

Am25LS2520

Octal D-Type Flip-Flop with Clear, Clock Enable and Three-State Control

DISTINCTIVE CHARACTERISTICS

- Buffered common clock enable input
- Buffered common asynchronous clear input
- Three-state outputs
- 8-bit, high-speed parallel register with positive edge-triggered, D-type flip-flops
- Am25LS Family offers improved sink current, source current and noise margin

GENERAL DESCRIPTION

The Am25LS2520 is an 8-bit register built using advanced Low-Power Schottky technology. The register consists of eight D-type flip-flops with a buffered common clock, a buffered common clock enable, a buffered asynchronous clear input, and three-state outputs.

When the clear input is LOW, the internal flip-flops of the register are reset to logic 0 (LOW), independent of all other inputs. When the clear input is HIGH, the register operates in the normal fashion.

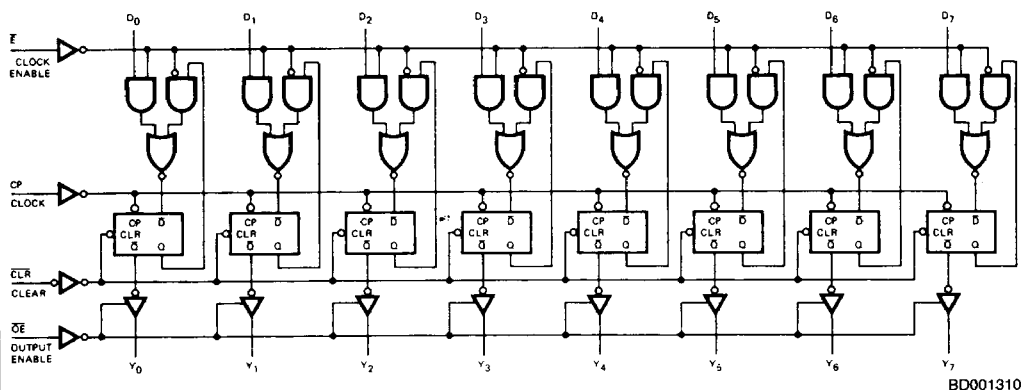
When the three-state output enable ($\overline{OE}$) input is LOW, the Y outputs are enabled and appear as normal TTL outputs.

When the output enable ($\overline{OE}$) input is HIGH, the Y outputs are in the high impedance (three-state) condition. This does not affect the internal state of the flip-flop Q output.

The clock enable input ($\overline{E}$) is used to selectively load data into the register. When the $\overline{E}$ input is HIGH, the register will retain its current data. When the $\overline{E}$ is LOW, new data is entered into the register on the LOW-to-HIGH transition of the clock input.

This device is packaged in a space-saving (0.4-inch row spacing) 22-pin package and in a 24-pin flatpack.

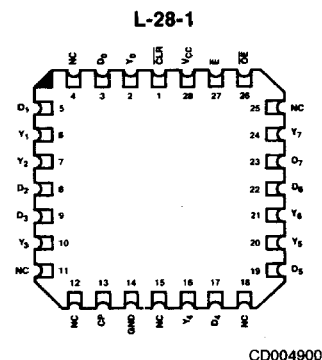
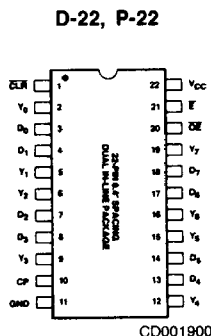
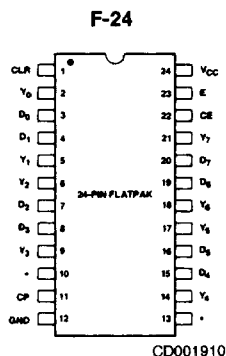
BLOCK DIAGRAM



RELATED PRODUCTS

Part No.	Description
Am25S18	Quad D Register
Am2920	Octal D-Type Flip-flop
Am2954/5	Octal D Registers

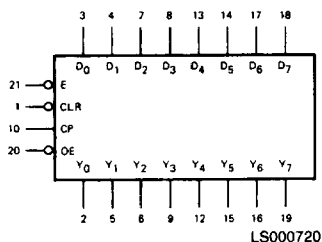
CONNECTION DIAGRAM Top View



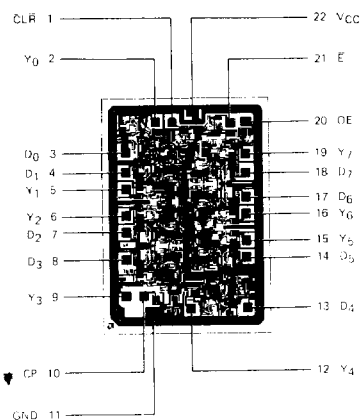
Note: Pin 1 is marked for orientation

*Reserved - do not use.

LOGIC SYMBOL



METALLIZATION AND PAD LAYOUT



DIE SIZE 0.080" x 0.111"

ORDERING INFORMATION

AMD products are available in several packages and operating ranges. The order number is formed by a combination of the following: Device number, speed option (if applicable), package type, operating range and screening option (if desired).

Am25LS2520

D

C

B

Screening Option
Blank - Standard processing
B - Burn-in

Temperature (See Operating Range)
C - Commercial (0°C to +70°C)
M - Military (-55°C to +125°C)

Package

D - 22-pin Cerdip
F - 24-pin flatpak
L - 28-pin leadless chip carrier
P - 22-pin plastic DIP
X - Dice

Device type
Octal D-type Flip-Flop

Valid Combinations

Valid Combinations	
Am25LS2520	PC DC, DM FM LC, LM XC, XM

Valid Combinations

Consult the AMD sales office in your area to determine if a device is currently available in the combination you wish.

PIN DESCRIPTION

Pin No.	Name	I/O	Description
	D_i	I	The D flip-flop data inputs.
1	$\overline{CLR}$	I	When the clear input is LOW, the Q_i outputs are LOW, regardless of the other inputs. When the clear input is HIGH, data can be entered into the register.
11	CP	I	Clock Pulse for the Register; enters data into the register on the LOW-to-HIGH transition.
	Y_i	O	The register three-state outputs.
21	$\overline{E}$	I	Clock Enable. When the clock enable is LOW, data on the D_i input is transferred to the Q_i output on the LOW-to-HIGH clock transition. When the clock enable is HIGH, the Q_i outputs do not change state, regardless of the data or clock input transitions.
20	$\overline{OE}$	I	Output Control. When the $\overline{OE}$ input is HIGH, the Y_i outputs are in the high impedance state. When the $\overline{OE}$ input is LOW, the TRUE register data is present at the Y_i outputs.

FUNCTION TABLE

Function	Inputs					Internal	Outputs
	$\overline{OE}$	$\overline{CLR}$	$\overline{E}$	D_i	CP	Q_i	Y_i
Hi-Z	H	X	X	X	X	X	Z
Clear	H	L	X	X	X	L	Z
	L	L	X	X	X	L	L
Hold	H	H	H	X	X	NC	Z
	L	H	H	X	X	NC	NC
Load	H	H	L	L	↑	L	Z
	H	H	L	H	↑	H	Z
	L	H	L	L	↑	L	L
	L	H	L	H	↑	H	H

H = HIGH

L = LOW

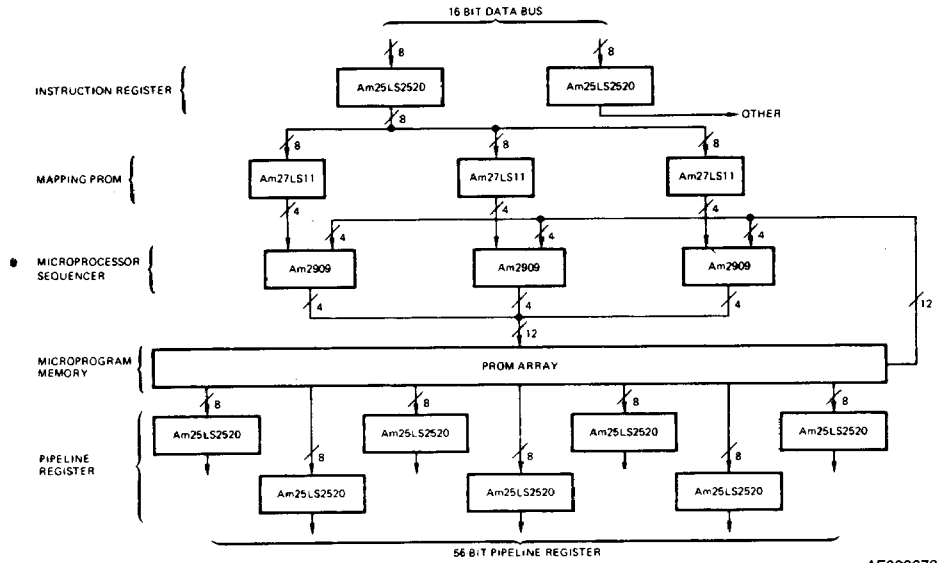
NC = No change

↑ = LOW-to-HIGH Transition

X = Don't Care

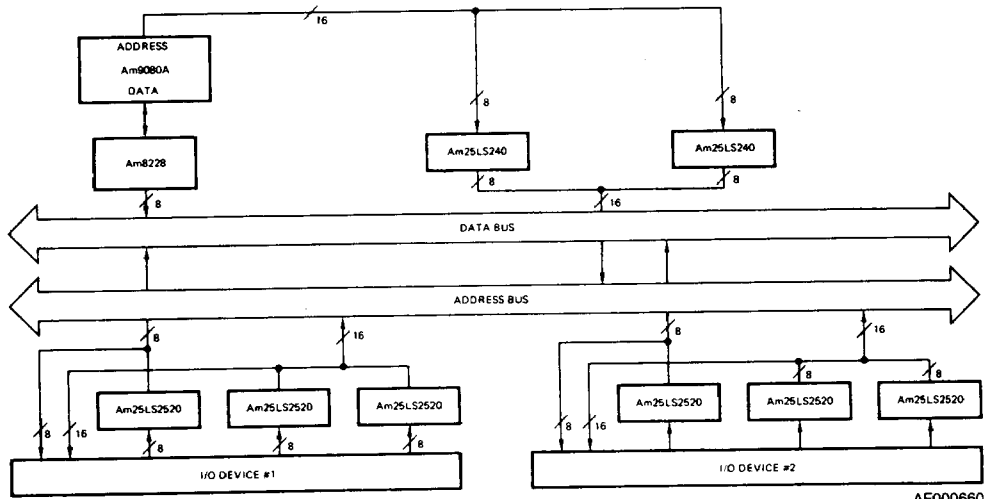
Z = High-Impedance

APPLICATIONS



AF000670

A typical Computer Control Unit for a microprogrammed machine.



AF000660

The Am25LS2520 is a useful device in interfacing with the Am9080A system buses.

ABSOLUTE MAXIMUM RATINGS

Storage Temperature	-65°C to +150°C
(Ambient) Temperature 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

Stresses above those listed under **ABSOLUTE MAXIMUM RATINGS** may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

OPERATING RANGES**Commercial (C) Devices**

Temperature	0°C to +70°C
Supply Voltage	+4.75V to +5.25V

Military (M) Devices

Temperature	-55°C to +125°C
Supply Voltage	+4.5V to +5.5V

Operating ranges define those limits over which the functionality of the device is guaranteed.

DC CHARACTERISTICS over operating range unless otherwise specified

Parameters	Description	Test Conditions (Note 2)		Min	Typ (Note 1)	Max	Units
V _{OH}	Output HIGH Voltage	V _{CC} = MIN V _{IN} = V _{IH} or V _{IL}	MIL, I _{OH} = -1.0mA	2.4	3.4		Volts
			COM'L, I _{OH} = -2.6mA	2.4	3.4		
V _{OL}	Output LOW Voltage	V _{CC} = MIN V _{IN} = V _{IH} or V _{IL}	I _{OL} = 4.0 mA			0.4	Volts
			I _{OL} = 8.0mA			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} = MIN, I _{IN} = -18mA				-1.5	Volts
I _{IL}	Input LOW Current	V _{CC} = MAX, V _{IN} = 0.4V				-0.36	mA
I _{IH}	Input HIGH Current	V _{CC} = MAX, V _{IN} = 2.7V				20	μA
I _I	Input HIGH Current	V _{CC} = MAX, V _{IN} = 7.0V				0.1	mA
I _O	Off-State (High-Impedance) Output Current	V _{CC} = MAX	V _O = 0.4V			-20	μA
			V _O = 2.4V			20	
I _{SC}	Output Short Circuit Current (Note 3)	V _{CC} = MAX		-15		-85	mA
I _{CC}	Power Supply Current (Note 4)	V _{CC} = MAX			24	37	mA

- Notes: 1. Typical limits are at V_{CC} = 5.0V, 25°C ambient and maximum loading.
 2. For conditions shown as MIN or MAX, use the appropriate value specified under Operating Ranges for the applicable device type.
 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, $\bar{E}$ = GND, Di inputs = CLR = $\bar{OE}$ = 4.5V. Apply momentary ground, then 4.5V to clock input.

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

Parameters	Description		Test Conditions	Min	Typ	Max	Units
t _{PLH}	Clock to Y _i ($\overline{OE}$ LOW)		C _L = 15pF R _L = 2.0kΩ		18	27	ns
t _{PHL}					24	36	
t _{PHL}	Clear to Y			22	35	ns	
t _s	Data (D _i)	10		3		ns	
t _h	Data (D _i)	10		3		ns	
t _s	Enable ($\overline{E}$)	Active		15	10		ns
		Inactive		20	12		
t _h	Enable ($\overline{E}$)	0		0		ns	
t _s	Clear Recovery (In-Active) to Clock			11	7		ns
t _w	Clock	HIGH		20	14		ns
		LOW		25	13		
t _{pw}	Clear			20	13		ns
t _{ZH}	$\overline{OE}$ to Y _i				9	13	ns
t _{ZL}					14	21	
t _{HZ}	$\overline{OE}$ to Y _i		C _L = 5.0pF R _L = 2.0kΩ		20	30	ns
t _{LZ}				24	36		
f _{max}	Maximum Clock Frequency (Note 1)				40		MHz

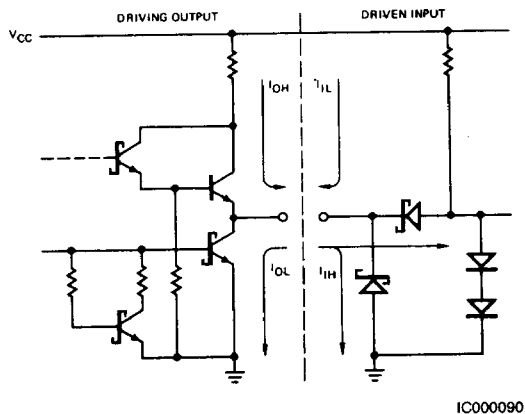
Note 1. Per industry convention, f_{max} is the worst case value of the maximum device operating frequency with no constraints on t_r , t_f , pulse width or duty cycle.

SWITCHING CHARACTERISTICS over operating range unless otherwise specified*

Parameters	Description		Test Conditions	COMMERCIAL		MILITARY		Units
				Am25LS2520		Am25LS2520		
				Min	Max	Min	Max	
t _{PLH}	Clock to Y _i (OE LOW)		C _L = 50pF R _L = 2.0kΩ		33		39	ns
t _{PHL}					45		54	
t _{PHL}	Clear to Y				43		51	ns
t _s	Data (D _i)			12		15		ns
t _h	Data (D _i)			12		15		ns
t _s	Enable (E)	Active		17		20		ns
		Inactive		20		23		
t _h	Enable (E)			0		0		ns
t _s	Clear Recovery (In-Active) to Clock			13		15		ns
t _{pw}	Clock	HIGH		25		30		ns
		LOW		30		35		
t _{pw}	Clear			22		25		ns
t _{ZH}	OE to Y _i				19		25	ns
t _{ZL}					30		39	
t _{HZ}	OE to Y _i		C _L = 5.0pF R _L = 2.0kΩ		35		40	ns
t _{LZ}					39		42	
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.

Am25LS2520
LOW-POWER SCHOTTKY INPUT/OUTPUT
CURRENT INTERFACE CONDITIONS



Note: Actual current flow direction shown.