

Am25LS377 • Am25LS377B

Am54LS/74LS377

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

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DISTINCTIVE CHARACTERISTICS

- Eight-bit, high speed parallel registers
- Clock to output delay – 14ns (typ) on Am25LS377
- Buffered outputs to eliminate output commutation on Am25LS377B
- Positive, edge-triggered, D-type flip-flops
- Buffered common clock and buffered common clock enable
- Am25LS devices offer the following improvements over Am54/74LS
 - 50mV lower V_{OL} at $I_{OL} = 8\text{mA}$
 - Twice the fan-out over military range
 - 440 μA source current at HIGH output
- 100% product assurance screening to MIL-STD-883 requirements

FUNCTIONAL DESCRIPTION

The Am25LS377, Am25LS377B and the Am54LS/74LS377 are eight-bit registers built using advanced Low-Power Schottky technology. These registers consist of eight D-type flip-flops with a buffered common clock and a buffered common clock enable.

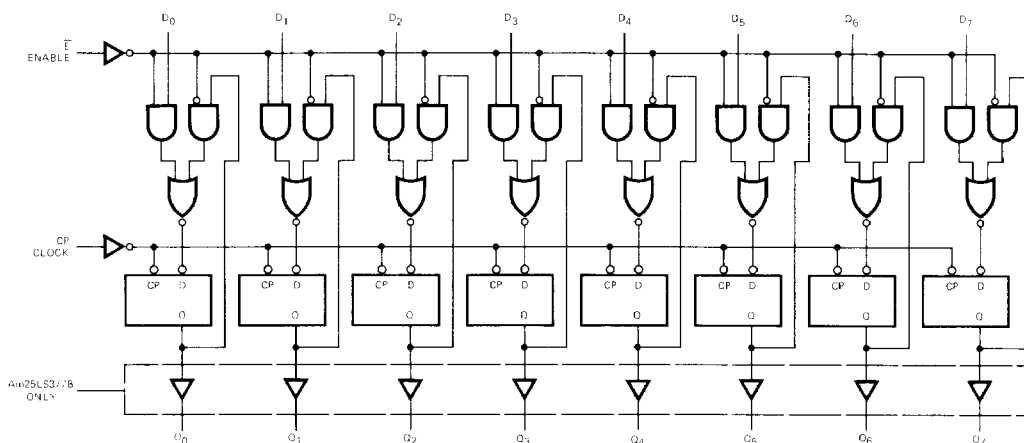
When the clock enable ($\bar{E}$) input is LOW, new data is entered into the flip-flop register on the LOW-to-HIGH transition of the clock input. When the ($\bar{E}$) input is HIGH, the register will retain the present data independent of the clock inputs.

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

The Am25LS377 and Am54LS/74LS377 are designed for maximum speed.

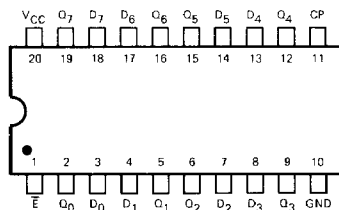
The Am25LS377B has an additional output buffer to eliminate output commutation.

LOGIC DIAGRAM



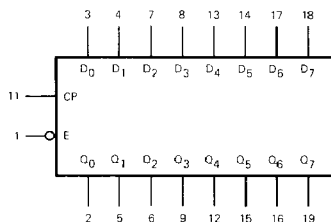
CONNECTION DIAGRAM

Top View



Note: Pin 1 is marked for orientation.

LOGIC SYMBOL



V_{CC} = Pin 20

GND = Pin 10

Am25LS/54LS/74LS377/377B**Am25LS377 • Am25LS377B****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. = 4.75V MAX. = 5.25V
MIL $T_A = -55^\circ\text{C to } +125^\circ\text{C}$ $V_{CC} = 5.0\text{V} \pm 10\%$ MIN. = 4.50V MAX. = 5.50V

DC CHARACTERISTICS OVER OPERATING RANGE

Parameters	Description	Test Conditions (Note 1)	Min.	Typ. (Note 2)	Max.	Units
V_{OH}	Output HIGH Voltage	$V_{CC} = \text{MIN.}, I_{OH} = -440\mu\text{A}$ $V_{IN} = V_{IH} \text{ or } V_{IL}$	MIL	2.5		Volts
			COM'L	2.7		
V_{OL}	Output LOW Voltage	$V_{CC} = \text{MIN.},$ $V_{IN} = V_{IH} \text{ or } V_{IL}$	$I_{OL} = 4.0\text{mA}$		0.4	Volts
			$I_{OL} = 8.0\text{mA}$		0.45	
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	$V_{CC} = \text{MAX.}, V_{IN} = 0.4\text{V}$			-0.36	mA
I_{IH}	Input HIGH Current	$V_{CC} = \text{MAX.}, V_{IN} = 2.7\text{V}$			20	μA
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	-85	mA
I_{CC}	Power Supply Current (Note 4)	$V_{CC} = \text{MAX.}$		17	28	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°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. All outputs open, E = GND, all Di inputs = GND. Apply momentary ground, then 4.5V to 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 +7.0V
DC Voltage Applied to Outputs for High Output State	-0.5V to + V_{CC} max
DC Input Voltage	-0.5V to +7.0V
DC Output Current, Into Outputs	30mA
DC Input Current	-30mA to +5.0mA

Am54LS/74LS377

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_{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		Volts
			COM'L	2.7		
V_{OL}	Output LOW Voltage	$V_{CC} = \text{MIN.}$ $V_{IN} = V_{IH} \text{ or } V_{IL}$	All, $I_{OL} = 4\text{mA}$		0.4	Volts
			74LS only, $I_{OL} = 8\text{mA}$		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	μA
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	28	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°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. All outputs open, E = GND, all D_i inputs = GND. Apply momentary ground, then 4.5V to clock input.

FUNCTION TABLE

INPUTS			OUTPUTS Q_i
$\bar{E}$	D_i	CP	
H	X	X	NC
L	X	H	NC
L	X	L	NC
L	L	$\uparrow$	L
L	H	$\uparrow$	H

H = HIGH

L = LOW

 $\uparrow$ = LOW-to-HIGH Transition

NC = No Change

X = Don't Care

DEFINITION OF FUNCTIONAL TERMS

 D_i The D flip-flop data inputs. $\bar{E}$ Enable. When the enable is LOW, data on the D_i inputs is transferred to the Q_i outputs on the LOW-to-HIGH clock transition. When the enable is HIGH, the Q_i outputs do not change regardless of the data or clock input transitions.

CP Clock Pulse for the register. Enters data on the LOW-to-HIGH transition.

 Q_i The TRUE register outputs.

Am25LS/54LS/74LS377/377B

Am25LS377 • Am54LS/74LS377

SWITCHING CHARACTERISTICS

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

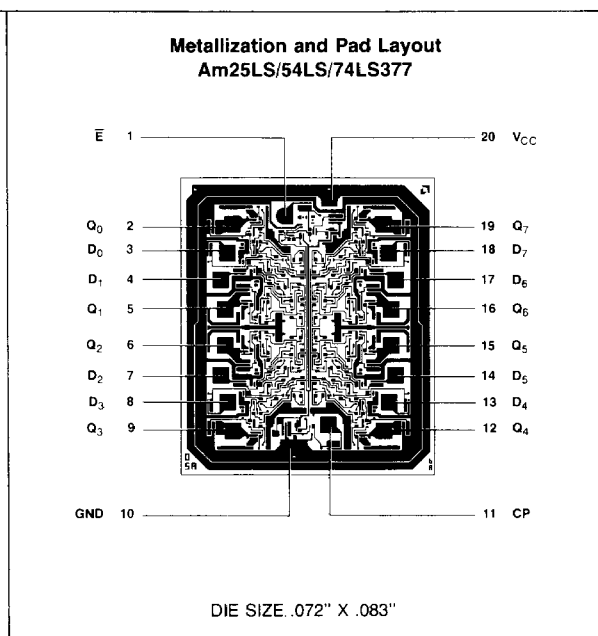
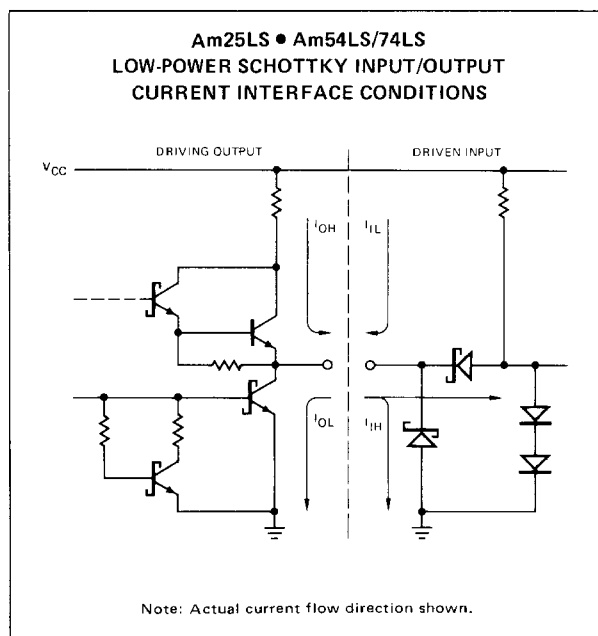
SWITCHING CHARACTERISTICS			Am25LS			Am54LS/74LS			Units	Test Conditions
Parameters	Description		Min.	Typ.	Max.	Min.	Typ.	Max.		
t _{PLH}	Clock to Output			13	20		17	27	ns	C _L = 15pF R _L = 2.0kΩ
t _{PHL}				14	21		18	27		
t _{pw}	Clock Pulse Width	HIGH	15			20			ns	
		LOW	15			20				
t _s	Data		20			20			ns	
t _h	Data		0			5			ns	
t _s	Clock Enable	Active State	15			25			ns	
		Inactive State	10			10				
t _h	Clock Enable		5			5			ns	
f _{max}	Maximum Clock Frequency (Note 1)		30	40		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.

Am25LS377 ONLY SWITCHING CHARACTERISTICS OVER OPERATING RANGE*

Am25LS377 ONLY SWITCHING CHARACTERISTICS OVER OPERATING RANGE*			Am25LS COM'L		Am25LS MIL		Units	Test Conditions
			$T_A = 0^{\circ}\text{C to } +70^{\circ}\text{C}$ $V_{CC} = 5.0\text{V} \pm 5\%$		$T_A = -55^{\circ}\text{C to } +125^{\circ}\text{C}$ $V_{CC} = 5.0\text{V} \pm 10\%$			
Parameters	Description		Min.	Max.	Min.	Max.		
t_{PLH}	Clock to Output			25		27	ns	$C_L = 50\text{pF}$ $R_L = 2.0\text{k}\Omega$
t_{PHL}				29		34		
t_{pw}	Clock Pulse Width	HIGH	15		15		ns	
		LOW	15		15			
t_s	Data		24		26		ns	
t_h	Data		0		0		ns	
t_s	Clock Enable	Active	18		20		ns	
		Inactive	13		15			
t_h	Clock Enable		5		5		ns	
f_{max}	Maximum Clock Frequency (Note 1)		25		20		MHz	

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



Am25LS377B
SWITCHING CHARACTERISTICS

(T_A = +25°C, V_{CC} = 5.0V)

SWITCHING CHARACTERISTICS			Am25LS			Units	Test Conditions
Parameters		Description	Min.	Typ.	Max.		
t _{PLH}	Clock to Output			18	27	ns	C _L = 15pF R _L = 2.0kΩ
t _{PHL}				23	35		
t _{pw}	Clock Pluse Width	HIGH	20		ns		
		LOW	25				
t _S	Data		20		ns		
t _H	Data		10		ns		
t _S	Clock Enable	Active State	25		ns		
		Inactive State	20				
t _H	Clock Enable		5		ns		
f _{max}	Maximum Clock Frequency (Note 1)		30	40	MHz		

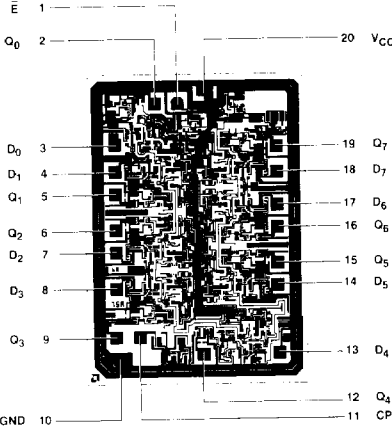
Note 1. Per industry convention, f_{max} is the worst case value of the maximum device operating frequency with no constraints on t_r, t_f, pulse width or duty cycle.

Am25LS377B
SWITCHING CHARACTERISTICS
OVER OPERATING RANGE*

Am25LS377B			Am25LS COM'L		Am25LS MIL		Units	Test Conditions
SWITCHING CHARACTERISTICS			T _A = 0°C to +70°C		T _A = -55°C to +125°C			
OVER OPERATING RANGE*			V _{CC} = 5.0V ±5%		V _{CC} = 5.0V ±10%			
Parameters		Description	Min.	Max.	Min.	Max.		
t _{PLH}	Clock to Output			32		37	ns	C _L = 50pF R _L = 2.0kΩ
t _{PHL}				45		54		
t _{pw}	Clock Pulse Width	HIGH	25		25	ns		
		LOW	25		30			
t _s	Data		20		20	ns		
t _h	Data		12		15	ns		
t _s	Clock Enable	Active	27		30	ns		
		Inactive	22		25			
t _h	Clock Enable		5		5	ns		
f _{max}	Maximum Clock Frequency (Note 1)		25		20	MHz		

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

Metalization and Pad Layout
Am25LS377B

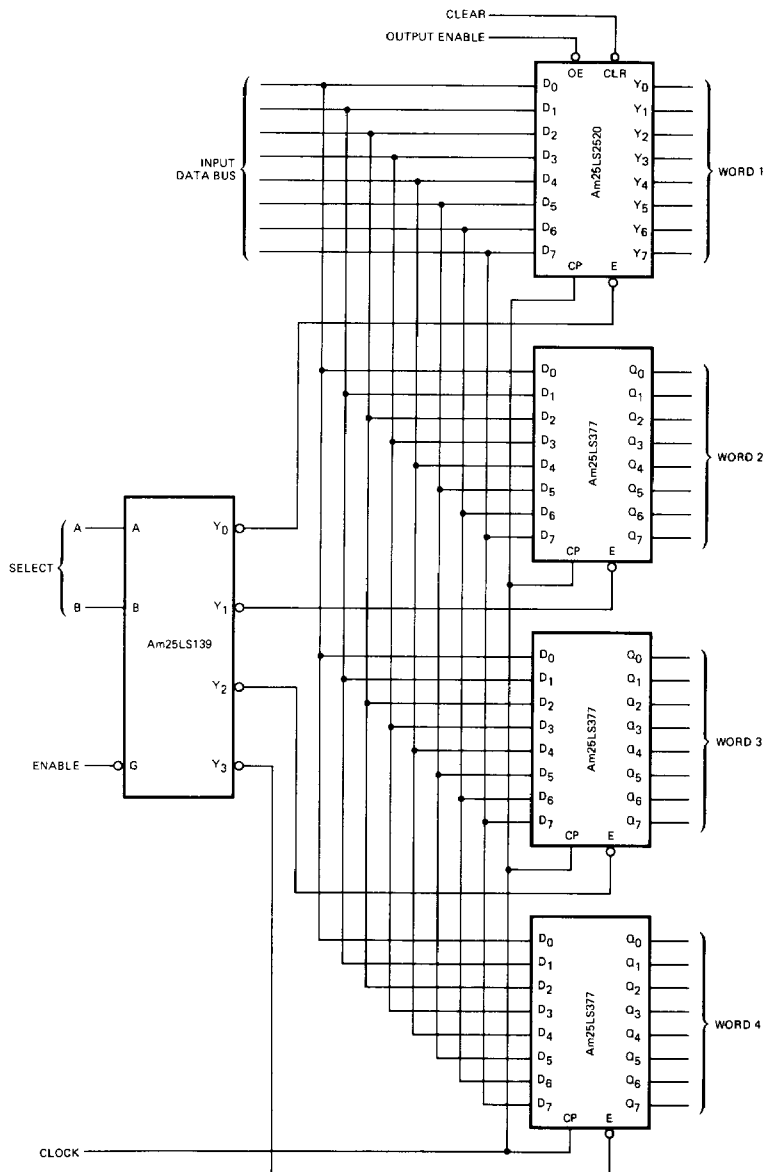


DIE SIZE 0.080" X 0.111"

ORDERING INFORMATION

Package Type	Temperature Range	Am25LS377 Order Number	Am25LS377B Order Number	Am54LS/74LS377 Order Number
Molded DIP	0°C to 70°C	Am25LS377PC	Am25LS377BPC	SN74LS377N
Hermetic DIP	0°C to 70°C	Am25LS377DC	Am25LS377BDC	SN74LS377J
Dice	0°C to 70°C	Am25LS377XC	Am25LS377BXC	SN74LS377X
Hermetic DIP	-55°C to +125°C	Am25LS377DM	Am25LS377BDM	SN54LS377J
Hermetic Flat Pak	-55°C to +125°C	Am25LS377FM	Am25LS377BFM	SN54LS377W
Dice	-55°C to +125°C	Am25LS377XM	Am25LS377BXM	SN54LS377X

APPLICATION



Selective Register Loading of Data on Synchronous Clock.