National Semiconductor

MICROCIRCUIT DATA SHEET

MNDS7820A-X REV 0A0

Original Creation Date: 01/18/96
Last Update Date: 09/08/99
Last Major Revision Date:

DUAL LINE RECEIVER

General Description

The DS7820A is a improved performance digital line receiver with two completely independent units fabricated on a single silicon chip. Intended for use with digital systems connected by twisted pair lines, it has a differential input designed to reject large common mode signals while responding to small differential signals. The output is directly compatible with TTL or LS integrated circuits.

The response time can be controlled with an external capacitor to eliminate noise spikes, and the output state is determined for open inputs. Termination resistors for the twisted pair line are also included in the circuit. The DS7820 is specified, worst case, over it's full operating temperature range, for $\pm$ 10-percent supply voltage variations and over the entire input voltage range.

Industry Part Number

DS7820A

NS Part Numbers

DS7820AJ/883
DS7820AW-MLS

Prime Die

DS7820

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

- Operation from a single + 5V logic supply
- Input voltage range of ±15V
- Strobe low forces output to "1" state
- High input resistance
- Fanout of ten with TTL integrated circuits
- Outputs can be wire OR'ed
- Series 54/74 compatible

(Absolute Maximum Ratings)
(Note 1)

Supply Voltage	8.0V
Common-Mode Voltage	± 20V
Differential Input Voltage	± 20V
Strobe Voltage	8.0V
Output Sink Current	50 mA
Storage Temperature Range	-65 C to +150 C
Lead Temperature (Soldering, 4 seconds)	260 C

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

Recommended Operating Conditions

Supply Voltage (Vcc)	4.5V to 5.5V
Temperature (TA)	-55 C to +125 C

Electrical Characteristics

DC PARAMETER

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: Vcc = 5V

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Voh	Logical "1" Output Voltage	Vcc=4.5V, In-=0V, In+=1V, Strobe=4.5V, Iout=-400uA			2.5	5.5	V	1, 2, 3
Vol	Logical "0" Output Voltage	Vcc=4.5V, In-=1V, In+=0V, Strobe=4.5V, Iout=16mA				0.4	V	1, 2, 3
Iil (str)	Strobe Input Current	Vcc=5.5V, In-=3V, In+=0V, Strobe=0.4V				-1.4	mA	1, 2, 3
Iih (str)	Strobe Input Current	Vcc=4.5V, In-=0V, In+=+3V, Strobe=5.5V				5	uA	1, 2, 3
Iin+	Non-Inverting Input Current	Vcc=4.5V, In-=15V, In+=15V, Strobe=0V				7	mA	1, 2, 3
		Vcc=5.5V, In-=0V, In+=0V, Strobe=0V				-1.6	mA	1, 2, 3
		Vcc=5.5V, In-=-15V, In+=-15V, Strobe=0V				-9.8	mA	1, 2, 3
Iin-	Inverting Input Current	Vcc=4.5V, In-=15V, In+=15V, Strobe=0V				4.2	mA	1, 2, 3
		Vcc=5.5V, In-=0V, In+=0V, Strobe=5.5V				-0.5	mA	1, 2, 3
		Vcc=5.5V, In-=-15V, In+=-15V, Strobe=5.5V				-4.2	mA	1, 2, 3
Ios	Short Circuit Current	Vcc=5.5V, In-=0V, In+=3V, Strobe=0V, Vout=0V	2		-2.8	-6.7	mA	1, 2, 3
Icc	Power Supply Current (Total of Both Receivers)	Vcc=5.5V, In-=15.5V, In+=14.5V, Strobe=5V				12	mA	1, 2, 3
		Vcc=5.5V, In-=-14.5V, In+=-15.5V, Strobe=5V				28	mA	1, 2, 3
		Vcc=5.5V, In-=0.5V, In+=0V, Strobe=5V				20.4	mA	1, 2, 3
Rterm	Line Termination Resistance	Vcc=5V, In+= 0V, Iterm=1mA, (1mV=1 Ohm)			120	250	Ohm	1, 2, 3
Rin+	Non-Inverting Input Resistance	Vcc=5V, 1mA $\leq$ Iin+ $\leq$ 2mA, Iin-=0V			1.8		KOhm	1, 2, 3
Rin-	Inverting Input Resistance	Vcc=5V, 1mA $\leq$ Iin- $\leq$ 2mA, Iin+=0V			3.6		KOhm	1, 2, 3
Vsh	Strobe Input Voltage	Vcc=5.5V, Iout=+16mA, Vout $\leq$0.4V	1		2.1		V	1, 2, 3
Vsl	Strobe Input Voltage	Vcc=5.5V, Iout =-400uA, Vout $\geq$ 2.5V	1			0.9	V	1, 2, 3

Electrical Characteristics

DC PARAMETER(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: Vcc = 5V

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vth	Differential Threshold Voltage	Vcm=±3V, Vout ≥ 2.5V, Iout = -400uA	1			0.5	V	1, 2, 3
		Vcm=±3V, Vout ≤ 0.4V, Iout = 16mA	1			-0.5	V	1, 2, 3
		Vcm=±15V, Vout ≥ 2.5V, Iout = -400uA	1			1	V	1, 2, 3
		Vcm=±15V, Vout ≤ 0.4V, Iout = 16mA	1			-1	V	1, 2, 3

AC Parameters: PROPAGATION DELAY

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: Vcc = 5V

tPHL	From Differential Input					45	nS	9
tPLH	From Differential Input					40	nS	9
tPHL	From Strobe Input					25	nS	9
tPLH	From Strobe Input					30	nS	9

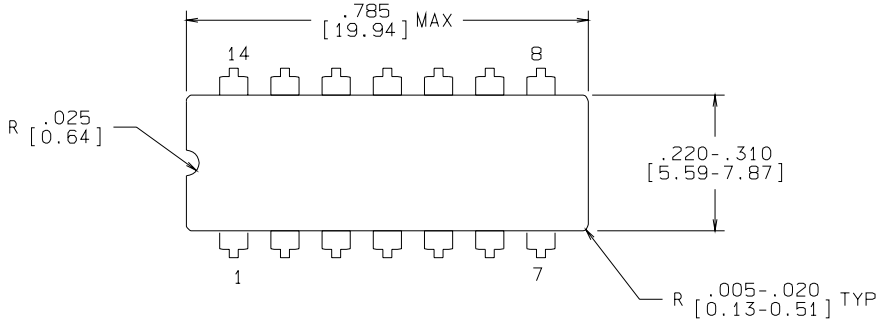
Note 1: Parameter tested go-no-go only.
Note 2: Only one output at a time should be shorted.

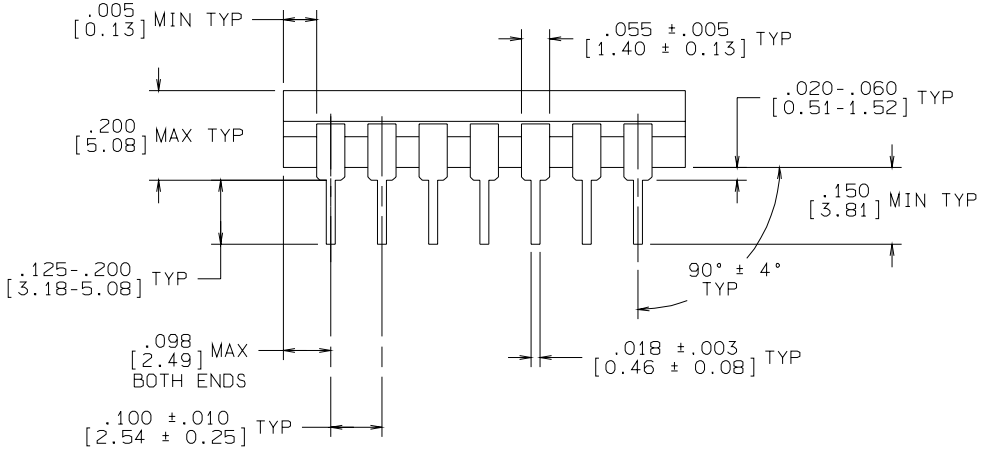
Graphics and Diagrams

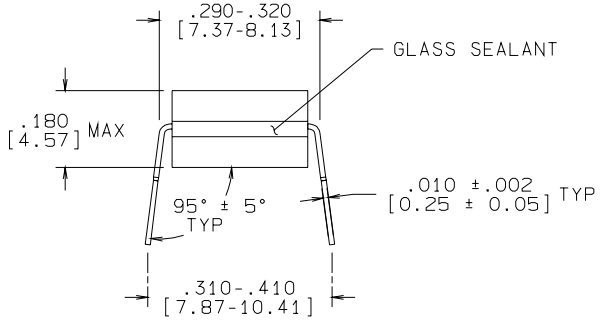
GRAPHICS#	DESCRIPTION
J14ARH	CERDIP (J), 14 LEAD (P/P DWG)
W14BRN	CERPACK (W), 14 LEAD (P/P DWG)

See attached graphics following this page.

REVISIONS				
LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
H	REVISE PER CURRENT STD; REDRAW	10001	09/15/93	TL/







CONTROLLING DIMENSION: INCH

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 AB, DATED 04/1981.

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

PROJECTION

INCH
[MM]

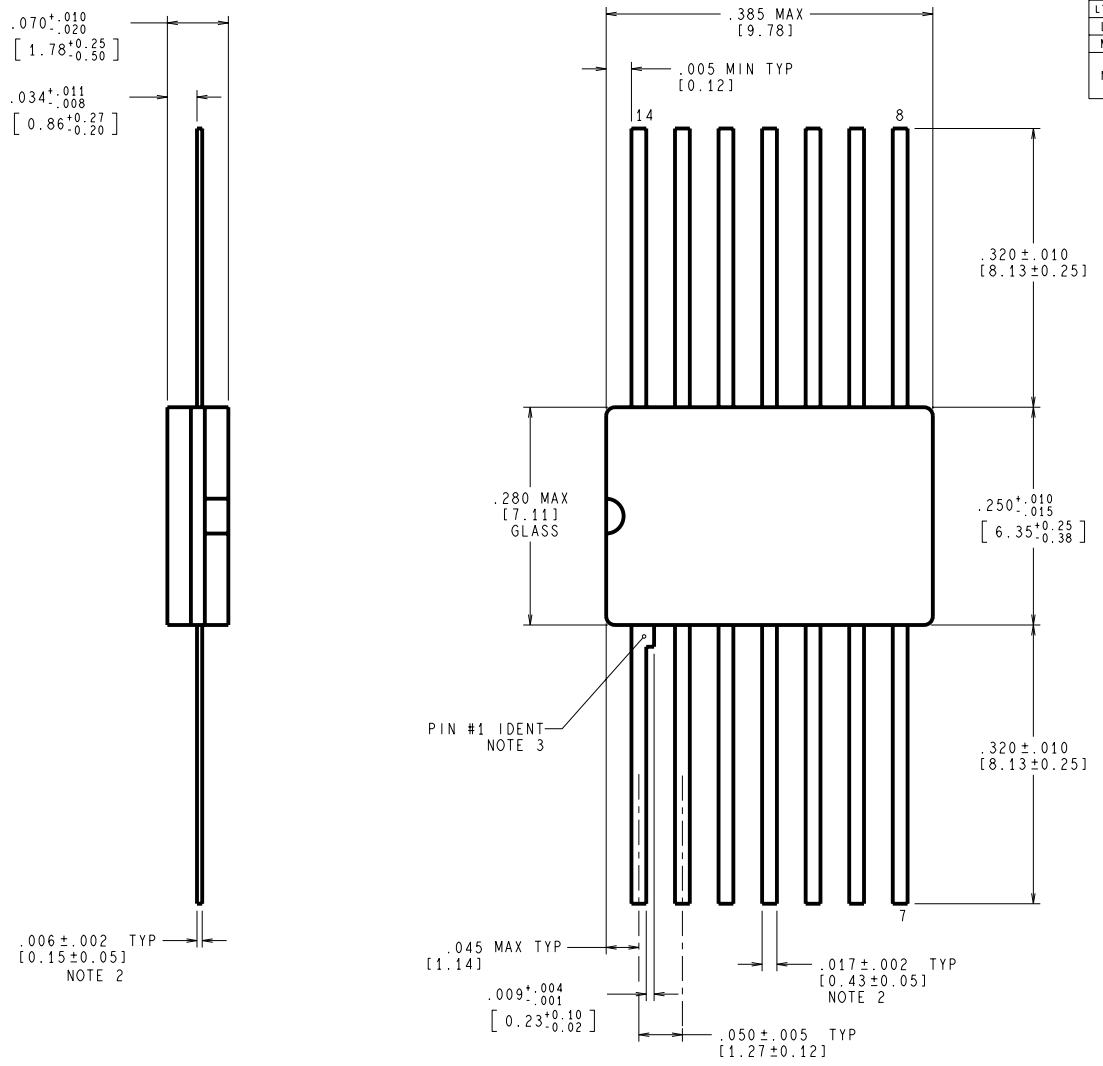
NATIONAL SEMICONDUCTOR CORPORATION
2900 Semiconductor Drive, Santa Clara, CA 95052-8090

CERDIP (J), 14 LEAD,

SCALE	SIZE	DRAWING NUMBER	REV
N/A	B	MKT-J14A	H

DO NOT SCALE DRAWING | SHEET 1 OF 1

REVISIONS				
LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
L	REVISE AND REDRAW PER NEW STANDARD.	10513	07/26/94	DEG/AEP
M	.017±.002 WAS .017±.020.	10655	10/21/94	DEG/CD
N	L/F THKS .006±.002 WAS .005±.001; UPDATE NOTES 1 & 2; REMOVE NOTE 4; UPDATE MILAERO STAMP; DUAL DIM'S WERE INCHES ONLY.	11005	06/08/95	MS/



NOTES: UNLESS OTHERWISE SPECIFIED.

1. LEAD FINISH: SOLDER DIPPED WITH Sn60 OR Sn63 SOLDER CONFORMING TO MIL-I-38535 TO A MINIMUM THICKNESS OF 200 MICROINCHES/ 5.08 MICROMETERS. SOLDER MAY BE APPLIED OVER LEAD BASIS METAL OR Sn PLATE.
2. MAXIMUM LIMIT MAY BE INCREASED BY .003 INCHES/ 0.08 MILLIMETERS 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

CONTROLLING DIMENSION IS INCH
VALUES IN [ ] ARE MILLIMETERS

MIL-I-38535
CONFIGURATION CONTROL

APPROVALS	DATE
DRAWN D.E.Grady	07/26/94
DFTG. CHK.	
ENGR. CHK.	

PROJECTION INCH [MM]

National Semiconductor
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CERPACK, 14 LEAD

SCALE	SIZE	DRAWING NUMBER	REV
N/A	C	MKT-W14B	N

DO NOT SCALE DRAWING | SHEET 1 of 1

Revision History

Rev	ECN #	Rel Date	Originator	Changes
0A0	M0003549	09/08/99	Rose Malone	Initial MDS Release. Conversion from RETS to MDS. Obsolete RETS7820AX, Rev. 3E replaced by MNDS7820A-X, Rev. 0A0.