

**MNDS90LV031A-X REV 1C0**

 Original Creation Date: 02/09/99  
 Last Update Date: 08/15/03  
 Last Major Revision Date: 02/21/00

**3V LVDS Quad CMOS Differential Line Driver**
**General Description**

The DS90LV031A is a quad CMOS differential line driver utilizing Low Voltage Differential Signaling (LVDS) technology. It is designed for applications requiring low power dissipation and high data rates.

The DS90LV031A accepts TTL/CMOS input levels and translates them to low voltage (350 mV) differential output signals. In addition the driver supports a TRI-STATE function that may be used to disable the output stage, disabling the load current, and thus dropping the device to a low idle power state.

The EN and EN\* inputs allow active Low or active High control of the TRI-STATE outputs. The enables are common to all four drivers. The DS90LV031A and companion line receiver (DS90LV032A) provide a new alternative to high power pseudo-ECL devices for high speed point-to-point interface applications.

In addition, the DS90LV031A provides power-off high impedance LVDS outputs. This feature assures minimal loading effect on the LVDS bus lines when VCC is not present.

**Industry Part Number**

DS90LV031A

**Prime Die**

DS90LV031A

**NS Part Numbers**

 DS90LV031AW-MLS  
 DS90LV031AW-QML  
 DS90LV031AWGMLS  
 DS90LV031AWGQML

**Controlling Document**

SEE FEATURES SECTION

**Processing**

MIL-STD-883, Method 5004

**Quality Conformance Inspection**

MIL-STD-883, Method 5005

Subgrp	Description	Temp ( °C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

**Features**

- High impedance LVDS outputs with power-off
- 3.3V power supply design
- +/- 350mV differential signaling
- Low power dissipation.
- Low differential skew.
- Low propagation delay
- Interoperable with existing 5V LVDS devices
- Military operating temperature range
- Pin compatible with DS26C31.
- Compatible with IEEE 1596.3 SCI LVDS standard
- Compatible with proposed TIA/EIA-644 LVDS standard
- Typical Rise/Fall times of 800pS.
- Typical Tri-State Enable/Disable Delays of less than 5nS.

CONTROLLING DOCUMENT:

DS90LV031AW-QML	5962-9865101QFA
DS90LV031AWQML	5962-9865101QXA

**(Absolute Maximum Ratings)**

(Note 1)

Supply Voltage (Vcc)	-0.3 to +4V
Input Voltage (Din)	-0.3 to (Vcc+0.3V)
Enable Input Voltage (EN, EN*)	-0.3 to (Vcc+0.3V)
Output Voltage (Dout+, Dout-)	-0.3 to +3.9V
Storage Temperature Range	-65C to +150C
Lead Temperature Soldering (4 sec)	260C
ESD Rating.	6000 Volts.
Maximum Junction Temperature	+150C
Maximum Power Dissipation @ +25C (Note 2)	
16 PIN CERPAK (W Pkg)	845mW
16 PIN CERAMIC SOIC (WG Pkg)	845mW
Thermal Resistance. (Theta JA)	
16 PIN CERPAK (W Pkg)	148C/W
16 PIN CERAMIC SOIC (WG Pkg)	148C/W
Thermal Resistance. (Theta JC)	
16 PIN CERPAK (W Pkg)	22C/W
16 PIN CERAMIC SOIC (WG Pkg)	22C/W

Note 1: Absolute Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the device should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

Note 2: Derate (W & WG Pkgs) at 6.8mW/C for temperatures above +25C.

**Recommended Operating Conditions**

Supply Voltage	3.0 to 3.6V
Operating Free Air Temperature	-55 to +125 C

## Electrical Characteristics

### DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
DC: Vcc = 3.0/3.6V unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vod1	Differential Output Voltage	RL = 100 Ohms		Dout-, Dout+	250	450	mV	1, 2, 3
DVod1	Change in Magnitude of Vod1 for complementary output States	RL = 100 Ohms		Dout-, Dout+		50	mV	1, 2, 3
Vos	Offset Voltage	RL = 100 Ohms		Dout-, Dout+	1.125	1.625	V	1, 2, 3
DVos	Change in Magnitude of Vos for Complementary Output States	RL = 100 Ohms		Dout-, Dout+		50	mV	1, 2, 3
Voh	Output Voltage High	RL = 100 Ohms		Dout-, Dout+		1.85	V	1, 2, 3
Vol	Output Voltage Low	RL = 100 Ohms		Dout-, Dout+	.9		V	1, 2, 3
Vih	Input Voltage High		1	Din, EN, EN*	2.0	Vcc	V	1, 2, 3
Vil	Input Voltage Low		1	Din, EN, EN*	Gnd	0.8	V	1, 2, 3
IiH	Input Current	Vin = Vcc or 2.5V, Vcc = 3.6V		Din, EN, EN*		±10	uA	1, 2, 3
IiL	Input Current	Vin = Gnd or 0.4V, Vcc = 3.6V		Din, EN, EN*		±10	uA	1, 2, 3
Vcl	Input Clamp Voltage	Icl = -8mA, Vcc = 3.0V		Din, EN, EN*		-1.5	V	1, 2, 3
Ios	Output Short Circuit Current	ENABLED Din = Vcc, Dout + = 0V or Din = Gnd, Dout- = 0V		Dout-, Dout+		-9.0	mA	1, 2, 3
Ioff	Power-off Leakage	Vout = 0V or 3.6V Vcc = 0V or Vcc = Open		Dout-, Dout+		±20	uA	1, 2, 3
Ioz	Output TRI-STATE Current	EN = 0.8V and EN* = 2.0V VOUT = 0V or VCC, VCC = 3.6V		Dout-, Dout+		±10	uA	1, 2, 3
Icc	No Load Drivers Enabled Supply Current	Din = Vcc or Gnd		Vcc		18	mA	1, 2, 3
Iccl	Loaded Drivers Enabled Supply Current	Rl = 100 ohms All Channels, Din = Vcc or Gnd (all inputs)		Vcc		35	mA	1, 2, 3
Iccz	Loaded or No Load Drivers Disabled Supply Current	Din = Vcc or Gnd, En = Gnd, En* = Vcc		Vcc		12	mA	1, 2, 3

## Electrical Characteristics

### AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
 AC: VCC = 3.0/3.3/3.6V, RL = 100 Ohms, CL = 20pF

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPHLD	Differential Propagation Delay High to Low				0.3	3.5	ns	9, 10, 11
tPLHD	Differential Propagation Delay Low to High				0.3	3.5	ns	9, 10, 11
tSKD	Differential Skew tPHLD-tPLHD					1.5	ns	9, 10, 11
tSK1	Channel to Channel Skew		2			1.75	ns	9, 10, 11
tSK2	Chip to Chip Skew		3			3.2	ns	9, 10, 11

Note 1: Tested during VOH/VOL tests.

Note 2: Channel to Channel Skew is defined as the difference between the propagation delay of one channel and that of the others on the same chip with any event on the inputs.

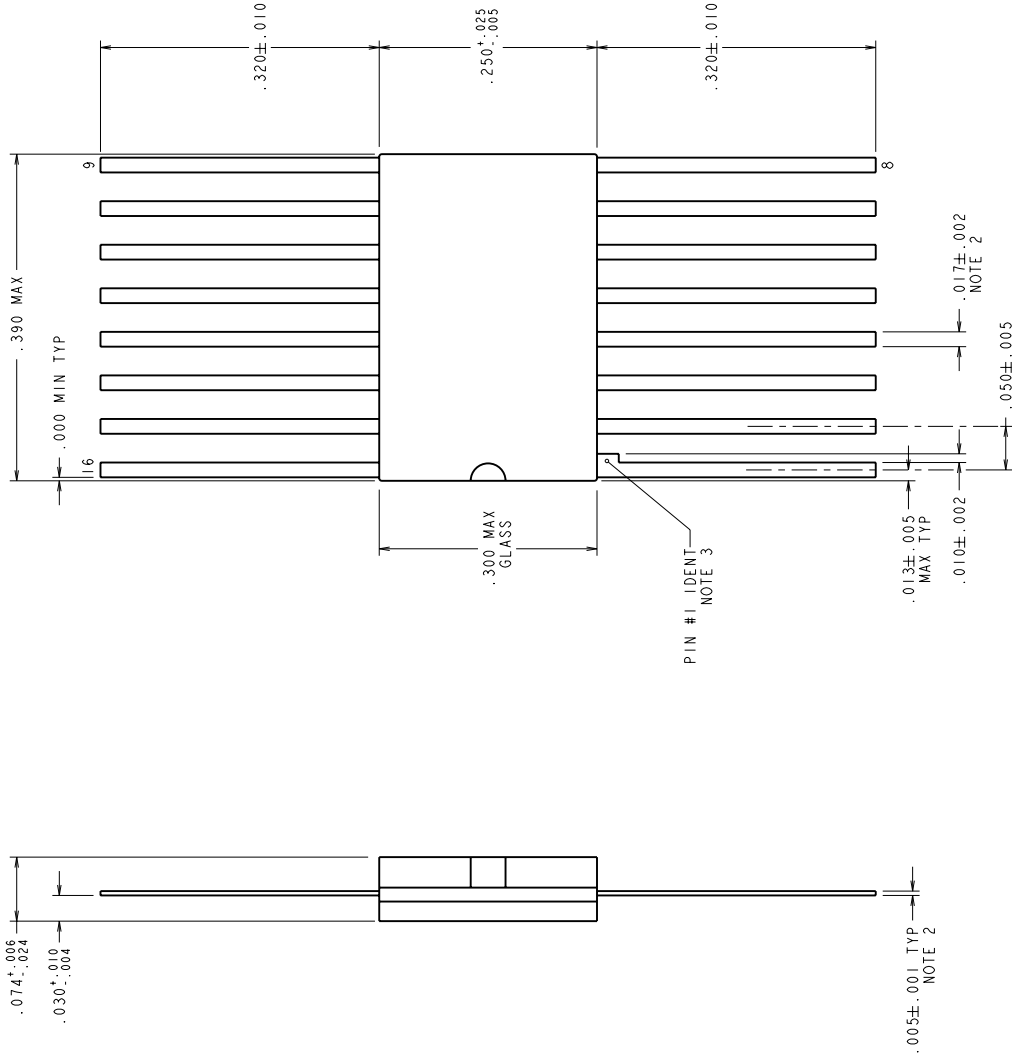
Note 3: Chip to Chip Skew is defined as the difference between the minimum and maximum specified differential propagation delays.

## Graphics and Diagrams

GRAPHICS#	DESCRIPTION
W16ARL	CERPACK (W), 16 LEAD (P/P DWG)
WG16ARC	CERAMIC SOIC (WG), 16 LEAD (P/P DWG)

See attached graphics following this page.

REVISIONS			
LTR	DESCRIPTION	E.C.N.	DATE
K	REVISE AND REDRAW PER NEW STANDARD.	10514	07/28/94
L	.017±.002 WAS .017±.020.	10656	10/21/94
			DEG/AEP
			DEG/



MIL/AERO  
CONFIGURATION CONTROL

MIL-M-38510  
CONFIGURATION CONTROL

APPROVALS	DATE	SCALE	SIZE	DRAWING NUMBER	REV
DRAWN <i>D. F. Grady</i>	07/28/94	N/A	C	MKT-W16A	L
DTG. CHK.		DO NOT SCALE DRAWING			
EMR. CHK.		SHEET 1 of 1			
<i>National Semiconductor</i> 2800 Semiconductor dr., Santa Clara, CA 95052-8090					
CERPACK, 16 LEAD					

NOTES: UNLESS OTHERWISE SPECIFIED.

1. LEAD FINISH: SOLDER DIPPED WITH Sn60 OR Sn63 SOLDER CONFORMING TO MIL-M-38510 TO A MINIMUM THICKNESS OF 200 MICRONS. SOLDER MAY BE APPLIED OVER LEAD BASIS METAL OR Sn PLATE.
2. MAXIMUM LIMIT MAY BE INCREASED BY .003 INCHES AFTER LEAD FINISH APPLIED.
3. LEAD IDENTIFICATION SHALL BE:
  - a) A NOTCH OR OTHER MARK WITHIN THIS AREA
  - b) A TAB ON LEAD 1, EITHER SIDE
4. REFERENCE JEDEC REGISTRATION M0-092, VARIATION AC, DATED 04/89.

REVISIONS			
LTR	DESCRIPTION	E.C.N.	DATE
A	RELEASE TO DOCUMENT CONTROL	11376	02/29/1996
B	LD PITCH TOL WAS ±.005; CHANGE LD RADIUS TO REF DIM; REMOVE THE OTHER R.006±.002; DIM. .040±.003 WAS .037±.003	11443	04/19/1996
C	R.015(0.38) WAS R.006(0.15)	11840	10/08/1997

APPROVALS	DATE	BY/APP'D
DRN: <i>MARYA SUCHY</i>	02/29/96	MS/KH
ENGR. CHK:		MS/KH
PROJECTION		
		
SCALE	SIZE	REV
N/A	C	C
DO NOT SCALE DRAWING		

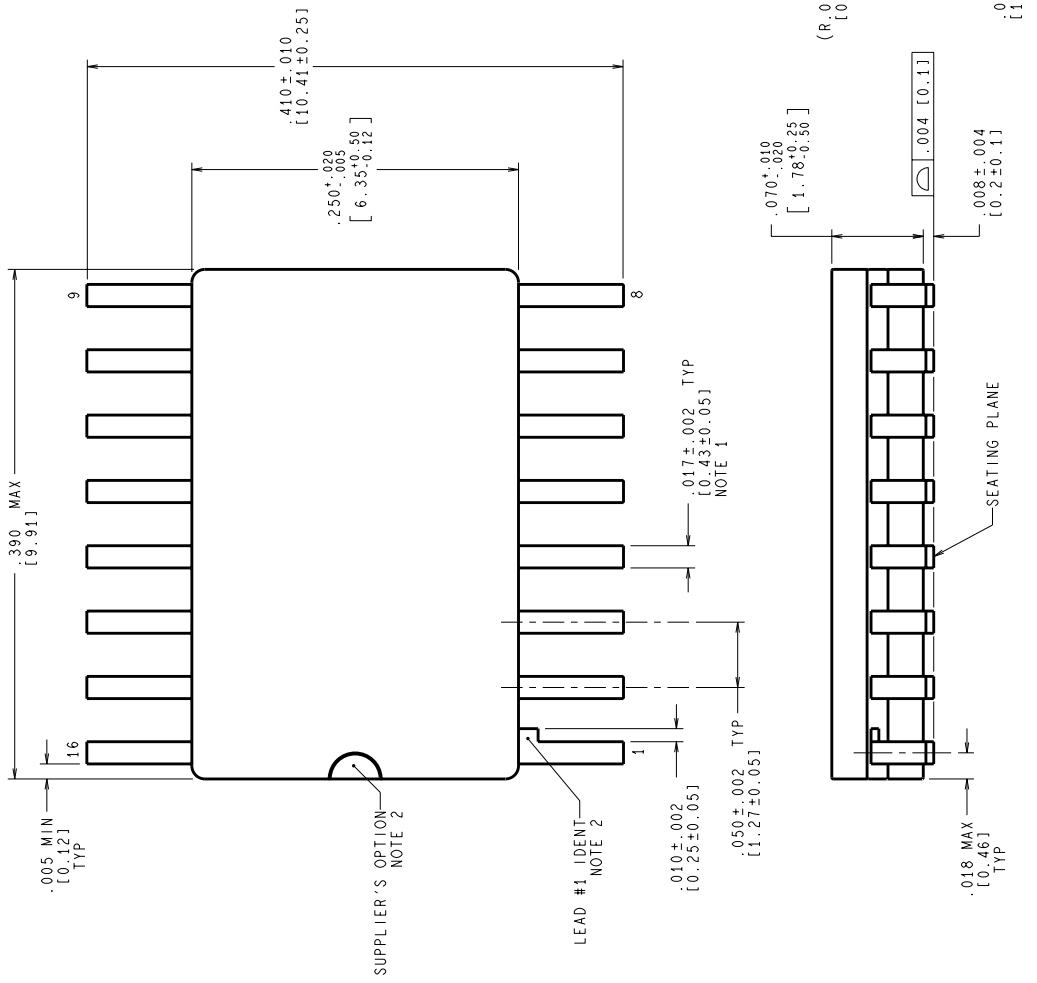
**MIL-PRF-38535  
CONFIGURATION CONTROL**

**National Semiconductor**  
2800 Semiconductor Dr., Santa Clara, CA 95052-8000

**CERPACK,  
16 LEAD,  
GULL WING**

SCALE: N/A C (SC) MKT-WG16A C  
DRAWING NUMBER: (SC) MKT-WG16A C

DO NOT SCALE DRAWING SHEET 1 of 1



CONTROLLING DIMENSION IS INCH  
VALUES IN | ARE MILLIMETERS

- NOTES: UNLESS OTHERWISE SPECIFIED
- LEAD FINISH: SOLDER DIPPED WITH Sn60 OR Sn63 SOLDER CONFORMING TO MIL-PRF-38535 TO A MINIMUM THICKNESS OF 200 MICRONS / 5.08 MICROMETERS. SOLDER MAY BE APPLIED OVER LEAD BASIS METAL OR Sn PLATE. MAXIMUM LIMIT MAY BE INCREASED BY .003 IN / 0.08mm AFTER LEAD FINISH APPLIED.
  - LEAD 1 IDENTIFICATION SHALL BE:
    - A NOTCH OR OTHER MARK WITHIN THIS AREA
    - A TAB ON LEAD 1, EITHER SIDE
  - NO JEDEC REGISTRATION AS OF FEBRUARY 1996.



**Revision History**

Rev	ECN #	Rel Date	Originator	Changes
0A0	M0003265	03/10/00	Mike Fitzgerald	Initial MDS Release
1A0	M0003630	08/16/02	Mike Fitzgerald	Added WG pkg NSID's, split out Pkg references under the "Absolute Maximum Ratings" section for Thermal Resistance, and Power Dissipation. Added WG pkg Marketing Outline Drawing.
1B0	M0004034	08/15/03	Rose Malone	Update MDS: MNDS90LV031A-X, Rev. 1A0 to MNDS90LV031A-X, Rev. 1B0. Added to Main Table NS Part Number DS90LV031AW-MLS. Moved reference to SMD number from Main Table to Features Section.
1C0	M0004183	08/15/03	Rose Malone	Update MDS: MNDS90LV031A-X, Rev. 1B0 to 1C0. MDS enhancements: Additional verbage to the general discription, Main Table and Added new bullet to the Features Section.