

# Am25S374 • Am54S/74S374

# Am25S534 • Am54S/74S534

## Octal Registers with Three-State Outputs

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### DISTINCTIVE CHARACTERISTICS

- Eight-bit, high-speed parallel registers
- Am25S/54S/74S374 has non-inverting inputs
- Am25S/54S/74S534 has inverting inputs
- Positive, edge-triggered, D-type flip-flops
- Buffered common clock and buffered common three-state control
- $V_{OL} = 0.5V$  (max) at  $I_{OL} = 20mA$
- Am25S versions with  $I_{OL} = 32mA$
- High-speed – Clock to output 11ns typical
- 100% product assurance screening to MIL-STD-883 requirements

### FUNCTIONAL DESCRIPTION

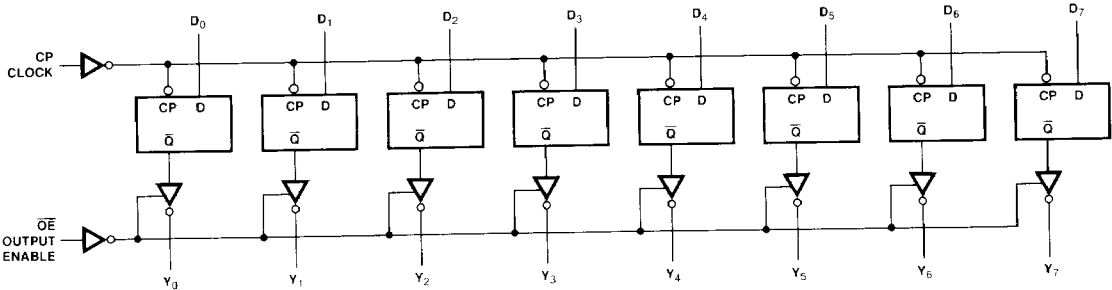
The Am25S/54S/74S374 and Am25S/54S/74S534 are eight-bit registers built using high-speed Schottky technology. The registers consist of eight D-type flip-flops with a buffered common clock and a buffered three-state output control. When the output enable ( $\overline{OE}$ ) input is LOW, the eight outputs are enabled. When the  $\overline{OE}$  input is HIGH, the outputs are in the three-state condition.

Input data meeting the set-up and hold time requirements of the D inputs is transferred to the Y outputs on the LOW-to-HIGH transition of the clock input.

The devices are packaged in a space-saving (0.3-inch row spacing) 20-pin package.

Am25S374 and Am25S534 versions are also available offering  $V_{OL} = 0.5V$  (max) at  $I_{OL} = 32mA$ .

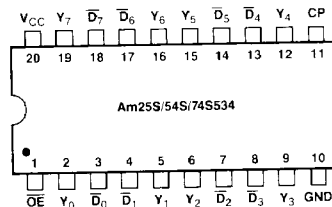
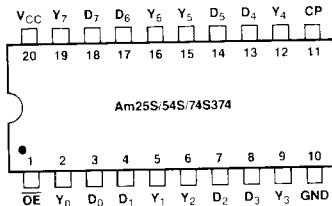
### LOGIC DIAGRAM Am25S/54S/74S374



Inputs  $D_0$  through  $D_7$  are inverted on the Am25S/54S/74S534.

BLI-051

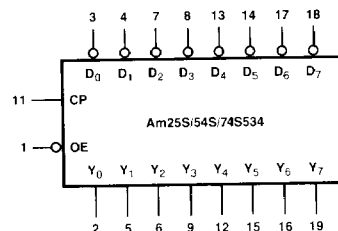
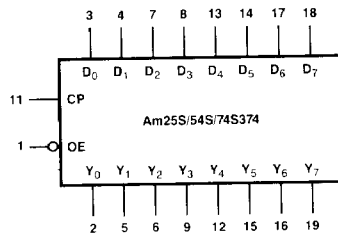
### CONNECTION DIAGRAMS – Top Views



Note: Pin 1 is marked for orientation.

BLI-052

### LOGIC SYMBOLS



$V_{CC}$  = Pin 20  
 $GND$  = Pin 10

BLI-053

**Am25S374 • Am25S534****ELECTRICAL CHARACTERISTICS**

The Following Conditions Apply Unless Otherwise Specified:

Am25S374/534XC, DC, PC	$T_A = 0$ to $70^\circ\text{C}$	$V_{CC} = 4.75$ to $5.25\text{V}$
Am25S374/534XM, DM	$T_A = -55$ to $+125^\circ\text{C}$	$V_{CC} = 4.50$ to $5.50\text{V}$
Am25S374/534FM	$T_C = -55$ to $+125^\circ\text{C}$	$V_{CC} = 4.50$ to $5.50\text{V}$

**DC CHARACTERISTICS OVER OPERATING RANGE**

Parameters	Description	Test Conditions (Note 1)	Min	Typ (Note 2)	Max	Units	
$V_{OH}$	Output HIGH Voltage	$V_{CC} = \text{MIN}$ $V_{IN} = V_{IH}$ or $V_{IL}$	MIL, $I_{OH} = -2.0\text{mA}$	2.4	3.4		Volts
			COML, $I_{OH} = -6.5\text{mA}$	2.4	3.1		
$V_{OL}$	Output LOW Voltage	$V_{CC} = \text{MIN}$ $V_{IN} = V_{IH}$ or $V_{IL}$	$I_{OL} = 20\text{mA}$			.45	Volts
			$I_{OL} = 32\text{mA}$			.5	
$V_{IH}$	Input HIGH Level	Guaranteed input logical HIGH voltage for all inputs	2.0			Volts	
$V_{IL}$	Input LOW Level	Guaranteed input logical LOW voltage for all inputs			0.8	Volts	
$V_I$	Input Clamp Voltage	$V_{CC} = \text{MIN}$ , $I_{IN} = -18\text{mA}$			-1.2	Volts	
$I_{IL}$	Input LOW Current	$V_{CC} = \text{MAX}$ , $V_{IN} = 0.5\text{V}$			-250	$\mu\text{A}$	
$I_{IH}$	Input HIGH Current	$V_{CC} = \text{MAX}$ , $V_{IN} = 2.7\text{V}$			50	$\mu\text{A}$	
$I_I$	Input HIGH Current	$V_{CC} = \text{MAX}$ , $V_{IN} = 5.5\text{V}$			1.0	mA	
$I_{OZ}$	Off-State (High-Impedance) Output Current	$V_{CC} = \text{MAX}$	$V_O = 0.5\text{V}$			-50	$\mu\text{A}$
			$V_O = 2.4\text{V}$			50	
$I_{SC}$	Output Short Circuit Current (Note 3)	$V_{CC} = \text{MAX}$	-40		-100	mA	
$I_{CC}$	Power Supply Current (Note 4)	$V_{CC} = \text{MAX}$		90	140	mA	

- Notes: 1. For conditions shown as MIN or MAX use the appropriate value specified under Electrical Characteristics for the applicable device type.  
 2. Typical limits are at  $V_{CC} = 5.0\text{V}$ ,  $25^\circ\text{C}$  ambient and maximum loading.  
 3. Not more than one output should be shorted at a time. Duration of the short circuit test should not exceed one second.  
 4. 'S374 measured at CLK = LOW-to-HIGH,  $\overline{OE} = \text{HIGH}$ , and all data inputs are LOW.  
 'S534 measured at CLK = LOW-to-HIGH,  $\overline{OE} = \text{HIGH}$ , and all data inputs are LOW.

**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 (Pin 16 to Pin 8) Continuous	-0.5 to +7.0V
DC Voltage Applied to Outputs for HIGH Output State	-0.5V to $+V_{CC}$ max
DC Input Voltage	-0.5 to +5.5V
DC Output Current, Into Outputs	30mA
DC Input Current	-30 to +5.0mA

**ORDERING INFORMATION**

Package Type	Temperature Range	Am25S374 Order Number	Am54S/74S374 Order Number	Am25S534 Order Number	Am54S/74S534 Order Number
Molded DIP	0 to $70^\circ\text{C}$	Am25S374PC	SN74S374N	Am25S534PC	SN74S534N
Hermetic DIP	0 to $70^\circ\text{C}$	Am25S374DC	SN74S374J	Am25S534DC	SN74S534J
Dice	0 to $70^\circ\text{C}$	Am25S374XC	SN74S374X	Am25S534XC	SN74S534X
Hermetic DIP	-55 to +125°C	Am25S374DM	SN54S374J	Am25S534DM	SN54S534J
Hermetic Flat Pak	-55 to +125°C	Am25S374FM	SN54S374W	Am25S534FM	SN54S534W
Dice	-55 to +125°C	Am25S374XM	SN54S374X	Am25S534XM	SN54S534X

**Am54S/74S374 • Am54S/74S534****ELECTRICAL CHARACTERISTICS**

The Following Conditions Apply Unless Otherwise Specified:

Am54S/74S374/534XC, DC, PC	$T_A = 0$ to $+70^\circ\text{C}$	$V_{CC} = 4.75$ to $5.25\text{V}$
Am54S/74S374/534XM, DM	$T_A = -55$ to $+125^\circ\text{C}$	$V_{CC} = 4.50$ to $5.50\text{V}$
Am54S/74S374/534FM	$T_C = -55$ to $+125^\circ\text{C}$	$V_{CC} = 4.50$ to $5.50\text{V}$

**DC CHARACTERISTICS OVER OPERATING RANGE**

Parameters	Description	Test Conditions (Note 1)	Typ (Note 2)		Max	Units
			Min	Max		
$V_{OH}$	Output HIGH Voltage	$V_{CC} = \text{MIN}$ $V_{IN} = V_{IH}$ or $V_{IL}$	MIL, $I_{OH} = -2.0\text{mA}$ COM'L, $I_{OH} = -6.5\text{mA}$	2.4 2.4	3.4 3.1	Volts
$V_{OL}$	Output LOW Voltage	$V_{CC} = \text{MIN}$ $V_{IN} = V_{IH}$ or $V_{IL}$	$I_{OL} = 20\text{mA}$		0.5	Volts
$V_{IH}$	Input HIGH Level	Guaranteed input logical HIGH voltage for all inputs		2.0		Volts
$V_{IL}$	Input LOW Level	Guaranteed input logical LOW voltage for all inputs		MIL COM'L	0.8 0.8	Volts
$V_I$	Input Clamp Voltage	$V_{CC} = \text{MIN}$ , $I_{IN} = -18\text{mA}$			-1.2	Volts
$I_{IL}$	Input LOW Current	$V_{CC} = \text{MAX}$ , $V_{IN} = 0.5\text{V}$			-250	$\mu\text{A}$
$I_{IH}$	Input HIGH Current	$V_{CC} = \text{MAX}$ , $V_{IN} = 2.7\text{V}$			50	$\mu\text{A}$
$I_I$	Input HIGH Current	$V_{CC} = \text{MAX}$ , $V_{IN} = 5.5\text{V}$			1.0	$\text{mA}$
$I_{OZ}$	Off-State (High-Impedance) Output Current	$V_{CC} = \text{MAX}$	$V_O = 0.5\text{V}$ $V_O = 2.4\text{V}$		-50 50	$\mu\text{A}$
$I_{SC}$	Output Short Circuit Current (Note 3)	$V_{CC} = \text{MAX}$		-40	-100	$\text{mA}$
$I_{CC}$	Power Supply Current (Note 4)	$V_{CC} = \text{MAX}$			90 140	$\text{mA}$

- Notes: 1. For conditions shown as MIN or MAX use the appropriate value specified under Electrical Characteristics for the applicable device type.  
 2. Typical limits are at  $V_{CC} = 5.0\text{V}$ ,  $25^\circ\text{C}$  ambient and maximum loading.  
 3. Not more than one output should be shorted at a time. Duration of the short circuit test should not exceed one second.  
 4. 'S374 measured at  $\text{CLK} = \text{LOW-to-HIGH}$ ,  $\overline{\text{OE}} = \text{HIGH}$ , and all data inputs are LOW.  
 'S534 measured at  $\text{CLK} = \text{LOW-to-HIGH}$ ,  $\overline{\text{OE}} = \text{HIGH}$ , and all data inputs are LOW.

**DEFINITION OF FUNCTIONAL TERMS**

- $D_i$  The D flip-flop data inputs ('S374, non-inverting).  
 $\overline{D}_i$  The D flip-flop data inputs ('S534, inverting).  
**CP** Clock Pulse for the register. Enters data on the LOW-to-HIGH transition.  
 $Y_i$  The register three-state outputs ('S374, non-inverting).  
 $\overline{\text{OE}}$  Output Control. An active-LOW three-state control used to enable the outputs. A HIGH level input forces the outputs to the high impedance (off) state.

**FUNCTION TABLE**

Function	Inputs				Internal	Outputs
	$\overline{\text{OE}}$	Clock	'S374 $D_i$	'S534 $\overline{D}_i$	$Q_i$	$Y_i$
Hi-Z	H	L	X	X	NC	Z
	H	H	X	X	NC	Z
LOAD REGISTER	L	$\uparrow$	L	H	L	L
	L	$\uparrow$	H	L	H	H
	H	$\uparrow$	L	H	L	Z
	H	$\uparrow$	H	L	H	Z

H = HIGH                      NC = No Change  
 L = LOW                        Z = High Impedance  
 X = Don't Care                 $\uparrow$  = LOW-to-HIGH transition

**SWITCHING CHARACTERISTICS**

( $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 5.0\text{V}$ )

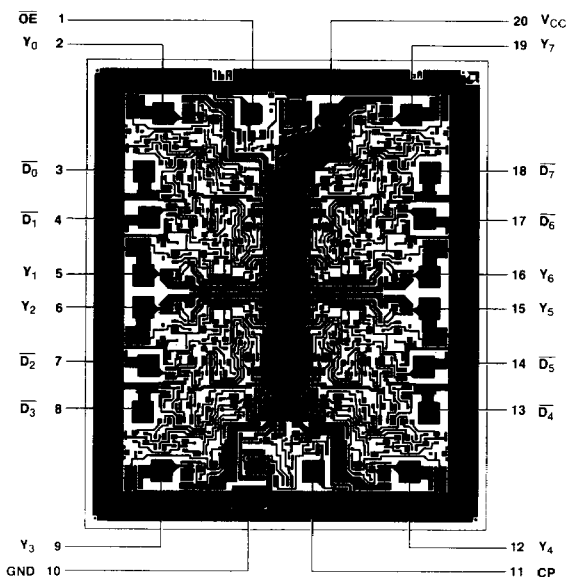
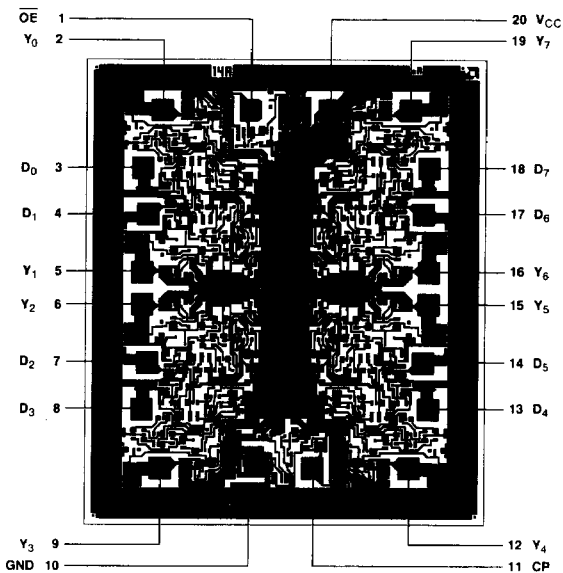
Parameters	Description	Am25S/54S/74S			Units	Test Conditions	
		Min	Typ	Max			
$t_{PLH}$	Clock to Output, $Y_i$		8	15	ns	$C_L = 15\text{pF}$ $R_L = 280\Omega$	
$t_{PHL}$			11	17			
$t_{ZH}$	$\overline{OE}$ to $Y_i$		8	15	ns		
$t_{ZL}$			11	18			
$t_{HZ}$	$\overline{OE}$ to $Y_i$		5	9	ns		$C_L = 5\text{pF}$ $R_L = 280\Omega$
$t_{LZ}$			7	12			
$t_{PW}$	Clock Pulse Width	HIGH	6		ns		
		LOW	7.3		ns		
$t_S$	Data to Clock		5		ns		
$t_H$			2		ns		
$f_{max}$	Maximum Clock Frequency (Note 1)	75	100		MHz		

Note: 1. Per industry convention,  $f_{max}$  is the worst case value of the maximum device operating frequency with no constraints on  $t_r$ ,  $t_f$ , pulse width or duty cycle.

**Metallization and Pad Layouts**

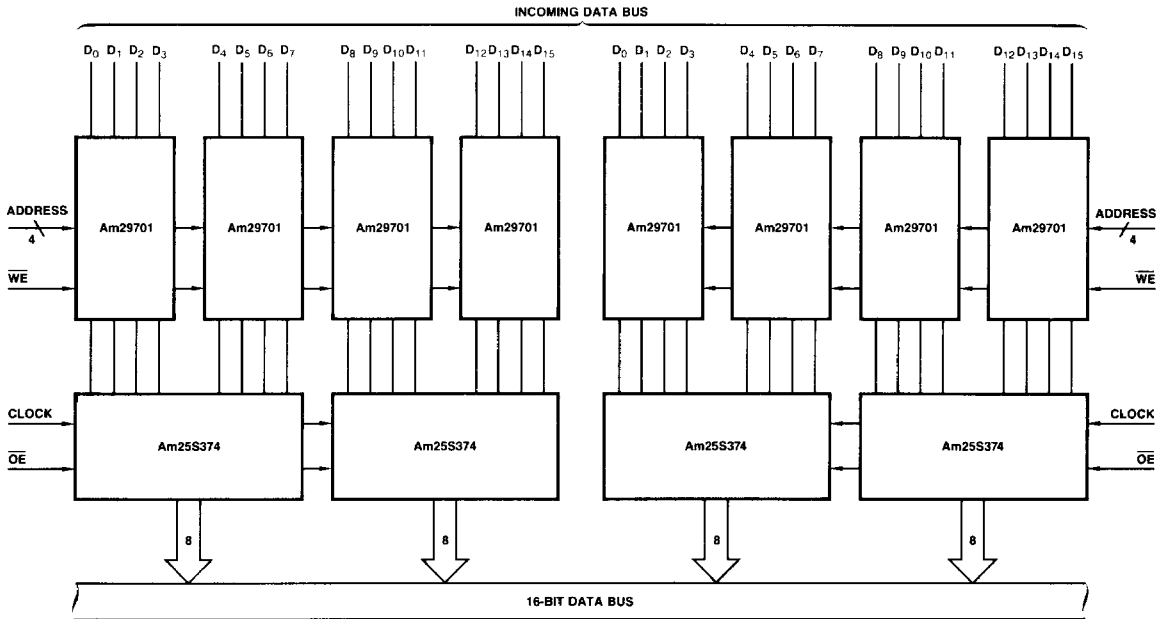
Am25S/54S/74S374

Am25S/54S/74S534



DIE SIZE 0.096" X 0.083"

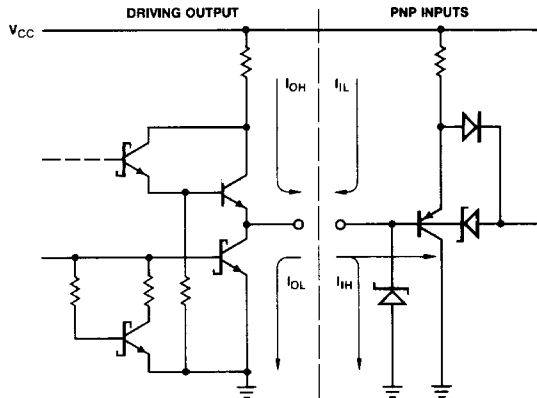
### APPLICATION



Dual 16-word by 16-bit non-inverting high-speed data buffer.

BLI-054

### SCHOTTKY INPUT/OUTPUT CURRENT INTERFACE CONDITIONS



Note: Actual current flow direction shown.

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