AM26LS31

Quad High Speed Differential Line Driver

The AM26LS31 is a quad-differential line driver, designed for digital data transmission over balanced lines. The AM26LS31 meets all the requirements of EIA standard RS-422 and federal standard 1020. It is designed to provide unipolar differential drive to twisted-pair or parallel-wire transmission lines.

The circuit provides an enable and disable function common to all four drivers. The AM26LS31 features 3-state outputs and logical OR-ed complementary enable inputs. The inputs are all LS compatible and are all one unit load.

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.

Am26LS31

Quad High Speed Differential Line Driver

Advanced Micro Devices

DISTINCTIVE CHARACTERISTICS

- Output skew – 2.0 ns typical
- Input to output delay – 12 ns
- Operation from single +5 V supply
- 16-pin hermetic and molded DIP package
- Outputs won't load line when V_{CC} = 0
- Four line drivers in one package for maximum package density
- Output short-circuit protection
- Complementary outputs
- Meets the requirements of EIA standard RS-422
- High output drive capability for 100 Ω terminated transmission lines
- Available in military and commercial temperature range
- Advanced low-power Schottky processing

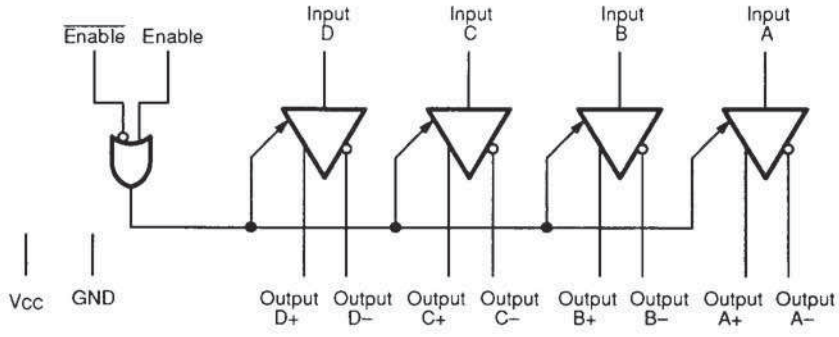
GENERAL DESCRIPTION

The Am26LS31 is a quad-differential line driver, designed for digital data transmission over balanced lines. The Am26LS31 meets all the requirements of EIA standard RS-422 and federal standard 1020. It is designed to provide unipolar differential drive to twisted-pair or parallel-wire transmission lines.

The circuit provides an enable and disable function common to all four drivers. The Am26LS31 features 3-state outputs and logical OR-ed complementary enable inputs. The inputs are all LS compatible and are all one unit load.

The Am26LS31 is constructed using advanced low-power Schottky processing.

BLOCK DIAGRAM



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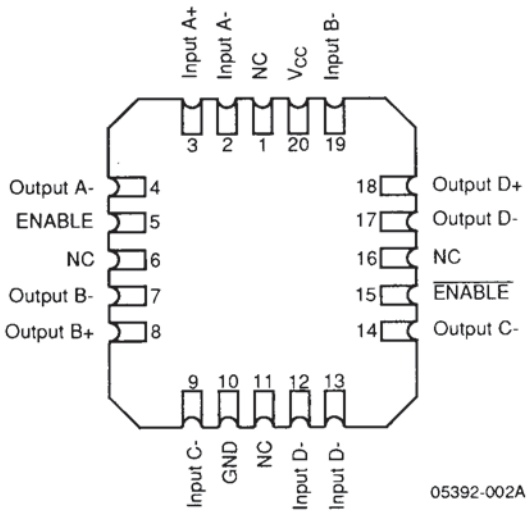
RELATED PRODUCTS

Part No.	Description
26LS30	Dual Differential RS-422 Party Line/Quad Single Ended RS-423 Line Driver
26LS32	Quad Differential RS-422 Line Receiver

Publication# 05392 Rev. B Amendment/0
Issue Date: May 1991

CONNECTION DIAGRAMS
Top View



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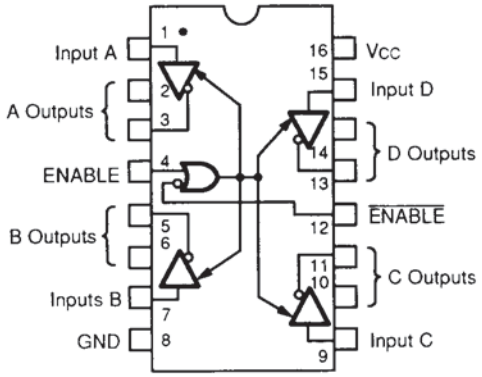

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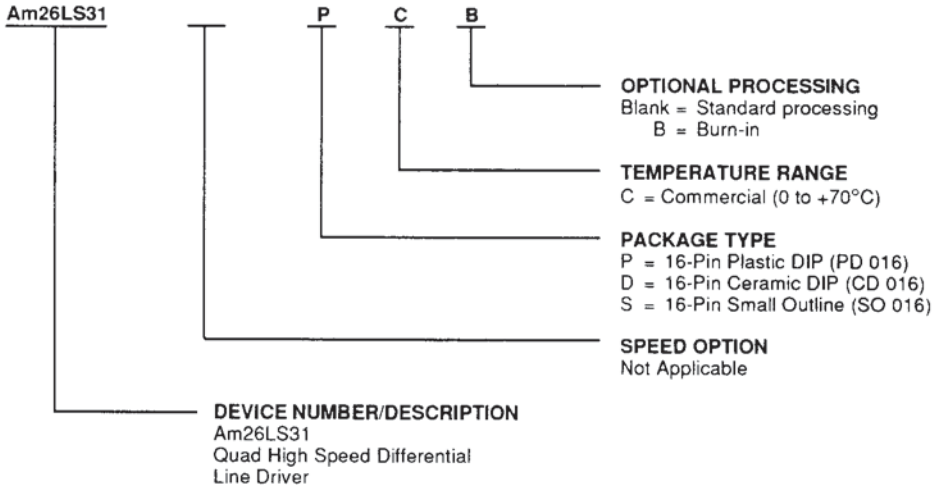
ORDERING INFORMATION
Standard Products

AMD standard products are available in several packages and operating ranges. The order number (Valid Combination) is formed by a combination of:



Valid Combinations	
AM26LS31	PC, PCB DC, DCB SC

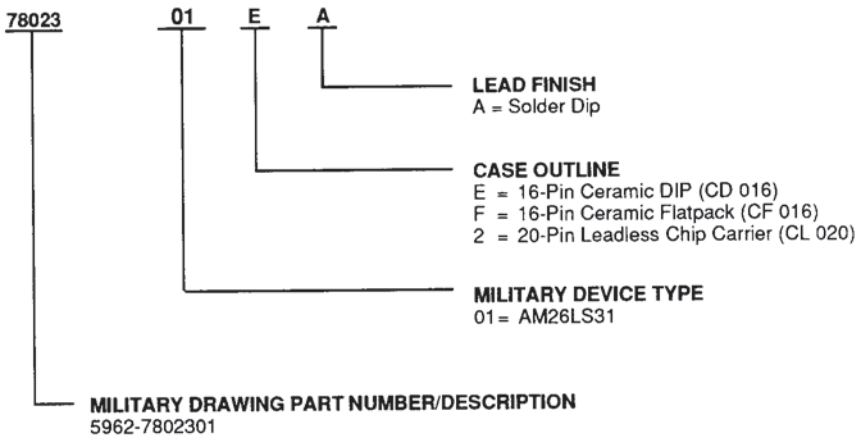
Valid Combinations

Valid Combinations list configurations planned to be supported in volume for this device. Consult the local AMD sales office to confirm availability of specific valid combinations or to check on newly released combinations, and to obtain additional data on AMD's standard military grade products.

MILITARY ORDERING INFORMATION

SMD/DESC Products

AMD products for Aerospace and Defense applications are available in several packages and operating ranges. Standard Military Drawing (SMD)/DESC products are fully compliant with MIL-STD-883C requirements. The order number (Valid Combination) is formed by a combination of:



Valid Combinations	
5962-7802301	MEA, MFA, M2A

Valid Combinations

Valid Combinations list configurations planned to be supported in volume for this device. Consult the local AMD sales office to confirm availability of specific valid combinations, or to check on newly released combinations.

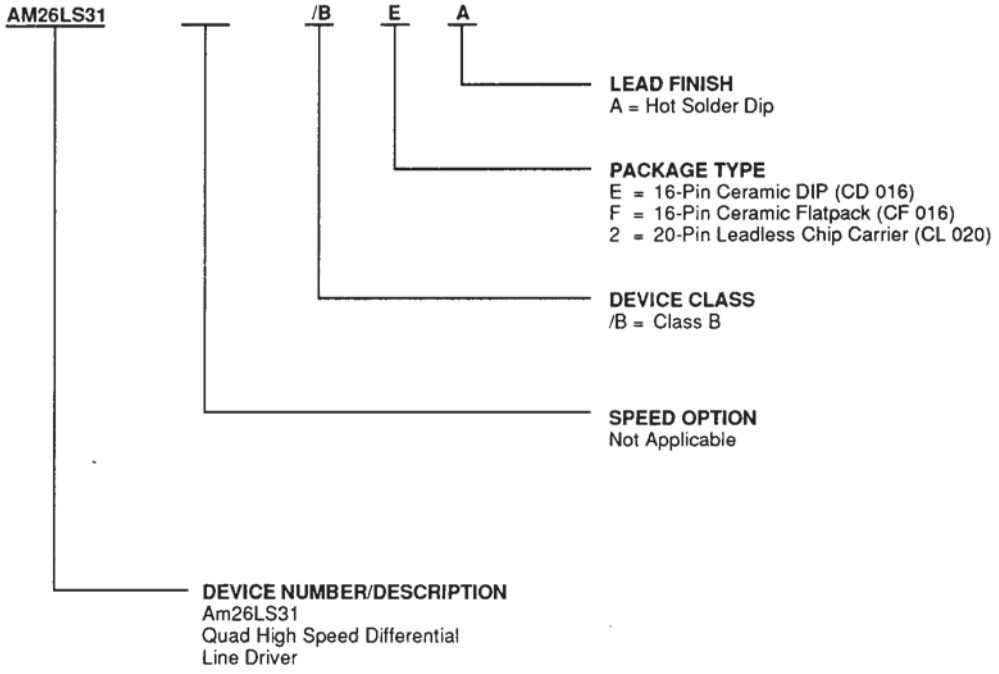
Group A Tests

Group A tests consist of Subgroups 1, 2, 3, 7, 8, 9, 10, 11.

MILITARY ORDERING INFORMATION

APL Products

AMD products for Aerospace and Defense applications are available in several packages and operating ranges. APL (Approved Products List) products are fully compliant with MIL-STD-883C requirements. The order number (Valid Combination) is formed by a combination of:



Valid Combinations	
Am26LS31	/BEA, /BFA, /B2A

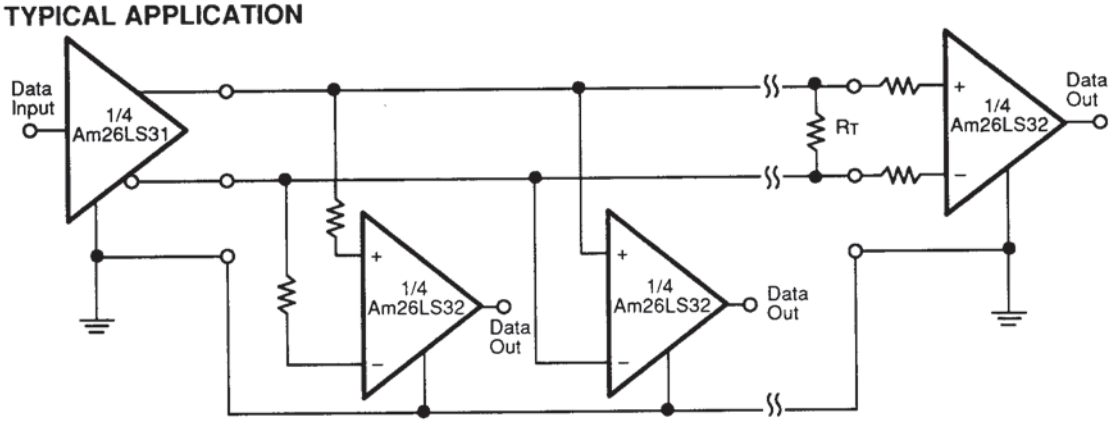
Valid Combinations

Valid Combinations list configurations planned to be supported in volume for this device. Consult the local AMD sales office to confirm availability of specific valid combinations, or to check on newly released combinations.

Group A Tests

Group A tests consist of Subgroups 1, 2, 3, 7, 8, 9, 10, 11.

TYPICAL APPLICATION



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ABSOLUTE MAXIMUM RATINGS

Storage Temperature	–65 to +150°C
Supply Voltage	–0.5 to 7.0 V
DC Input Voltage	–1.5 to 7.0 V
DC Output Voltage	–0.5 to V_{CC} max

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

Ambient Temperature (T_A)	0 to +70°C
Supply Voltage (V_{CC})	+4.75 to +5.25 V

Military (M) Devices

Temperature	–55 to +125°C
Supply Voltage (V_{CC})	+4.5 to +5.5 V

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

DC CHARACTERISTICS over operating ranges unless otherwise specified

Parameter Symbol	Parameter Description	Test Conditions (Note 2)		Min.	Typ. (Note 1)	Max.	Unit
V_{OH}	Output HIGH Voltage	V_{CC} = Min; I_{OH} = –20 mA		2.5	3.2		V
V_{OL}	Output LOW Voltage	V_{CC} = Min; I_{OL} = 20 mA			0.32	0.5	V
V_{IH}	Input HIGH Voltage	V_{CC} = Min; (Note 3)		2.0			V
V_{IL}	Input LOW Voltage	V_{CC} = Max. (Note 3)				0.8	V
I_{IL}	Input LOW Current	V_{CC} = Max., V_{IN} = 0.4 V			–0.20	–0.36	mA
I_{IH}	Input HIGH Current	V_{CC} = Max., V_{IN} = 2.7 V			0.5	20	µA
I_I	Input Reverse Current	V_{CC} = Max., V_{IN} = 7.0 V				0.1	mA
I_O	Off-State (High-Impedance) Output Current	V_{CC} = Max.	V_O = 2.5 V			20	µA
			V_O = 0.5 V			–20	
V_I	Input CLAMP Voltage	V_{CC} = Min., I_{IN} = –18 mA			–0.8	–1.5	V
I_{OFF}	Power off leakage Current	V_{CC} = 0 V	V_{OUT} = 6 V			100	µA
			V_{OUT} = –.25 V			–100	
I_{SC}	Output Short Circuit Current	V_{CC} = Max., (Note 4)		–30	–60	–150	mA
I_{CC}	Power Supply Current	V_{CC} = Max., all outputs disabled			60	80	mA
AC Parameters V_{CC} = 5.0 V, T_A = 25°C							
t_{PLH}	Input to Output	V_{CC} = 5.0 V, T_A = 25°C, Load = Note 2			12	20	ns
t_{PHL}	Input to Output	V_{CC} = 5.0 V, T_A = 25°C, Load = Note 2			12	20	ns
SKEW	Output to Output	V_{CC} = 5.0 V, T_A = 25°C, Load = Note 2			2.0	6.0	ns
t_{LZ}	Enable to Output	V_{CC} = 5.0 V, T_A = 25°C, C_L = 10 pF R_{L1} = 180 Ω, R_{L2} = 75 Ω			23	35	ns
t_{HZ}	Enable to Output	V_{CC} = 5.0 V, T_A = 25°C, C_L = 10 pF R_{L1} = 180 Ω, R_{L2} = 75 Ω			17	30	ns
t_{ZL}	Enable to Output	V_{CC} = 5.0 V, T_A = 25°C, Load = Note 2			35	45	ns
t_{ZH}	Enable to Output	V_{CC} = 5.0 V, T_A = 25°C, Load = Note 2			30	40	ns

Notes:

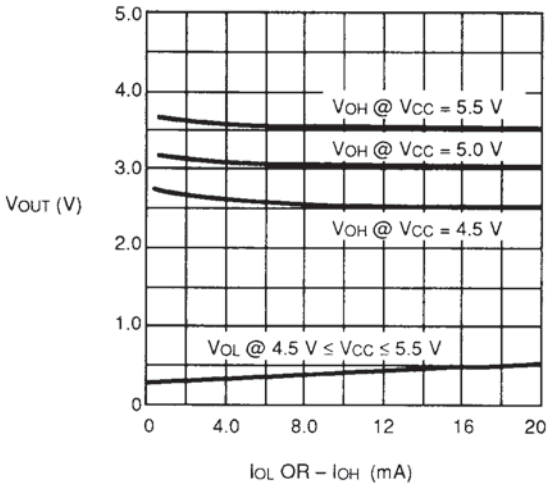
1. All typical values are V_{CC} = 5.0 V, T_A = 25°C.
2. C_L = 30 pF, V_{IN} = 1.3 V to V_{OUT} = 1.3 V, V_{PULSE} = 0 V to +3.0 V, R_{L1} = 180 Ω, R_{L2} = 75 Ω.
3. Input thresholds are tested during DC tests and may be done in combination with testing of other DC parameters.
4. Not more than one output should be shorted at a time. Duration of the short circuit test should not exceed one second.

SWITCHING CHARACTERISTICS

Parameter Symbol	Parameter Description	Test Conditions	Min.	Typ. (Note 1)	Max.	Unit
AC Parameters (Commercial) V_{CC} = 4.75 V – 5.25 V; T_A = 0°C – 70°C						
t_{PLH}	Propagation Delay from Input to Output	C_L = 30 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		18	30	ns
t_{PHL}	Propagation Delay from Input to Output	C_L = 30 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		18	30	ns
t_{SKEW}	Output to Output	C_L = 30 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		3.0	9.0	ns
t_{PLZ}	Propagation Delay from Enable to Output	C_L = 10 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		35	53	ns
t_{PHZ}	Propagation Delay from Enable to Output	C_L = 10 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		25	45	ns
t_{PZL}	Propagation Delay from Enable to Output	C_L = 30 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		53	68	ns
t_{PZH}	Propagation Delay from Enable to Output	C_L = 30 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		45	60	ns
AC Parameters (Military) V_{CC} = 4.75 V – 5.25 V; T_A = –55°C – +125°C						
t_{PLH}	Propagation Delay from Input to Output	C_L = 30 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		18	30	ns
t_{PHL}	Propagation Delay from Input to Output	C_L = 30 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		18	30	ns
t_{SKEW}	Output to Output	C_L = 30 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		3.0	9.0	ns
t_{PLZ}	Propagation Delay from Enable to Output	C_L = 10 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		35	53	ns
t_{PHZ}	Propagation Delay from Enable to Output	C_L = 10 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		25	45	ns
t_{PZL}	Propagation Delay from Enable to Output	C_L = 30 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		53	68	ns
t_{PZH}	Propagation Delay from Enable to Output	C_L = 30 pF, R_{L1} = 180 Ω, R_{L2} = 75 Ω		45	60	ns

PERFORMANCE CURVES

Guaranteed V_{OH} and V_{OL}
(T_A = –55°C to +125°C)



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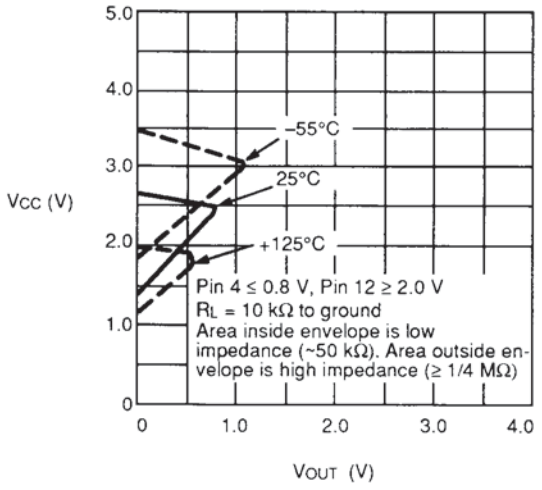
V_{OUT} Versus V_{CC}



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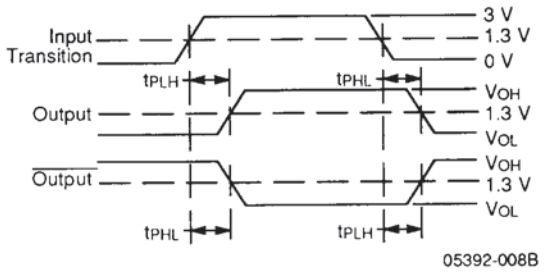
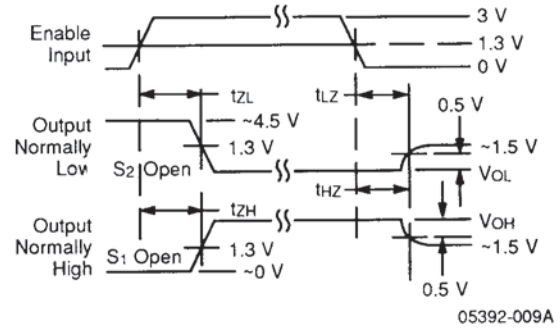
KEY TO SWITCHING WAVEFORMS

WAVEFORM	INPUTS	OUTPUTS
	Must Be Steady	Will Be Steady
	May Change from H to L	Will Be Changing from H to L
	May Change from L to H	Will Be Changing from L to H
	Don't Care, Any Change Permitted	Changing State Unknown
	Does Not Apply	Center Line is High Impedance "Off" State



Propagation Delay
(Notes 1 and 3)

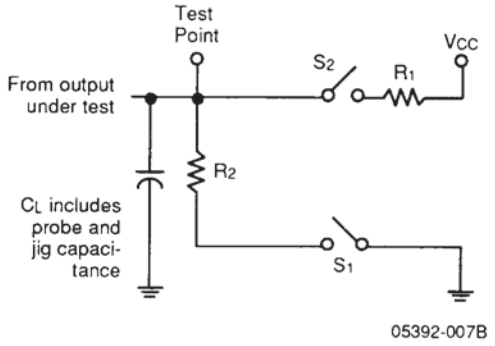


Enable and Disable Times
(Notes 2 and 3)

Notes:

1. Diagram shown for $\overline{\text{Enable}}$ LOW.
2. S_1 and S_2 of Load Circuit are closed except where shown.
3. Pulse Generator for All Pulses: Rate ≤ 1.0 MHz; Z_O = 50 Ω; t_r ≤ 15 ns; t_f ≤ 6.0 ns.

SWITCHING TEST CIRCUIT



Three-State Outputs

EQUIVALENT CIRCUIT (1/4 Am26LS31)