

# Am25LS273 • Am25LS273B Am54LS/74LS273

8-Bit Register with Clear  
8-Bit Register with Clear and Buffered Outputs

### DISTINCTIVE CHARACTERISTICS

- Eight-bit, high-speed parallel registers
- Clock to output delay — 15ns (typ) on Am25LS273
- Buffered outputs to eliminate output commutation on Am25LS273B
- Positive edge-triggered D-type flip-flops
- Common clock and common clear
- Am25LS devices offer the following improvements over Am54/74LS
  - 50mV lower  $V_{OL}$  at  $I_{OL} = 8mA$
  - Twice the fan-out over military range
  - 440 $\mu A$  source current at HIGH output
- 100% product assurance screening to MIL-STD-883 requirements

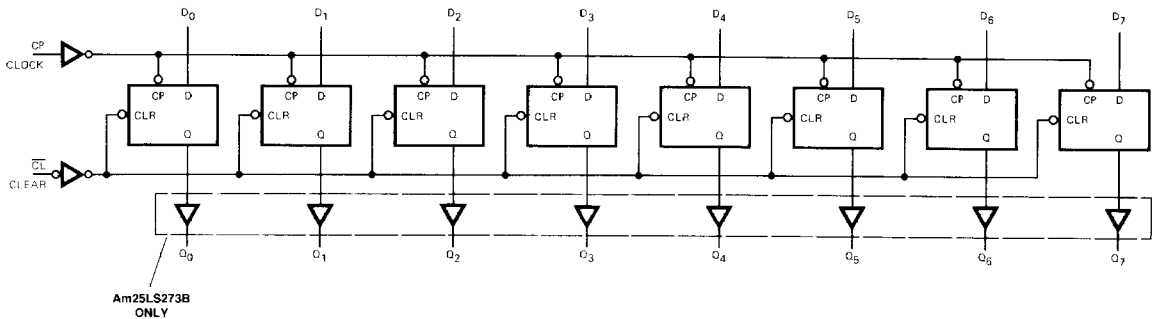
### FUNCTIONAL DESCRIPTION

The Am25LS273, Am25LS273B and the Am54LS/74LS273 are eight-bit registers built using Advanced Low-Power Schottky Technology. These registers consist of D-type flip-flops with a buffer common clock and an asynchronous active LOW buffered clear.

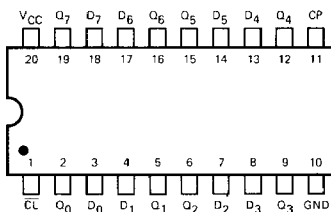
When the clear input is LOW, the Q outputs are LOW, independent of the other inputs. Information meeting the set-up and hold time requirements of the D inputs is transferred to the Q outputs on the LOW-to-HIGH transition of the clock input. These devices are supplied in the 20-pin space saving package featuring 0.3-inch centers between rows of leads.

The Am25LS273 and Am54LS/74LS273 are designed for maximum speed. The Am25LS273B has an additional output buffer to eliminate output commutation.

### LOGIC DIAGRAM

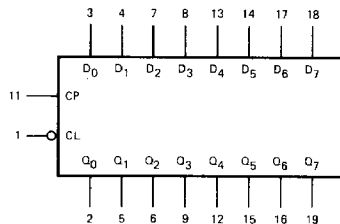


### CONNECTION DIAGRAM Top View



Note: Pin 1 is marked for orientation.

### LOGIC SYMBOL



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

**Am25LS/54LS/74LS273/273B**

**Am25LS273 • Am25LS273B**

**ELECTRICAL CHARACTERISTICS**

The Following Conditions Apply Unless Otherwise Specified:

COM'L  $T_A = 0^\circ\text{C to } +70^\circ\text{C}$   $V_{CC} = 5.0\text{V} \pm 5\%$  MIN. = 4.75 V MAX. = 5.25 V  
 MIL  $T_A = -55^\circ\text{C to } +125^\circ\text{C}$   $V_{CC} = 5.0\text{V} \pm 10\%$  MIN. = 4.50 V MAX. = 5.50 V

**DC CHARACTERISTICS OVER OPERATING RANGE**

Parameters	Description	Test Conditions (Note 1)	Min.	Typ. (Note 2)	Max.	Units
V <sub>OH</sub>	Output HIGH Voltage	V <sub>CC</sub> = MIN., I <sub>OH</sub> = -440 μA V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	MIL	2.5	3.4	Volts
			COM'L	2.7	3.4	
V <sub>OL</sub>	Output LOW Voltage	V <sub>CC</sub> = MIN. V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 4.0 mA		0.4	Volts
			I <sub>OL</sub> = 8.0 mA		0.45	
V <sub>IH</sub>	Input HIGH Level	Guaranteed input logical HIGH voltage for all inputs	2.0			Volts
V <sub>IL</sub>	Input LOW Level	Guaranteed input logical LOW voltage for all inputs	MIL		0.7	Volts
			COM'L		0.8	
V <sub>I</sub>	Input Clamp Voltage	V <sub>CC</sub> = MIN., I <sub>IN</sub> = -18 mA			-1.5	Volts
I <sub>IL</sub>	Input LOW Current	V <sub>CC</sub> = MAX., V <sub>IN</sub> = 0.4 V			-0.36	mA
I <sub>IH</sub>	Input HIGH Current	V <sub>CC</sub> = MAX., V <sub>IN</sub> = 2.7 V			20	μA
I <sub>I</sub>	Input HIGH Current	V <sub>CC</sub> = MAX., V <sub>IN</sub> = 7.0 V			0.1	mA
I <sub>SC</sub>	Output Short Circuit Current (Note 3)	V <sub>CC</sub> = MAX.	-20		-85	mA
I <sub>CC</sub>	Power Supply Current (Note 4)	V <sub>CC</sub> = MAX.		17	27	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<sub>CC</sub> = 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. (a) All outputs open and 4.5 V applied to the data and clear input. Measured after a momentary ground, then 4.5V applied to the clock input.  
 (b) All outputs open, 4.5V applied to the clear input, all D<sub>i</sub> inputs = GND. Measure after a momentary ground, then 4.5V applied to the clock input.

**Am25LS • Am54LS/74LS**

**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 Continuous	-0.5V to +7V
DC Voltage Applied to Outputs for High Output State	-0.5V to +V <sub>CC</sub> min
DC Input Voltage	-0.5V to +7V
DC Output Current, Into Outputs	30 mA
DC Input Current	-30 mA to +5.0 mA

**Am54LS/74LS273****ELECTRICAL CHARACTERISTICS**

The Following Conditions Apply Unless Otherwise Specified:

COM'L  $T_A = 0^\circ\text{C to } +70^\circ\text{C}$   $V_{CC} = 5.0\text{ V} \pm 5\%$  MIN. = 4.75 V MAX. = 5.25 VMIL  $T_A = -55^\circ\text{C to } +125^\circ\text{C}$   $V_{CC} = 5.0\text{ V} \pm 10\%$  MIN. = 4.50 V MAX. = 5.50 V**DC CHARACTERISTICS OVER OPERATING RANGE**

Parameters	Description	Test Conditions (Note 1)	Min.	Typ. (Note 2)	Max.	Units	
$V_{OH}$	Output HIGH Voltage	$V_{CC} = \text{MIN.}, I_{OH} = -400\mu\text{A}$ $V_{IN} = V_{IH} \text{ or } V_{IL}$	MIL	2.5	3.4		Volts
			COM'L	2.7	3.4		
$V_{OL}$	Output LOW Voltage	$V_{CC} = \text{MIN.}$ $V_{IN} = V_{IH} \text{ or } V_{IL}$	All, $I_{OL} = 4.0\text{mA}$			0.4	Volts
			74LS only, $I_{OL} = 8.0\text{mA}$			0.5	
$V_{IH}$	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	MIL			0.7	Volts
			COM'L			0.8	
$V_I$	Input Clamp Voltage	$V_{CC} = \text{MIN.}, I_{IN} = -18\text{mA}$			-1.5	Volts	
$I_{IL}$	Input LOW Current	$V_{CC} = \text{MAX.}, V_{IN} = 0.4\text{V}$			-0.4	mA	
$I_{IH}$	Input HIGH Current	$V_{CC} = \text{MAX.}, V_{IN} = 2.7\text{V}$			20	$\mu\text{A}$	
$I_I$	Input HIGH Current	$V_{CC} = \text{MAX.}, V_{IN} = 7.0\text{V}$			0.1	mA	
$I_{SC}$	Output Short Circuit Current (Note 3)	$V_{CC} = \text{MAX.}$	-20		-100	mA	
$I_{CC}$	Power Supply Current (Note 4)	$V_{CC} = \text{MAX.}$		17	27	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. (a) All outputs open and 4.5 V applied to the data and clear input. Measured after a momentary ground, then 4.5V applied to the clock input.  
 (b) All outputs open, 4.5V applied to the clear input, all  $D_i$  inputs = GND. Measure after a momentary ground, then 4.5V applied to the clock input.

**DEFINITION OF FUNCTIONAL TERMS** $D_i$  The D flip-flop data inputs. $\overline{\text{CL}}$  Clear. When the clear is LOW, the  $Q_i$  outputs are LOW, regardless of the other inputs. When the clear is HIGH, data can be entered in the register. $\text{CP}$  Clock pulse for the register. Enters data on the positive transition. $Q_i$  The TRUE register outputs.**FUNCTION TABLE**

INPUTS			OUTPUT
Clear	Clock	$D_i$	$Q_i$
L	X	X	L
H	L	X	NC
H	H	X	NC
H	↑	L	L
H	↑	H	H

H = HIGH

L = LOW

↑ = LOW-to-HIGH Transition

X = Don't Care

NC = No Change

# Am25LS/54LS/74LS273/273B

## Am25LS273 • Am54LS/74LS273 SWITCHING CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ , $V_{CC} = 5.0\text{V}$ )

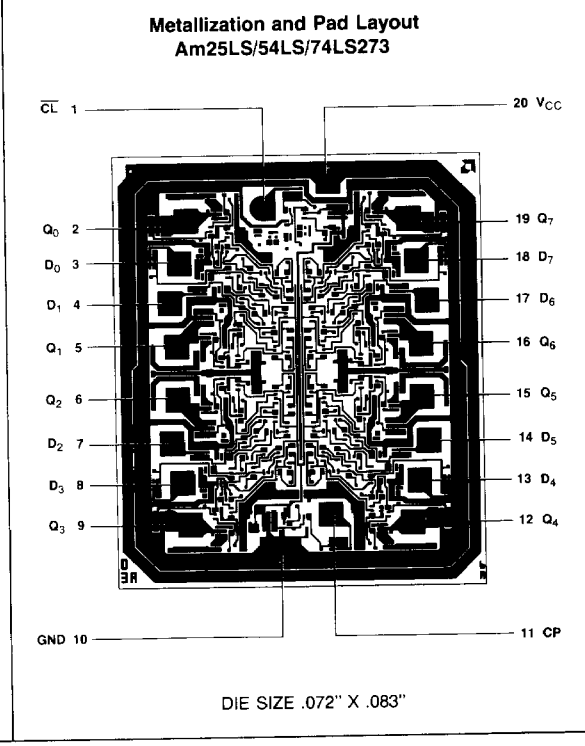
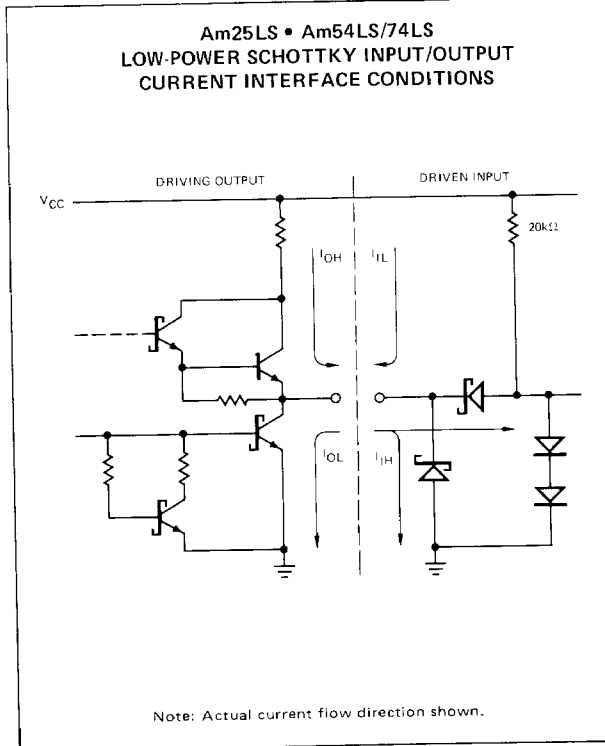
Parameters	Description	Am25LS			Am54LS/74LS			Units	Test Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
$t_{PLH}$	Clock to Output		15	23		17	27	ns	$C_L = 15\text{pF}$ $R_L = 2.0\text{k}\Omega$
$t_{PHL}$			15	23		18	27		
$t_{PHL}$	Clear to Output		18	27		18	27	ns	
$t_{pw}$		Clock Pulse Width	HIGH	15		20			
	LOW		15		20				
$t_{pw}$	Clear Pulse Width		15		20		ns		
$t_s$		Data Set-up	20		20			ns	
$t_h$	Data Hold	5			5		ns		
$t_s$	Set-up, Clear Recovery (In-Active) to Clock		25		25			ns	
$f_{max}$ (Note 1)		Maximum Clock Frequency	30	40		30	40		

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.

## Am25LS273 ONLY SWITCHING CHARACTERISTICS OVER OPERATING RANGE\*

Parameters	Description	Am25LS COM'L		Am25LS MIL		Units	Test Conditions
		Min.	Max.	Min.	Max.		
$t_{PLH}$	Clock to Output		28		30	ns	$C_L = 50\text{pF}$ $R_L = 2.0\text{k}\Omega$
$t_{PHL}$			31		37		
$t_{PHL}$	Clear to Output		37		45	ns	
$t_{pw}$		Clock Pulse Width	HIGH	17	20		
	LOW		20	27			
$t_{pw}$	Clear Pulse Width		17	20	ns		
$t_s$		Data Set-up	22			25	
$t_h$	Data Hold	0		0	ns		
$t_s$	Set-up, Clear Recovery (In-Active) to Clock		30	33		ns	
$f_{max}$ (Note 1)		Maximum Clock Frequency	25		20		

\* AC performance over the operating temperature range is guaranteed by testing defined in Group A, Subgroup 9.



**Am25LS273B****SWITCHING CHARACTERISTICS** $(T_A = +25^\circ\text{C}, V_{CC} = 5.0\text{V})$ 

Parameters	Description	Am25LS273B			Units	Test Conditions
		Min.	Typ.	Max.		
$t_{PLH}$	Clock to Output		21	32	ns	$C_L = 15\text{pF}$ $R_L = 2.0\text{k}\Omega$
$t_{PHL}$			26	38		
$t_{PHL}$	Clear to Output		28	39	ns	
$t_{pw}$	Clock Pulse Width	HIGH	20		ns	
		LOW	25			
$t_{pw}$	Clear Pulse Width	25			ns	
$t_s$	Data Set-up	20			ns	
$t_h$	Data Hold	10			ns	
$t_s$	Set-up, Clear Recovery (In-Active) to Clock	25			ns	
$f_{max}$ (Note 1)	Maximum Clock Frequency	30	40		MHz	

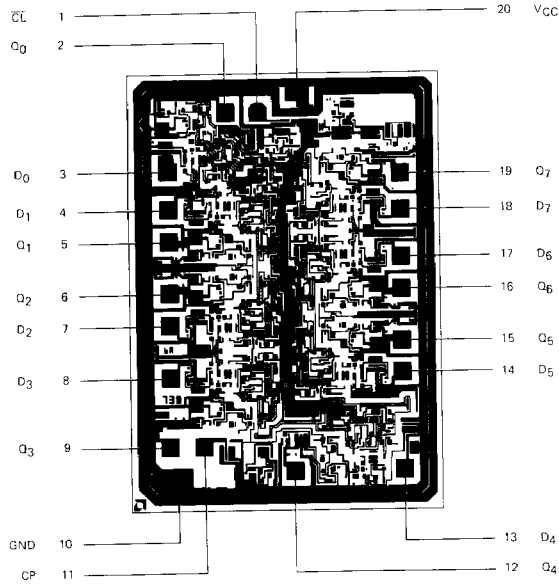
Note: 1. Per industry convention,  $f_{max}$  is the worst case value of the maximum device operating frequency with no constraints on  $t_r$ ,  $t_f$ , pulse width or duty cycle.

**Am25LS273B****SWITCHING CHARACTERISTICS****OVER OPERATING RANGE\***

Parameters	Description	Am25LS COM'L		Am25LS MIL		Units	Test Conditions
		$T_A = 0^\circ\text{C to } +70^\circ\text{C}$		$T_A = -55^\circ\text{C to } +125^\circ\text{C}$			
		$V_{CC} = 5.0\text{V} \pm 5\%$		$V_{CC} = 5.0\text{V} \pm 10\%$			
		Min.	Max.	Min.	Max.		
$t_{PLH}$	Clock to Output		36		40	ns	$C_L = 50\text{pF}$ $R_L = 2.0\text{k}\Omega$
$t_{PHL}$			49		60		
$t_{PHL}$	Clear to Output		50		60	ns	
$t_{pw}$	Clock Pulse Width	HIGH	25		30	ns	
		LOW	30		35		
$t_{pw}$	Clear Pulse Width	25		25		ns	
$t_s$	Data Set-up	20		20		ns	
$t_h$	Data Hold	12		15		ns	
$t_s$	Set-up, Clear Recovery (In-Active) to Clock	25		25		ns	
$f_{max}$ (Note 1)	Maximum Clock Frequency	25		20		MHz	

\*AC performance over the operating temperature range is guaranteed by testing defined in Group A, Subgroup 9.

**Metallization and Pad Layout  
Am25LS273B**

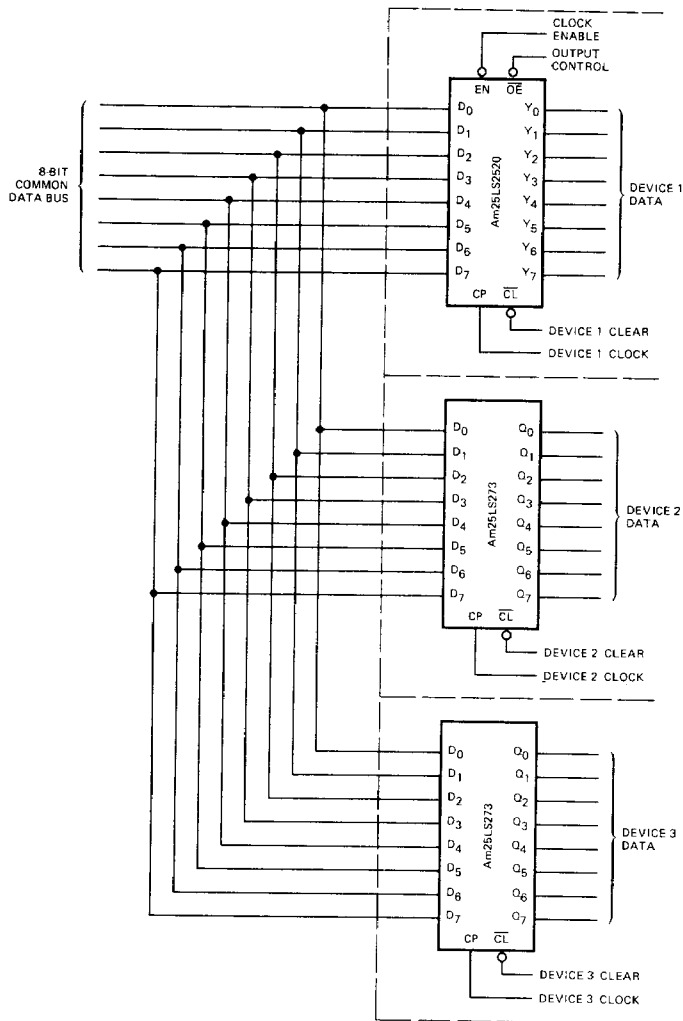


DIE SIZE 0.080" X 0.111"

**ORDERING INFORMATION**

Package Type	Temperature Range	Am25LS273 Order Number	Am25LS273B Order Number	Am54LS/74LS273 Order Number
Molded DIP	0°C to +70°C	AM25LS273PC	AM25LS273BPC	SN74LS273N
Hermetic DIP	0°C to +70°C	AM25LS273DC	AM25LS273BDC	SN74LS273J
Dice	0°C to +70°C	AM25LS273XC	AM25LS273BXC	SN74LS273X
Hermetic DIP	-55°C to +125°C	AM25LS273DM	AM25LS273BDM	SN54LS273J
Hermetic Flat Pak	-55°C to +125°C	AM25LS273FM	AM25LS273BFM	SN54LS273W
Dice	-55°C to +125°C	AM25LS273XM	AM25LS273BXM	SN54LS273X

## APPLICATION



Am25LS273 8-bit registers are shown used as device data input registers on a common 8-bit data bus.