

AM25LS2519

Quad Register with Two Independently Controlled Three-State Outputs

The AM25LS2519 consists of four D-type flip-flops with a buffered common clock enable. Information meeting the set-up and hold time requirements on the D inputs is transferred to the flip-flop outputs on the LOW-to-HIGH transition of the clock. Data on the Q outputs of the flip-flops is enabled at the three-state outputs when the output control (\overline{OE}) input is LOW. When the appropriate \overline{OE} input is HIGH, the outputs are in the high impedance state. Two independent sets of outputs - W and Y - are provided such that the register can simultaneously and independently drive two buses. One set of outputs contains a polarity control such that the outputs can either be inverting or non-inverting.

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.

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.

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Am25LS2519

Quad Register with Two Independently Controlled Three-State Outputs

Am25LS2519

DISTINCTIVE CHARACTERISTICS

- Two sets of fully buffered three-state outputs
- Four D-type flip-flops
- Polarity control on W outputs
- Buffered common clock enable
- Buffered common asynchronous clear
- Separate buffered common output enable for each set of outputs

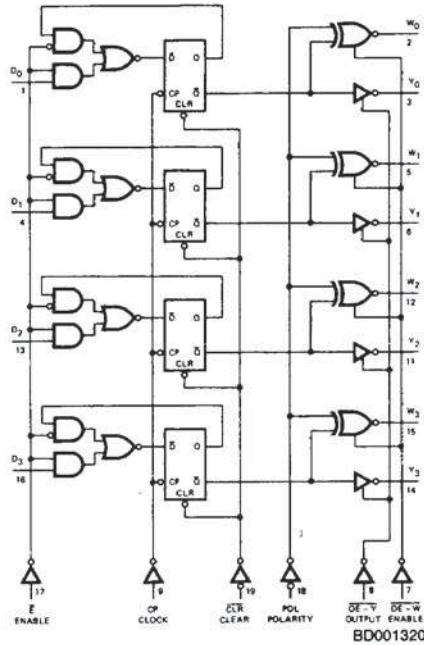
GENERAL DESCRIPTION

The Am25LS2519 consists of four D-type flip-flops with a buffered common clock enable. Information meeting the set-up and hold time requirements on the D inputs is transferred to the flip-flop outputs on the LOW-to-HIGH transition of the clock. Data on the Q outputs of the flip-flops is enabled at the three-state outputs when the output control (\overline{OE}) input is LOW. When the appropriate \overline{OE} input is HIGH, the outputs are in the high impedance state. Two independent sets of outputs – W and Y – are provided such

that the register can simultaneously and independently drive two buses. One set of outputs contains a polarity control such that the outputs can either be inverting or non-inverting.

The device also features an active LOW asynchronous clear. When the clear input is LOW, the Q output of the internal flip-flops are forced LOW independent of the other inputs. The Am25LS2519 is packaged in a space saving (0.3-inch row spacing) 20-pin package.

BLOCK DIAGRAM



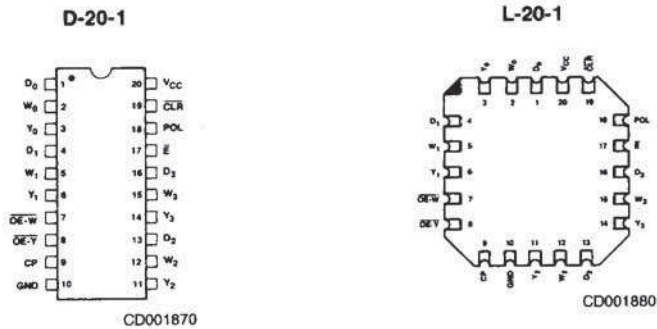
RELATED PRODUCTS

Part No.	Description
Am25S18, Am2918	Quad D Register
Am25LS2518	Quad D Register

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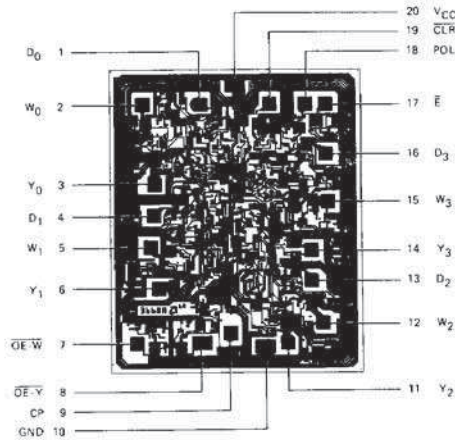
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CONNECTION DIAGRAM Top View



Note: Pin 1 is marked for orientation

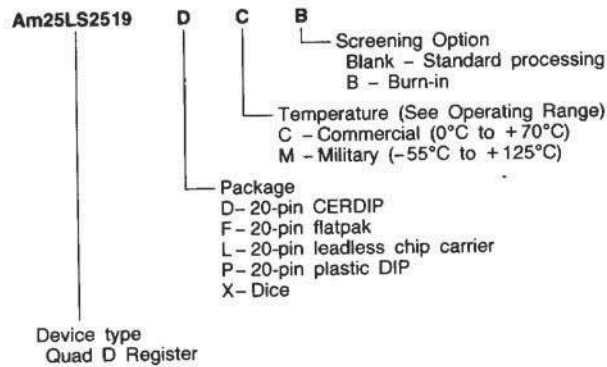
METALLIZATION AND PAD LAYOUT



DIE SIZE 0.083" x 0.099"

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	
Am25LS2519	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

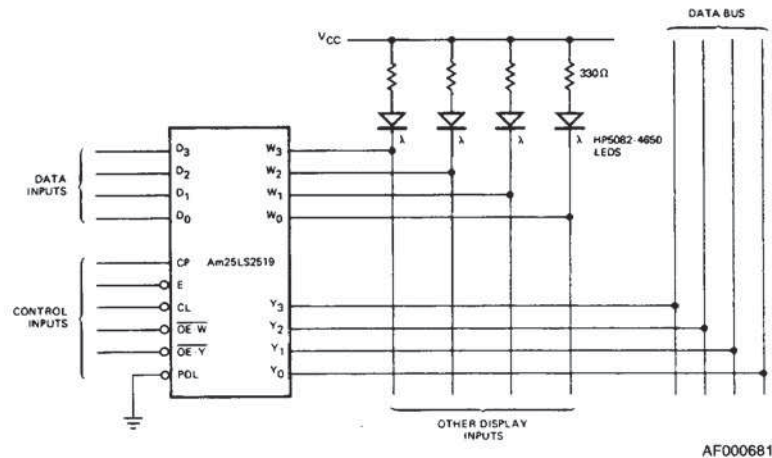
Pin No.	Name	I/O	Description
	D _i	I	Any of the four D flip-flop data lines.
17	E	I	Clock Enable. When LOW, the data is entered into the register on the next clock LOW-to-HIGH transition. When HIGH, the data in the register remains unchanged, regardless of the data in.
9	CP	I	Clock Pulse. Data is entered into the register on the LOW-to-HIGH transition.
7, 8	OE-W, OE-Y	O	Output Enable. When OE is LOW, the register is enable to the output. When HIGH, the output is in the high-impedance state. The OE-W controls the W set of outputs, and OE-Y controls the Y set.
	Y _i	O	Any of the four non-inverting three-state output lines.
	W _i	O	Any of the four three-state outputs with polarity control.
18	POL	O	Polarity Control. The W _i outputs will be non-inverting when POL is LOW, and when it is HIGH, the outputs are inverting.
19	CLR	I	Asynchronous Clear. When CLR is LOW, the internal Q flip-flops are reset to LOW.

FUNCTION TABLE

FUNCTION	INPUTS							INTERNAL	OUTPUTS	
	CP	D _i	E	CLR	POL	OE-W	OE-Y	Q	W _i	Y _i
Output Three-State Control	X	X	X	X	X	H	L	NC	Z	Enabled
	X	X	X	X	X	L	H	NC	Enabled	Z
	X	X	X	X	X	H	H	NC	Z	Z
	X	X	X	X	X	L	L	NC	Enabled	Enabled
W _i Polarity	X	X	X	X	L	L	L	NC	Non-Inverting	Non-Inverting
	X	X	X	X	H	L	L	NC	Inverting	Non-Inverting
Asynchronous Clear	X	X	X	L	L	L	L	L	L	L
	X	X	X	L	H	L	L	L	H	L
Clock Enabled	↑	X	H	H	X	X	X	NC	NC	NC
	↑	L	L	H	L	L	L	L	L	L
	↑	L	L	H	H	L	L	L	H	L
	↑	H	L	H	L	L	L	H	H	H
	↑	H	L	H	H	L	L	H	L	H

L = LOW
H = HIGH
Z = High-Impedance
X = Don't Care
NC = No Change
↑ = LOW to HIGH Transition

APPLICATION



Convenient Register Content Monitor or Test Point

AF000681

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		
			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	MIL		24	36	mA	
			COM'L		24	39		

- 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. Inputs grounded; 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_{PHL}	Clock to Y_i	$C_L = 15\text{pF}$ $R_L = 2.0\text{k}\Omega$		22	33	ns
t_{PLH}				20	30	
t_{PLH}	Clock to W_i (Either Polarity)			24	36	ns
t_{PHL}				24	36	
t_{PHL}	Clear to Y_i			29	43	ns
t_{PLH}				25	37	
t_{PHL}	Clear to W_i			30	45	ns
t_{PLH}				23	34	
t_{PHL}	Polarity to W_i			25	37	ns
t_{pw}			Clear		18	
t_{pw}	Clock Pulse Width			LOW	15	
			HIGH	18		
t_s	Data			15		ns
t_h	Data			5		ns
t_s	Data Enable		20		ns	
t_h	Data Enable		0		ns	
t_s	Set-up Time, Clear Recovery (inactive) to clock		20	15	ns	
t_{ZH}	Output Enable to W or Y			11	17	ns
t_{ZL}				13	20	
t_{HZ}	Output Enable to W or Y	$C_L = 5.0\text{pF}$ $R_L = 2.0\text{k}\Omega$		13	20	ns
t_{LZ}				11	17	
f_{max}	Maximum Clock Frequency (Note 1)	$C_L = 15\text{pF}$ $R_L = 2.0\text{k}\Omega$	35	45		MHz

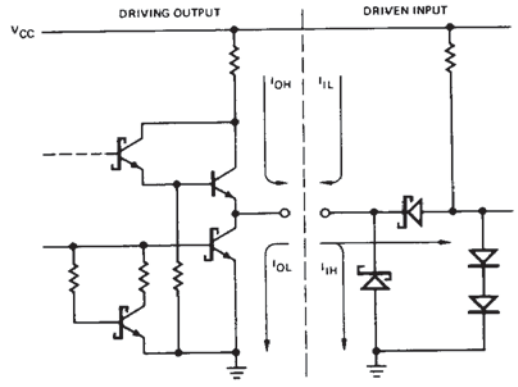
Note 1. Per industry convention, f_{max} is the worst case value of the maximum device operating frequency with no constraints on t_r , t_f , pulse width or duty cycle.

SWITCHING CHARACTERISTICS over operating range unless otherwise specified*

Parameters	Description	Test Conditions	COMMERCIAL		MILITARY		Units
			Am25LS2519		Am25LS2519		
			Min	Max	Min	Max	
t_{PLH}	Clock to Y_i	$C_L = 50\text{pF}$ $R_L = 2.0\text{k}\Omega$		39		42	ns
t_{PHL}				39		45	
t_{PLH}	Clock to W_i (Either Polarity)			41		43	ns
t_{PHL}				44		48	
t_{PHL}	Clear to Y_i			52		58	ns
t_{PLH}				42		43	
t_{PHL}	Clear to W_i			51		53	ns
t_{PLH}				41		45	
t_{PHL}	Polarity to W_i			42		44	ns
t_{pw}			Clear		20	20	
t_{pw}	Clock			LOW	20	20	
			HIGH	20	20		
t_s	Data			15		15	ns
t_h	Data			10		10	ns
t_s	Data Enable		25		25	ns	
t_h	Data Enable		0		0	ns	
t_s	Set-up Time, Clear Recovery (Inactive) to Clock		23		24	ns	
t_{ZH}	Output Enable to W_i or Y_i			24		27	ns
t_{ZL}				29		35	
t_{HZ}	Output Enable to W_i or Y_i	$C_L = 5.0\text{pF}$ $R_L = 2.0\text{k}\Omega$		33		45	ns
t_{LZ}				22		26	
f_{max}	Maximum Clock Frequency (Note 1)	$C_L = 5.0\text{pF}$ $R_L = 2.0\text{k}\Omega$	30		25		MHz

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

Am25LS2519 LOW-POWER SCHOTTKY INPUT/OUTPUT CURRENT INTERFACE CONDITIONS



IC000090

Note: Actual current flow direction shown.