

# Am25S240 • Am25S241 • Am25S244 Am54S/74S240 • Am54S/74S241 • 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 DC loading on bus lines
- $V_{OL}$  of 0.55V at 64mA for COM'L; 48mA for MIL
- 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

### 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.

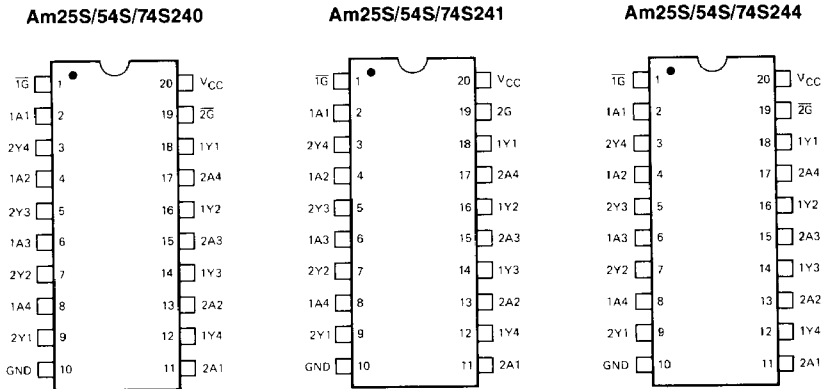
The Am25S/54S/74S240, Am25S/54S/74S241 and Am25S/54S/74S244 have four buffers which are enabled from one common line, and the other four buffers are enabled from another common line. The Am25S/54S/74S240 is inverting, while the Am25S/54S/74S241 and Am25S/54S/74S244 present true data at the outputs.

Am25S versions feature 30 to 60% lower  $I_{CC}$  – a significant reduction in system power consumption where multiple devices are used per system.

### Note

- Am25S240/241/244 have up to 40% lower  $I_{CC}$  than 54S/74S versions

### CONNECTION DIAGRAMS Top Views

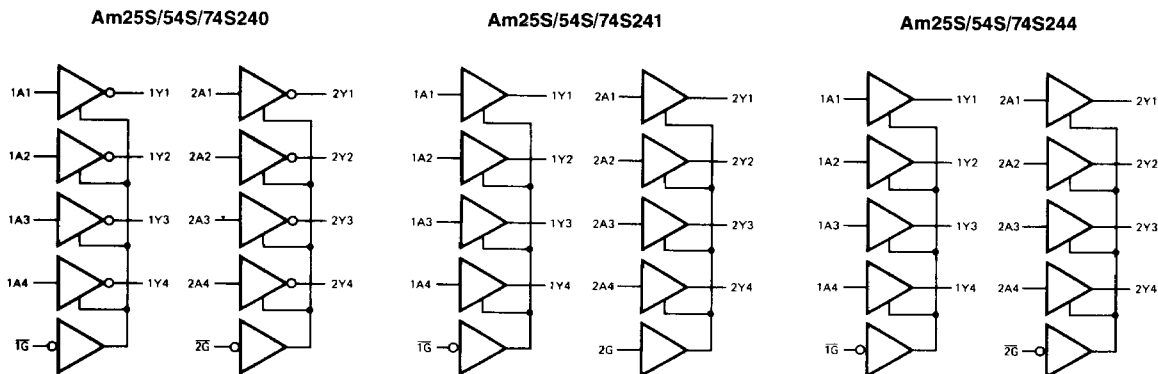


Note: Pin 1 is marked for orientation.

### ORDERING INFORMATION

Package Type	Temperature Range	Order Number			
		Am25S240/241/244	Am54S/74S240	Am54S/74S241	Am54S/74S244
Hermetic	–55 to +125°C	AM25S240/241/244DM	SN54S240J	SN54S241J	SN54S244J
Dice	–55 to +125°C	AM25S240/241/244XM	AM54S240X	AM54S241X	AM54S244X
Hermetic	0 to 70°C	AM25S240/241/244DC	SN74S240J	SN74S241J	SN74S244J
Molded	0 to 70°C	AM25S240/241/244PC	SN74S240N	SN74S241N	SN74S244N
Dice	0 to 70°C	AM25S240/241/244XC	AM74S240X	AM74S241X	AM74S244X

**LOGIC DIAGRAMS**



Note: All gates have input hysteresis.

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

Storage Temperature	-65 to +150°C
Temperature (Ambient) Under Bias	-55 to +125°C
Supply Voltage to Ground Potential	-0.5 to +7.0V
DC Voltage Applied to Outputs for HIGH Output State	-0.5V to +V <sub>CC</sub> max
DC Input Voltage	-0.5 to +5.5V
DC Output Current	150mA
DC Input Current	-30 to +5.0mA

**FUNCTION TABLES**

**Am25S/54S/74S240**

INPUTS		OUTPUT
G	A	Y
H	X	Z
L	H	L
L	L	H

**Am25S/54S/74S241**

INPUTS			OUTPUT
1G	2G	A	Y
H	L	X	Z
L	H	H	H
L	H	L	L

**Am25S/54S/74S244**

INPUTS		OUTPUT
G	A	Y
H	X	Z
L	H	H
L	L	L

**ELECTRICAL CHARACTERISTICS**

The Following Conditions Apply Unless Otherwise Noted:

Am25S/54S240/241/244 (MIL)  $T_A = -55$  to  $+125^\circ\text{C}$   $V_{CC}(\text{MIN}) = 4.50\text{V}$   $V_{CC}(\text{MAX}) = 5.50\text{V}$   
 Am25S/74S240/241/244 (COM'L)  $T_A = 0$  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**

Parameter	Description	Test Conditions (Note 1)	Typ (Note 2)		Units				
			Min	Max					
$V_{IH}$	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, $I_{OH} = -12\text{mA}$	2.0					
			COM'L, $I_{OH} = -15\text{mA}$	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				
$I_I$	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	$V_{CC} = \text{MAX}, V_{IL} = 0.5\text{V}$		-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	All Outputs HIGH	$V_{CC} = \text{MAX},$ Outputs open	MIL		123	mA	
					COM'L		135		
					All Outputs LOW	MIL			145
					COM'L		150		
					Outputs at Hi-Z	MIL			145
						COM'L			150
		Am54S/74S241 Am54S/74S244	All Outputs HIGH	$V_{CC} = \text{MAX},$ Outputs open	MIL		147	mA	
					COM'L		160		
					All Outputs LOW	MIL			170
					COM'L		180		
					Outputs at Hi-Z	MIL			170
						COM'L			180
		Am25S240	All Outputs HIGH	$V_{CC} = \text{MAX},$ Outputs open	MIL and COM'L		37	65	mA
			All Outputs LOW				59	90	
			Outputs at Hi-Z				69	105	
		Am25S241 Am25S244	All Outputs HIGH	$V_{CC} = \text{MAX},$ Outputs open	MIL and COM'L		37	65	mA
All Outputs LOW			63			105			
Outputs at Hi-Z			72			120			

- 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** ( $V_{CC} = 5V, T_A = +25^\circ C$ )

Parameter	Description	Test Conditions	Am54S/74S240			Am54S/74S241/244			Units
			Min	Typ	Max	Min	Typ	Max	
$t_{PLH}$	Propagation Delay Time, Low-to-High-Level Output	$C_L = 50pF, R_L = 90\Omega$ (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			6.5	10		8.0	12	ns
$t_{LZ}$	Output Disable Time from Low Level	$C_L = 5.0pF, R_L = 90\Omega$ (Note 3)		10	15		10	15	ns
$t_{HZ}$	Output Disable Time from High Level			6.0	9.0		6.0	9.0	ns
$t_{LZ}$	Output Disable Time	$C_L = 50pF, R_L = 90\Omega$ (Note 3)						18	ns
$t_{HZ}$									18

**Am25S ONLY**  
**SWITCHING CHARACTERISTICS**  
**OVER OPERATING RANGE**

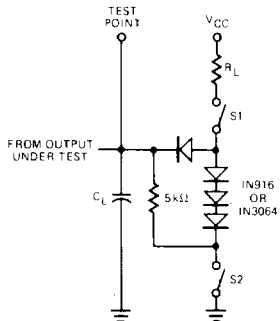
Parameter	Description	Am25S240 COM'L		Am25S240 MIL		Units	Test Conditions
		Min	Max	Min	Max		
		$T_A = 0 \text{ to } 70^\circ C$ $V_{CC} = 5.0V \pm 5\%$		$T_A = -55 \text{ to } +125^\circ C$ $V_{CC} = 5.0V \pm 10\%$			
$t_{PLH}$	Propagation Delay Data Input to Output		7.5		9	ns	$C_L = 50pF$ $R_L = 90\Omega$
$t_{PHL}$			7		9		
$t_{ZL}$	Output Enable Time to LOW		16		18	ns	
$t_{ZH}$	Output Enable Time to HIGH		13		13		
$t_{LZ}$	Output Disable Time from LOW		16		18	ns	$C_L = 5.0pF$ $R_L = 90\Omega$
$t_{HZ}$	Output Disable Time from HIGH		10		12		

**Am25S ONLY**  
**SWITCHING CHARACTERISTICS**  
**OVER OPERATING RANGE**

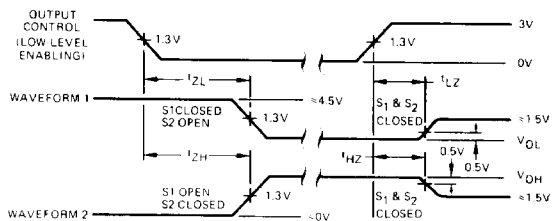
Parameter	Description	Am25S241/244 COM'L		Am25S241/244 MIL		Units	Test Conditions
		Min	Max	Min	Max		
		$T_A = 0 \text{ to } 70^\circ C$ $V_{CC} = 5.0V \pm 5\%$		$T_A = -55 \text{ to } +125^\circ C$ $V_{CC} = 5.0V \pm 10\%$			
$t_{PLH}$	Propagation Delay Data Input to Output		10.5		12	ns	$C_L = 50pF$ $R_L = 90\Omega$
$t_{PHL}$			10.5		12		
$t_{ZL}$	Output Enable Time to LOW		16*		18*	ns	
$t_{ZH}$	Output Enable Time to HIGH		13*		13*		
$t_{LZ}$	Output Disable Time from LOW		16*		18*	ns	$C_L = 5.0pF$ $R_L = 90\Omega$
$t_{HZ}$	Output Disable Time from HIGH		10*		12*		

\*Note: Am25S241, add 3ns for 2G enable.

**LOAD CIRCUIT FOR THREE-STATE OUTPUTS**



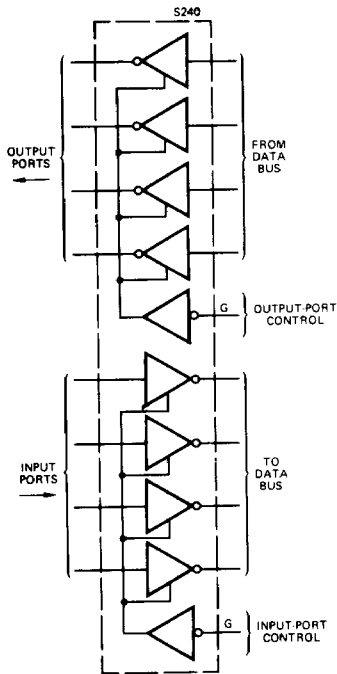
**VOLTAGE WAVEFORMS**  
**ENABLE AND DISABLE TIMES, THREE-STATE OUTPUTS**



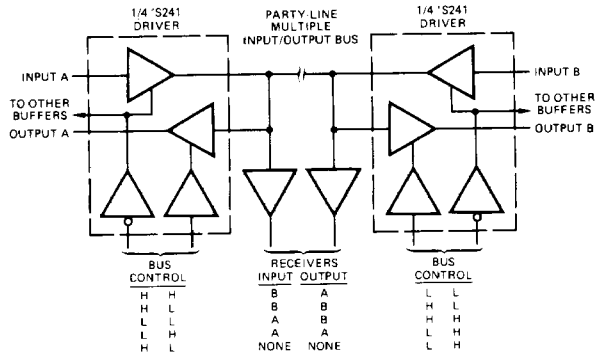
1. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.
2. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
3. In the examples above, the phase relationships between inputs and outputs have been chosen arbitrarily.  $PRR \leq 1.0MHz, Z_{OUT} \approx 50\Omega$  and  $t_r \leq 2.5ns, t_f \leq 2.5ns$ .

### APPLICATIONS

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

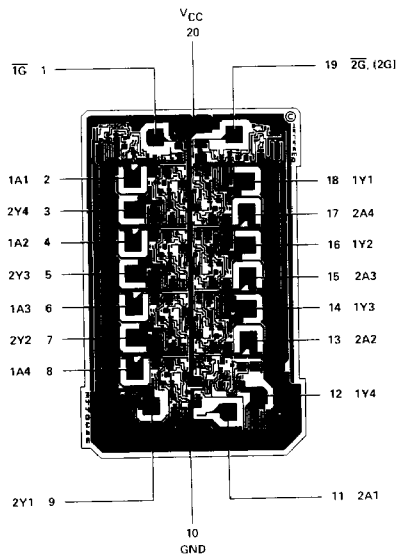


#### PARTY-LINE BUS SYSTEM WITH MULTIPLE INPUTS, OUTPUTS AND RECEIVERS



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#### Metallization and Pad Layout



DIE SIZE 0.059" X 0.091"