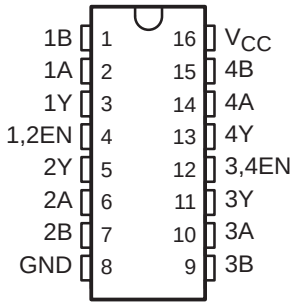
- **Meets or Exceeds the Requirements of ANSI EIA/TIA-422-B, EIA/TIA-423-B, and RS-485**
- **Meets ITU Recommendations V.10, V.11, X.26, and X.27**
- **Designed for Multipoint Bus Transmission on Long Bus Lines in Noisy Environments**
- **Low Supply Current Requirement 27 mA Max**
- **Common-Mode Input Voltage Range of −12 V to 12 V**
- **Input Sensitivity . . . ±200 mV**
- **Input Hysteresis . . . 50 mV Typ**
- **High Input Impedance . . . 12 kΩ Min**
- **Operates From Single 5-V Supply**

N OR NS† PACKAGE
(TOP VIEW)



† The NS package is only available left-ended taped and reeled (order device SN75ALS175NSLE).

description

The SN75ALS175 is a monolithic quadruple differential line receiver with 3-state outputs. It is designed to meet the requirements of ANSI Standards EIA/TIA-422-B, EIA/TIA-423-B, and RS-485 and several ITU recommendations. Advanced low-power Schottky technology provides high speed without the usual power penalty. Each of the two pairs of receivers has a common active-high enable. The device features high input impedance, input hysteresis for increased noise immunity, and input sensitivity of ±200 mV over a common-mode input voltage range of −12 V to 12 V.

The SN75ALS175 is characterized for operation from 0°C to 70°C.

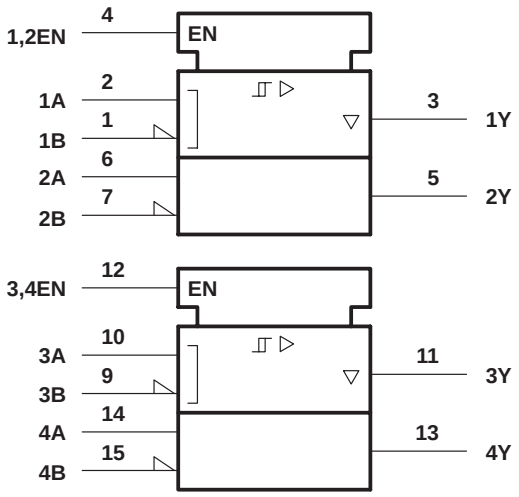
FUNCTION TABLE
(each receiver)

DIFFERENTIAL INPUTS A – B	ENABLES EN	OUTPUT Y
$V_{ID} \geq 0.2$ V	H	H
-0.2 V $< V_{ID} < 0.2$ V	H	?
$V_{ID} \leq -0.2$ V	H	L
X	L	Z
Open Circuit	H	H

H = high level, L = low level, ? = indeterminate,
X = irrelevant, Z = high impedance (off)

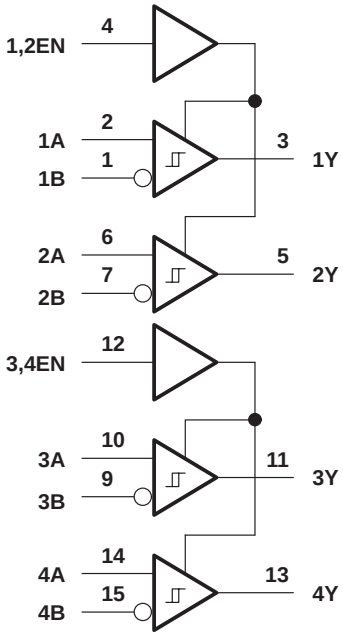
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

logic symbol†

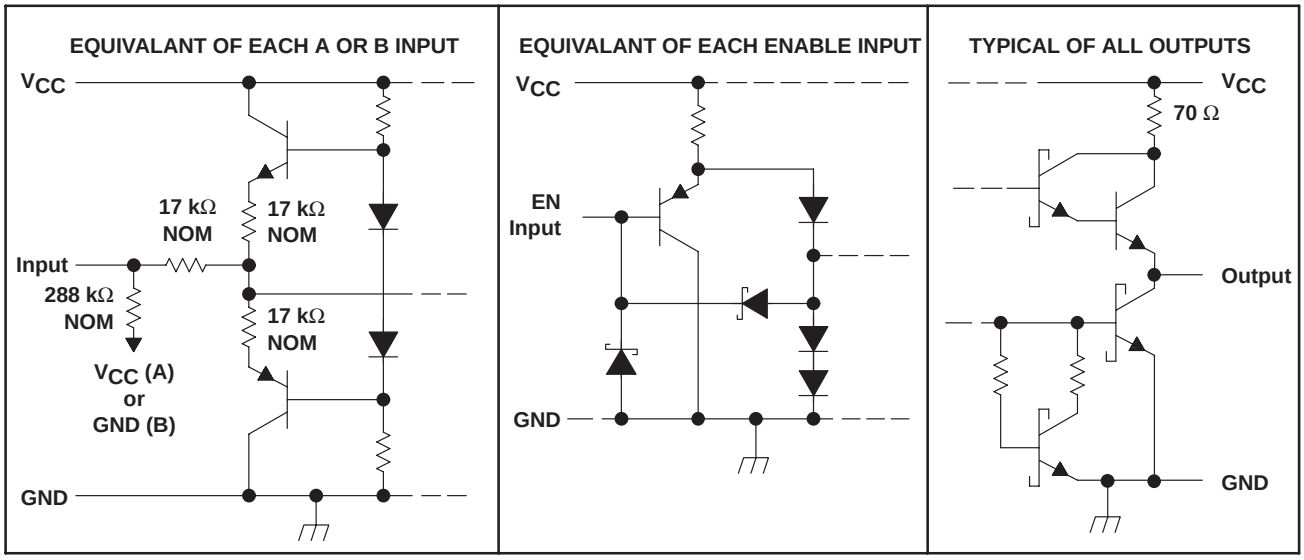


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



schematics of inputs and outputs



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage, V_I (A or B inputs) . . . . . ±14 V
Differential input voltage, V_{ID} (see Note 2) . . . . . ±14 V
Enable input voltage, V_I . . . . . 7 V
Low-level output current, I_{OL} . . . . . 50 mA
Continuous total dissipation . . . . . See Dissipation Rating Table
Operating free-air temperature range, T_A . . . . . 0°C to 70°C
Storage temperature range, T_{stg} . . . . . –65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 260°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltage values, except differential input voltage, are with respect to network ground terminal.
2. Differential-input voltage is measured at the noninverting input with respect to the corresponding inverting input.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING
N	1150 mW	9.2 mW/°C	736 mW
NS	625 mW	5.0 mW/°C	400 mW

recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}	4.75	5	5.25	V
Common-mode input voltage, V_{IC}			±12	V
Differential input voltage, V_{ID}			±12	V
High-level enable-input voltage, V_{IH}	2			V
Low-level enable-input voltage, V_{IL}			0.8	V
High-level output current, I_{OH}			–400	μA
Low-level output current, I_{OL}			8	mA
Operating free-air temperature, T_A	0		70	°C

electrical characteristics over recommended ranges of common-mode input voltage, supply voltage and operating free-air temperature (unless otherwise noted) (see Note 3)

PARAMETER		TEST CONDITIONS			MIN	TYP†	MAX	UNIT
V_{IT+}	Positive-going input threshold voltage						200	mV
V_{IT-}	Negative-going input threshold voltage				–200‡			mV
V_{hys}	Hysteresis voltage ($V_{IT+} - V_{IT-}$)					50		mV
V_{IK}	Enable-input clamp voltage	I_I = –18 mA					–1.5	V
V_{OH}	High-level output voltage	V_{ID} = 200 mV,	I_{OH} = –400 μA,	See Figure 1	2.7			V
V_{OL}	Low-level output voltage	V_{ID} = –200 mV,	I_{OL} = 8 mA,	See Figure 1			0.45	V
I_{OZ}	High-impedance-state output current	V_O = 0.4 V to 2.4 V					±20	μA
I_I	Line input current	Other input at 0 V,	See Note 3	V_I = 12 V			1	mA
				V_I = –7 V			–0.8	
I_{IH}	High-level enable-input current	$V_{IH(E)}$ = 2.7 V					20	μA
I_{IL}	Low-level enable-input current	$V_{IL(E)}$ = 0.4 V					–100	μA
r_i	Input resistance				12			kΩ
I_{OS}	Short-circuit output current	V_O = 0			–15		–85	mA
I_{CC}	Suply current (total package)	No load,	Outputs enabled			16	24	mA
		No load,	Outputs disabled			18	27	

† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ The algebraic convention, in which the less positive (more negative) limit is designated as minimum, is used in this data sheet for threshold voltage levels only.
NOTE 3: Refer to ANSI Standard RS-485 for exact conditions.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS		MIN	TYP†	MAX	UNIT
t_{PHL}	Propagation delay time, high- to low-level output	V_{ID} = –2.5 V to 2.5 V,		9	18	27	ns
t_{PLH}	Propagation delay time, low- to high-level output	C_L = 15 pF,	See Figure 2	9	18	27	ns
t_{PZH}	Output enable time to high level	C_L = 15 pF,	See Figure 3	4	12	18	ns
t_{PZL}	Output enable time to low level			6	13	21	ns
t_{PHZ}	Output disable time from high level	C_L = 15 pF,	See Figure 3	10	21	27	ns
t_{PLZ}	Output disable time from low level			8	15	25	ns

† All typical values are at V_{CC} = 5 V, T_A = 25°C.

PARAMETER MEASUREMENT INFORMATION

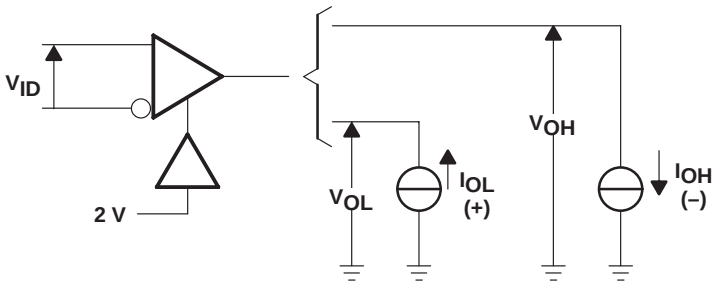
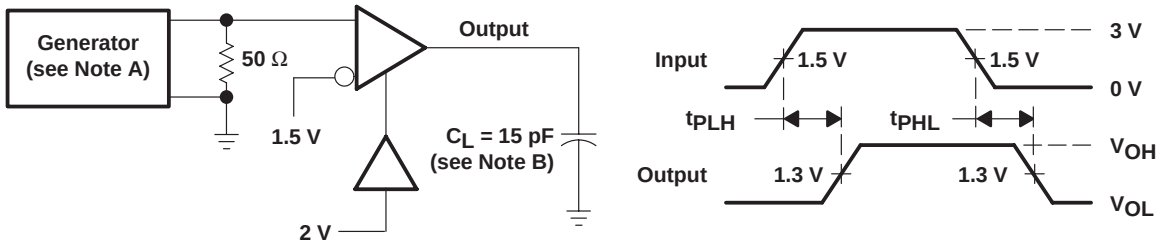


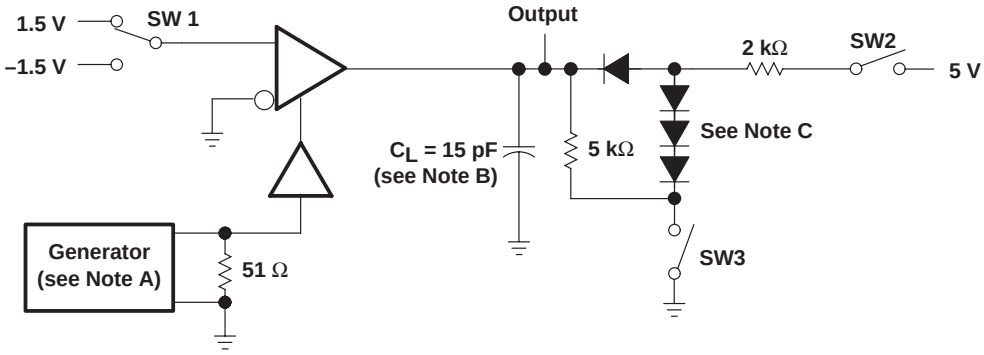
Figure 1. V_{OH}, V_{OL}



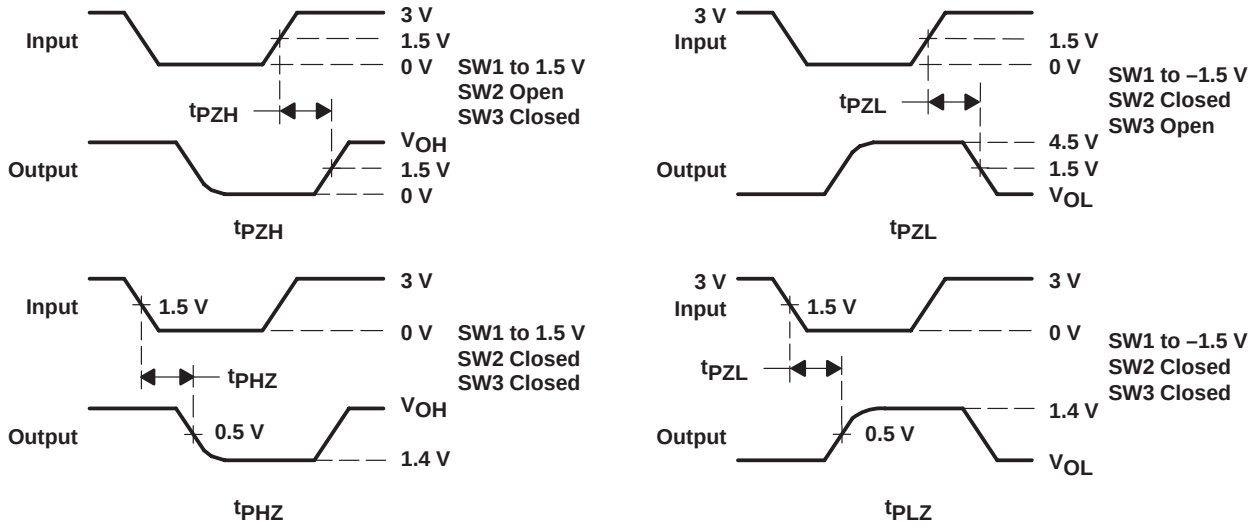
NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR = 1 MHz, duty cycle = 50%, $t_r = t_f = 6$ ns.
B. C_L includes probe and jig capacitance.

Figure 2. Propagation Delay Times

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE WAVEFORMS

NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR = 1 MHz, duty cycle = 50%, $t_r = t_f = 6$ ns.
B. C_L includes probe and jig capacitance.
C. All diodes are 1N916 or equivalent.

Figure 3. Enable and Disable Times

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN75ALS175N	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN75ALS175N	Samples
SN75ALS175NSR	ACTIVE	SO	NS	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	75ALS175	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

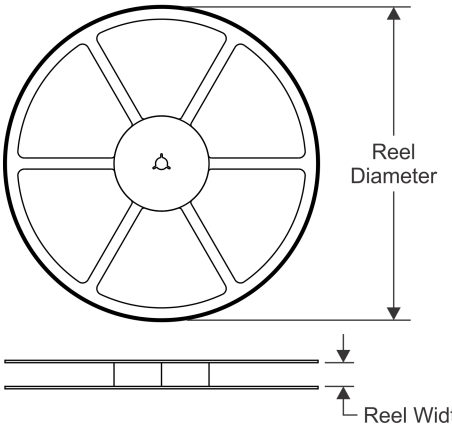
(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

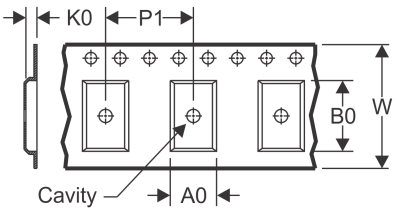
(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

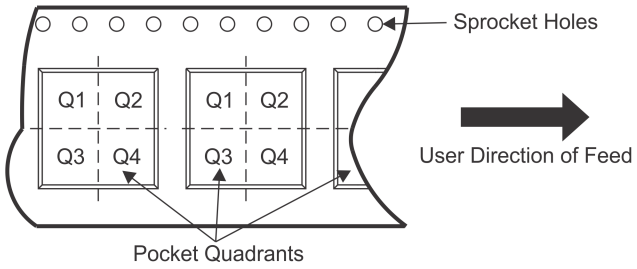


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

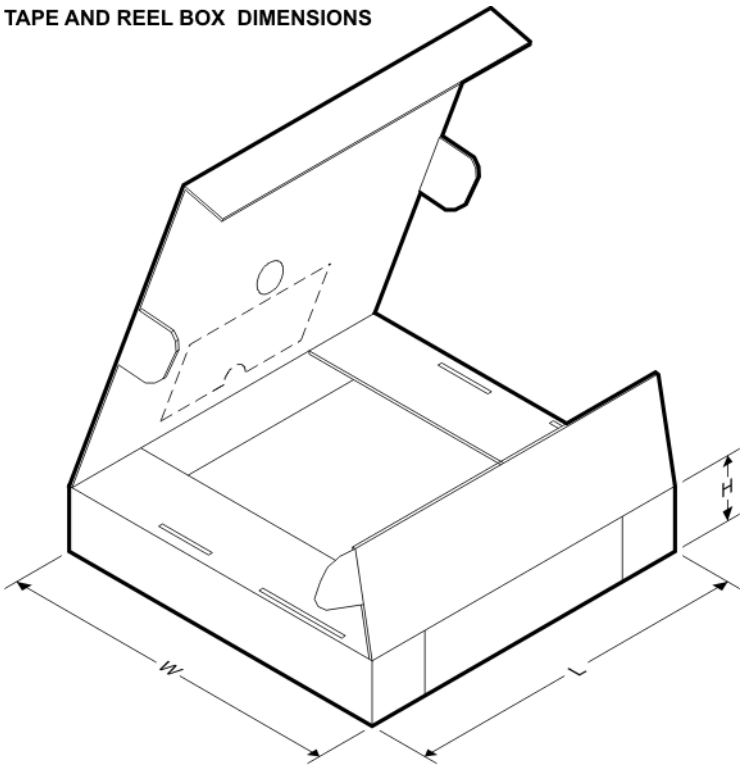
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN75ALS175NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS



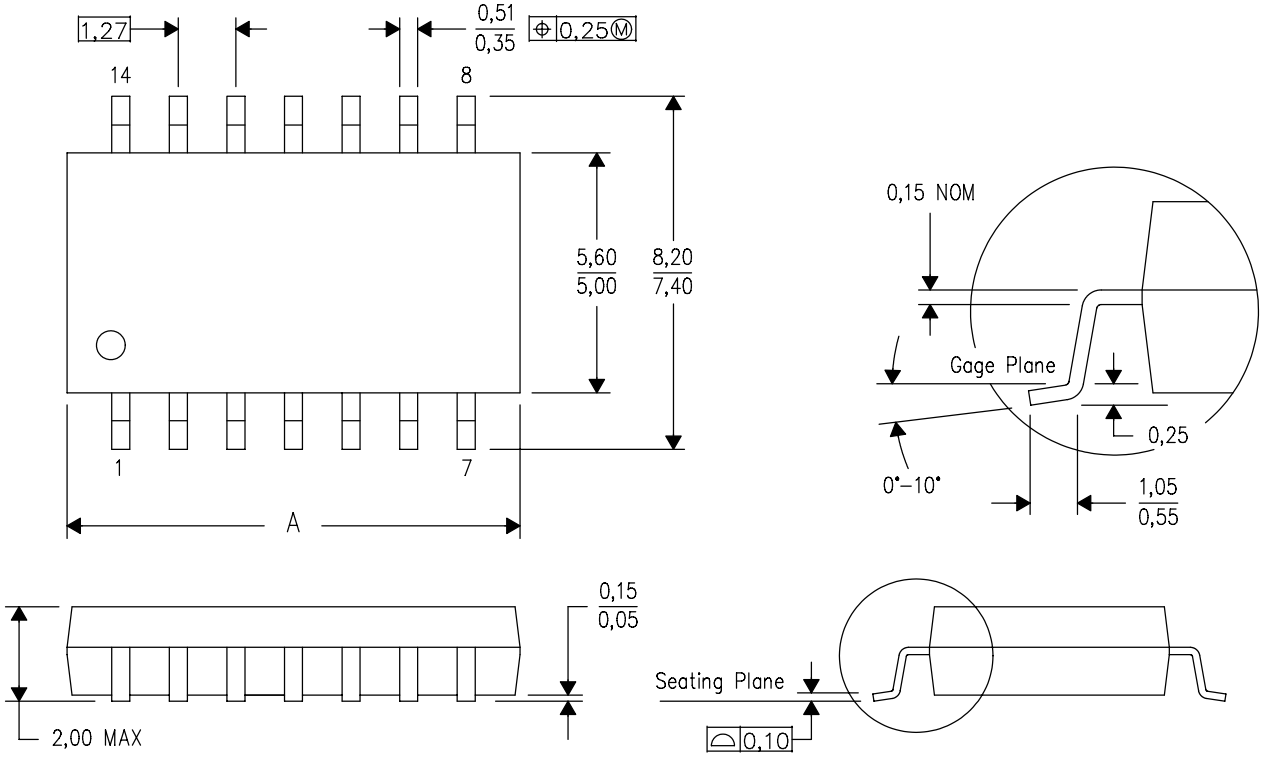
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75ALS175NSR	SO	NS	16	2000	853.0	449.0	35.0

MECHANICAL DATA

NS (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

14-PINS SHOWN



DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

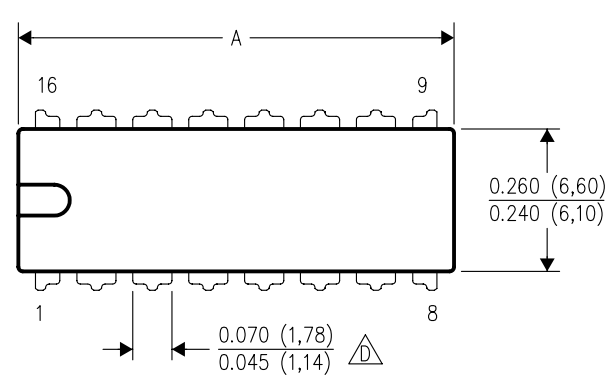
4040062/C 03/03

NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

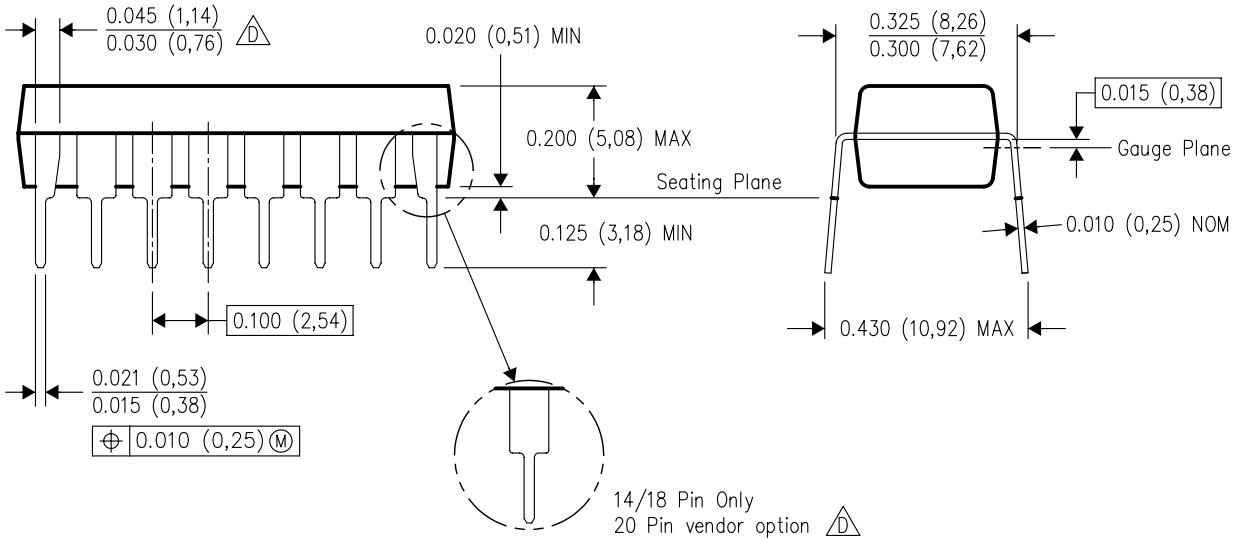
N (R–PDIP–T**)

PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN



DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS–001 VARIATION (C)	AA	BB	AC	AD



4040049/E 12/2002

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

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