

# SN74LS240, SN74LS244



**ON Semiconductor**

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## Octal Buffer/Line Driver with 3-State Outputs

The SN74LS240 and SN74LS244 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.

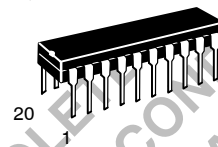
- Hysteresis at Inputs to Improve Noise Margins
- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- Input Clamp Diodes Limit High-Speed Termination Effects

### GUARANTEED OPERATING RANGES

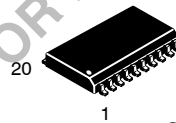
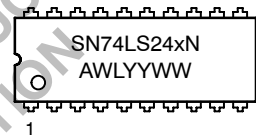
Symbol	Parameter	Min	Typ	Max	Unit
$V_{CC}$	Supply Voltage	4.75	5.0	5.25	V
$T_A$	Operating Ambient Temperature Range	0	25	70	°C
$I_{OH}$	Output Current - High			-3.0	mA
				-15	mA
$I_{OL}$	Output Current - Low			24	mA

**LOW  
POWER  
SCHOTTKY**

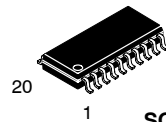
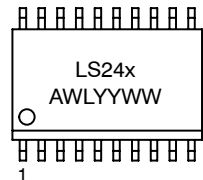
### MARKING DIAGRAMS



**PDIP-20  
N SUFFIX  
CASE 738**



**SOIC-20  
DW SUFFIX  
CASE 751D**



**SOEIAJ-20  
M SUFFIX  
CASE 967**



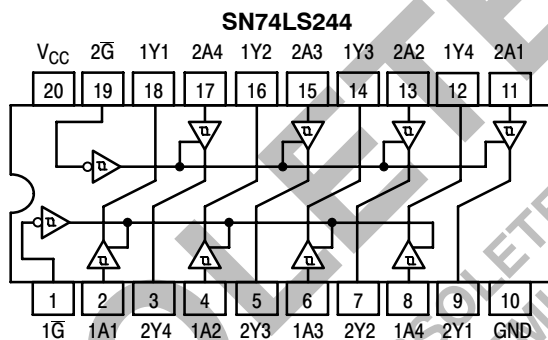
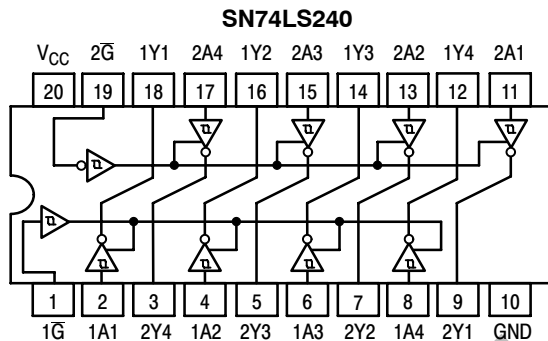
x = 0 or 4  
A = Assembly Location  
WL = Wafer Lot  
YY = Year  
WW = Work Week

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

# SN74LS240, SN74LS244

## LOGIC AND CONNECTION DIAGRAMS DIP (TOP VIEW)



### TRUTH TABLES

**SN74LS240**

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

**SN74LS244**

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

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

## SN74LS240, SN74LS244

### 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			0.8	V	Guaranteed Input LOW Voltage for All Inputs
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	2.4	3.4		V	V <sub>CC</sub> = MIN, I <sub>OH</sub> = -3.0 mA
		2.0			V	V <sub>CC</sub> = MIN, I <sub>OH</sub> = MAX
V <sub>OL</sub>	Output LOW Voltage		0.25	0.4	V	I <sub>OL</sub> = 12 mA
			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		
		LS244		46		
	Total at HIGH Z	LS240		50		
		LS244		54		

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 LS244		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>	Output Disable Time from LOW Level		15	25	ns	C <sub>L</sub> = 5.0 pF, R <sub>L</sub> = 667 Ω
t <sub>PHZ</sub>	Output Disable Time from HIGH Level		10	18	ns	

# SN74LS240, SN74LS244

## AC WAVEFORMS

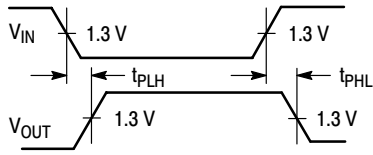


Figure 1.

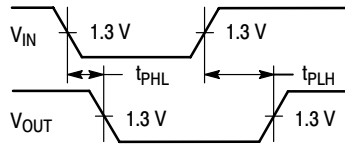


Figure 2.

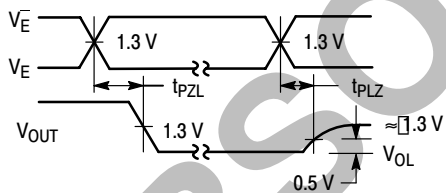


Figure 3.

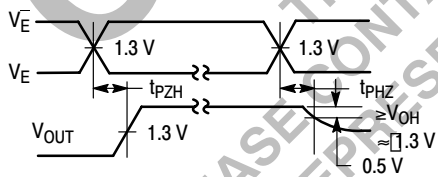
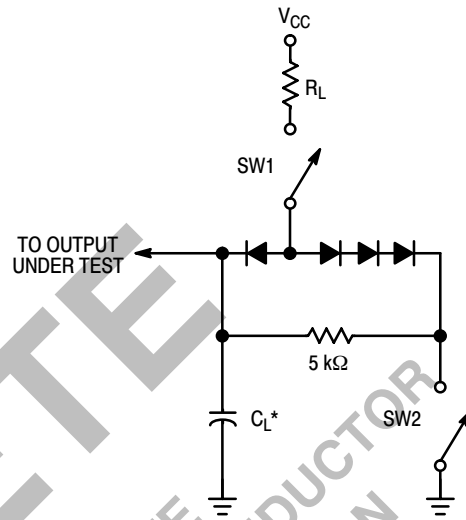


Figure 4.



SWITCH POSITIONS

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

Figure 5.

## SN74LS240, SN74LS244

### DEVICE ORDERING INFORMATION

Device Order Number	Package Type	Tape and Reel Size
SN74LS240N	PDIP-20	1440 Units/Box
SN74LS240DW	SOIC-WIDE	38 Units/Rail
SN74LS240DWR2	SOIC-WIDE	2500/Tape and Reel
SN74LS240M	SOEIAJ-20	See Note 2
SN74LS240MEL	SOEIAJ-20	See Note 2
SN74LS244N	PDIP-20	1440 Units/Box
SN74LS244DW	SOIC-WIDE	38 Units/Rail
SN74LS244DWR2	SOIC-WIDE	2500/Tape and Reel
SN74LS244M	SOEIAJ-20	See Note 2
SN74LS244MEL	SOEIAJ-20	See Note 2

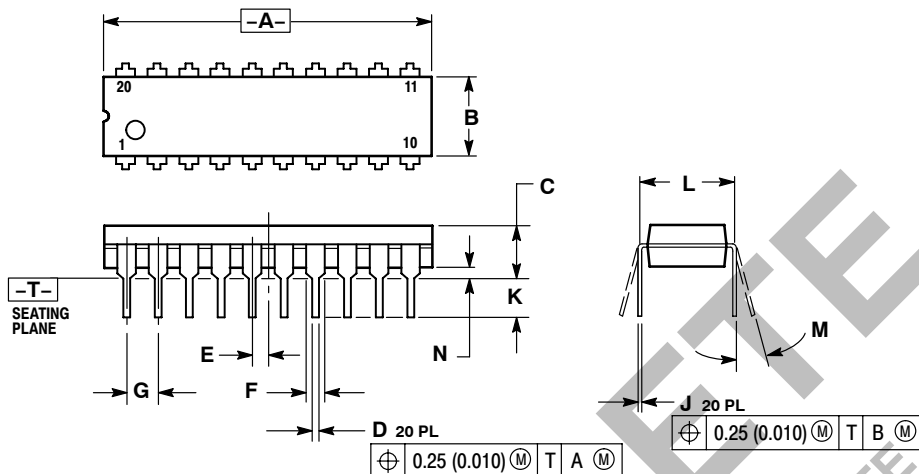
2. For ordering information on the EIAJ version of the SOIC package, please contact your local ON Semiconductor representative.

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

# SN74LS240, SN74LS244

## PACKAGE DIMENSIONS

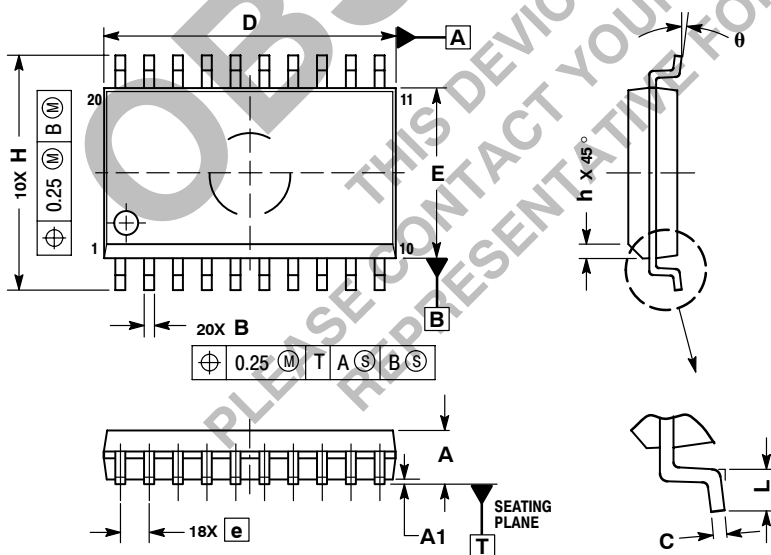
### N SUFFIX PLASTIC PACKAGE CASE 738-03 ISSUE E



- 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	0.300 BSC		7.62 BSC	
M	0°	15°	0°	15°
N	0.020	0.040	0.51	1.01

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



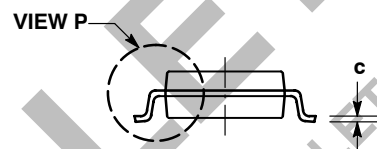
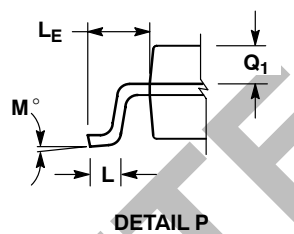
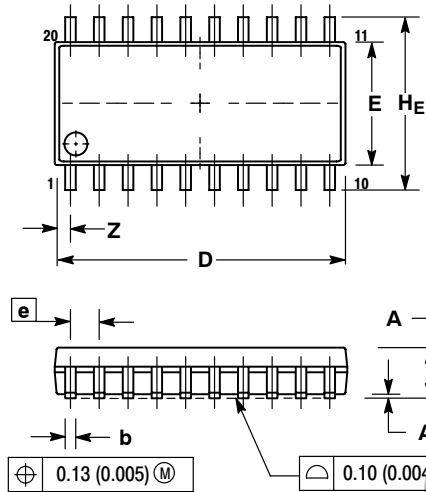
- NOTES:
1. DIMENSIONS ARE IN MILLIMETERS.
  2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
  3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
  5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL 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
theta	0°	7°

# SN74LS240, SN74LS244

## PACKAGE DIMENSIONS

**M SUFFIX**  
**SOEIAJ PACKAGE**  
**CASE 967-01**  
**ISSUE O**



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
  4. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
  5. THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.46 (0.018).

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	---	2.05	---	0.081
A <sub>1</sub>	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
c	0.18	0.27	0.007	0.011
D	12.35	12.80	0.486	0.504
E	5.10	5.45	0.201	0.215
e	1.27 BSC		0.050 BSC	
H <sub>E</sub>	7.40	8.20	0.291	0.323
L	0.50	0.85	0.020	0.033
L <sub>E</sub>	1.10	1.50	0.043	0.059
M	0°	10°	0°	10°
Q <sub>1</sub>	0.70	0.90	0.028	0.035
Z	---	0.81	---	0.032

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