

Am25LS2518

Quad D Register with Standard and Three-State Outputs

DISTINCTIVE CHARACTERISTICS

- Low-Power Schottky version of the popular Am2918 and Am25S18
- Four standard totem-pole outputs
- Four three-state outputs
- Four D-type flip-flops
- Second sourced by T. I. as the SN54/74LS388

GENERAL DESCRIPTION

The Am25LS2518 consists of four D-type flip-flops with a buffered common clock. Information meeting the set-up and hold requirements on the D inputs is transferred to the Q outputs on the LOW-to-HIGH transition of the clock.

The same data as on the Q outputs is enabled at the three-state Y outputs when the "output control" (\overline{OE}) input is LOW. When the \overline{OE} input is HIGH, the Y outputs are in the high-impedance state.

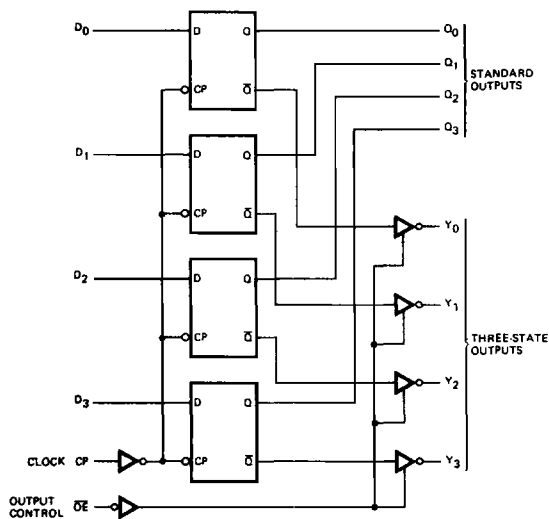
The Am25LS2518 is a 4-bit, high-speed register intended for use in real-time signal processing systems where the

standard outputs are used in a recursive algorithm and the three-state outputs provide access to a data bus to dump the results after a number of iterations.

The device can also be used as an address register or status register in computers or computer peripherals.

Likewise, the Am25LS2518 is also useful in certain display applications where the standard outputs can be decoded to drive LED's (or equivalent) and the three-state outputs are bus organized for occasional interrogation of the data as displayed.

BLOCK DIAGRAM

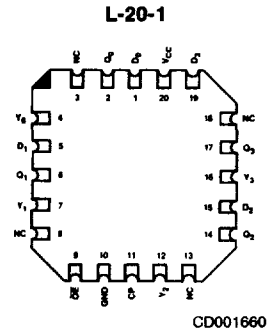
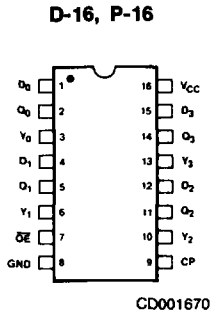


BD001510

RELATED PRODUCTS

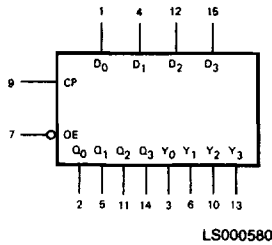
Part No.	Description
Am25S18	Quad D Register
Am2918	Quad D Register
Am29LS18	Quad D Low Power Register
Am29LS2519	Quad D Low Power Register

CONNECTION DIAGRAM Top View

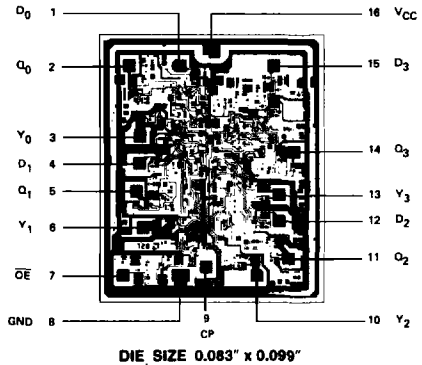


Note: Pin 1 is marked for orientation

LOGIC SYMBOL

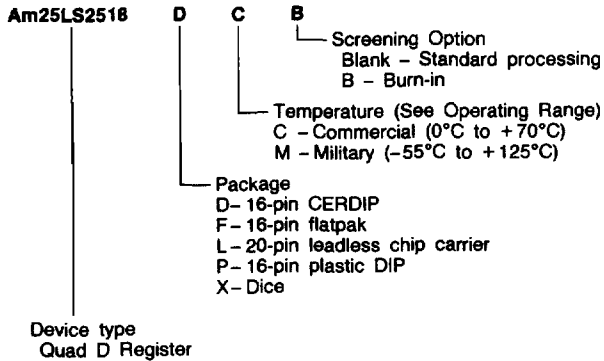


METALLIZATION AND PAD LAYOUT



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).



Valid Combinations	
Am25LS2518	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

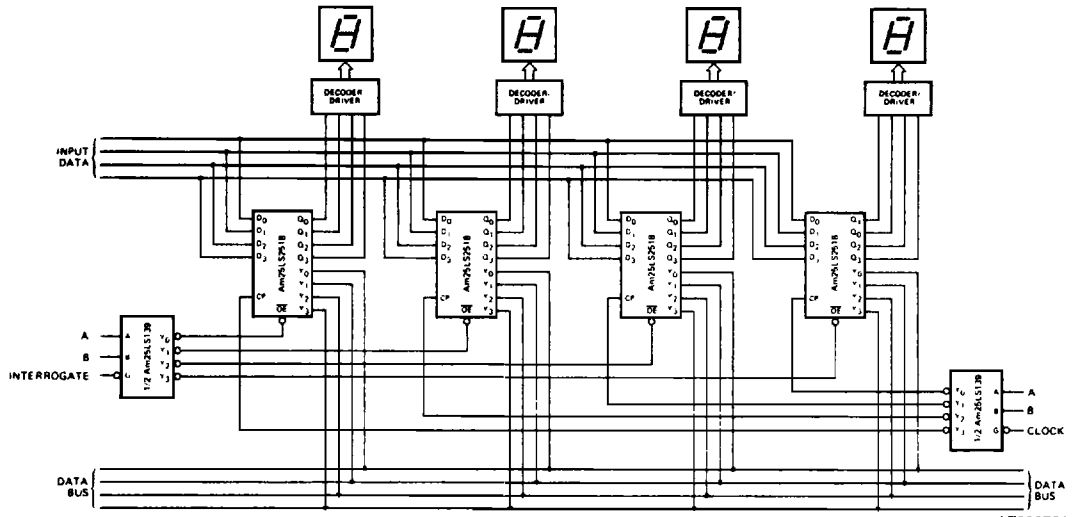
Pin No.	Name	I/O	Description
	D _i	I	The four data inputs to the register.
	Q _i	O	The four data outputs of the register with standard totem-pole active pull-up outputs. Data is passed non-inverted.
	Y _i	O	The four three-state data outputs of the register. When the three-state outputs are enabled, data is passed non-inverted. A HIGH on the "output control" input forces the Y _i outputs to the high-impedance state.
9	CP	I	Clock. The buffered common clock for the register. Enters data on the LOW-to-HIGH transition.
7	OE	I	Output Control. When the OE input is HIGH, the Y _i outputs are in the high-impedance state. When the OE input is LOW, the TRUE register data is present at the Y _i outputs.

TRUTH TABLE

OE	INPUTS		OUTPUTS			NOTES
	CLOCK CP	D	Q	Y		
H	L	X	NC	Z	-	
H	H	X	NC	Z	-	
H	↑	L	L	Z	-	
H	↑	H	H	Z	-	
L	↑	L	L	L	-	
L	↑	H	H	H	-	
L	-	-	L	L	1	
L	-	-	H	H	1	

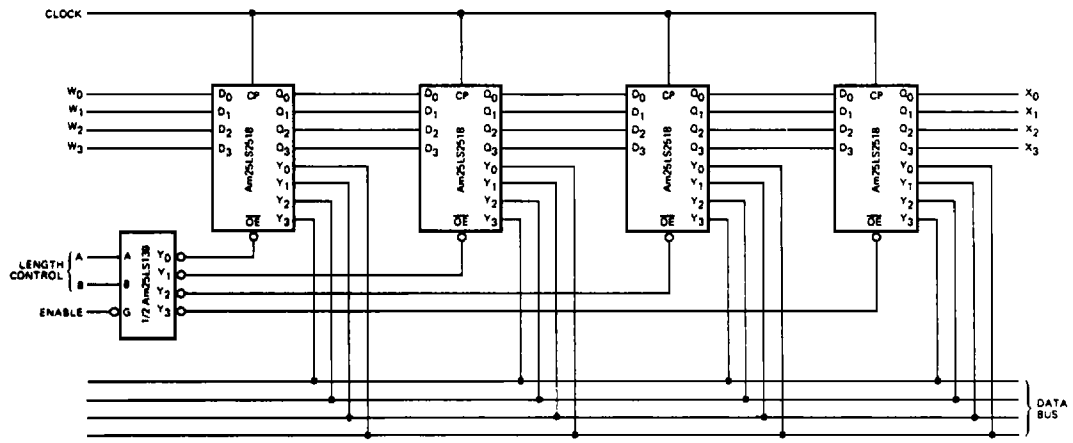
L = LOW NC = No change
 H = HIGH ↑ = LOW-to-HIGH transition
 X = Don't care Z = High-Impedance
 Note: 1. When OE is LOW, the Y output will be in the same logic state as the Q output.

APPLICATIONS



AF000701

The Am25LS2518 used as display register with bus interrogate capability.



AF000691

The Am25LS2518 as a variable length (1, 2, 3 or 4 word) shift register.

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}	Q, I _{OH} = -660µA	MIL	2.5	3.4	Volts
				COM'L	2.7	3.4	
		Y	MIL, I _{OH} = -1.0mA	2.4	3.4		
			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		
			I _{OL} = 12mA		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} = 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 _{OZ}	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		17	26	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. I_{CC} is measured with all inputs at 4.5V and all outputs open.

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 Q_i	$C_L = 15\text{pF}$ $R_L = 2.0\text{k}\Omega$		18	27	ns	
t_{PHL}				18	27		
t_{PLH}	Clock to Y_i (\overline{OE} LOW)			18	27	ns	
t_{PHL}				18	27		
t_{pw}	Clock Pulse Width		LOW	18		ns	
			HIGH	15			
t_s	Data			15		ns	
t_h	Data			5.0		ns	
t_{ZH}	\overline{OE} to Y_i				7.0	11	ns
t_{ZL}					8	12	
t_{HZ}	\overline{OE} to Y_i	$C_L = 5.0\text{pF}$ $R_L = 2.0\text{k}\Omega$		14	21	ns	
t_{LZ}				12	18		
f_{max}	Maximum Clock Frequency (Note 1)		35	50		MHz	

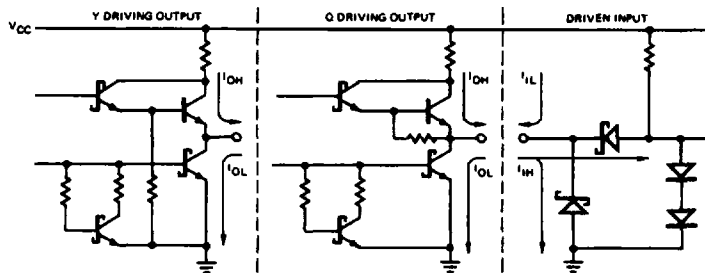
Note 1. Per industry convention, f_{max} is the worst case value of the maximum device operating frequency with no constraints on t_r , t_f , pulse width or duty cycle.

SWITCHING CHARACTERISTICS over operating range unless otherwise specified*

Parameters	Description	Test Conditions	COMMERCIAL		MILITARY		Units	
			Am25LS2518		Am25LS2518			
			Min	Max	Min	Max		
t_{PLH}	Clock to Q_i	$C_L = 50\text{pF}$ $R_L = 2.0\text{k}\Omega$		38		45	ns	
t_{PHL}				38		45		
t_{PLH}	Clock to Y_i (\overline{OE} LOW)			35		40	ns	
t_{PHL}				35		40		
t_{pw}	Clock Pulse Width		LOW	20		20	ns	
			HIGH	20		20		
t_s	Data			15		15	ns	
t_h	Data			5.0		5.0	ns	
t_{ZH}	\overline{OE} to Y_i				15		17	ns
t_{ZL}					16		17	
t_{HZ}	\overline{OE} to Y_i	$C_L = 5.0\text{pF}$ $R_L = 2.0\text{k}\Omega$		27		30	ns	
t_{LZ}				24		30		
f_{max}	Maximum Clock Frequency (Note 1)		30		25	MHz		

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

Am25LS2518
LOW-POWER SCHOTTKY INPUT/OUTPUT
CURRENT INTERFACE CONDITIONS



Note: Actual current flow direction shown.