

**FAIRCHILD**  
SEMICONDUCTOR™

August 1986  
Revised March 2000

## DM74LS240 • DM74LS241

### Octal 3-STATE Buffer/Line Driver/Line Receiver

#### General Description

These buffers/line drivers are designed to improve both the performance and PC board density of 3-STATE buffers/drivers employed as memory-address drivers, clock drivers, and bus-oriented transmitters/receivers. Featuring 400 mV of hysteresis at each low current PNP data line input, they provide improved noise rejection and high fanout outputs and can be used to drive terminated lines down to 133Ω.

#### Features

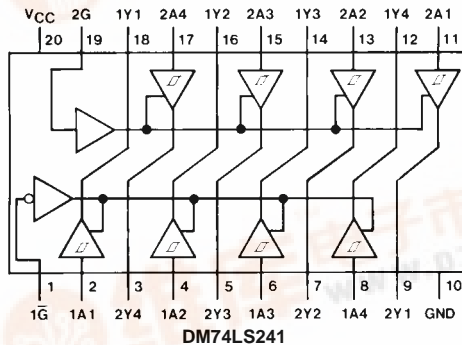
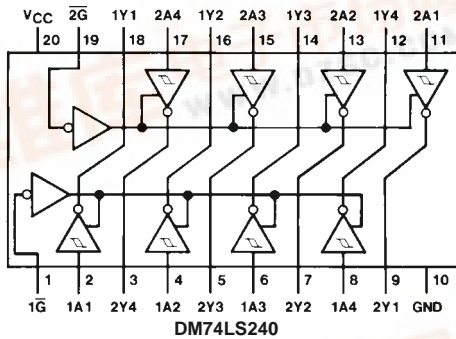
- 3-STATE outputs drive bus lines directly
- PNP inputs reduce DC loading on bus lines
- Hysteresis at data inputs improves noise margins
- Typical  $I_{OL}$  (sink current)
  - 24 mA
- Typical  $I_{OH}$  (source current)
  - 15 mA
- Typical propagation delay times
  - Inverting 10.5 ns
  - Noninverting 12 ns
- Typical enable/disable time 18 ns
- Typical power dissipation (enabled)
  - Inverting 130 mW
  - Noninverting 135 mW

#### Ordering Code:

Order Number	Package Number	Package Description
DM74LS240WM	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
DM74LS240SJ	M20D	20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
DM74LS240N	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide
DM74LS241WM	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
DM74LS241N	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

#### Connection Diagrams



DM74LS240 • DM74LS241 Octal 3-STATE Buffer/Line Driver/Line Receiver



DM74LS240 • DM74LS241

**Function Tables**

DM74LS240

Inputs		Output
$\bar{G}$	A	Y
L	L	H
L	H	L
H	X	Z

DM74LS241

Inputs				Outputs	
G	$\bar{G}$	1A	2A	1Y	2Y
X	L	L	X	L	
X	L	H	X	H	
X	H	X	X	Z	
H	X	X	L		L
H	X	X	H		H
L	X	X	X		Z

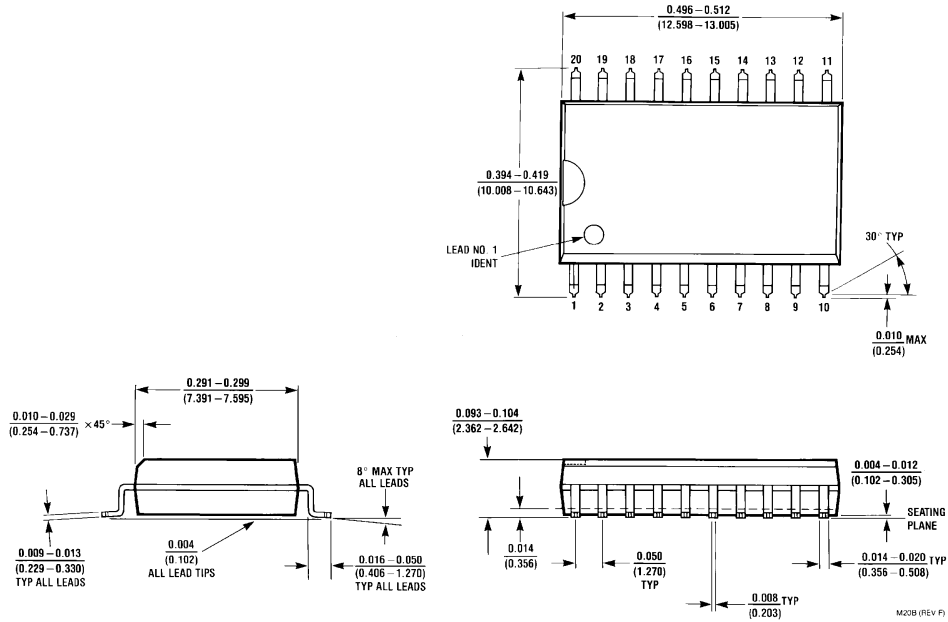
L = LOW Logic Level  
 H = HIGH Logic Level  
 X = Either LOW or HIGH Logic Level  
 Z = High Impedance

Absolute Maximum Ratings (Note 1)							
Supply Voltage	7V	<b>Note 1:</b> The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.					
Input Voltage	7V						
Operating Free Air Temperature Range	0°C to +70°C						
Storage Temperature Range	-65°C to +150°C						
Recommended Operating Conditions							
Symbol	Parameter	Min	Nom	Max	Units		
V <sub>CC</sub>	Supply Voltage	4.75	5	5.25	V		
V <sub>IH</sub>	HIGH Level Input Voltage	2			V		
V <sub>IL</sub>	LOW Level Input Voltage			0.8	V		
I <sub>OH</sub>	HIGH Level Output Current			-15	mA		
I <sub>OL</sub>	LOW Level Output Current			24	mA		
T <sub>A</sub>	Free Air Operating Temperature	0		70	°C		
Electrical Characteristics							
over recommended operating free air temperature range (unless otherwise noted)							
Symbol	Parameter	Conditions	Min	Typ (Note 2)	Max	Units	
V <sub>I</sub>	Input Clamp Voltage	V <sub>CC</sub> = Min, I <sub>I</sub> = -18 mA			-1.5	V	
HYS	Hysteresis (V <sub>T+</sub> - V <sub>T-</sub> ) Data Inputs Only	V <sub>CC</sub> = Min	0.2	0.4		V	
V <sub>OH</sub>	HIGH Level Output Voltage	V <sub>CC</sub> = Min, V <sub>IH</sub> = Min V <sub>IL</sub> = Max, I <sub>OH</sub> = -1 mA	2.7			V	
		V <sub>CC</sub> = Min, V <sub>IH</sub> = Min V <sub>IL</sub> = Max, I <sub>OH</sub> = -3 mA	2.4	3.4			
		V <sub>CC</sub> = Min, V <sub>IH</sub> = Min V <sub>IL</sub> = 0.5V, I <sub>OH</sub> = Max	2				
V <sub>OL</sub>	LOW Level Output Voltage	V <sub>CC</sub> = Min V <sub>IL</sub> = Max V <sub>IH</sub> = Min	I <sub>OL</sub> = 12 mA		0.4	V	
			I <sub>OL</sub> = Max		0.5		
I <sub>ozH</sub>	Off-State Output Current, HIGH Level Voltage Applied	V <sub>CC</sub> = Max V <sub>IL</sub> = Max	V <sub>O</sub> = 2.7V		20	μA	
I <sub>ozL</sub>	Off-State Output Current, LOW Level Voltage Applied	V <sub>IH</sub> = Min	V <sub>O</sub> = 0.4V		-20	μA	
I <sub>I</sub>	Input Current at Maximum Input Voltage	V <sub>CC</sub> = Max V <sub>I</sub> = 7V			0.1	mA	
I <sub>IH</sub>	HIGH Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 2.7V			20	μA	
I <sub>IL</sub>	LOW Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V			-0.2	mA	
I <sub>OS</sub>	Short Circuit Output Current	V <sub>CC</sub> = Max (Note 3)		-40	-225	mA	
I <sub>CC</sub>	Supply Current	V <sub>CC</sub> = Max, Outputs OPEN	Outputs HIGH		13	23	mA
			Outputs LOW		26	44	
					27	46	
			Outputs Disabled		29	50	
				32	54		
<b>Note 2:</b> All typicals are at V <sub>CC</sub> = 5V, T <sub>A</sub> = 25°C. <b>Note 3:</b> Not more than one output should be shorted at a time, and the duration should not exceed one second.							

DM74LS240 • DM74LS241

Switching Characteristics					
at $V_{CC} = 5V$ and $T_A = 25^\circ C$					
Symbol	Parameter	Conditions		Max	Units
$t_{PLH}$	Propagation Delay Time LOW-to-HIGH Level Output	$C_L = 45 \text{ pF}$	DM74LS240	14	ns
		$R_L = 667\Omega$	DM74LS241	18	
$t_{PHL}$	Propagation Delay Time HIGH-to-LOW Level Output	$C_L = 45 \text{ pF}$	DM74LS240	18	ns
		$R_L = 667\Omega$	DM74LS241	18	
$t_{PZL}$	Output Enable Time to LOW Level	$C_L = 45 \text{ pF}$	DM74LS240	30	ns
		$R_L = 667\Omega$	DM74LS241	30	
$t_{PZH}$	Output Enable Time to HIGH Level	$C_L = 45 \text{ pF}$	DM74LS240	23	ns
		$R_L = 667\Omega$	DM74LS241	23	
$t_{PLZ}$	Output Disable Time from LOW Level	$C_L = 5 \text{ pF}$	DM74LS240	25	ns
		$R_L = 667\Omega$	DM74LS241	25	
$t_{PHZ}$	Output Disable Time from HIGH Level	$C_L = 5 \text{ pF}$	DM74LS240	18	ns
		$R_L = 667\Omega$	DM74LS241	18	
$t_{PLH}$	Propagation Delay Time LOW-to-HIGH Level Output	$C_L = 150 \text{ pF}$	DM74LS240	18	ns
		$R_L = 667\Omega$	DM74LS241	21	
$t_{PHL}$	Propagation Delay Time HIGH-to-LOW Level Output	$C_L = 150 \text{ pF}$	DM74LS240	22	ns
		$R_L = 667\Omega$	DM74LS241	22	
$t_{PZL}$	Output Enable Time to LOW Level	$C_L = 150 \text{ pF}$	DM74LS240	33	ns
		$R_L = 667\Omega$	DM74LS241	33	
$t_{PZH}$	Output Enable Time to HIGH Level	$C_L = 150 \text{ pF}$	DM74LS240	26	ns
		$R_L = 667\Omega$	DM74LS241	26	

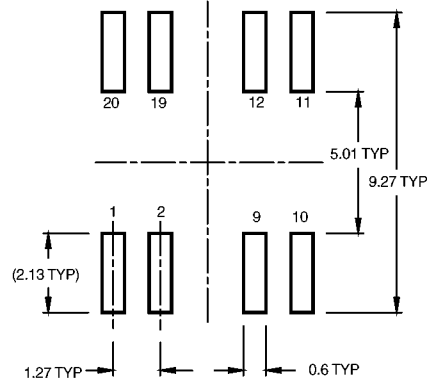
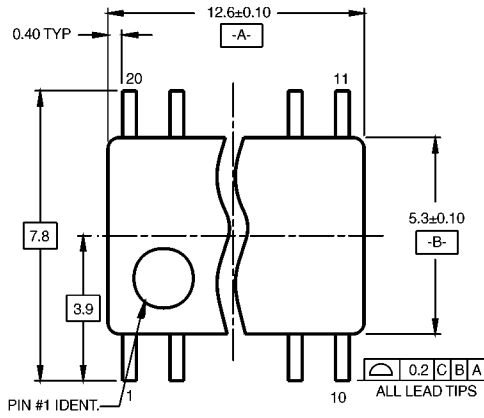
**Physical Dimensions** inches (millimeters) unless otherwise noted



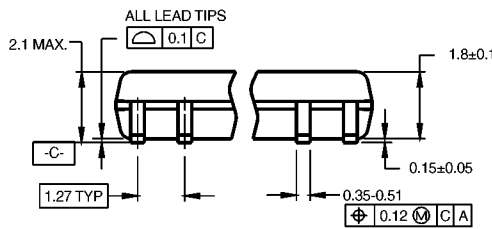
**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide  
Package Number M20B**

DM74LS240 • DM74LS241

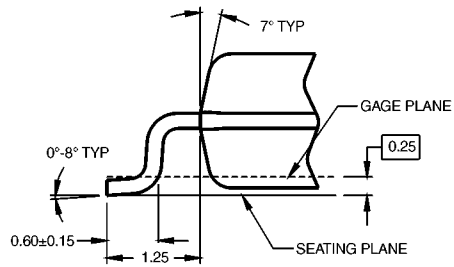
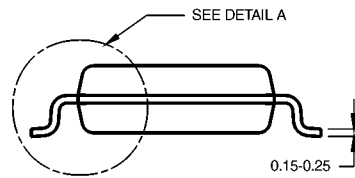
**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



**LAND PATTERN RECOMMENDATION**



DIMENSIONS ARE IN MILLIMETERS



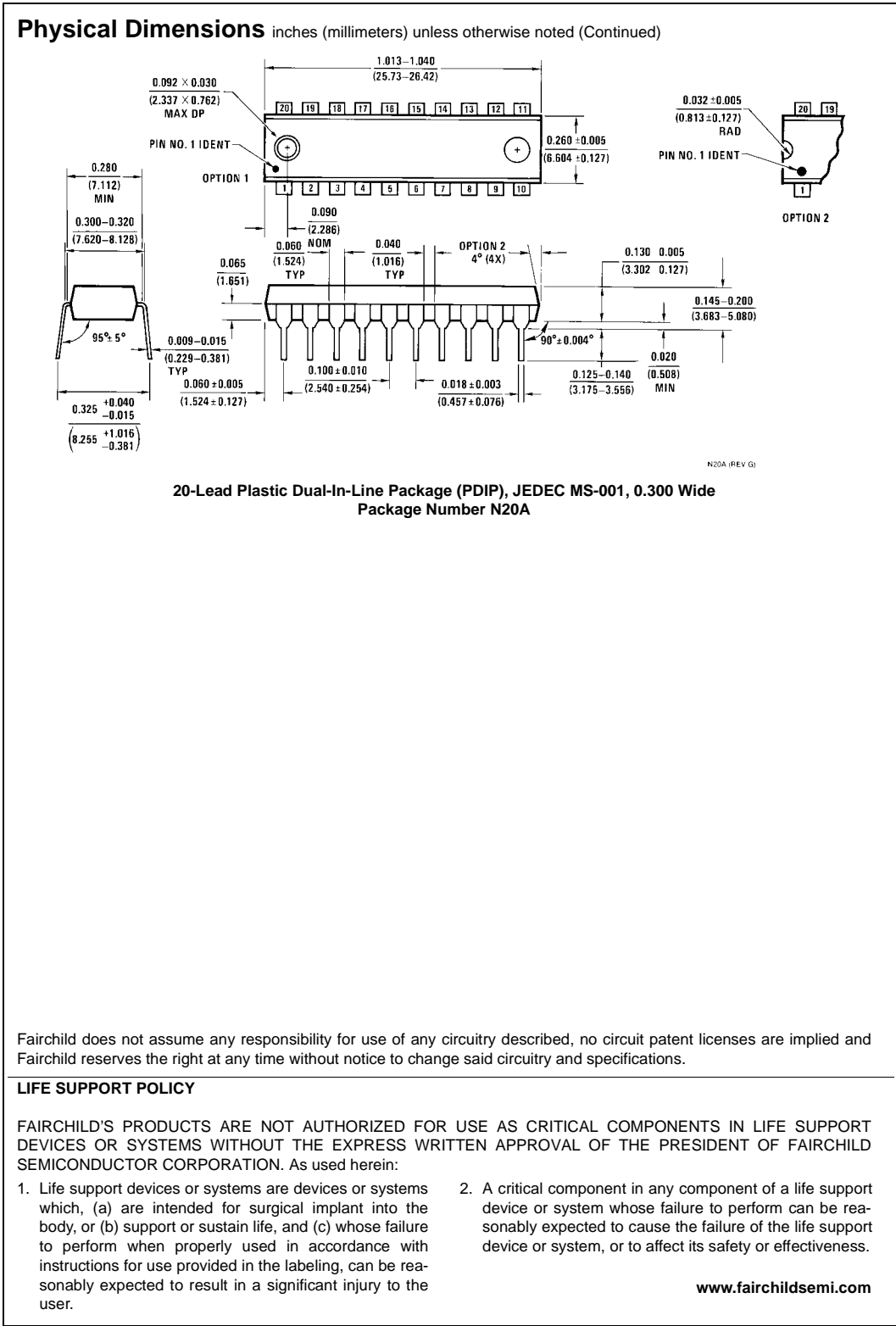
**DETAIL A**

**NOTES:**

- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M20DRevB1

**20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide  
Package Description M20D**



Fairchild does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and Fairchild reserves the right at any time without notice to change said circuitry and specifications.

**LIFE SUPPORT POLICY**

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

[www.fairchildsemi.com](http://www.fairchildsemi.com)