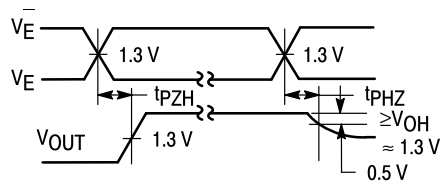
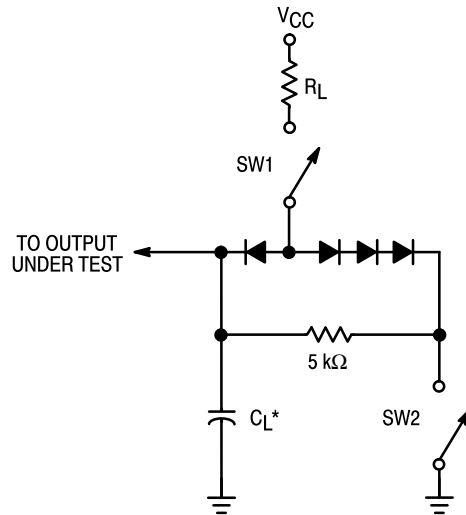


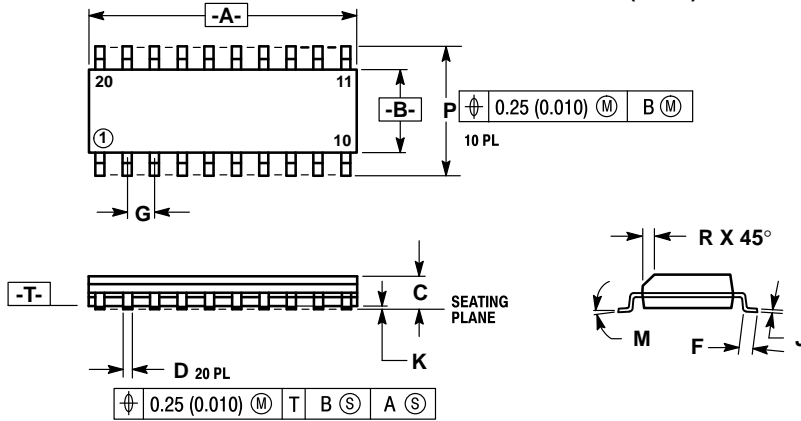
Figure 4



SWITCH POSITIONS

Figure 5

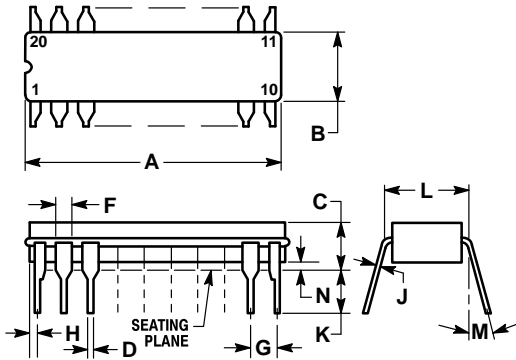
**Case 751D-03 DW Suffix  
20-Pin Plastic  
SO-20 (WIDE)**



- 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

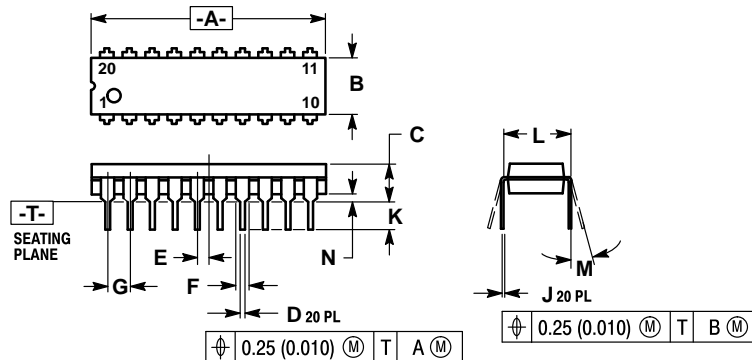
**Case 732-03 J Suffix  
20-Pin Ceramic Dual In-Line**



- 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

