

MNDS96F174M-X REV 1B0

 Original Creation Date: 06/19/95
 Last Update Date: 10/23/01
 Last Major Revision Date: 06/19/95

RS-485 COMPARABLE QUAD DIFFERENTIAL DRIVER
General Description

The DS96F174 is a high speed quad differential line driver designed to meet EIA Standard RS-485. The DS96F174 offers improved performance due to the use of new, 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. Thus, the DS96F174 features lower power, extended temperature range, improved RS-485 specifications.

The DS96F174 has wide positive and negative common mode range for multipoint applications in noisy environments. Positive and negative current-limiting is provided to protect the driver from line fault conditions over a +12V to -7V common mode range. The DS96F174 features separate active high Enables for each driver pair.

Industry Part Number

DS96F174

NS Part Numbers

 DS96F174ME/883
 DS96F174MJ-QMLV
 DS96F174MJ/883
 DS96F174MW/883

Prime Die

DS96M174

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

CONTROLLING DOCUMENTS:

DS96F174MJ/883	5962-9076502MEA
DS96F174MJ-QMLV	5962-9076502VEA

(Absolute Maximum Ratings)

Supply Voltage	7.0V
Enable Input Voltage	5.5V
Maximum Power Dissipation at 25 C (Note 1, 2, 3)	
E pkg	2000mW
J pkg	1800mW
W pkg	1000mW
Storage Temperature Range	-65 C to + 175 C
Lead Temperature Ceramic Dip (Soldering, 60 sec.)	300 C

Note 1: Derate W Pkg 7.1 mW/C above 25C.
 Note 2: Derate E Pkg 13.3 mW/C above 25C.
 Note 3: Derate J Pkg 12.5 mW/C above 25C.

Recommended Operating Conditions

Output Current Low (Iol)	60mA
Output Current High (Ioh)	-60mA
Supply Voltage (Vcc)	Min=4.50V Typ=5.0V, Max=5.5V
Common Mode Output Voltage (Voc)	Min=-7.0V, Max=+12.0V
Operating Temperature (Ta)	Min=-55, Typ=+25, Max=+125c

Electrical Characteristics

(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: VCC = 5.5V

AC: VCC = 5.0V

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS	
VIL	Logical 0 Input Voltage					.8	V	1	
						.7	V	2, 3	
VIH	Logical 1 Input Voltage				2		V	1, 2, 3	
VIC	Input Clamp Voltage	I = -18mA			-1.5		V	1, 2, 3	
VOD1	Differential Output Voltage	IO = 0mA				6	V	1, 2, 3	
VOD2 (1)	Differential Output Voltage	VCC = 4.5V, RL = 54 ohms				1.5	V	1, 2	
						1.2	V	3	
VOD2 (2)	Differential Output Voltage	VCC = 4.5V, RL = 100 ohms			2.0		V	1, 2, 3	
Delta VOD (1)	Change In Magnitude of (VOD2)	VCC = 4.5V, RL = 54 ohms				-200	200	mV	1, 2
						-400	400	mV	3
Delta VOD (2)	Change In Magnitude of (VOD2)	VCC = 4.5V, RL = 100 ohms				-200	200	mV	1, 2
						-400	400	mV	3
VOC (1)	Common Mode Output Voltage	RL = 54 ohms				3	V	1, 2, 3	
VOC (2)	Common Mode Output Voltage	RL = 100 ohms				3	V	1, 2, 3	
Delta VOC (1)	Change in Magnitude of VOC	VCC = 4.5V, RL = 54 ohms			-200	200	mV	1, 2, 3	
Delta VOC (2)	Change in Magnitude of VOC	VCC = 4.5V, RL = 100 ohms			-200	200	mV	1, 2, 3	
IO	Output Current With Power Off	VCC = 0V, VO = -7V to 12V			-50	50	uA	1, 2, 3	
IOZ	High Impedance State Output Current	VO = -7V to 12V			-50	50	uA	1, 2, 3	
IIH	Logical 1 Input Current	VI = 2.4V				20	uA	1, 2, 3	
IIL	Logical 0 Input Current	VI = 0.4V			-50		uA	1, 2, 3	
ICC	Supply Current	Outputs Enabled				50	mA	1, 2, 3	
ICCX	Supply Current	Outputs Disabled				30	mA	1, 2, 3	

Electrical Characteristics

(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: VCC = 5.5V
AC: VCC = 5.0V

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IOS (1)	Short Circuit Output Current	VO = -7V	2		-250		mA	1, 2, 3
IOS (2)	Short Circuit Output Current	VO = 0V	2		-150		mA	1, 2, 3
IOS (3)	Short Circuit Output Current	VO = VCC	2			150	mA	1, 2, 3
IOS (4)	Short Circuit Output Current	VO = 12V	2			250	mA	1, 2, 3
tPLH	Propagation Delay Lo to Hi level	RL = 27 ohms, CL = 15pF				25	ns	10, 11
						16	ns	9
tPHL	Propagation Delay Hi to Low Level	RL = 27 ohms, CL = 15pF				25	ns	10, 11
						16	ns	9
SKEW	Output to Output Delay Time	RL = 60 ohms				10	ns	10, 11
						4	ns	9
tLZ	Output Disable Time From Low Level	RL = 110 ohms, CL = 50pF				40	ns	10, 11
						25	ns	9
tHZ	Output Disable Time From High Level	RL = 110 ohms, CL = 50pF				80	ns	10, 11
						30	ns	9
tZL	Output Enable Time to Low Level	RL = 110 ohms, CL = 50pF				100	ns	10, 11
						40	ns	9
tZH	Output Enable Time to High Level	RL = 110 ohms, CL = 50pF				40	ns	10, 11
						32	ns	9
tDD	Differential Output Delay Time	RL = 60 ohms, CL = 15pF				30	ns	10, 11
						22	ns	9
tTD	Differential Output Transition Time	RL = 60 ohms, CL = 15pF				40	ns	10, 11
						22	ns	9

Note 1: -55 C limit exceeds EIA standard RS-485 specification.

Note 2: .2uF cap is connected between the output and GND to reduce oscillation.

Graphics and Diagrams

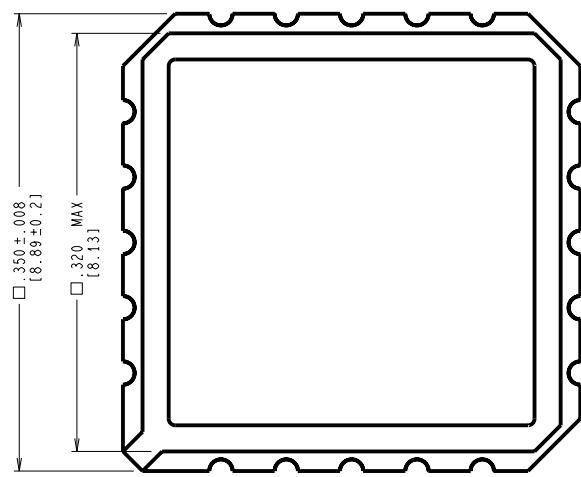
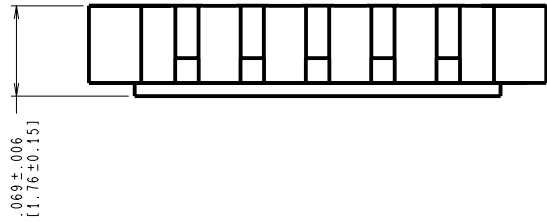
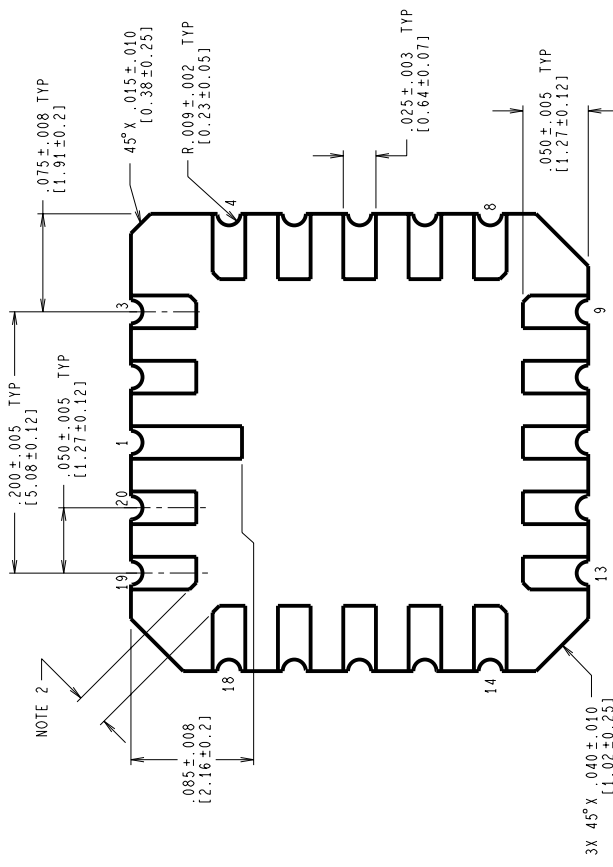
GRAPHICS#	DESCRIPTION
E20ARE	LCC (E), TYPE C, 20 TERMINAL(P/P DWG)
J16ARL	CERDIP (J), 16 LEAD (P/P DWG)
W16ARL	CERPACK (W), 16 LEAD (P/P DWG)

See attached graphics following this page.

SE
L1
LE
BO

REVISIONS

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



CONTROLLING DIMENSION IS INCH
VALUES IN [] ARE MILLIMETERS

NOTES: UNLESS OTHERWISE SPECIFIED.

- LEAD FINISH TO BE ONE OF THE FOLLOWING:
 - 50 MICRONS/12.7 MICROMETERS MINIMUM GOLD PLATING OVER 50-350 MICRONS/1.27-8.89 MICROMETERS NICKEL.
 - SOLDER DIP. SOLDER THICKNESS PER LATEST REVISION OF MIL-STD-1835.
- CORNER PADS MAY HAVE A $45^\circ \times 0.020$ IN/0.51mm MAXIMUM CHAMFER TO ACCOMPLISH THE .015 IN/0.38mm DIMENSION.
- REFERENCE JEDEC REGISTRATION MS-004, VARIATION CB, DATED 7/90.

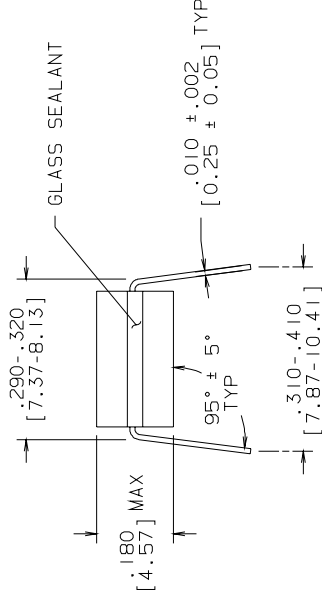
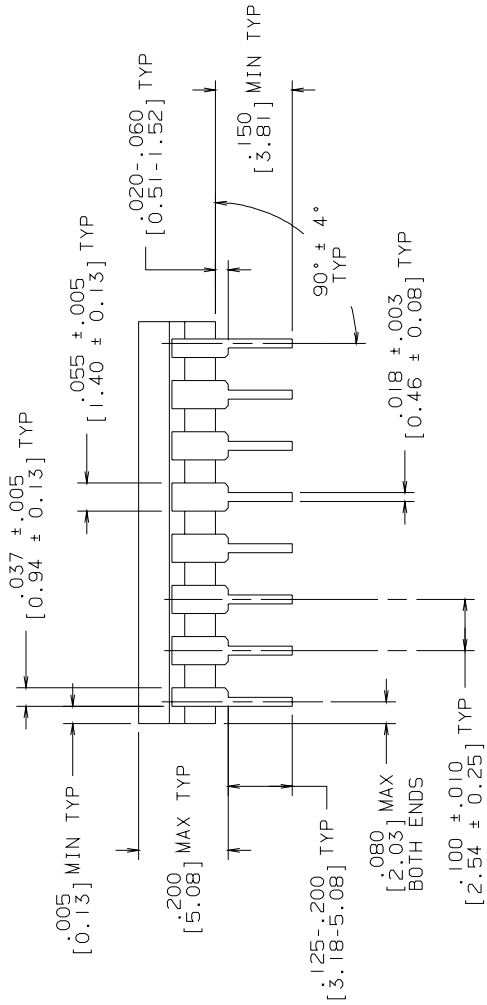
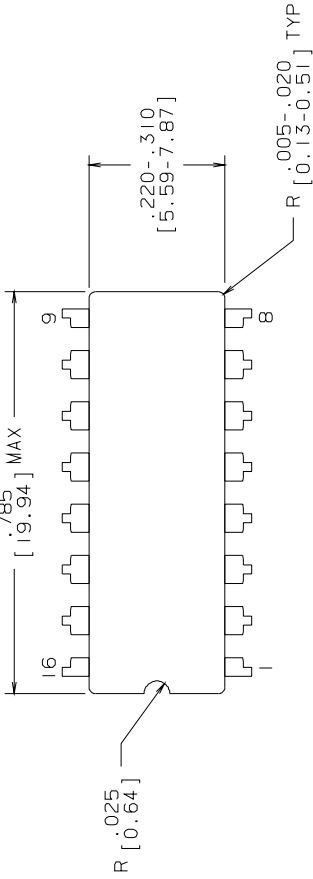
MIL/AERO
CONFIGURATION CONTROL

APPROVALS		DATE
DRN	<i>Deayne Gedy</i>	02/10/94
DFTG - CHK.		
ENGR - CHK.		
APPROVAL		

		NATIONAL SEMICONDUCTOR CORPORATION 2300 Semiconductor Drive, Santa Clara, CA 95052-8000	
LEADLESS CHIP CARRIER, TYPE C, 20 TERMINAL			
SCALE	SIZE	DRAWING NUMBER	REV.
N/A	C	MKT-E20A	E

PROJECTION	
DO NOT SCALE DRAWING	

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



MILIAERO CONFIGURATION CONTROL MIL-M-38510
 CONFIGURATION CONTROL CONFIGURATION CONTROL

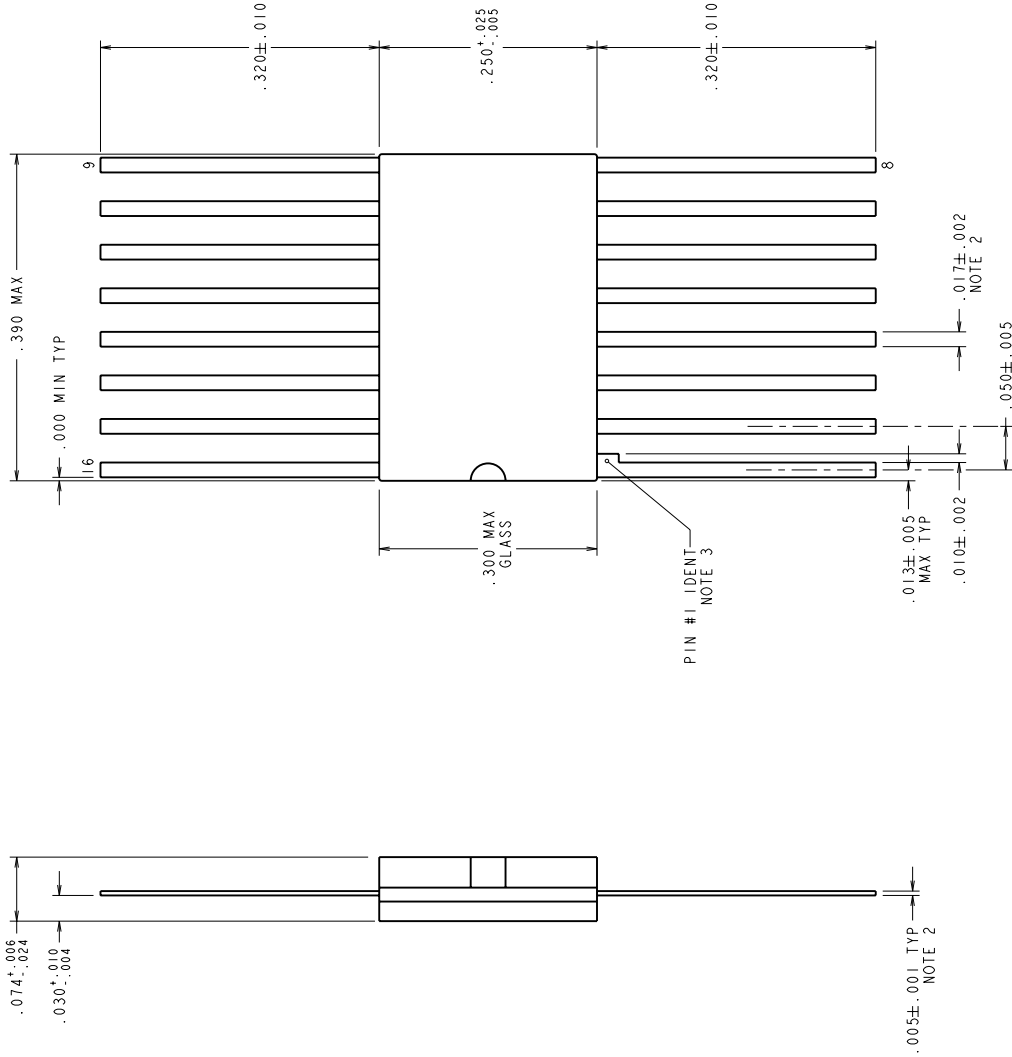
CONTROLLING DIMENSION: INCH	
APPROVALS	DATE
DRAWN T. LEQUANG	09/15/93
DFTG. CHK.	
ENGR. CHK.	
APPROVAL	
PROJECTION 	
SCALE N/A	SIZE B
DO NOT SCALE DRAWING	DRAWING NUMBER MKT-J16A
	REV L
	SHEET 1 OF 1

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

CERDIP (J),
 16 LEAD

- NOTES: UNLESS OTHERWISE SPECIFIED
- LEAD FINISH TO BE 200 MICROMETERS / 5.08 MICROMETERS MINIMUM SOLDER MEASURED AT THE CREST OF THE MAJOR FLATS.
 - JEDEC REGISTRATION MO-036, VARIATION AD, DATED 04/1981.

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



NOTES: UNLESS OTHERWISE SPECIFIED.

- 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.
- MAXIMUM LIMIT MAY BE INCREASED BY .003 INCHES AFTER LEAD FINISH APPLIED.
- LEAD 1 IDENTIFICATION SHALL BE:
 - A NOTCH OR OTHER MARK WITHIN THIS AREA
 - A TAB ON LEAD 1, EITHER SIDE
- REFERENCE JEDEC REGISTRATION M0-092, VARIATION AC, DATED 04/89.

MIL/AERO
CONFIGURATION CONTROL

MIL-M-38510
CONFIGURATION CONTROL

APPROVALS	DATE
DRWN: <i>D. F. Grady</i>	07/28/94
DTG. CHK.	
ENGR. CHK.	

PROJECTION	
	FIRST ANGLE

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

DO NOT SCALE DRAWING SHEET 1 of 1

National Semiconductor
2800 Semiconductor dr., Santa Clara, CA 95052-8090

CERPACK, 16 LEAD

Revision History

Rev	ECN #	Rel Date	Originator	Changes
1B0	M0003934	10/23/01	Rose Malone	Update MDS: MNDS96F174M-X, Rev. 1A0 to 1B0. Add DS96F174MJ-QMLV and SMD number reference to Main Table and Features Section, also add Marketing Dwg's. to Graphics Section.