Am25S374 • Am54S/74S374
Am25S534 • Am54S/74S534
Octal Registers with Three-State Outputs

3

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
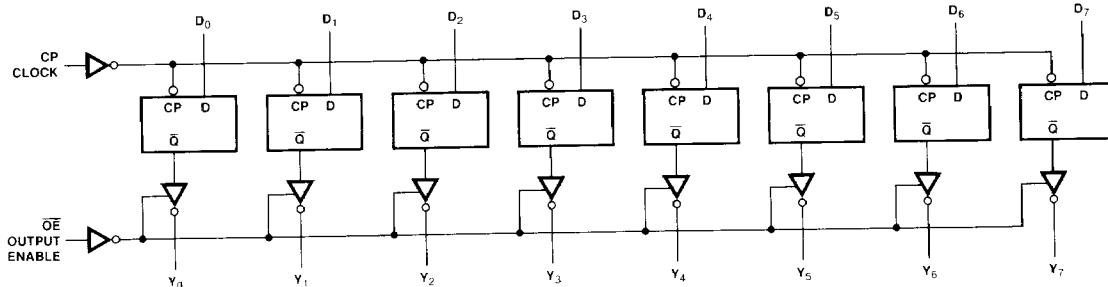
The Am25S/54S/74S374 and Am25S/54S/74S534 are eight-bit registers built using high-speed Schottky technology. The registers consist of eight D-type flip-flops with a buffered common clock and a buffered three-state output control. When the output enable ($\overline{OE}$) input is LOW, the eight outputs 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 $I_{OL} = 32mA$.
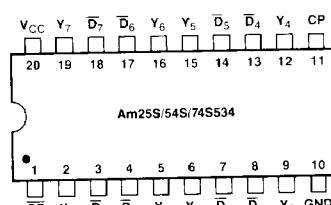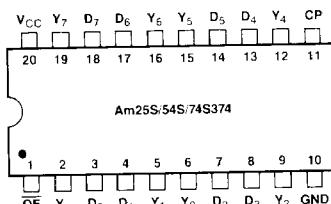
LOGIC DIAGRAM
Am25S/54S/74S374

Inputs D_0 through D_7 are inverted on the Am25S/54S/74S534.
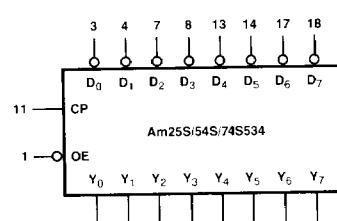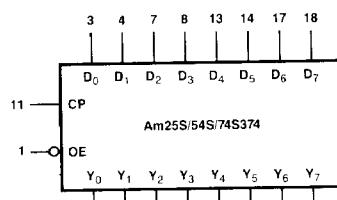
BLI-051

CONNECTION DIAGRAMS – Top Views

Am25S/54S/74S374

Am25S/54S/74S534

Note: Pin 1 is marked for orientation.

BLI-052

LOGIC SYMBOLS

Am25S/54S/74S374

Am25S/54S/74S534

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°C	V_{CC} = 4.75 to 5.25V
Am25S374/534XM, DM	T_A = −55 to +125°C	V_{CC} = 4.50 to 5.50V
Am25S374/534FM	T_C = −55 to +125°C	V_{CC} = 4.50 to 5.50V

DC CHARACTERISTICS OVER OPERATING RANGE

Parameters	Description	Test Conditions (Note 1)		Min	Typ (Note 2)	Max	Units
V_{OH}	Output HIGH Voltage	V_{CC} = MIN $V_{IN} = V_{IH}$ or V_{IL}	MIL, I_{OH} = −2.0mA	2.4	3.4		Volts
			COM'L, I_{OH} = −6.5mA	2.4	3.1		
V_{OL}	Output LOW Voltage	V_{CC} = MIN $V_{IN} = V_{IH}$ or V_{IL}	I_{OL} = 20mA			.45	Volts
			I_{OL} = 32mA			.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} = MIN, I_{IN} = −18mA				−1.2	Volts
I_{IL}	Input LOW Current	V_{CC} = MAX, V_{IN} = 0.5V				−250	μA
I_{IH}	Input HIGH Current	V_{CC} = MAX, V_{IN} = 2.7V				50	μA
I_I	Input HIGH Current	V_{CC} = MAX, V_{IN} = 5.5V				1.0	mA
I_{OZ}	Off-State (High-Impedance) Output Current	V_{CC} = MAX	V_O = 0.5V			−50	μA
			V_O = 2.4V			50	
I_{SC}	Output Short Circuit Current (Note 3)	V_{CC} = MAX		−40		−100	mA
I_{CC}	Power Supply Current (Note 4)	V_{CC} = 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} = 5.0V, 25°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, $\overline{OE}$ = HIGH, and all data inputs are LOW.
 'S534 measured at CLK = LOW-to-HIGH, $\overline{OE}$ = 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°C	Am25S374PC	SN74S374N	Am25S534PC	SN74S534N
Hermetic DIP	0 to 70°C	Am25S374DC	SN74S374J	Am25S534DC	SN74S534J
Dice	0 to 70°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 $+70°C$	$V_{CC} = 4.75$ to $5.25V$
Am54S/74S374/534XM, DM	$T_A = -55$ to $+125°C$	$V_{CC} = 4.50$ to $5.50V$
Am54S/74S374/534FM	$T_C = -55$ to $+125°C$	$V_{CC} = 4.50$ to $5.50V$

DC CHARACTERISTICS OVER OPERATING RANGE

Parameters	Description	Test Conditions (Note 1)		Min	Typ (Note 2)	Max	Units
V_{OH}	Output HIGH Voltage	$V_{CC} = MIN$ $V_{IN} = V_{IH}$ or V_{IL}	MIL, $I_{OH} = -2.0mA$	2.4	3.4		Volts
			COM'L, $I_{OH} = -6.5mA$	2.4	3.1		
V_{OL}	Output LOW Voltage	$V_{CC} = MIN$ $V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 20mA$			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			0.8	Volts
			COM'L			0.8	
V_I	Input Clamp Voltage	$V_{CC} = MIN$, $I_{IN} = -18mA$				-1.2	Volts
I_{IL}	Input LOW Current	$V_{CC} = MAX$, $V_{IN} = 0.5V$				-250	μA
I_{IH}	Input HIGH Current	$V_{CC} = MAX$, $V_{IN} = 2.7V$				50	μA
I_I	Input HIGH Current	$V_{CC} = MAX$, $V_{IN} = 5.5V$				1.0	mA
I_{OZ}	Off-State (High-Impedance) Output Current	$V_{CC} = MAX$	$V_O = 0.5V$			-50	μA
			$V_O = 2.4V$			50	
I_{SC}	Output Short Circuit Current (Note 3)	$V_{CC} = MAX$		-40		-100	mA
I_{CC}	Power Supply Current (Note 4)	$V_{CC} = MAX$			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 $V_{CC} = 5.0V$, 25°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, $\overline{OE}$ = HIGH, and all data inputs are LOW.
'S534 measured at CLK = LOW-to-HIGH, $\overline{OE}$ = 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).

$\overline{OE}$ 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
	$\overline{OE}$	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	↑	L	H	L	L
	L	↑	H	L	H	H
	H	↑	L	H	L	Z
	H	↑	H	L	H	Z

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

Am25S/54S/74S374/534
SWITCHING CHARACTERISTICS
(T_A = +25°C, V_{CC} = 5.0V)
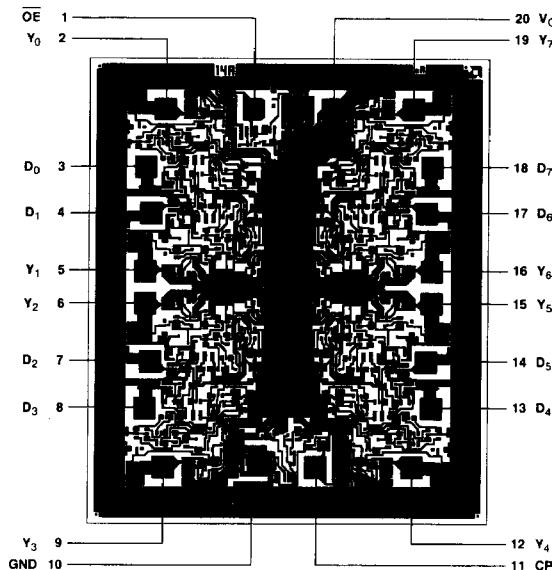
Parameters	Description		Am25S/54S/74S Min	Am25S/54S/74S Typ	Am25S/54S/74S Max	Units	Test Conditions
t_{PLH}	Clock to Output, Y_i			8	15	ns	C_L = 15pF R_L = 280Ω
t_{PHL}				11	17	ns	
t_{ZH}	$\overline{OE}$ to Y_i			8	15	ns	
t_{ZL}				11	18	ns	
t_{HZ}	$\overline{OE}$ to Y_i			5	9	ns	C_L = 5pF R_L = 280Ω
t_{LZ}				7	12	ns	
t_{PW}	Clock Pulse Width	HIGH	6			ns	C_L = 15pF R_L = 280Ω
		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	
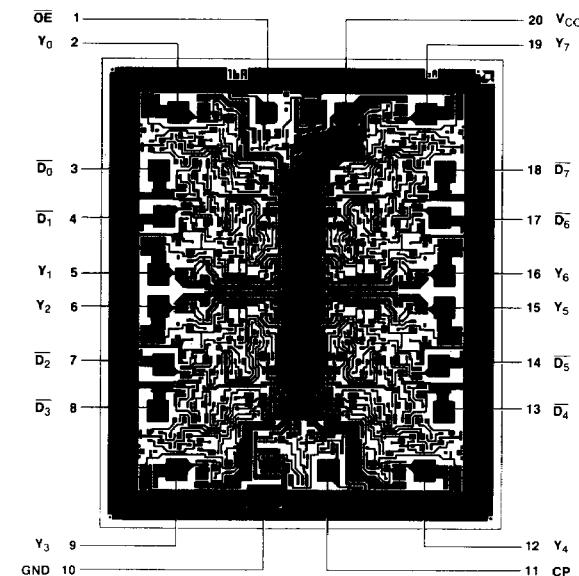
Note: 1. Per industry convention, f_{max} is the worst case value of the maximum device operating frequency with no constraints on t_r, t_f, pulse width or duty cycle.

Metallization and Pad Layouts

Am25S/54S/74S374
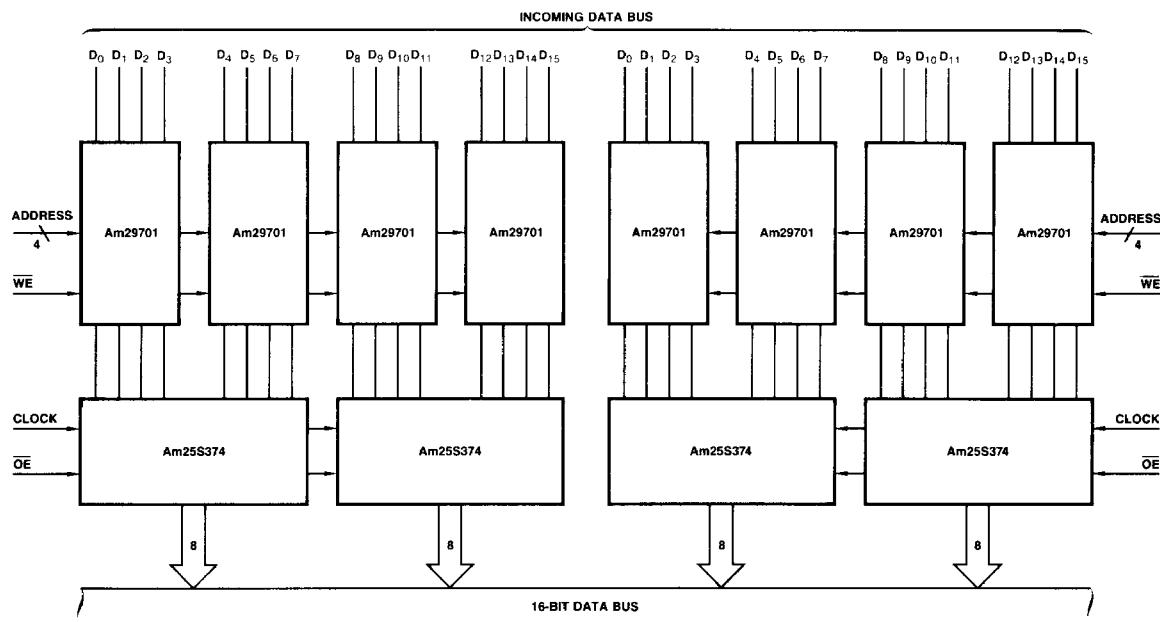
Am25S/54S/74S534

DIE SIZE 0.096" X 0.083"
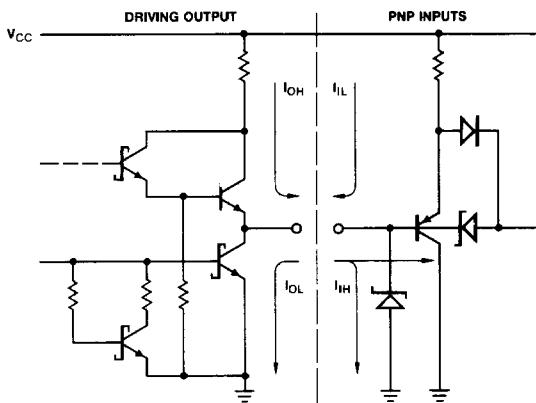
APPLICATION

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.

BLI-055