



MICROCIRCUIT DATA SHEET

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

Prime Die

DS96M174

NS Part Numbers

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

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
							-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
							-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.

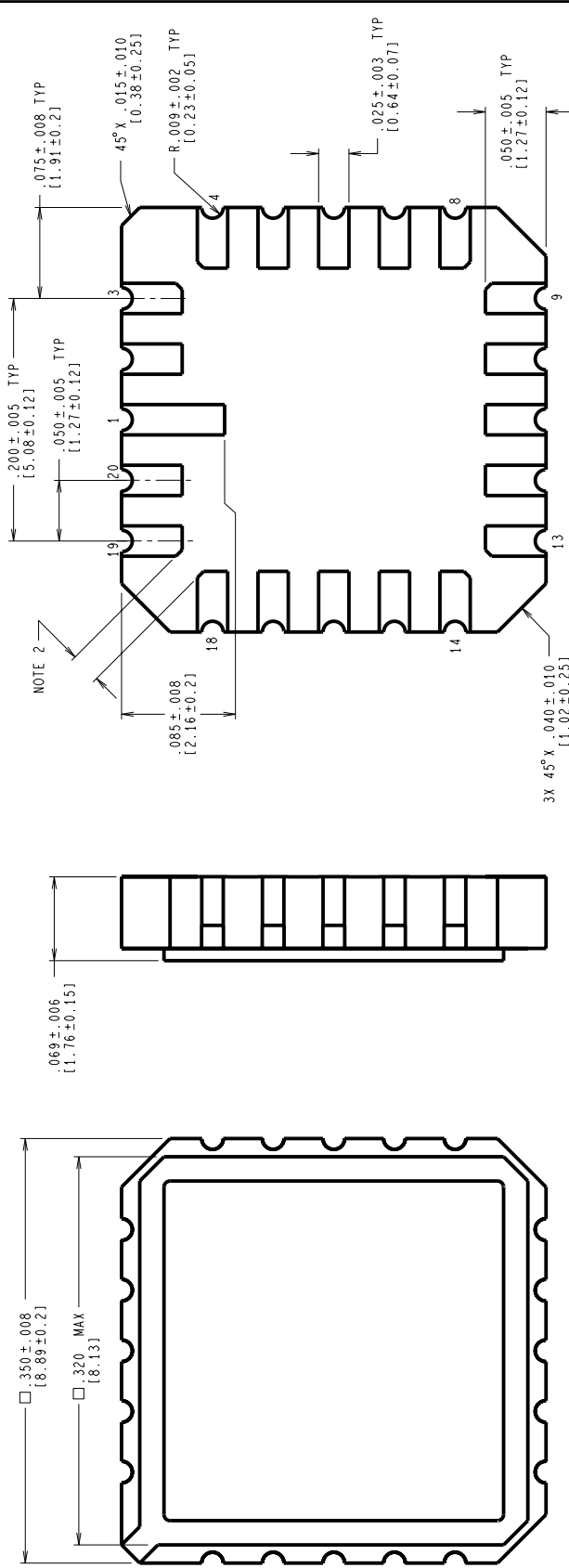
Note 2: .2uF cap is connected between the output and GND to reduce oscilation.

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.

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



CONTROLLING DIMENSION IS INCH
VALUES IN [] ARE MILLIMETERS

NOTES: UNLESS OTHERWISE SPECIFIED.

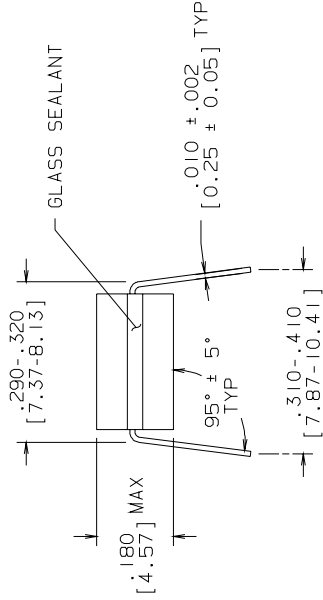
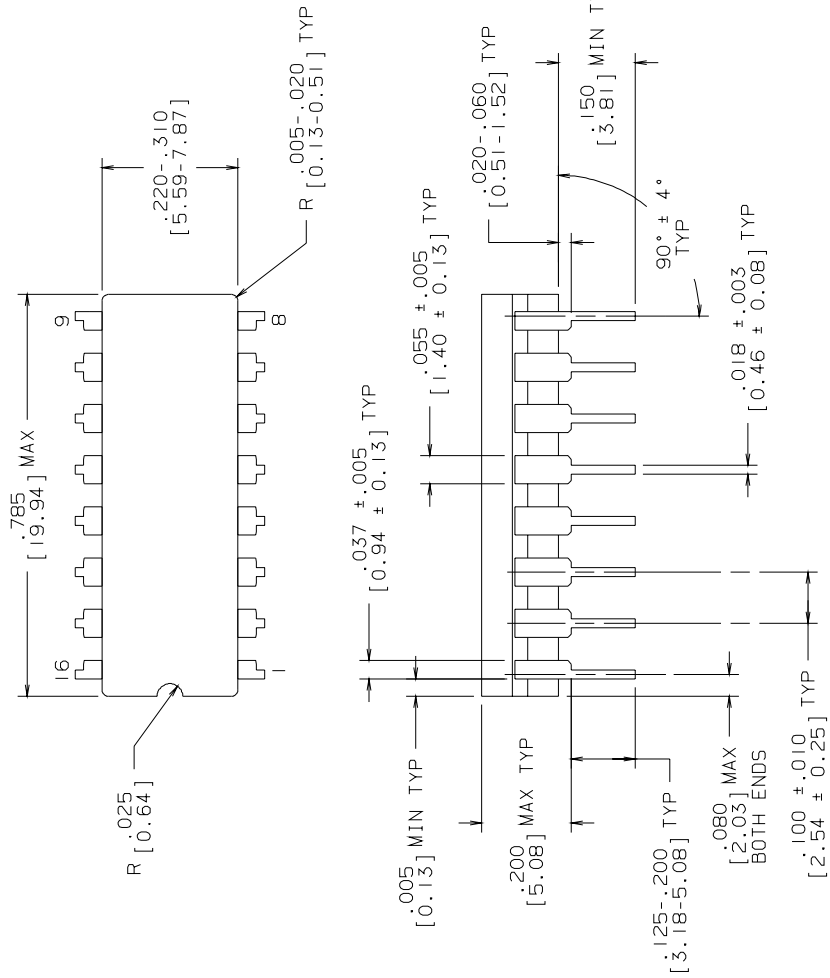
- LEAD FINISH TO BE ONE OF THE FOLLOWING:
 - 50 MICRONS/12.7 MICROMETERS MINIMUM GOLD PLATING OVER 50-350 MICRONS/1.27-8.89 MICROMETERS NICKEL.
 - SOLDER DIP.
 - SOLDER THICKNESS PER LATEST REVISION OF MIL-STD-1835.
 - CORNER PADS MAY HAVE A 45° X .020 IN/0.51mm MAXIMUM CHAMFER TO ACCOMPLISH THE .015 IN/0.38mm DIMENSION.
 - REFERENCE JEDEC REGISTRATION MS-004, VARIATION CB, DATED 7/90.

MIL/AERO CONFIGURATION CONTROL	
APPROVALS DRAWN: <i>Wayne Grady</i> DATE: 02/10/94 CHECKED: _____ APPROVAL: _____	NATIONAL SEMICONDUCTOR CORPORATION 2900 Semiconductor Dr. Irv., Santa Clara, CA 95052-8090 LEADLESS CHIP CARRIER, TYPE C, 20 TERMINAL SCALE: N/A C DRAWING NUMBER: MKT-E20A REV: E DO NOT SCALE DRAWING SHEET 1 of 1

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REVISIONS

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



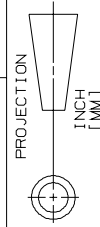
MIL/AERO CONFIGURATION CONTROL MIL-M-38510
 CONFIGURATION CONTROL CONFIGURATION CONTROL

CONTROLLING DIMENSION: INCH

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

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

CERDIP (J),
 16 LEAD

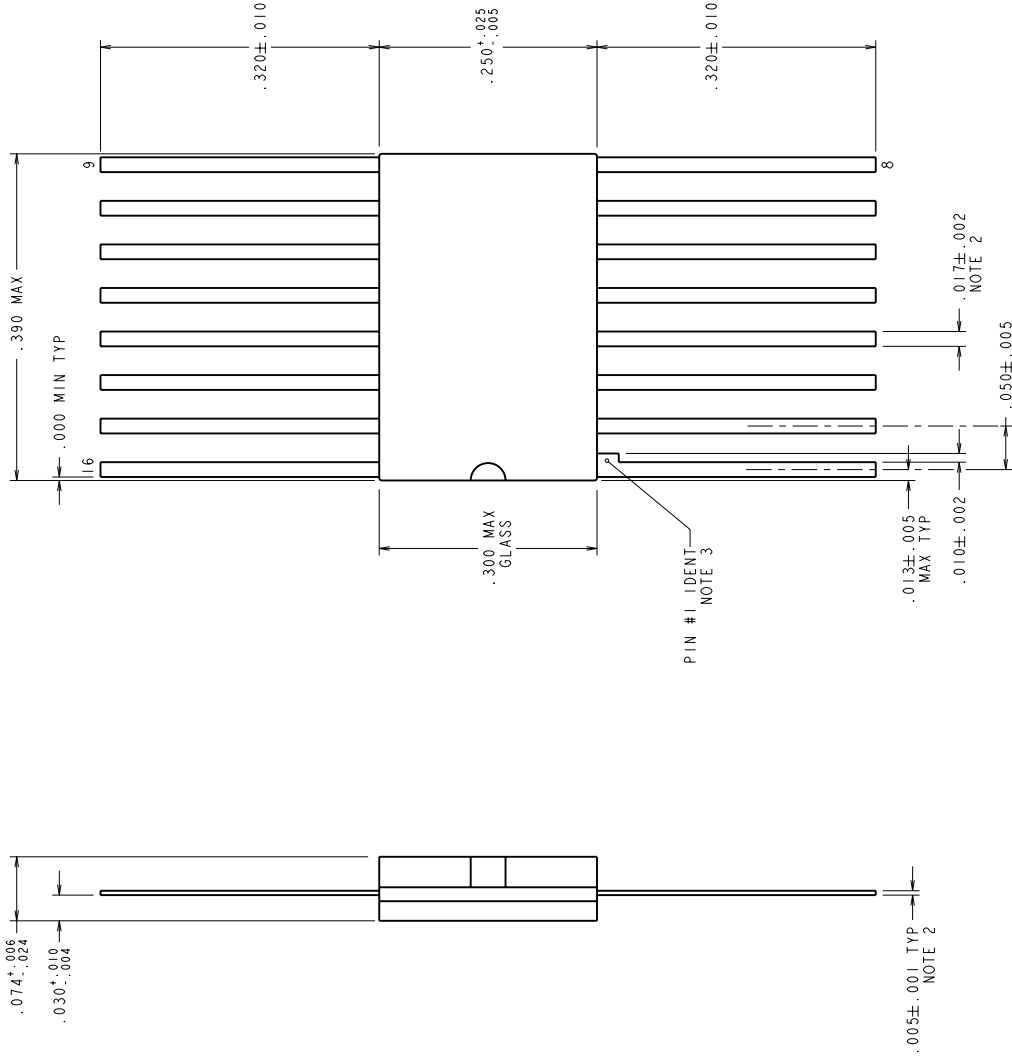


SCALE	SIZE	DRAWING NUMBER	REV
N/A	B	MKT-J16A	L
DO NOT SCALE DRAWING	SHEET	1	OF 1

- NOTES: UNLESS OTHERWISE SPECIFIED
- LEAD FINISH TO BE 200 MICRONS / 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	BY/APP'D
K	REVISE AND REDRAW PER NEW STANDARD. .017±.002 WAS .017±.020.	10514	07/28/94	DEG/AEP
L		10656	10/21/94	DEG/



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 LEAD LENGTH MAY BE INCREASED BY .003 INCHES AFTER LEAD FINISH APPLIED.
- LEAD 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 04/789.

APPROVALS	DATE
DRAWN <i>D.F. Brady</i>	07/28/94
DTLG. CHK.	
ENGR. CHK.	

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

PROJECTION	DO NOT SCALE DRAWING	SHEET 1 of 1

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.