

## AM25LS2518

### *Quad D Register with Standard and Three-State Outputs*

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.

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#### **Rochester Electronics Manufactured Components**

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

#### **Quality Overview**

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
  - Class Q Military
  - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
  - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

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*The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.*

# 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" ( $\bar{OE}$ ) input is LOW. When the  $\bar{OE}$  input is HIGH, the Y outputs are in the high-impedance state.

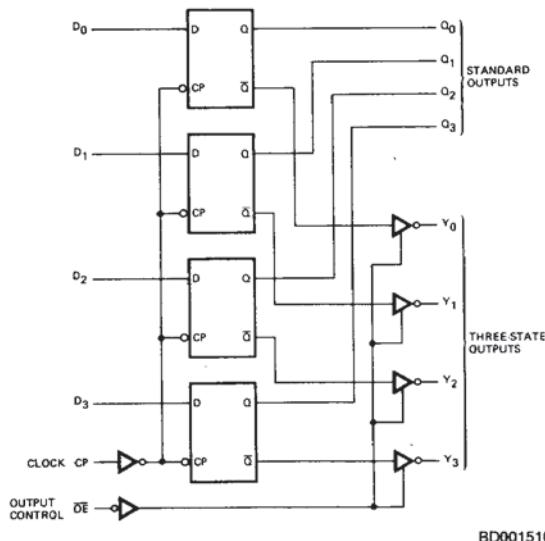
The Am25LS2518 is a 4-bit, high-speed register intended for use in real-time signal processing systems where the

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



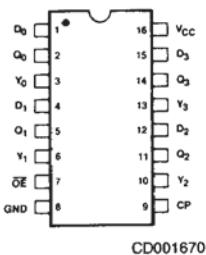
9

## RELATED PRODUCTS

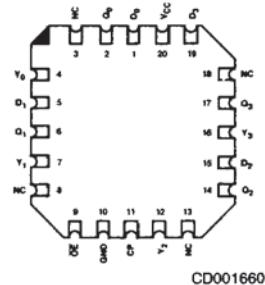
Part No.	Description
Am25S18	Quad D Register
Am2918	Quad D Register
Am29LS18	Quad D Low Power Register
Am29LS2519	Quad D Low Power Register

### CONNECTION DIAGRAM Top View

D-16, P-16

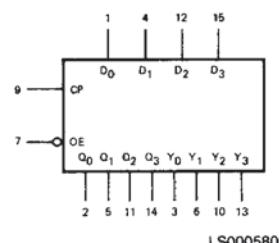


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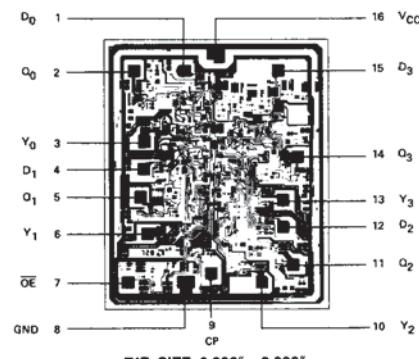


Note: Pin 1 is marked for orientation

### 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).

Am25LS2518

D

C

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 – 16-pin CERDIP  
F – 16-pin flatpak  
L – 20-pin leadless chip carrier  
P – 16-pin plastic DIP  
X – Dice

Device type  
Quad D Register

#### 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 <sub>i</sub>	I	The four data inputs to the register.
	Q <sub>i</sub>	O	The four data outputs of the register with standard totem-pole active pull-up outputs. Data is passed non-inverted.
	Y <sub>i</sub>	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 <sub>i</sub> 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 <sub>i</sub> outputs are in the high-impedance state. When the OE input is LOW, the TRUE register data is present at the Y <sub>i</sub> outputs.

## TRUTH TABLE

INPUTS		OUTPUTS			NOTES
OE	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

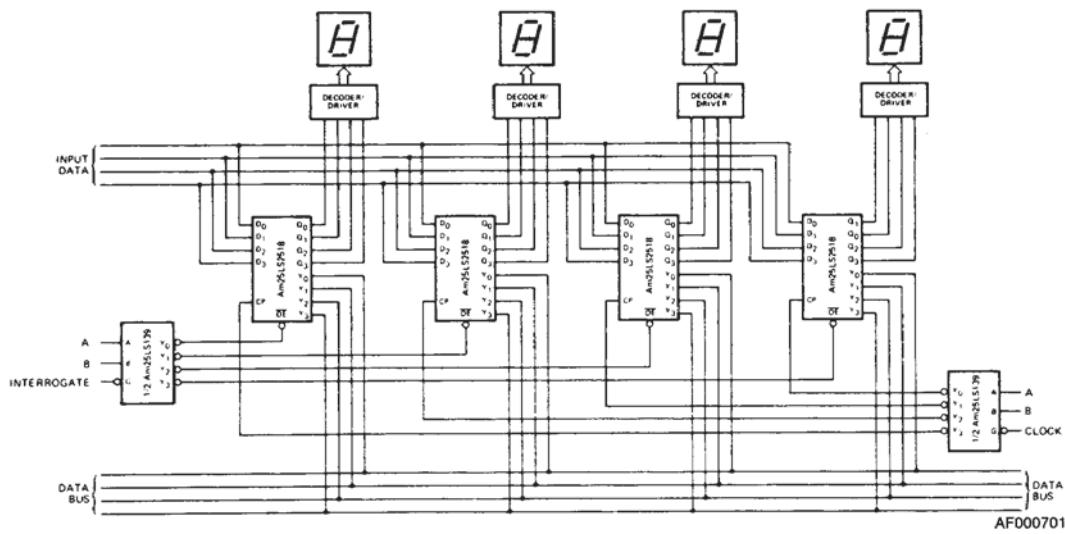
↑ = LOW-to-HIGH transition

X = Don't care

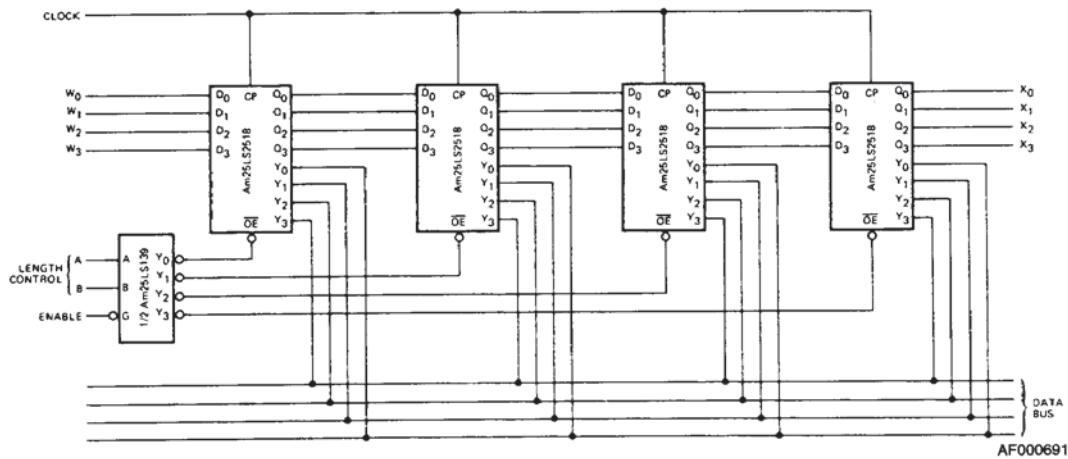
Z = High-Impedance

Note: 1. When OE is LOW, the Y output will be in the same logic state as the Q output.

## APPLICATIONS



The Am25LS2518 used as display register with bus interrogate capability.



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 <sub>CC</sub> 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 <sub>OH</sub>	Output HIGH Voltage	V <sub>CC</sub> = MIN V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	Q, I <sub>OH</sub> = -660μA	MIL	2.5	3.4	Volts
				COM'L	2.7	3.4	
			Y	MIL, I <sub>OH</sub> = -1.0mA	2.4	3.4	
				COM'L, I <sub>OH</sub> = -2.6mA	2.4	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> = 8.0mA			0.45	
			I <sub>OL</sub> = 12mA			0.5	
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> = -18mA				-1.5	Volts
I <sub>IL</sub>	Input LOW Current	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.4V				-0.36	mA
I <sub>IH</sub>	Input HIGH Current	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7V				20	μA
I <sub>I</sub>	Input HIGH Current	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0V				0.1	mA
I <sub>OZ</sub>	Off-State (High-Impedance) Output Current	V <sub>CC</sub> = MAX	V <sub>O</sub> = 0.4V			-20	μA
			V <sub>O</sub> = 2.4V			20	
I <sub>SC</sub>	Output Short Circuit Current (Note 3)	V <sub>CC</sub> = MAX		-15		-85	mA
I <sub>CC</sub>	Power Supply Current (Note 4)	V <sub>CC</sub> = MAX			17	28	mA

Notes: 1. Typical limits are at V<sub>CC</sub> = 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<sub>CC</sub> 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 $Y_i$ ( $\bar{OE}$ LOW)				18	27	ns	
$t_{PHL}$					18	27		
$t_{pw}$	Clock Pulse Width	LOW		18			ns	
		HIGH		15				
$t_s$	Data			15				
$t_h$	Data			5.0				
$t_{ZH}$			$C_L = 5.0\text{pF}$ $R_L = 2.0\text{k}\Omega$		7.0	11	ns	
$t_{ZL}$	$\bar{OE}$ to $Y_i$				8	12		
$t_{HZ}$	$\bar{OE}$ to $Y_i$				14	21	ns	
$t_{LZ}$					12	18		
$f_{max}$	Maximum Clock Frequency (Note 1)			35	50		MHz	

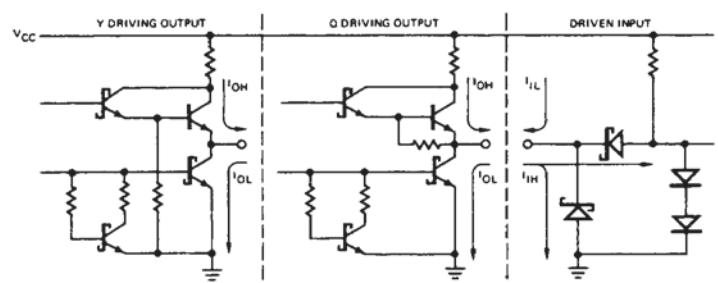
Note 1. Per industry convention,  $f_{max}$  is the worst case value of the maximum device operating frequency with no constraints on  $t_r$ ,  $t_f$ , pulse width or duty cycle.

## 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 $Y_i$ ( $\bar{OE}$ 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			
$t_h$	Data		5.0		5.0			
$t_{ZH}$	$\bar{OE}$ to $Y_i$	$C_L = 5.0\text{pF}$ $R_L = 2.0\text{k}\Omega$		15		17	ns	
$t_{ZL}$				16		17		
$t_{HZ}$	$\bar{OE}$ to $Y_i$			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.