National Semiconductor

MICROCIRCUIT DATA SHEET

MNDS16F95-X-RH REV 0A1

Original Creation Date: 01/26/96
Last Update Date: 04/29/99
Last Major Revision Date: 01/26/96

DIFFERENTIAL BUS TRANSCEIVER, ALSO AVAILABLE GUARANTEED TO 300K RAD (Si) TESTED TO MIL-STD-883 METHOD 1019.

General Description

The DS16F95 Differential Bus Transceiver is a monolithic integrated circuit designed for bidirectional data communication on balanced multipoint bus transmission lines. The Transceiver meets EIA standard RS-485 as well as RS-422A.

The DS16F95 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. Thus, the DS16F95 features lower power, extended temperature range, and improved specifications.

The DS16F95 combines a TRI-STATE differential input line receiver, both of which operate from a single 5.0V power supply. The driver and receiver have an active Enable that can be externally connected to function as a direction control. The driver differential outputs and the receiver differential inputs are internally connected to form differential input/output (I/O) bus ports that are designed to offer minimum loading to the bus whenever the driver is disabled or when Vcc = 0V. These ports feature wide positive and negative common mode voltage ranges, making the device suitable for multipoint applications in noisy environments.

The driver is designed to handle loads up to 60 mA of sink or source current. The driver features positive and negative current-limiting and thermal shutdown for protection from line fault conditions.

The DS16F95 can be used in transmission line applications employing the DS96F172 and DS96F174 quad differential line drivers and the DS96F173 and DS96F175 quad differential line receivers.

Industry Part Number

DS16F95

Prime Die

M176

Controlling Document

SEE FEATURES PAGE

NS Part Numbers

DS16F95E/883
DS16F95J-QMLV
DS16F95J/883
DS16F95JFQML
DS16F95JFQMLV
DS16F95W-QMLV
DS16F95W-SMD
DS16F95W/883
DS16F95WFQML
DS16F95WFQMLV
DS16F95WG-QMLV
DS16F95WG/883
DS16F95WGFQML
DS16F95WGFQMLV

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

- Meets EIA Standard RS-422A and RS-485
- Meets SCSI specifications
- Designed for multipoint transmission
- Wide positive and negative input/output bus voltage ranges
- Thermal shutdown protection
- Driver positive and negative current-limiting
- High impedance receiver input
- Receiver input hysteresis of 50mV typical
- Operates from single 5.0V supply
- Low power 28mA max
- Pin compatible with DS3695 and SN75176A
- CONTROLLING DOCUMENT

DS16F95E/883	5962-89615012A
DS16F95J/883	5962-8961501PA
DS16F95J-QMLV	5962-8961501VPA
DS16F95JFQML	5962F8961501QPA
DS16F95JFQMLV	5962F8961501VPA
DS16F95W-SMD	5962-8961501HA
DS16F95W/883	
DS16F95W-QMLV	5962-8961501VHA
DS16F95WFQML	5962F8961501QHA
DS16F95WFQMLV	5962F8961501VHA
DS16F95WG/883	5962-8961501QXA
DS16F95WG-QMLV	5962-8961501VXA
DS16F95WGFQML	5962F8961501QXA
DS16F95WGFQMLV	5962F8961501VXA

(Absolute Maximum Ratings)

(Note 1)

Storage Temperature Range	
Ceramic DIP	-65 C to +175 C
Lead Temperature	
Ceramic DIP (Soldering, 60 sec.)	300 C
Maximum Power Dissipation at 25 C (Note 2)	
Ceramic J Package	1274mW
Ceramic E Package	1800mW
Ceramic W & WG Packages	725mW
Supply Voltage	7.0V
Differential Input Voltage	+15V/-10V
Enable Input Voltage	5.5V
Thermal Resistance	
ThetaJA	
8 pin Cerdip (J pkg)	118 C/W @ 1.0W
20 pin LCC (E pkg)	83 C/W @ 0.5W
10 pin Cerpak (W pkg)	207 C/W @ 0.5W
Ceramic SOIC (WG pkg)	207 C/W @ 0.5W
ThetaJC	
8 pin Cerdip (J pkg)	14 C/W
20 pin LCC (E pkg)	17 C/W
10 pin Cerpak (W pkg)	18 C/W
Ceramic SOIC (WG pkg)	18 C/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 devices should be operated at these limits. The tables of "Electrical Characteristics" provide conditions for actual device operation.

Note 2: *Derate J package 8.5mW/C above +25C. *Derate E package 12.1mW/C above +25C. *Derate W & WG packages 4.8mW/C above +25C.

Recommended Operating Conditions

	Min.	Typ.	Max.	Units
Supply Voltage (Vcc)	4.5	5.0	5.50	V
Voltage at Any Bus Terminal (Separately or Common Mode) (Vi or Vcm)	-7.0		12	V
Differential Input Voltage (Vid)	-7.0		±12	V
Output Current HIGH (Ioh)				
Driver			-60	mA
Receiver			-400	uA
Output Current LOW (Iol)				
Driver			60	mA
Receiver			16	mA
Operating Temperature (TA)	-55	+25	+125	C

Electrical Characteristics

DC PARAMETERS: DRIVER (See Note 7)

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: Vcc = 5.5V

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vod1	Differential Vout	Vcc = 5.5V, Io = 0A, Vin = .8V				6	V	1, 2, 3
		Vcc = 5.5V, Io = 0A, Vin = 2V				6	V	1, 2, 3
Vod2	Differential Vout	Vcc = 4.5V, RL = 100 Ohms			2		V	1, 2, 3
		Vcc = 4.5V, RL = 54 Ohms			1.5		V	1, 2, 3
Delta Vod	Change In Differential Vout	Vcc = 4.5V, RL = 100 Ohms	1		-200	200	mV	1, 2, 3
		Vcc = 4.5V, RL = 54 Ohms	1		-200	200	mV	1, 2, 3
Delta Voc	Change In Common Mode Vout	Vcc = 4.5V, RL = 100 Ohms	1		-200	200	mV	1, 2, 3
		Vcc = 4.5V, RL = 54 Ohms	1		-200	200	mV	1, 2, 3
Voc	Common Mode Vout	RL = 100 Ohms				3	V	1, 2, 3
		RL = 54 Ohms				3	V	1, 2, 3
Iih	Logical "1" Input Current	Vi = 2.4V				20	uA	1, 2, 3
Io	Output Current	Output Disable, Vo = 12V				1	mA	1, 2, 3
		Output Disable, Vo = -7V	2		-.8		mA	1, 2, 3
		Vcc = 0, Output Disable, Vo = 12V				1	mA	1, 2, 3
		Vcc = 0, Output Disable, Vo = -7V	2		-.8		mA	1, 2, 3

Electrical Characteristics

DC PARAMETERS: DRIVER (See Note 7) (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: Vcc = 5.5V

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Ios	Output Short Circuit	Vin = 3V, Vout = Vcc				150	mA	1, 2, 3
		Vin = 3V, Vout = -7V	2		-250		mA	1, 2, 3
		Vin = 3V, Vout = 0V	2		-150		mA	1, 2, 3
		Vin = 3V, Vout = 12V				250	mA	1, 2, 3
		Vin = 0V, Vout = 12V				250	mA	1, 2, 3
		Vin = 0V, Vout = Vcc				150	mA	1, 2, 3
		Vin = 0V, Vout = -7V	2		-250		mA	1, 2, 3
		Vin = 0V, Vout = 0V	2		-150		mA	1, 2, 3
Voh	Logical "1" Output Voltage	Vcc = 4.5V, Io = -20mA			3		V	1, 2, 3
Vol	Logical "0" Output Voltage	Vcc = 4.5V, Io = 20mA				2	V	1, 2, 3
Vod3	Differential Vout	Vcm = -7V to 12V			1		V	1, 2, 3

Electrical Characteristics

DC PARAMETERS: RECEIVER (See NOTE 7)

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: Vcc = 5.5V

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Voh	Logical "1" Output Voltage	Vcc = 4.5V, Vid = 200mV, Ioh = -400uA			2.5		V	1, 2, 3
Vol	Logical "0" Output Voltage	Vcc = 4.5V, Vid = -200mV, Iol = 8mA				.45	V	1, 2, 3
		Vcc = 4.5V, Vid = -200mV, Iol = 16mA				.5	V	1, 2, 3
Ii	Line Input Current	Untested Input = 0V, Vi = 12V				1	mA	1, 2, 3
		Untested Input = 0V, Vi = -7V	2		-.8		mA	1, 2, 3
		Vcc = 0V, Untested Input = 0V, Vi = 12V	2			1	mA	1, 2, 3
		Vcc = 0V, Untested Input = 0V, Vi = -7V			-.8		mA	1, 2, 3
Iih	Logical "1" Input Current	Vi = 2.7V (Receiver)				20	uA	1, 2, 3
Rin	Input Resistance	Untested Input = 0V, Vi = 12V	3		10		K Ohms	1, 2, 3
		Untested Input = 0V, Vi = -7V	3		10		K Ohms	1, 2, 3
		Vcc = 0V, Untested Input = 0V, Vi = 12V	3		10		K Ohms	1, 2, 3
		Vcc = 0V, Untested Input = 0V, Vi = -7V	3		10		K Ohms	1, 2, 3
Ioz	High Impedance State	Vi = .4V			-20	20	uA	1, 2, 3
		Vi = 2.4V			-20	20	uA	1, 2, 3
Ios	Output Short Circuit	Vin = 1V, Vout = 0V			-85	-15	mA	1, 2, 3
Vth	Differential Input High Threshold	Vcc = 4.5V, Vo = 2.5V, Vcm = 12V & 0V & -7V, Io = -.4mA				.2	V	1, 2, 3
		Vcc = 5.5V, Vo = 2.5V, Vcm = 12V & 0V & -7V, Io = -.4mA				.2	V	1, 2, 3
Vtl	Differential Input Low Threshold	Vcc = 4.5V, Vo = .5V, Vcm = 12V & 0V & -7V, Io = 8mA			-.2		V	1, 2, 3
		Vcc = 5.5V, Vo = .5V, Vcm = 12V & 0V & -7V, Io = 8mA			-.2		V	1, 2, 3

Electrical Characteristics

DC PARAMETERS: RECEIVER (See NOTE 7) (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: Vcc = 5.5V

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vth+ - (Vth-)	Hyteresis	Vcc = 4.5V, Vcm = 0V			35		mV	1, 2, 3
		Vcc = 5.5V, Vcm = 0V			35		mV	1, 2, 3

DC PARAMETERS: BOTH DRIVER AND RECEIVER (See NOTE 7)

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: Vcc = 5.5V

Icc	Supply Current Icc Both Disable	Re = 2V, De = .8V				25	mA	1, 2, 3
Icc	Supply Current Icc Both Enable	Re =.8V, De = 2V				28	mA	1, 2, 3
Vic	Input Clamp Volt	Ii = -18mA			-1.3		V	1, 2, 3
Vih	Logical "1" Input Voltage				2		V	1, 2, 3
Vil	Logical "0" Input Voltage					.8	V	1, 2, 3
Vih	Logical "1" Enable Input Voltage				2		V	1, 2, 3
Vil	Logical "0" Enable Input Voltage					.8	V	1, 2, 3
Iil	Logical "0" Input Current	Vi = .4V	2		-50		uA	1, 2, 3

Electrical Characteristics

AC PARAMETERS: DRIVER (See NOTE 7)

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: Vcc = 5V, PRR = 1MHz, Tr ≤ Tf ≤ 6nS, 50% duty cycle, AMP = 3V, VLo = 0V, Zout = 50 Ohms

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tdd	Differential Output Delay Time	RL = 60 Ohms	6		8	25	nS	9
			6		8	30	nS	10, 11
tTD	Differential Output Transition Time	RL = 60 Ohms	5, 6		8	25	nS	9
			5, 6		8	30	nS	10, 11
tPLH	Propagation Delay Time Low to High	RL = 27 Ohms			6	18	nS	9
					6	25	nS	10, 11
tPHL	Propagation Delay Time high to Low	RL = 27 Ohms			6	18	nS	9
					6	25	nS	10, 11
tPZH	Output Enable Time to H	RL = 110 Ohms				35	nS	9
						45	nS	10, 11
tPZL	Output Enable Time to L	RL = 110 Ohms				40	nS	9
						50	nS	10, 11
tPHZ	Output Disable Time to H	RL = 110 Ohms				30	nS	9
						40	nS	10, 11
tPLZ	Output Disable Time to L	RL = 110 Ohms				30	nS	9
						40	nS	10, 11
Tskew	Differential Output Skew Time					6	nS	9
						12	nS	10, 11

Electrical Characteristics

AC PARAMETERS: RECEIVER (See NOTE 7)

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: Vcc = 5V, PRR = 1MHz, Tr ≤ Tf ≤ 6nS, 50% duty cycle, AMP = 3V, VLo = 0V, Zout = 50 Ohms

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPLH	Propagation Delay Time Low to High	Cl = 15pF			10	27	nS	9
					10	38	nS	10, 11
tPHL	Propagation Delay Time High to Low	Cl = 15pF			10	27	nS	9
					10	38	nS	10, 11
tPZH	Output Enable Time to H	Cl = 15pF				20	nS	9
						30	nS	10, 11
tPZL	Output Enable Time to L	Cl = 15pF				20	nS	9
						30	nS	10, 11
|tPLH - tPHL|	Output to Output Delay Time					8	nS	9
						16	nS	10, 11
tPHZ	Output Disable Time From H	Cl = 20pF	4			30	nS	9
			4			40	nS	10, 11
		Cl = 5pF	4			20	nS	9
			4			30	nS	10, 11
tPLZ	Output Disable Time From L	Cl = 5pF				20	nS	9
						30	nS	10, 11

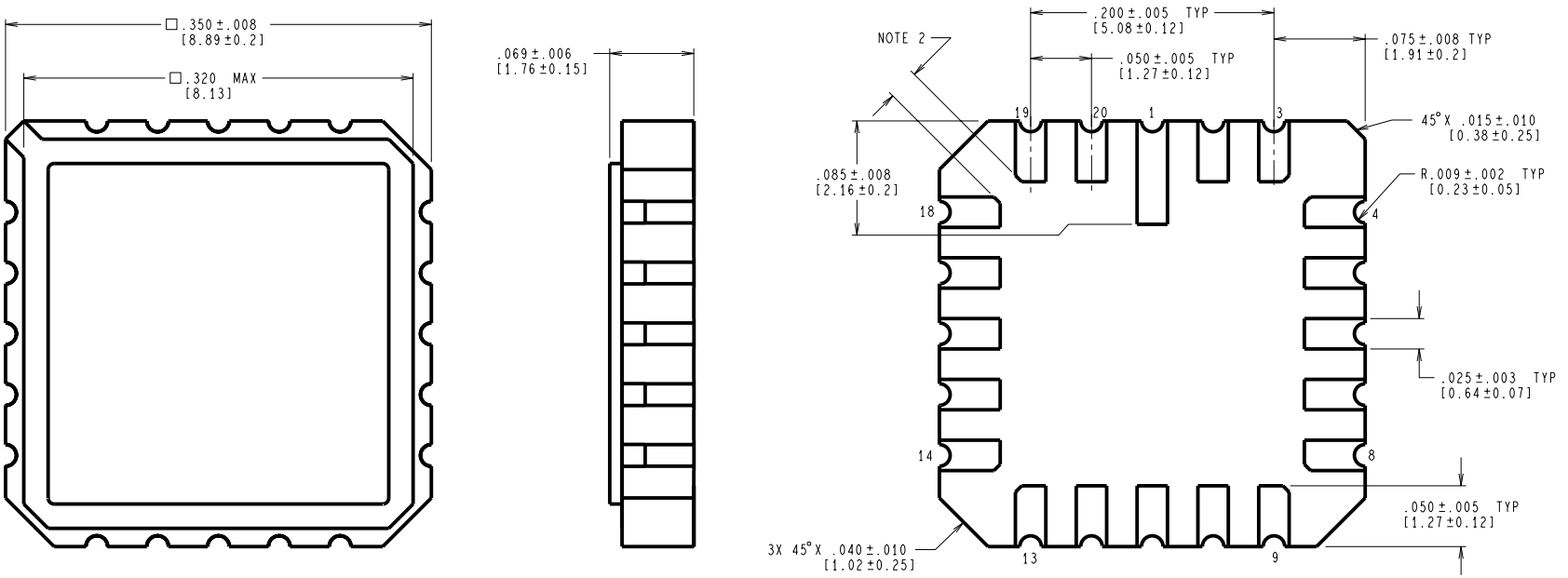
Note 1: Delta Vod and Delta Voc are the changes in magnitude of Vod and Voc.
Note 2: Negative sign of the limits indicates the direction of the current flow only.
Note 3: Rin is guaranteed by testing "Line Input Current" (II).
Note 4: Testing at 20pF assures conformance to spec at 5pF.
Note 5: tTD = Non-inverting output rise time + inverting output fall time / 2, Non-inverting output fall time + inverting output rise time / 2.
Note 6: Rise time 20% to 80%, Fall time 80% to 20%
Note 7: Pre and post irradiation limits are identical to those listed under AC and DC electrical characteristics. These parts may be dose rate sensitive in a space environment and demonstrate enhanced low dose rate effect. Radiation end point limits for the noted parameters are guaranteed only for the conditions as specified in MIL-STD 883, Method 1019.5, condition A.

Graphics and Diagrams

GRAPHICS#	DESCRIPTION
06070HRA2	LCC (E), TYPE C, 20 TERMINAL (B/I CKT)
06140HRA2	CERDIP (J), 8 LEAD (B/I CKT)
06141HRA2	CERPACK (W), 10 LEAD (B/I CKT)
06186HRA2	CERDIP (J), 8 LEAD (B/I CKT)
06187HRA2	CERPACK (W), 10 LEAD (B/I CKT)
E20ARE	LCC (E), TYPE C, 20 TERMINAL(P/P DWG)
J08ARL	CERDIP (J), 8 LEAD (P/P DWG)
P000356B	CERAMIC SOIC (WG), 10 LEAD (PINOUT)
P000433A	CERDIP (J), 8 LEAD (PINOUT)
P000434A	LCC (E), TYPE C, 20 TERMINAL (PINOUT)
W10ARG	CERPACK (W), 10 LEAD (P/P DWG)
WG10ARC	CERAMIC SOIC (WG), 10 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]

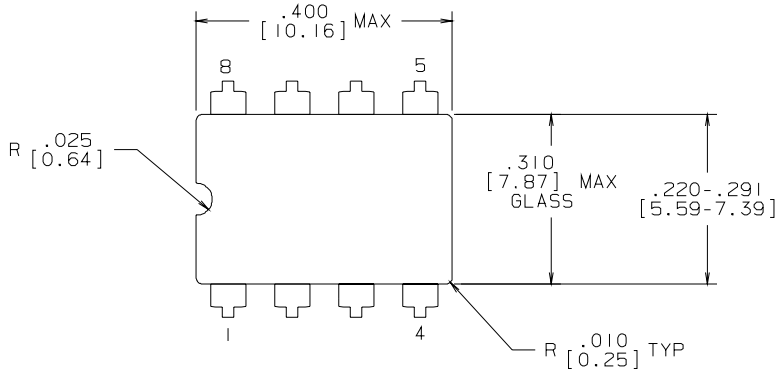
NATIONAL SEMICONDUCTOR CORPORATION
2900 Semiconductor Drive, Santa Clara, CA 95052-8090

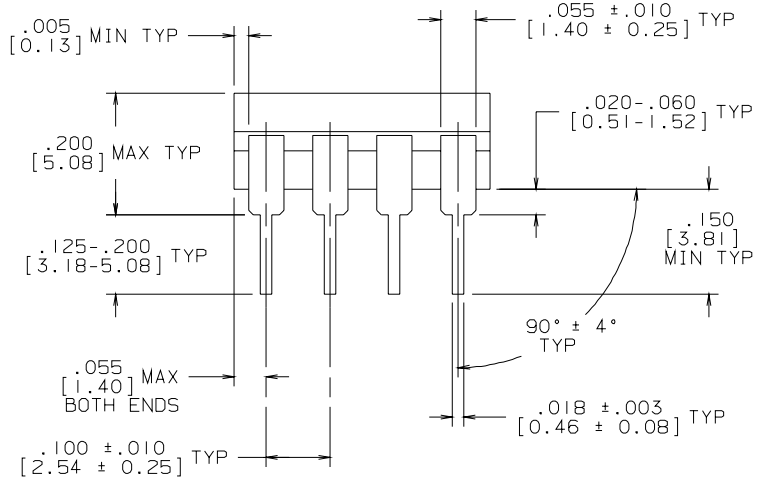
LEADLESS CHIP CARRIER, TYPE C, 20 TERMINAL

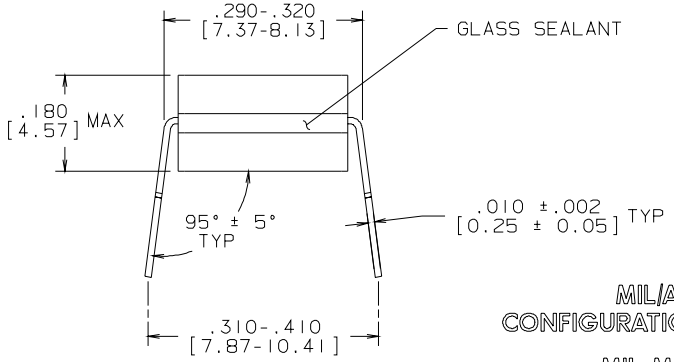
SCALE	SIZE	DRAWING NUMBER	REV
N/A	C	MKT-E20A	E

DO NOT SCALE DRAWING | SHEET 1 of 1

REVISIONS				
LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
L	REVISE PER CURRENT STD; REDRAW	10002	09/21/93	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 AA, DATED 04/1981.

CONTROLLING DIMENSION: INCH

APPROVALS	DATE
DRAWN T. LEQUANG	09/21/93
DFTG. CHK.	
ENGR. CHK.	
APPROVAL	

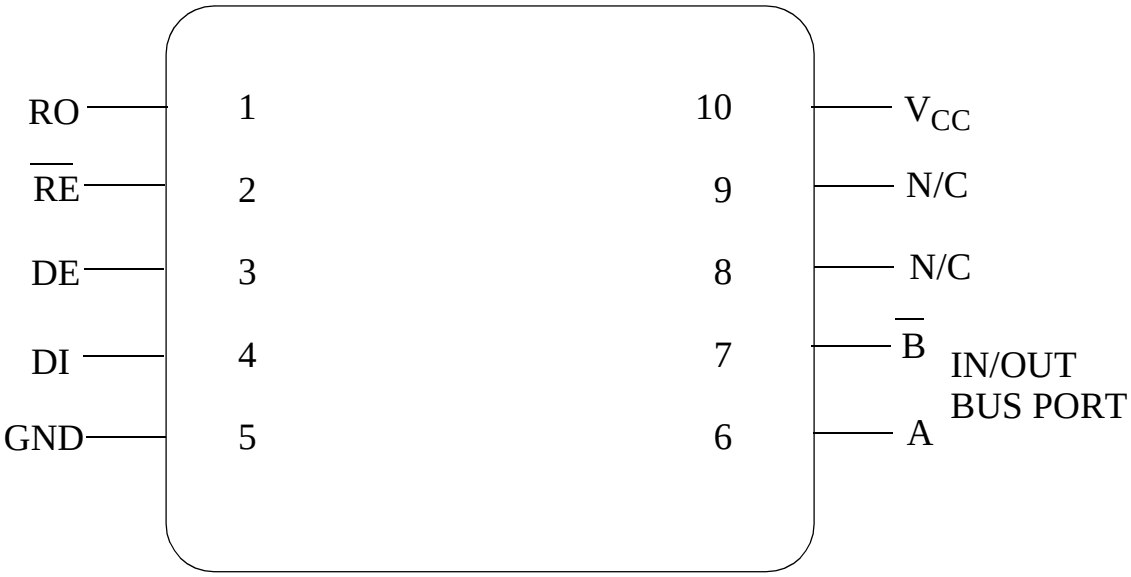
PROJECTION
INCH
[MM]

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

CERDIP (J), 8 LEAD

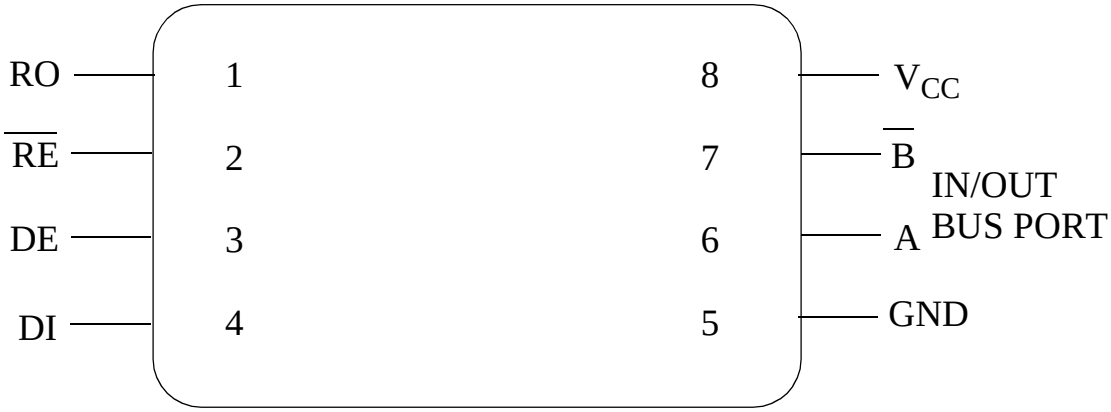
SCALE	SIZE	DRAWING NUMBER	REV
N/A	B	MKT-J08A	L

DO NOT SCALE DRAWING | SHEET 1 OF 1



DS16F95WG/W
10 - LEAD CERAMIC SOIC
CONNECTION DIAGRAM
TOP VIEW
P000356B

National Semiconductor™
MIL/AEROSPACE OPERATIONS
2900 SEMICONDUCTOR DRIVE
SANTA CLARA, CA 95050



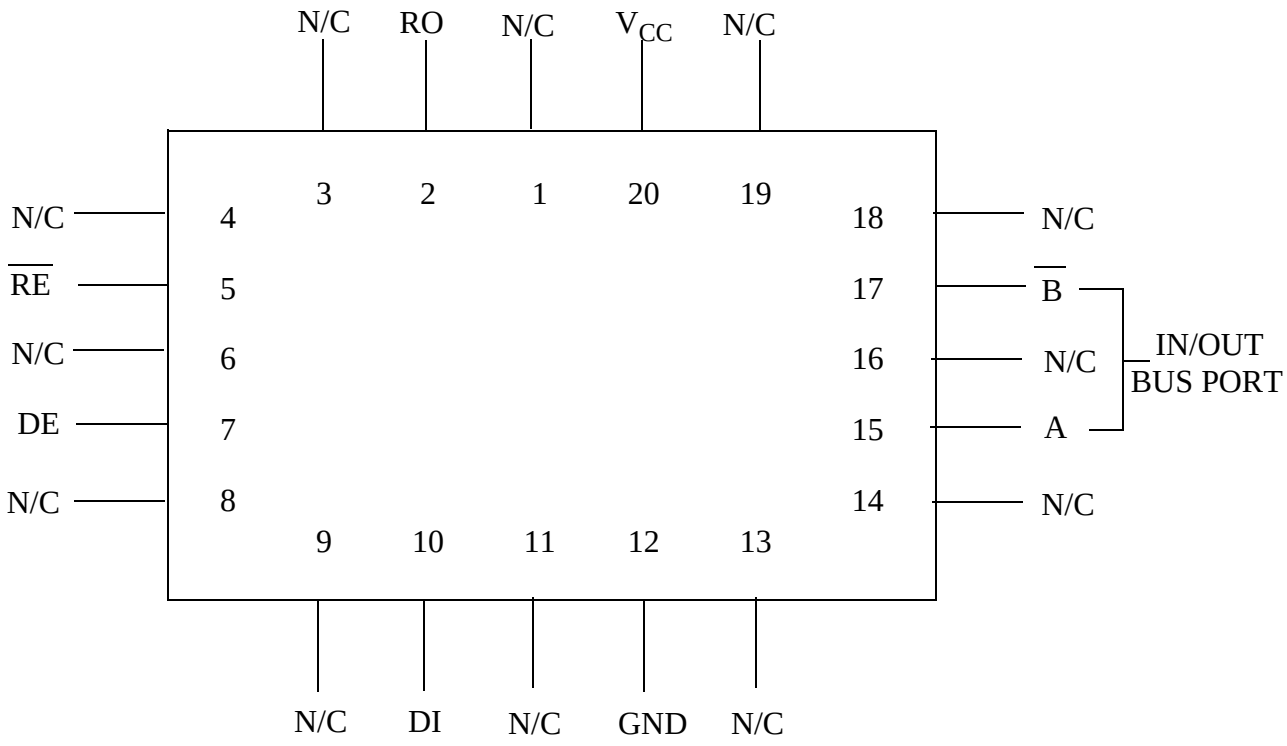
DS16F95J

8 - LEAD DIP

CONNECTION DIAGRAM
TOP VIEW

P000433A

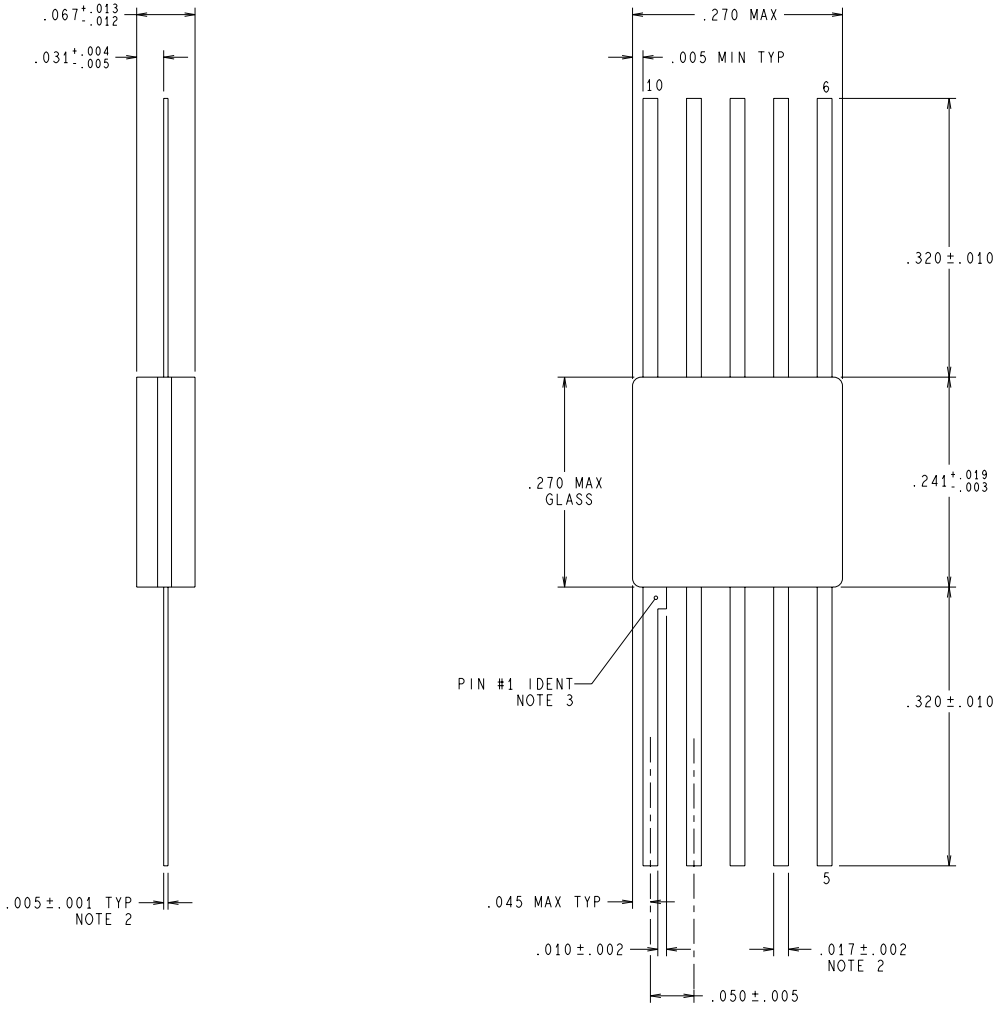
National Semiconductor™
MIL/AEROSPACE OPERATIONS
2900 SEMICONDUCTOR DRIVE
SANTA CLARA, CA 95050



DS16F95E
20 - LEAD LCC
CONNECTION DIAGRAM
TOP VIEW
P000434A

National Semiconductor™
MIL/AEROSPACE OPERATIONS
2900 SEMICONDUCTOR DRIVE
SANTA CLARA, CA 95050

REVISIONS				
LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
F	REVISE AND REDRAW PER NEW STANDARD.	10510	07/28/94	DEG/AEP
G	.017±.002 WAS .017±.020.	10654	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-003, VARIATION AG, DATED 06/01/76.

MIL/AERO CONFIGURATION CONTROL

MIL-M-38510 CONFIGURATION CONTROL

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

National Semiconductor
2900 Semiconductor dr, Santa Clara, CA 95052-8090

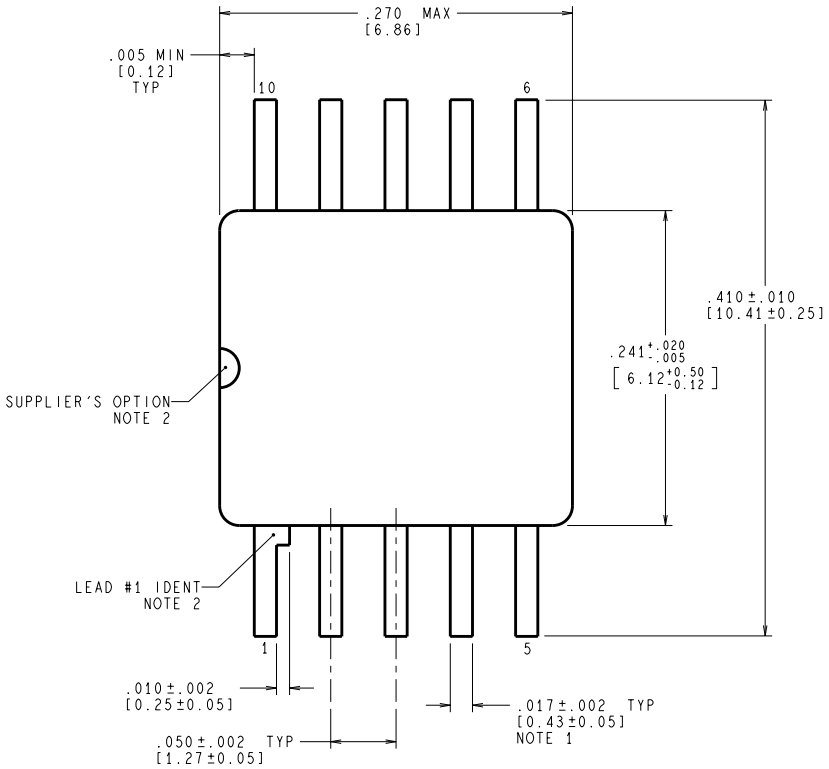
CERPACK, 10 LEAD

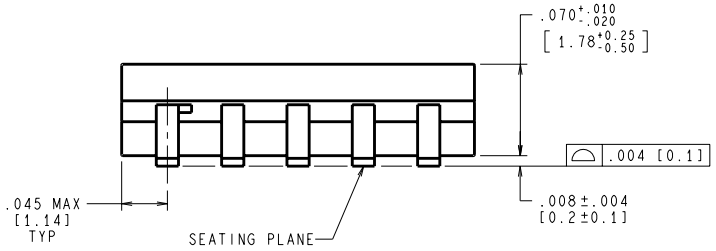
PROJECTION
INCH [MM]

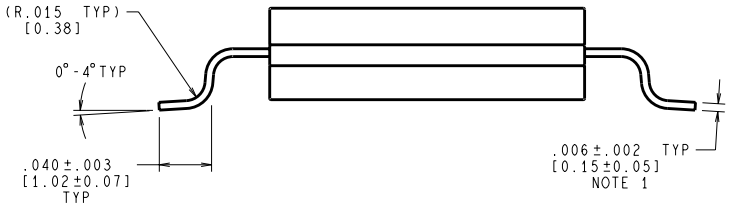
SCALE	SIZE	DRAWING NUMBER	REV
N/A	C	MKT-W10A	G

DO NOT SCALE DRAWING | SHEET 1 of 1

REVISIONS				
LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
A	RELEASE TO DOCUMENT CONTROL	11374	02/29/1996	MS/KH
B	LD PITCH TOL WAS ±.005; CHANGE LD RADIUS TO REF DIM; REMOVE THE OTHER R.006±.002 DIM .040±.003 WAS .037±.003	11441	04/19/1996	MS/KH
C	R .015[0.38] WAS R .006[0.15]	11838	10/08/1997	TL/







NOTES: UNLESS OTHERWISE SPECIFIED

1. LEAD FINISH: SOLDER DIPPED WITH Sn60 OR Sn63 SOLDER CONFORMING TO MIL-PRF-38535 TO A MINIMUM THICKNESS OF 200 MICROINCHES/ 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.
2. LEAD 1 IDENTIFICATION SHALL BE:
   a) A NOTCH OR OTHER MARK WITHIN THIS AREA
   b) A TAB ON LEAD 1, EITHER SIDE
3. NO JEDEC REGISTRATION AS OF FEBRUARY 1996.

CONTROLLING DIMENSION IS INCH
VALUES IN [ ] ARE MILLIMETERS

MIL-PRF-38535
CONFIGURATION CONTROL

APPROVALS	DATE
DRAWN: MARTA SUCHY	02/29/96
DFTG. CHK.	
ENGR. CHK.	

National Semiconductor
2900 Semiconductor dr, Santa Clara, CA 95052-8090

CERPACK, 10 LEAD, GULL WING

PROJECTION
INCH [MM]

SCALE	SIZE	DRAWING NUMBER	REV
N/A	C	(SC)MKT-WG10A	C

DO NOT SCALE DRAWING | SHEET 1 of 1

Revision History

Rev	ECN #	Rel Date	Originator	Changes
0A0	M0003240	04/29/99	Linda Collins	Renamed MDS: MNDS16F95-X Rev. 0A0 to MNDS16F95-X-RH, Rev. 0A0. Added new NSPN's for WG package, RHA and QMLV. Added Marketing DWG and Pinout for WG package. Updated Thermal Resistance and Max Power Dissipation ratings for all packages.
0A1	M0003374	04/29/99	Rose Malone	Update MDS: MNDS16F95-X-RH, Rev. 0A0 to MNDS16F95-X-RH, Rev. 0A1. Added Pin Out graphics and B/I ckts for all packages.

National Semiconductor was acquired by Texas Instruments.

http://www.ti.com/corp/docs/investor_relations/pr_09_23_2011_national_semiconductor.html

This file is the datasheet for the following electronic components:

DS16F95W/883 - http://www.ti.com/product/ds16f95w/883?HQS=TI-null-null-dscatalog-df-pf-null-wwe

5962-8961501HA - http://www.ti.com/product/5962-8961501ha?HQS=TI-null-null-dscatalog-df-pf-null-wwe

5962-89615012A - http://www.ti.com/product/5962-89615012a?HQS=TI-null-null-dscatalog-df-pf-null-wwe

59628961501VXA - http://www.ti.com/product/59628961501vxa?HQS=TI-null-null-dscatalog-df-pf-null-wwe

5962-8961501VPA - http://www.ti.com/product/5962-8961501vpa?HQS=TI-null-null-dscatalog-df-pf-null-wwe

5962-8961501QXA - http://www.ti.com/product/5962-8961501qxa?HQS=TI-null-null-dscatalog-df-pf-null-wwe

5962F8961501QXA - http://www.ti.com/product/5962f8961501qxa?HQS=TI-null-null-dscatalog-df-pf-null-wwe

5962F8961501QPA - http://www.ti.com/product/5962f8961501qpa?HQS=TI-null-null-dscatalog-df-pf-null-wwe

5962F8961501VHA - http://www.ti.com/product/5962f8961501vha?HQS=TI-null-null-dscatalog-df-pf-null-wwe

5962-8961501PA - http://www.ti.com/product/5962-8961501pa?HQS=TI-null-null-dscatalog-df-pf-null-wwe

5962F8961501VXA - http://www.ti.com/product/5962f8961501vxa?HQS=TI-null-null-dscatalog-df-pf-null-wwe

59628961501VHA - http://www.ti.com/product/59628961501vha?HQS=TI-null-null-dscatalog-df-pf-null-wwe

DS16F95J - http://www.ti.com/product/ds16f95j?HQS=TI-null-null-dscatalog-df-pf-null-wwe

DS16F95 MWA - http://www.ti.com/product/ds16f95 mwa?HQS=TI-null-null-dscatalog-df-pf-null-wwe

5962F8961501QHA - http://www.ti.com/product/5962f8961501qha?HQS=TI-null-null-dscatalog-df-pf-null-wwe

DS16F95 MDA - http://www.ti.com/product/ds16f95 mda?HQS=TI-null-null-dscatalog-df-pf-null-wwe

littlediode
COMPONENTS FOR ALL

Littlediode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

LittleDiode.com

Looking forward to providing you with the best possible service.