



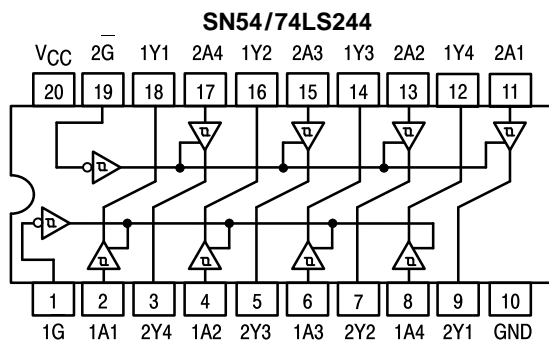
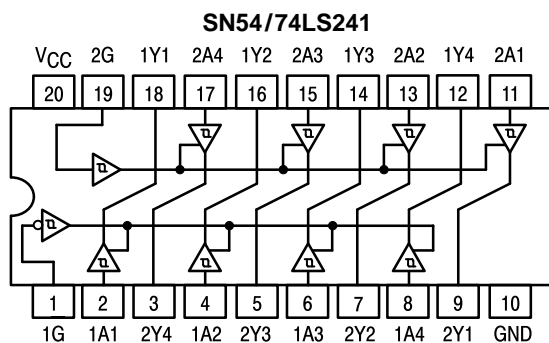
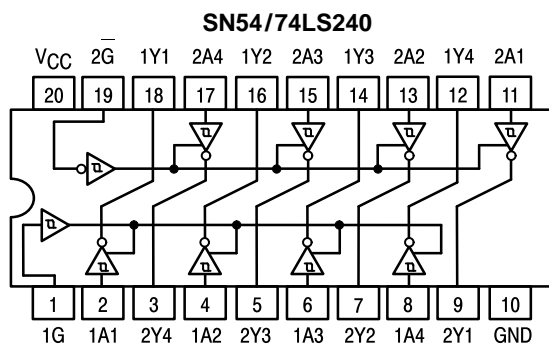
MOTOROLA

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

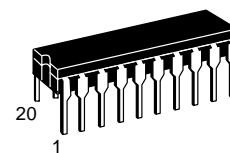
LOGIC AND CONNECTION DIAGRAMS DIP (TOP VIEW)



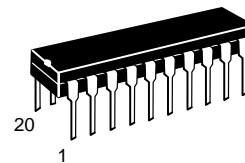
SN54/74LS240
SN54/74LS241
SN54/74LS244

**OCTAL BUFFER/LINE DRIVER
WITH 3-STATE OUTPUTS**

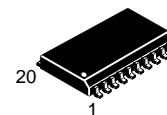
LOW POWER SCHOTTKY



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 _{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			−3.0	mA
		54 74			−12 −15	mA
I _{OL}	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 _{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 _{T+} –V _{T–}	Hysteresis		0.2	0.4		V	V _{CC} = MIN	
V _{IK}	Input Clamp Diode Voltage			–0.65	–1.5	V	V _{CC} = MIN, I _{IN} = –18 mA	
V _{OH}	Output HIGH Voltage	54, 74	2.4	3.4		V	V _{CC} = MIN, I _{OH} = –3.0 mA	
		54, 74	2.0			V	V _{CC} = MIN, I _{OH} = MAX	
V _{OL}	Output LOW Voltage	54, 74		0.25	0.4	V	I _{OL} = 12 mA	V _{CC} = V _{CC} MIN, V _{IN} = V _{IL} or V _{IH} per Truth Table
		74		0.35	0.5	V	I _{OL} = 24 mA	
I _{OZH}	Output Off Current HIGH				20	μA	V _{CC} = MAX, V _{OUT} = 2.7 V	
I _{OZL}	Output Off Current LOW				–20	μA	V _{CC} = MAX, V _{OUT} = 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				–0.2	mA	V _{CC} = MAX, V _{IN} = 0.4 V	
I _{OS}	Output Short Circuit Current (Note 1)		–40		–225	mA	V _{CC} = MAX	
I _{CC}	Power Supply Current Total, Output HIGH				27	mA	V _{CC} = 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 ($T_A = 25^\circ\text{C}$, $V_{CC} = 5.0 \text{ V}$)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
t _{PLH} t _{PHL}	Propagation Delay, Data to Output LS240		9.0 12	14 18	ns	C _L = 45 pF, R _L = 667 Ω
t _{PLH} t _{PHL}	Propagation Delay, Data to Output LS241 / 244		12 12	18 18	ns	
t _{PZH}	Output Enable Time to HIGH Level		15	23	ns	
t _{PZL}	Output Enable Time to LOW Level		20	30	ns	
t _{PLZ}	Output Disable Time from LOW Level		15	25	ns	C _L = 5.0 pF, R _L = 667 Ω
t _{PHZ}	Output Disable Time from HIGH Level		10	18	ns	

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

AC WAVEFORMS

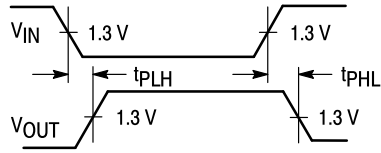


Figure 1

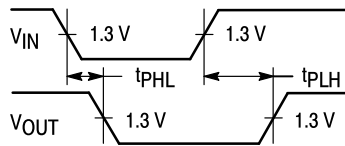


Figure 2

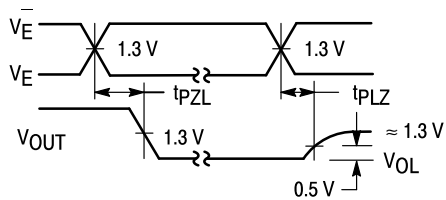


Figure 3

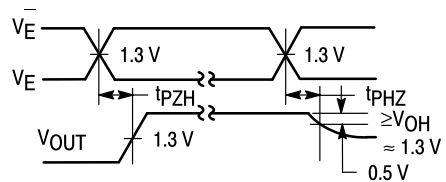
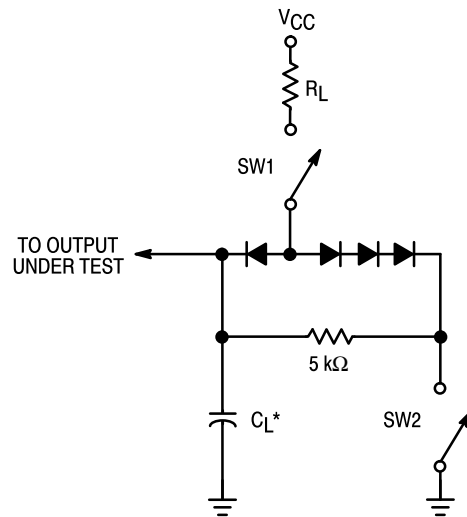


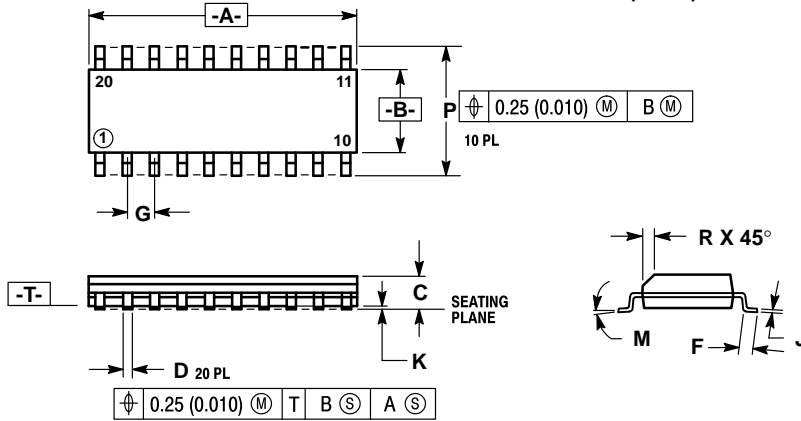
Figure 4



SWITCH POSITIONS

Figure 5

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

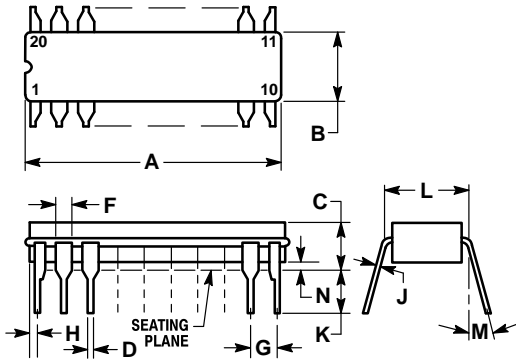


NOTES:

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**

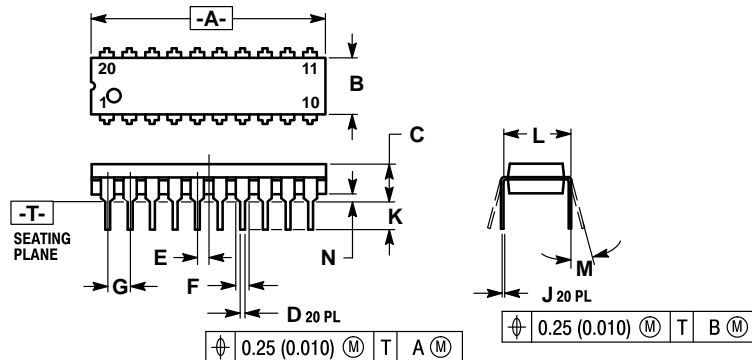


NOTES:

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