National Semiconductor

MILITARY DATA SHEET

MNDS26F31M-X REV 0A0

Original Creation Date: 01/24/96
Last Update Date: 09/26/96
Last Major Revision Date: 01/24/96

QUAD HIGH SPEED DIFFERENTIAL LINE DRIVER

General Description

The DS26F31 is a quad differential line driver designed for digital data transmission over balanced lines. The DS26F31 meets all the requirements of EIA Standard RS-422 and Federal Standard 1020. It is designed to provide unipolar differential driver to twisted-pair or parallel-wire transmission lines.

The DS26F31 offers improved performance due to the use of state-of-the-art L-FAST bipolar technology. The L-FAST technology allows for higher speeds and lower currents by utilizing extremely short gate delay times.

The circuit provides an enable and disable function common to all four drivers. The DS26F31M features TRI-STATE outputs and logical OR-ed complementary enable inputs. The inputs are all LS compatible and are all one unit load.

The DS26F31M offers optimum performance when used with the DS26F32 Quad Differential Line Receiver.

Industry Part Number

DS26F31

NS Part Numbers

DS26F31ME/883 *
DS26F31MJ/883 **
DS26F31MW-MLS
DS26F31MW/883 ***

Prime Die

M631

Controlling Document

7802302M2A*,MEA**,MFA***

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (^{O}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

- Military temperature range
- Operation from single +5.0V supply
- Outputs won't load line when Vcc = 0V
- Output short circuit protection
- Meets the requirements of EIA standard RS-422
- High output drive capability for 100 Ohms terminated transmission lines

(Absolute Maximum Ratings)

(Note 1)

Storage Temperature Range	-65 C to +175 C
Lead Temperature Soldering, 60 seconds	300 C
Supply Voltage	7.0V
Input Voltage	7.0V
Output Voltage	5.5V

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 devices should be operated at these limits. The tables of "Electrical Characteristics" provide conditions for actual device operation.

Recommended Operating Conditions

Temperature	-55 C to +125 C
Supply Voltage	4.5V to 5.5V

Electrical Characteristics

DC PARAMETERS

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vih	Logical "1" Input Voltage	Vcc = 4.5V	2		2		V	1, 2, 3
Vil	Logical "0" Input Voltage	Vcc = 5.5V	2			.8	V	1, 2, 3
Voh	Logical "1" Output Voltage	Vcc = 4.5V, Ioh = -20mA, Vil = .8V, Vih = 2V			2.5		V	1, 2, 3
Vol	Logical "0" Output Voltage	Vcc = 4.5V, Iol = 20mA, Vil = .8V, Vih = 2V				.5	V	1, 2, 3
Iih	Logical "1" Input Current	Vcc = 5.5V, Vin = 2.7V				20	uA	1, 2, 3
Iil	Logical "0" Input Current	Vcc = 5.5V, Vin = .4V				-200	uA	1, 2, 3
Ii	Input Reverse Current	Vcc = 5.5V, Vin = 7V				.1	mA	1, 2, 3
Ioz	TRI-STATE Output Current	Vcc = 5.5V, Vo = .5V				-20	uA	1, 2, 3
		Vcc = 5.5V, Vo = 2.5V				20	uA	1, 2, 3
Vi	Input Clamp Voltage	Vcc = 4.5V, Iin = -18mA				-1.5	V	1, 2, 3
Isc(min)	Output Short Circuit Current	Vcc = 5.5V, Vo = 0V			-30		mA	1, 2, 3
Isc(max)	Output Short Circuit Current	Vcc = 5.5V, Vo = 0V				-150	mA	1, 2, 3
Icc Dis	Power Supply Current	Vcc = 5.5V, Vin = .8V or 2V, Ven = .8V, $\overline{Ven}$ = 2V				50	mA	1, 2, 3
Icc En	Power Supply Current	Vcc = 5.5V, Ven = 2V, $\overline{Ven}$ = .8V				40	mA	1, 2, 3

Electrical Characteristics

AC PARAMETERS: PROPAGATION DELAY TIME:

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: Vcc = 5V, Cl = 50pF or equivalent impedance provided by diode load

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPLH	Input to Output		3			16	nS	9
			3			24	nS	10, 11
		Cl = 30pF	4			15	nS	9
			4			23	nS	10, 11
tPHL	Input to Output		3			17	nS	9
			3			25	nS	10, 11
		Cl = 30pF	4			15	nS	9
			4			23	nS	10, 11
tLZ	Disable Time		3			38	nS	9
			3			56	nS	10, 11
		CL = 10 pF	4			35	nS	9
			4			53	nS	10, 11
tHZ	Disable Time		3			23	nS	9
			3			30	nS	10, 11
		CL = 10 pF	4			20	nS	9
			4			27	nS	10, 11
tZL	Enable Time		3			28	nS	9
			3			40	nS	10, 11
		CL = 30pF	4			25	nS	9
			4			37	nS	10, 11
tZH	Enable Time		3			32	nS	9
			3			52	nS	10, 11
		CL = 30 pF	4			30	nS	9
			4			50	nS	10, 11
Skew	Output to Output		3			6	nS	9
			3			9	nS	10, 11
		Cl = 30pF	4			4.5	nS	9
			4			7	nS	10, 11

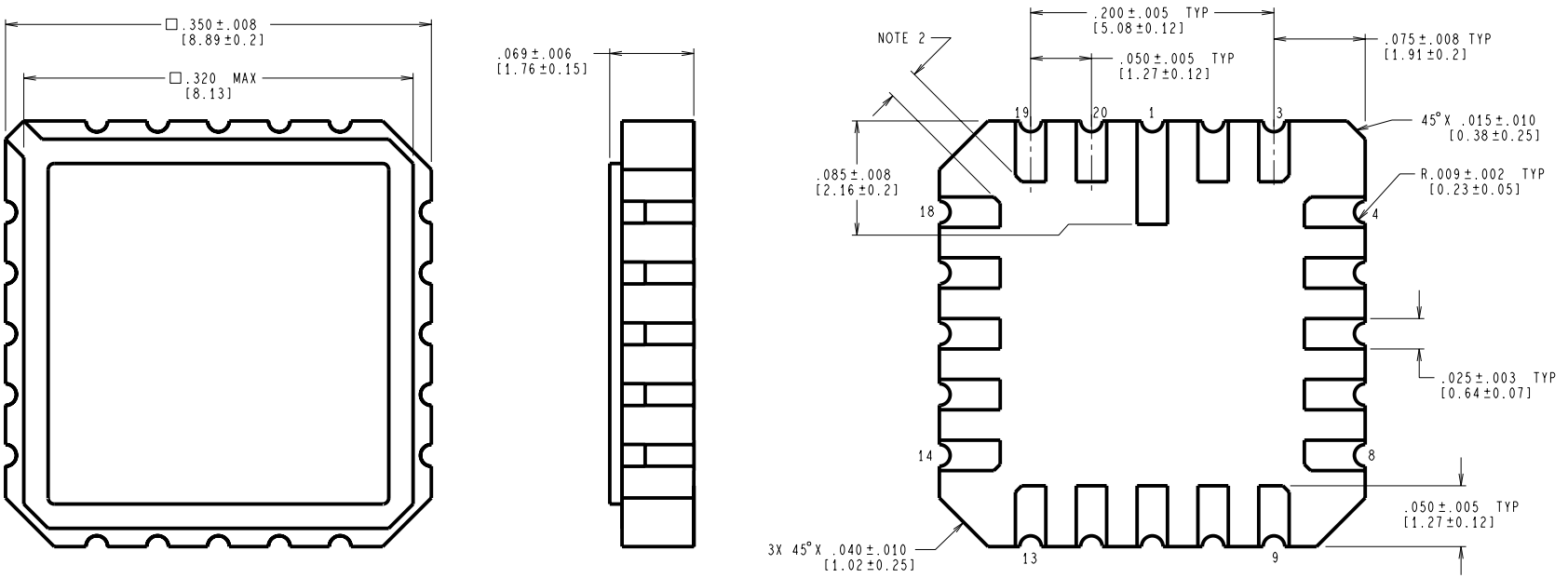
Note 1: Power dissipation must be externally controlled at elevated temperatures.
Note 2: Parameter tested go-no-go only.
Note 3: Tested at 50pF, system capacitance exceed 10 and 30pF.
Note 4: Testing at 50pF guarantees limits at 10 and 30pF.

Graphics and Diagrams

GRAPHICS#	DESCRIPTION
E20ARE	LDLESS CHIP CARRIER, TYPE C 20 TERMINAL(P/P DWG)
J16ARL	CERDIP (J), 16 LEAD (P/P DWG)
W16ARL	CERPAC (W), 16 LEAD (P/P DWG)

See attached graphics following this page.

REVISIONS				
LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
E	REVISE AND REDRAW.	10005	02/10/94	DEG/



NOTES: UNLESS OTHERWISE SPECIFIED.

1. LEAD FINISH TO BE ONE OF THE FOLLOWING:

   a. 50 MICROINCHES/12.7 MICROMETERS MINIMUM GOLD PLATING OVER 50-350 MICROINCHES/1.27-8.89 MICROMETERS NICKEL.

   b. SOLDER DIP.
   SOLDER THICKNESS PER LATEST REVISION OF MIL-STD-1835.

2. CORNER PADS MAY HAVE A 45°X.020IN/0.51mm MAXIMUM CHAMFER TO ACCOMPLISH THE .015IN/0.38mm DIMENSION.

4. REFERENCE JEDEC REGISTRATION MS-004, VARIATION CB, DATED 7/90.

CONTROLLING DIMENSION IS INCH
VALUES IN [ ] ARE MILLIMETERS

MIL/AERO
CONFIGURATION CONTROL

APPROVALS	DATE
DRAWN: Dwayne Grady	02/10/94
DFTG. CHK.	
ENGR. CHK.	
APPROVAL	

PROJECTION
INCH
[MM]

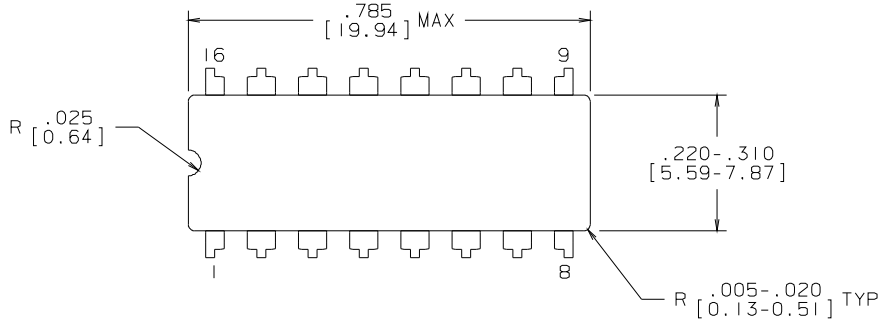
NATIONAL SEMICONDUCTOR CORPORATION
2900 Semiconductor Drive, Santa Clara, CA 95052-8090

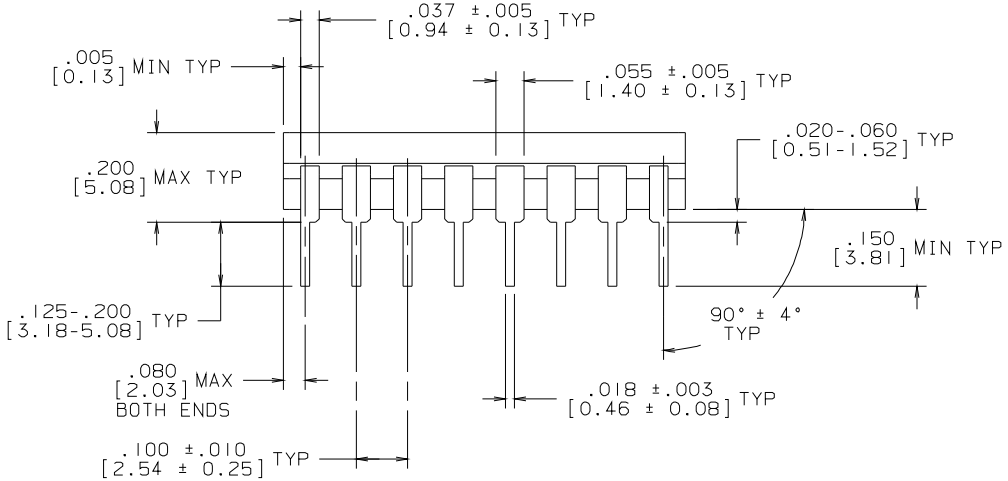
LEADLESS CHIP CARRIER, TYPE C, 20 TERMINAL

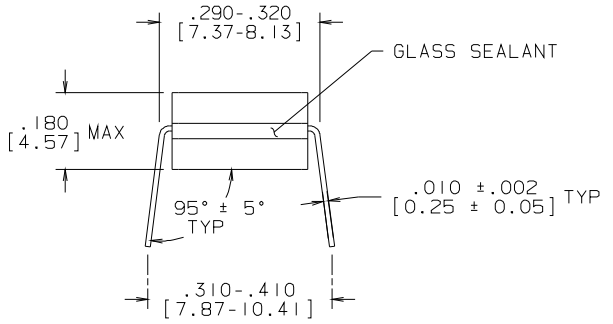
SCALE	SIZE	DRAWING NUMBER	REV
N/A	C	MKT-E20A	E

DO NOT SCALE DRAWING | SHEET 1 of 1

REVISIONS				
LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
L	REVISE PER CURRENT STD; REDRAW	09996	09/15/93	TL/







MIL/AERO CONFIGURATION CONTROL

MIL-M-38510 CONFIGURATION CONTROL

NOTES: UNLESS OTHERWISE SPECIFIED

1. LEAD FINISH TO BE 200 MICROINCHES / 5.08 MICROMETERS MINIMUM SOLDER MEASURED AT THE CREST OF THE MAJOR FLATS.
2. JEDEC REGISTRATION MO-036, VARIATION AD, DATED 04/1981.

CONTROLLING DIMENSION: INCH

APPROVALS	DATE
DRAWN T. LEQUANG	09/15/93
DFTG. CHK.	
ENGR. CHK.	
APPROVAL	

PROJECTION

INCH
[MM]

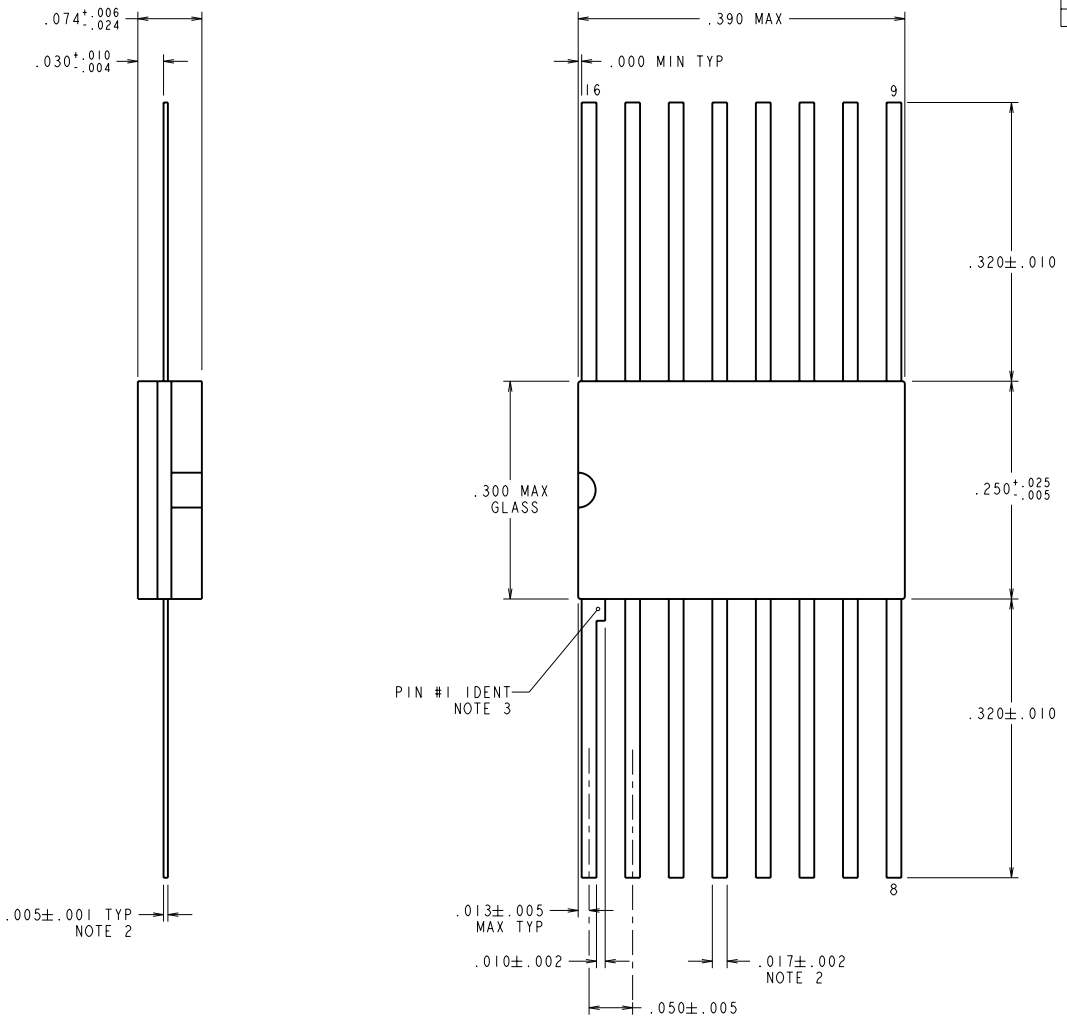
NATIONAL SEMICONDUCTOR CORPORATION
2900 Semiconductor Drive, Santa Clara, CA 95052-8090

CERDIP (J), 16 LEAD

SCALE	SIZE	DRAWING NUMBER	REV
N/A	B	MKT-J16A	L

DO NOT SCALE DRAWING | SHEET 1 OF 1

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



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 MICROINCHES. 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 1 IDENTIFICATION SHALL BE:
   a) A NOTCH OR OTHER MARK WITHIN THIS AREA
   b) A TAB ON LEAD 1, EITHER SIDE
4. REFERENCE JEDEC REGISTRATION MO-092, VARIATION AC, DATED 04/89.

MIL/AERO CONFIGURATION CONTROL

MIL-M-38510 CONFIGURATION CONTROL

APPROVALS	DATE
DRAWN D.E.Grady	07/28/94
DFTG. CHK.	
ENGR. CHK.	

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2900 Semiconductor dr, Santa Clara, CA 95052-8090

CERPACK, 16 LEAD

PROJECTION

INCH [MM]

SCALE	SIZE	DRAWING NUMBER	REV
N/A	C	MKT-W16A	L

DO NOT SCALE DRAWING | SHEET 1 of 1