

# Am54S/74S240 • Am54S/74S241 Am54S/74S242 • Am54S/74S243 Am54S/74S244

Octal Buffers/Line Drivers/Line Receivers With Three-State Outputs

## DISTINCTIVE CHARACTERISTICS

- Three-state outputs drive bus lines directly
- Advanced Schottky processing
- Hysteresis at inputs improve noise margin
- PNP inputs reduce D.C. loading on bus lines
- $V_{OL}$  of 0.55V at 64mA for Am74S; 48mA for Am54S
- Data-to-output propagation delay times:  
Inverting – 7.0ns MAX  
Non-inverting – 9.0ns MAX
- Enable-to-output – 15.0ns MAX
- 100% reliability assurance testing in compliance with MIL-STD-883
- 20 pin hermetic and molded DIP packages for Am54S/74S240, Am54S/74S241, and Am54S/74S244

## FUNCTIONAL DESCRIPTION

These buffers/line drivers, used as memory-address drivers, clock drivers, and bus oriented transmitters/receivers, provide improved PC board density. The outputs of the commercial temperature range versions have 64mA sink and 15mA source capability, which can be used to drive terminated lines down to 133Ω. The outputs of the military temperature range versions have 48mA sink and 12mA source current capability.

Featuring 0.2V minimum guaranteed hysteresis at each low-current PNP data input, they provide improved noise rejection and high-fan-out outputs to restore Schottky TTL levels completely.

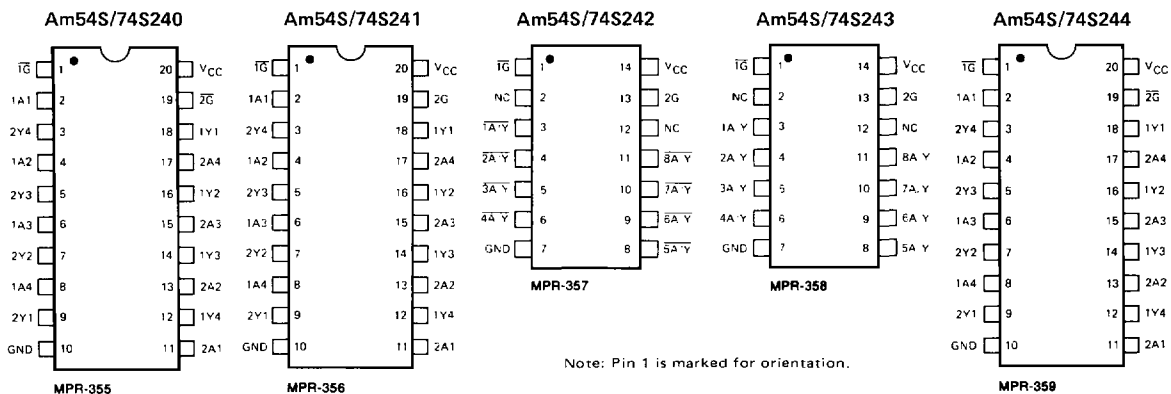
The Am54S/74S240, Am54S/74S241 and Am54S/74S244 have four buffers which are enabled from one common line, and the other four buffers are enabled from another common line. The Am54S/74S240 is inverting, while the Am54S/74S241 and Am54S/74S244 present true data at the outputs.

The Am54S/74S242 and Am54S/74S243 have the two 4-line data paths connected input-to-output on both sides to form an asynchronous transceiver/buffer with complementing enable inputs. The Am54S/74S242 is inverting, while the Am54S/74S243 presents non-inverting data at the outputs.

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## CONNECTION DIAGRAMS

Top Views

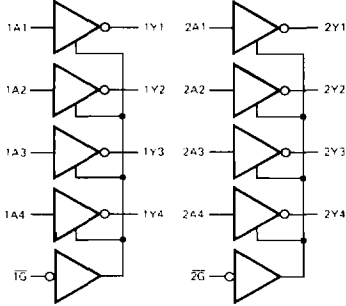


## ORDERING INFORMATION

Package Type	Temperature Range	Order Number				
		Am54S/74S240	Am54S/74S241	Am54S/74S242	Am54S/74S243	Am54S/74S244
Hermetic Dice	-55°C to +125°C	SN54S240J	SN54S241J	SN54S242J	SN54S243J	SN54S244J
Hermetic Dice	-55°C to +125°C	AM54S240X	AM54S241X	AM54S242X	AM54S243X	AM54S244X
Hermetic Dice	0°C to +70°C	SN74S240J	SN74S241J	SN74S242J	SN74S243J	SN74S244J
Molded Dice	0°C to +70°C	SN74S240N	SN74S241N	SN74S242X	SN74S243X	SN74S244N
Molded Dice	0°C to +70°C	AM74S240X	AM74S241X	AM74S242X	AM74S243X	AM74S244X

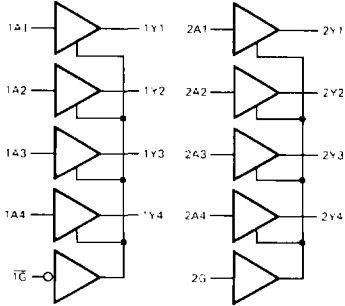
LOGIC DIAGRAMS

Am54S/74S240



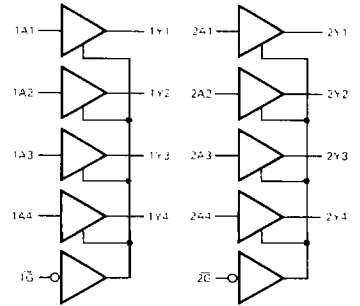
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Am54S/74S241



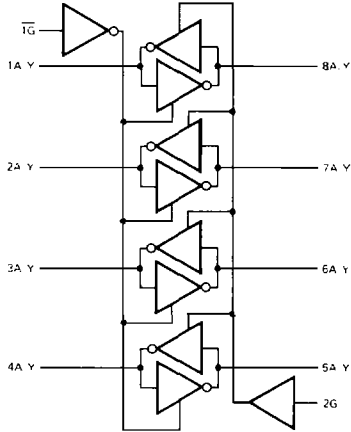
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Am54S/74S244



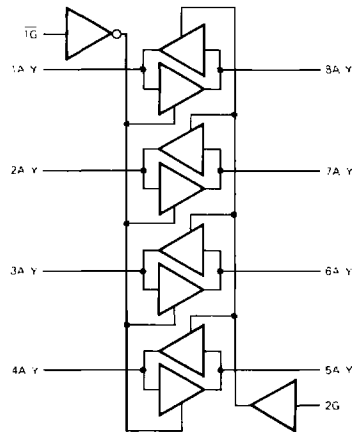
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Am54S/74S242



LIC-464

Am54S/74S243



LIC-465

Note: All gates have input hysteresis.

**MAXIMUM RATINGS** above which the useful life may be impaired

Storage Temperature	-65°C to +150°C
Temperature (Ambient) Under Bias	-55°C to +125°C
Supply Voltage to Ground Potential	-0.5V to +7.0V
DC Voltage Applied to Outputs for HIGH Output State	-0.5V to +V <sub>CC</sub> max.
DC Input Voltage	-0.5V to +7.0V
DC Output Current	150mA
DC Input Current	-30mA to +5.0mA

## ELECTRICAL CHARACTERISTICS

The Following Conditions Apply Unless Otherwise Noted:

Am54S240/S241/S242/S243/S244 (MIL)

 $T_A = -55^\circ\text{C}$  to  $+125^\circ\text{C}$  $V_{CC}(\text{MIN.}) = 4.50\text{V}$  $V_{CC}(\text{MAX.}) = 5.50\text{V}$ 

Am74S240/S241/S242/S243/S244 (COM'L)

 $T_A = 0^\circ\text{C}$  to  $+70^\circ\text{C}$  $V_{CC}(\text{MIN.}) = 4.75\text{V}$  $V_{CC}(\text{MAX.}) = 5.25\text{V}$ 

## ELECTRICAL CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE

Parameters	Description	Test Conditions (Note 1)	Min.	Typ. (Note 2)	Max.	Units		
$V_{IH}$	High-Level Input Voltage		2.0			Volts		
$V_{IL}$	Low-Level Input Voltage				0.8	Volts		
$V_{IK}$	Input Clamp Voltage	$V_{CC} = \text{MIN.}, I_I = -18\text{mA}$			-1.2	Volts		
	Hysteresis ( $V_{T+} - V_{T-}$ )	$V_{CC} = \text{MIN.}$	0.2	0.4		Volts		
$V_{OH}$	High-Level Output Voltage	$V_{CC} = \text{MIN.}$ $V_{IL} = 0.8\text{V}$ COM'L, $I_{OH} = -1\text{mA}$	2.7			Volts		
		$I_{OH} = -3\text{mA}$	2.4	3.4				
		$V_{CC} = \text{MIN.}$ $V_{IL} = 0.5\text{V}$ MIL, $I_{OH} = -12\text{mA}$ COM'L, $I_{OH} = -15\text{mA}$	2.0		2.0			
$V_{OL}$	Low-Level Output Voltage	$V_{CC} = \text{MIN.}$ $V_{IL} = 0.8\text{V}$ MIL, $I_{OL} = 48\text{mA}$			0.55	Volts		
		COM'L, $I_{OL} = 64\text{mA}$			0.55			
$I_{OZH}$	Off-State Output Current, High-Level Voltage Applied	$V_{CC} = \text{MAX.}$ $V_{IH} = 2.0\text{V}$ $V_{IL} = 0.8\text{V}$ $V_O = 2.4\text{V}$			50	$\mu\text{A}$		
$I_{OZL}$	Off-State Output Current, Low-Level Voltage Applied	$V_O = 0.5\text{V}$			-50			
		'S240, 'S241, 'S244 'S242, 'S243			-500			
$I_I$	Input Current at Maximum Input Voltage	$V_{CC} = \text{MAX.}, V_I = 5.5\text{V}$			1.0	mA		
$I_{IH}$	High-Level Input Current, Any Input	$V_{CC} = \text{MAX.}, V_{IH} = 2.7\text{V}$			50	$\mu\text{A}$		
$I_{IL}$	Low-Level Input Current	Any A			-400	$\mu\text{A}$		
		Any G			-2.0	mA		
$I_{OS}$	Short-Circuit Output Current (Note 3)	$V_{CC} = \text{MAX.}$	-50		-225	mA		
$I_{CC}$	Supply Current	Am54S/74S240 Am54S/74S242	$V_{CC} = \text{MAX.}$ Outputs open	All Outputs HIGH	MIL	80	123	mA
				All Outputs LOW	COM'L	80	135	
					MIL	100	145	
				Outputs at Hi-Z	COM'L	100	150	
					MIL	100	145	
				COM'L	100	150		
		Am54S/74S241 Am54S/74S243 Am54S/74S244	$V_{CC} = \text{MAX.}$ Outputs open	All Outputs HIGH	MIL	95	147	mA
				All Outputs LOW	COM'L	95	160	
					MIL	120	170	
				Outputs at Hi-Z	COM'L	120	180	
					MIL	120	170	
				COM'L	120	180		

Notes: 1. For conditions shown as MIN. or MAX., use the appropriate value specified under recommended operating conditions.

2. All typical values are  $V_{CC} = 5.0\text{V}$ ,  $T_A = 25^\circ\text{C}$ .

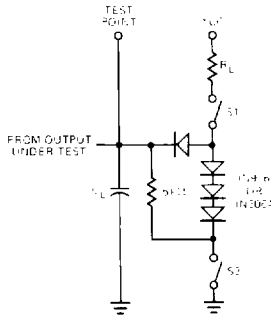
3. Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second.

SWITCHING CHARACTERISTICS ( $V_{CC} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ )

Am54S/74S240/242 Am54S/74S241/243/244

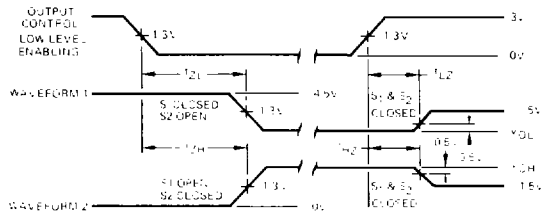
Parameter	Description	Test Conditions	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
$t_{PLH}$	Propagation Delay Time, Low-to-High-Level Output	$C_L = 50\text{pF}$ , $R_L = 90\Omega$ (Note 3)		4.5	7.0		6.0	9.0	ns
$t_{PHL}$	Propagation Delay Time, High-to-Low-Level Output			4.5	7.0		6.0	9.0	ns
$t_{ZL}$	Output Enable Time to Low Level			10	15		10	15	ns
$t_{ZH}$	Output Enable Time to High Level	$C_L = 5.0\text{pF}$ , $R_L = 90\Omega$ (Note 3)		6.5	10		8.0	12	ns
$t_{LZ}$	Output Disable Time from Low Level			10	15		10	15	ns
$t_{HZ}$	Output Disable Time from High Level			6.0	9.0		6.0	9.0	ns

**LOAD CIRCUIT FOR THREE-STATE OUTPUTS**



LIC-466

**VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES, THREE-STATE OUTPUTS**



LIC-467

- Notes: 1. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.  
 2. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.  
 3. In the examples above, the phase relationships between inputs and outputs have been chosen arbitrarily. PRR  $\approx$  1.0MHz, Z<sub>OUT</sub>  $\approx$  50 $\Omega$  and t<sub>r</sub>  $\leq$  2.5ns, t<sub>f</sub>  $\leq$  2.5ns.

**FUNCTION TABLES**

Am54S/74S242

INPUTS		OUTPUTS	
$\overline{1G}$	2G	A	Y
H	L	X	Z
L	H	L	H
L	H	H	L

Am54S/74S240

INPUTS	OUTPUT
$\overline{G}$	A
H	X
L	H
L	L

Am54S/74S241  
Am54S/74S243

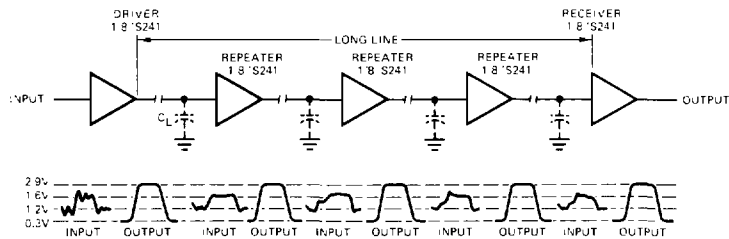
INPUTS		OUTPUTS	
$\overline{1G}$	2G	A	Y
H	L	X	Z
L	H	H	H
L	H	L	L

Am54S/74S244

INPUTS	OUTPUT
$\overline{G}$	A
H	X
L	H
L	L

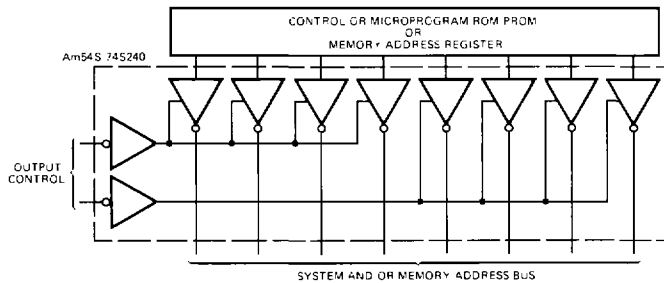
**APPLICATIONS**

**Am54S/74S241'S USED AS REPEATER/LEVEL RESTORER**



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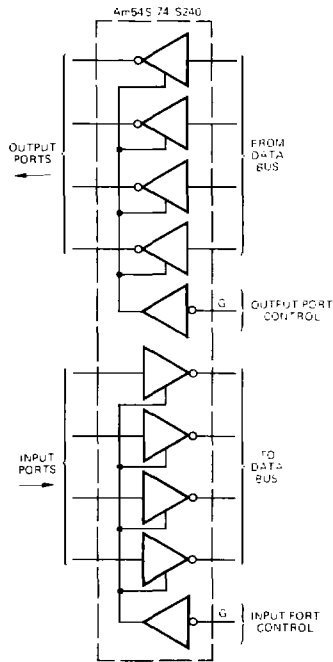
**'S240 USED AS SYSTEM AND/OR MEMORY BUS DRIVER – 4-BIT ORGANIZATION CAN BE APPLIED TO HANDLE BINARY OR BCD**



LIC-469

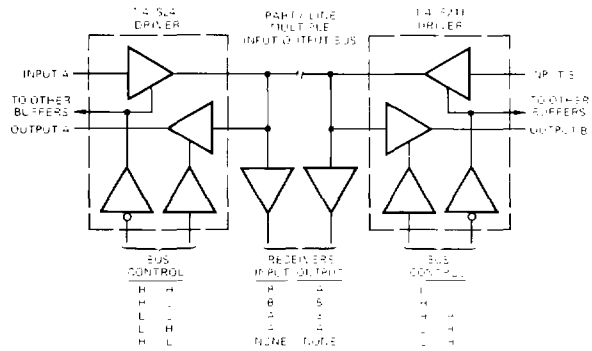
APPLICATIONS (Cont.)

INDEPENDENT 4-BIT BUS DRIVERS/RECEIVERS IN A SINGLE PACKAGE



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PARTY-LINE BUS SYSTEM WITH MULTIPLE INPUTS, OUTPUTS, AND RECEIVERS

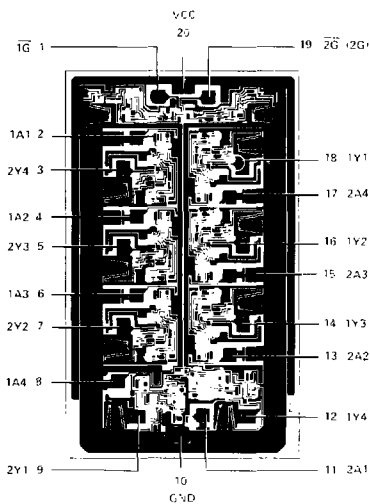


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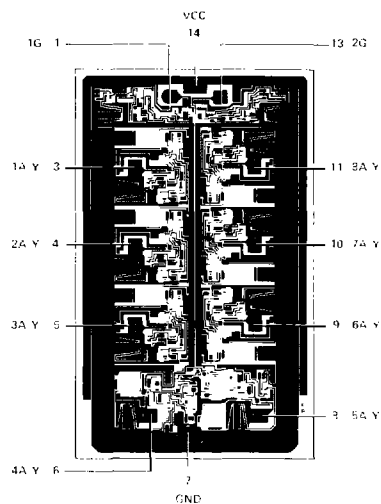
Metallization and Pad Layouts

Am54S/74S240  
Am54S/74S241  
Am54S/74S244



DIE SIZE 0.077" X 0.124"

Am54S/74S242  
Am54S/74S243



DIE SIZE 0.077" X 0.124"