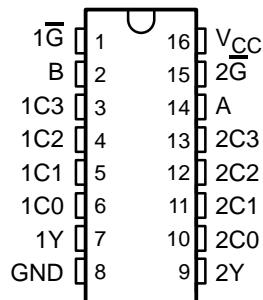


# SN54HC153, SN74HC153 DUAL 4-LINE TO 1-LINE DATA SELECTORS/MUXES

SCLS112C – DECEMBER 1982 – REVISED DECEMBER 2002

- Wide Operating Voltage Range of 2 V to 6 V
- Outputs Can Drive Up To 15 LSTTL Loads
- Low Power Consumption, 80- $\mu$ A Max I<sub>CC</sub>
- Typical t<sub>pd</sub> = 9 ns
- $\pm 6$ -mA Output Drive at 5 V
- Low Input Current of 1  $\mu$ A Max
- Permit Multiplexing from n Lines to One Line
- Perform Parallel-to-Serial Conversion
- Strobe (Enable) Line Provided for Cascading (N Lines to n Lines)

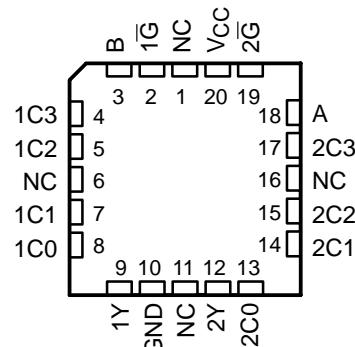
**SN54HC153 . . . J OR W PACKAGE**  
**SN74HC153 . . . D, N, NS, OR PW PACKAGE**  
(TOP VIEW)



## description/ordering information

Each of these data selectors/multiplexers contains inverters and drivers to supply full binary decoding data selection to the AND-OR gates. Separate strobe ( $\bar{G}$ ) inputs are provided for each of the two 4-line sections.

**SN54HC153 . . . FK PACKAGE**  
(TOP VIEW)



NC – No internal connection

## ORDERING INFORMATION

T <sub>A</sub>	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	PDIP – N	Tube	SN74HC153N	SN74HC153N
	SOIC – D	Tube	SN74HC153D	HC153
		Tape and reel	SN74HC153DR	
	SOP – NS	Tape and reel	SN74HC153NSR	HC153
	TSSOP – PW	Tube	SN74HC153PW	HC153
		Tape and reel	SN74HC153PWR	
–55°C to 125°C	CDIP – J	Tube	SNJ54HC153J	SNJ54HC153J
	CFP – W	Tube	SNJ54HC153W	SNJ54HC153W
	LCCC – FK	Tube	SNJ54HC153FK	SNJ54HC153FK

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



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On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

# SN54HC153, SN74HC153 DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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FUNCTION TABLE

SELECT†		INPUTS				$\bar{G}$	OUTPUT Y
B	A	C0	C1	C2	C3		
X	X	X	X	X	X	H	L
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
L	H	X	L	X	X	L	L
L	H	X	H	X	X	L	H
H	L	X	X	L	X	L	L
H	L	X	X	H	X	L	H
H	H	X	X	X	L	L	L
H	H	X	X	X	H	L	H

† Select inputs A and B are common to both sections.

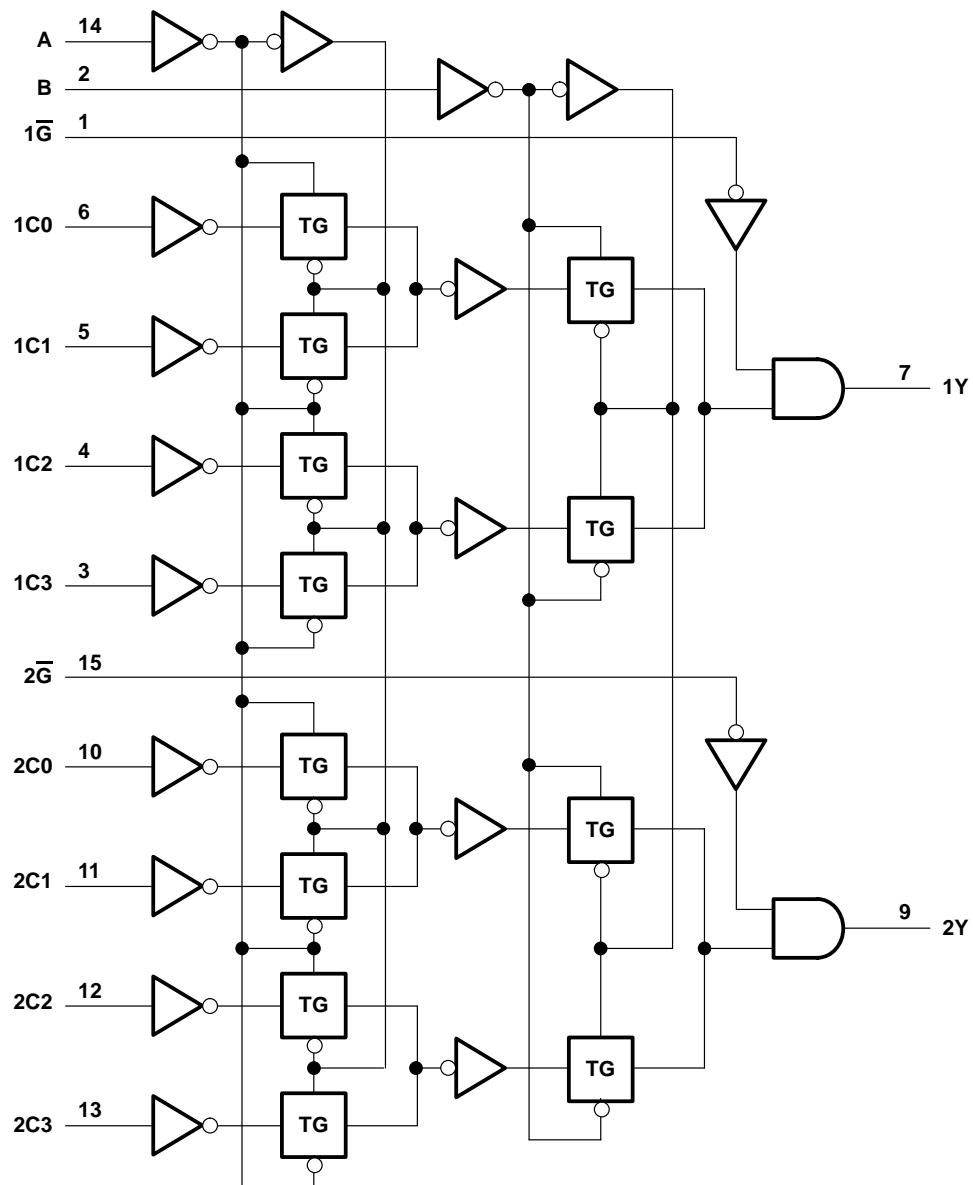


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**SN54HC153, SN74HC153**  
**DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS**

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**logic diagram (positive logic)**



Pin numbers shown are for the D, J, N, NS, PW, and W packages.

# SN54HC153, SN74HC153 DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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## absolute maximum ratings over operating free-air temperature range<sup>†</sup>

Supply voltage range, $V_{CC}$ .....	-0.5 V to 7 V
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ) (see Note 1) .....	$\pm 20$ mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) (see Note 1) .....	$\pm 20$ mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	$\pm 35$ mA
Continuous current through $V_{CC}$ or GND .....	$\pm 70$ mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): D package .....	73°C/W
N package .....	67°C/W
NS package .....	64°C/W
PW package .....	108°C/W
Storage temperature range, $T_{STG}$ .....	-65°C to 150°C

<sup>†</sup> 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. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
2. The package thermal impedance is calculated in accordance with JESD 51-7.

## recommended operating conditions (see Note 3)

		SN54HC153			SN74HC153			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$	Supply voltage	2	5	6	2	5	6	V
$V_{IH}$	High-level input voltage	$V_{CC} = 2$ V	1.5	1.5	3.15	3.15	4.2	V
		$V_{CC} = 4.5$ V	3.15	3.15				
		$V_{CC} = 6$ V	4.2	4.2				
$V_{IL}$	Low-level input voltage	$V_{CC} = 2$ V	0.5	0.5	1.35	1.35	1.8	V
		$V_{CC} = 4.5$ V	1.35	1.35				
		$V_{CC} = 6$ V	1.8	1.8				
$V_I$	Input voltage	0	$V_{CC}$	0	$V_{CC}$	0	$V_{CC}$	V
$V_O$	Output voltage	0	$V_{CC}$	0	$V_{CC}$	0	$V_{CC}$	V
$\Delta t/\Delta v$	Input transition rise/fall time	$V_{CC} = 2$ V	1000	1000	500	500	400	ns
		$V_{CC} = 4.5$ V	500	500				
		$V_{CC} = 6$ V	400	400				
$T_A$	Operating free-air temperature	-55	125	-40	85	85	°C	

NOTE 3: All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

**SN54HC153, SN74HC153**  
**DUAL 4-LINE TO 1-LINE DATA SELECTORS/MUXES**

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**electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)**

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			SN54HC153		SN74HC153		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V <sub>OH</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -20 µA	2 V	1.9	1.998	1.9		1.9		V
			4.5 V	4.4	4.499	4.4		4.4		
			6 V	5.9	5.999	5.9		5.9		
		I <sub>OH</sub> = -6 mA	4.5 V	3.98	4.3	3.7		3.84		
		I <sub>OH</sub> = -7.8 mA	6 V	5.48	5.8	5.2		5.34		
V <sub>OL</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 µA	2 V	0.002	0.1	0.1		0.1		V
			4.5 V	0.001	0.1	0.1		0.1		
			6 V	0.001	0.1	0.1		0.1		
		I <sub>OL</sub> = 6 mA	4.5 V	0.17	0.26	0.4		0.33		
		I <sub>OL</sub> = 7.8 mA	6 V	0.15	0.26	0.4		0.33		
I <sub>I</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0		6 V	±0.1	±100	±1000		±1000		nA
I <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0, I <sub>O</sub> = 0		6 V		8	160		80		µA
C <sub>i</sub>		2 V to 6 V		3	10	10		10		pF

**switching characteristics over recommended operating free-air temperature range, C<sub>L</sub> = 50 pF (unless otherwise noted) (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub>	T <sub>A</sub> = 25°C			SN54HC153		SN74HC153		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A or B	Y	2 V	90	150		225		190		ns
				4.5 V	21	30	45		38		
				6 V	17	26	38		32		
	Data (Any C)	Y	2 V	73	126		189		158		
				4.5 V	17	28	42		35		
				6 V	14	23	35		29		
	$\bar{G}$	Y	2 V	38	95		150		125		
				4.5 V	11	19	28		24		
				6 V	9	16	24		20		
t <sub>t</sub>		Y	2 V	20	60		90		75		ns
				4.5 V	8	12	18		15		
				6 V	6	10	15		13		

# SN54HC153, SN74HC153 DUAL 4-LINE TO 1-LINE DATA SELECTORS/MUXES

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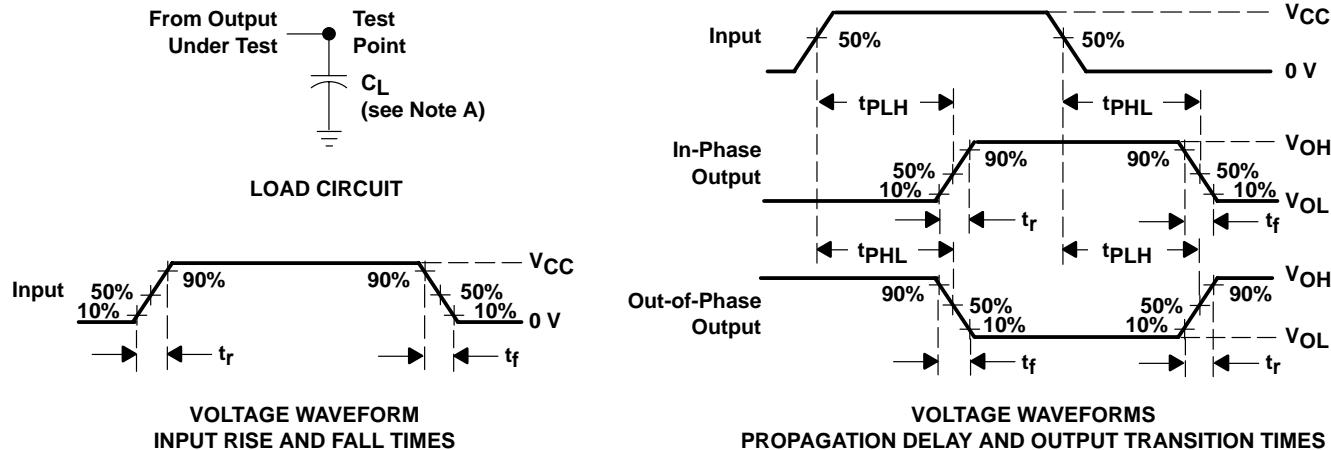
**switching characteristics over recommended operating free-air temperature range,  $C_L = 150 \text{ pF}$  (unless otherwise noted) (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC}$	$T_A = 25^\circ\text{C}$			SN54HC153	SN74HC153	UNIT
				MIN	TYP	MAX			
$t_{pd}$	A or B	Y	2 V	105	235	355	295		ns
			4.5 V	27	47	71	59		
			6 V	21	41	60	51		
	Data (Any C)	Y	2 V	93	220	335	274		
			4.5 V	23	44	67	55		
			6 V	19	38	57	48		
	$\bar{G}$	Y	2 V	60	185	280	230		
			4.5 V	17	37	56	46		
			6 V	14	32	48	40		
$t_t$		Y	2 V	45	210	315	265		ns
			4.5 V	17	42	63	53		
			6 V	13	36	53	45		

**operating characteristics,  $T_A = 25^\circ\text{C}$**

PARAMETER	TEST CONDITIONS	TYP	UNIT
$C_{pd}$ Power dissipation capacitance per multiplexer	No load	40	pF

## PARAMETER MEASUREMENT INFORMATION



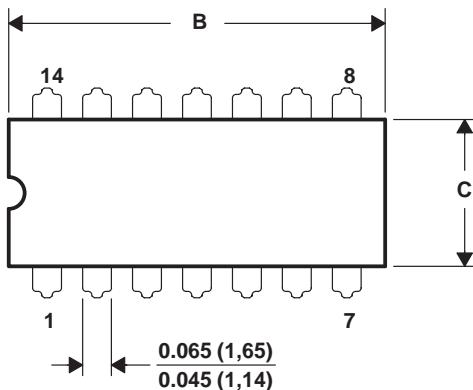
- NOTES:
- A.  $C_L$  includes probe and test-fixture capacitance.
  - B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR  $\leq 1 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r = 6 \text{ ns}$ ,  $t_f = 6 \text{ ns}$ .
  - C. The outputs are measured one at a time with one input transition per measurement.
  - D.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

Figure 1. Load Circuit and Voltage Waveforms

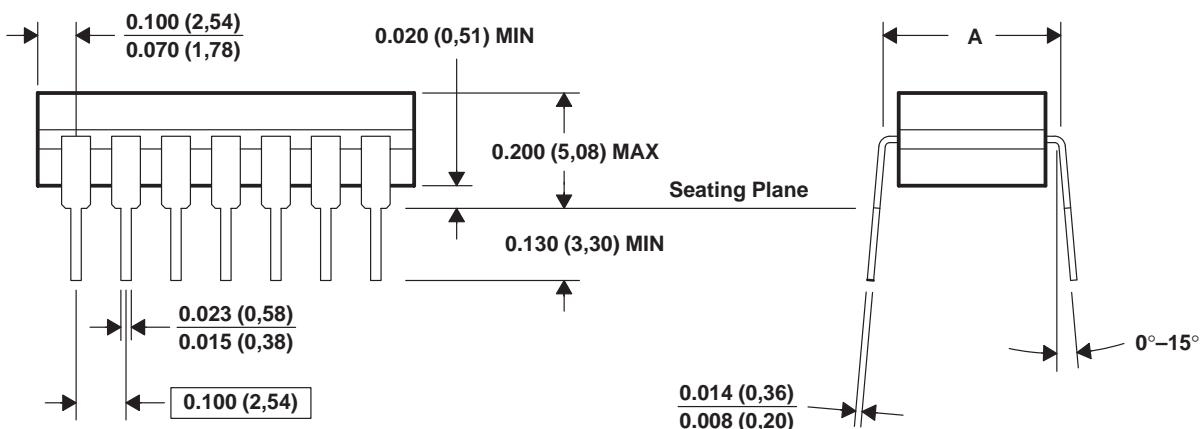
## J (R-GDIP-T\*\*)

14 LEADS SHOWN

## CERAMIC DUAL-IN-LINE



DIM \ PINS **	14	16	20
A MAX	0.310 (7,87)	0.310 (7,87)	0.310 (7,87)
A MIN	0.290 (7,37)	0.290 (7,37)	0.290 (7,37)
B MAX	0.785 (19,94)	0.785 (19,94)	0.975 (24,77)
B MIN	0.755 (19,18)	0.755 (19,18)	0.930 (23,62)
C MAX	0.300 (7,62)	0.300 (7,62)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.245 (6,22)

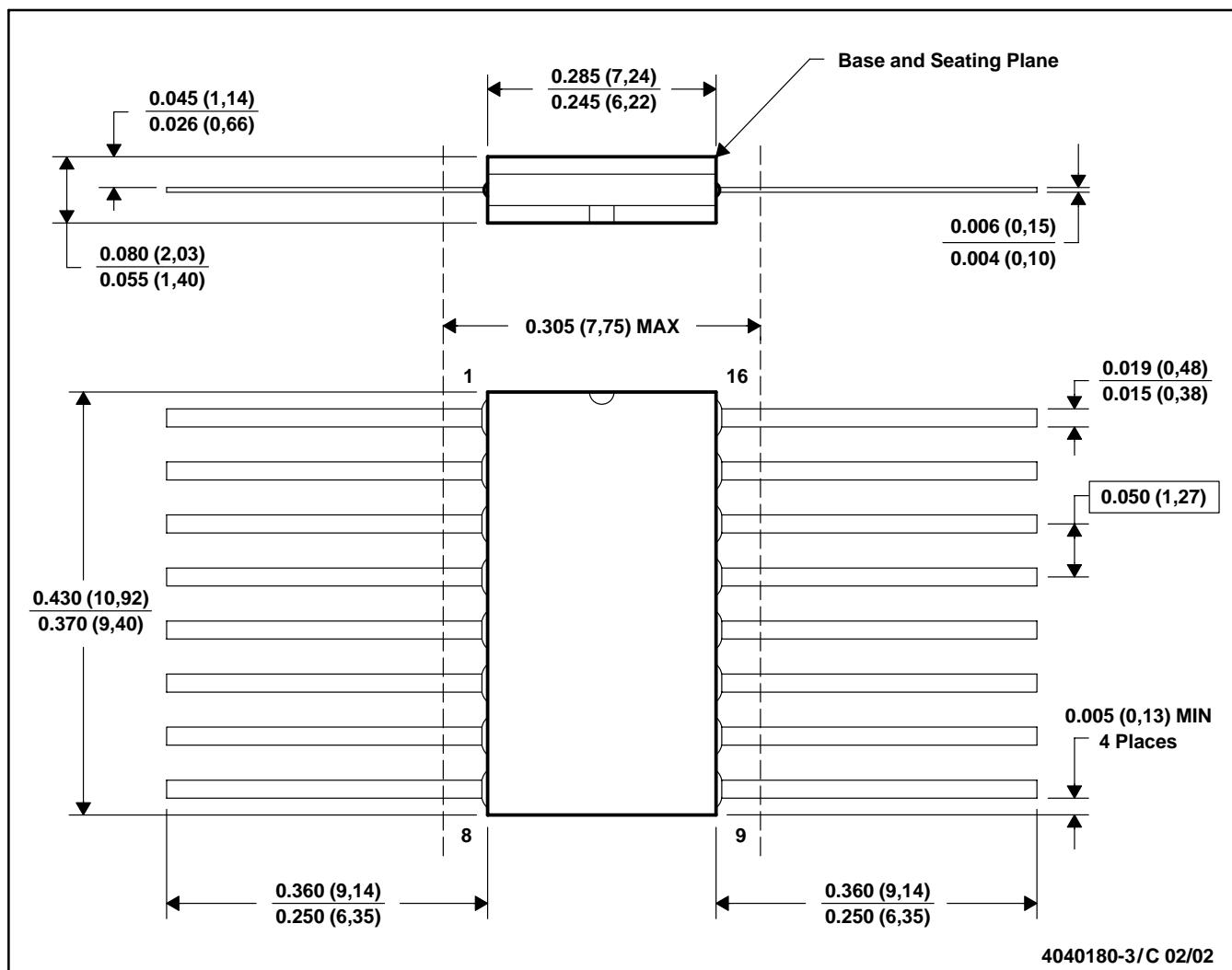


4040083/E 03/99

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package is hermetically sealed with a ceramic lid using glass frit.
  - D. Index point is provided on cap for terminal identification.
  - E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, and GDIP1-T20

W (R-GDFP-F16)

CERAMIC DUAL FLATPACK

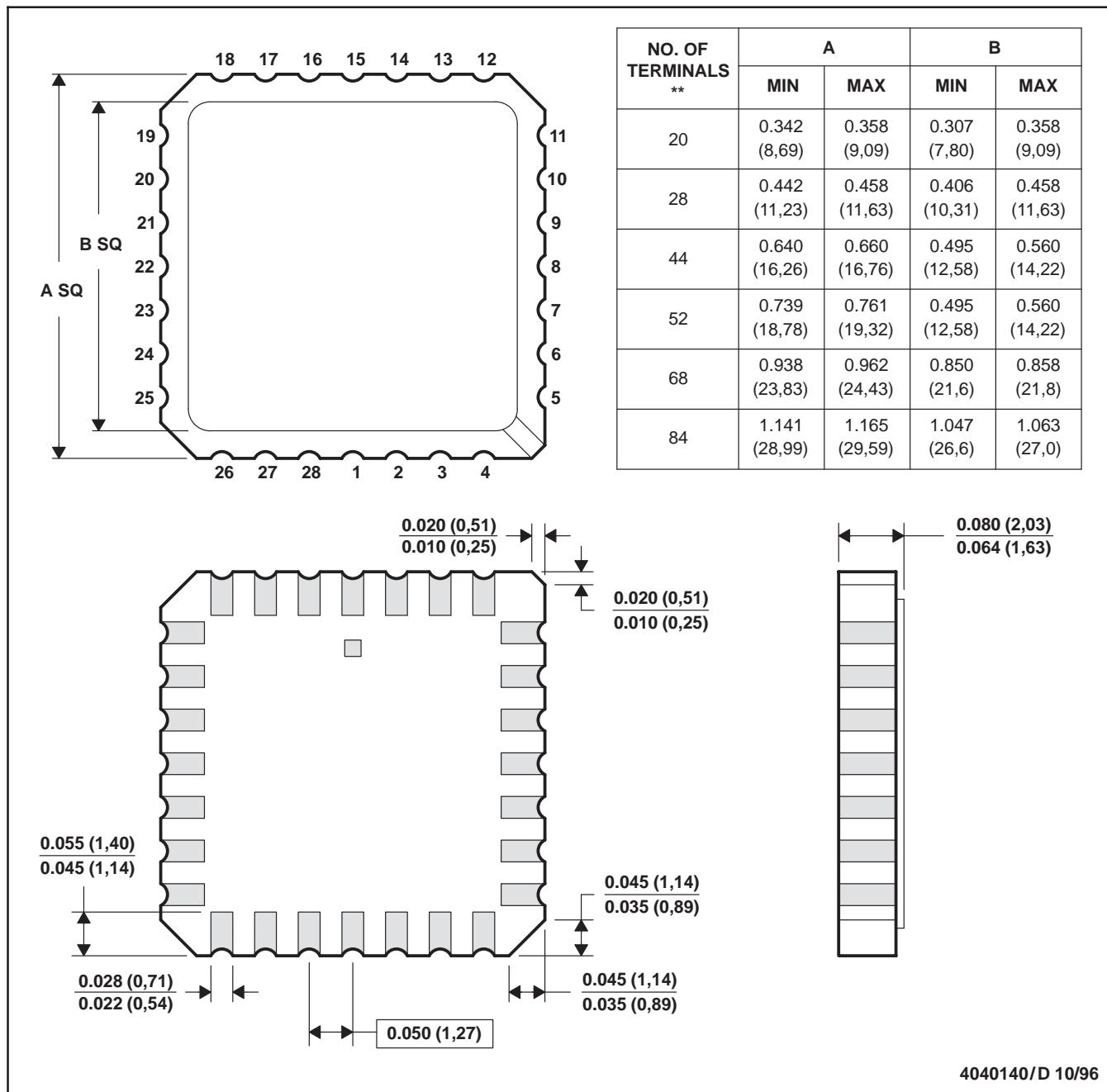


- NOTES: A. All linear dimensions are in inches (millimeters).  
 B. This drawing is subject to change without notice.  
 C. This package can be hermetically sealed with a ceramic lid using glass frit.  
 D. Index point is provided on cap for terminal identification only.  
 E. Falls within MIL STD 1835 GDFP-1F16 and JEDEC MO-092AC

## FK (S-CQCC-N\*\*)

## LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



NOTES: A. All linear dimensions are in inches (millimeters).

B. This drawing is subject to change without notice.

C. This package can be hermetically sealed with a metal lid.

D. The terminals are gold plated.

E. Falls within JEDEC MS-004

4040140/D 10/96

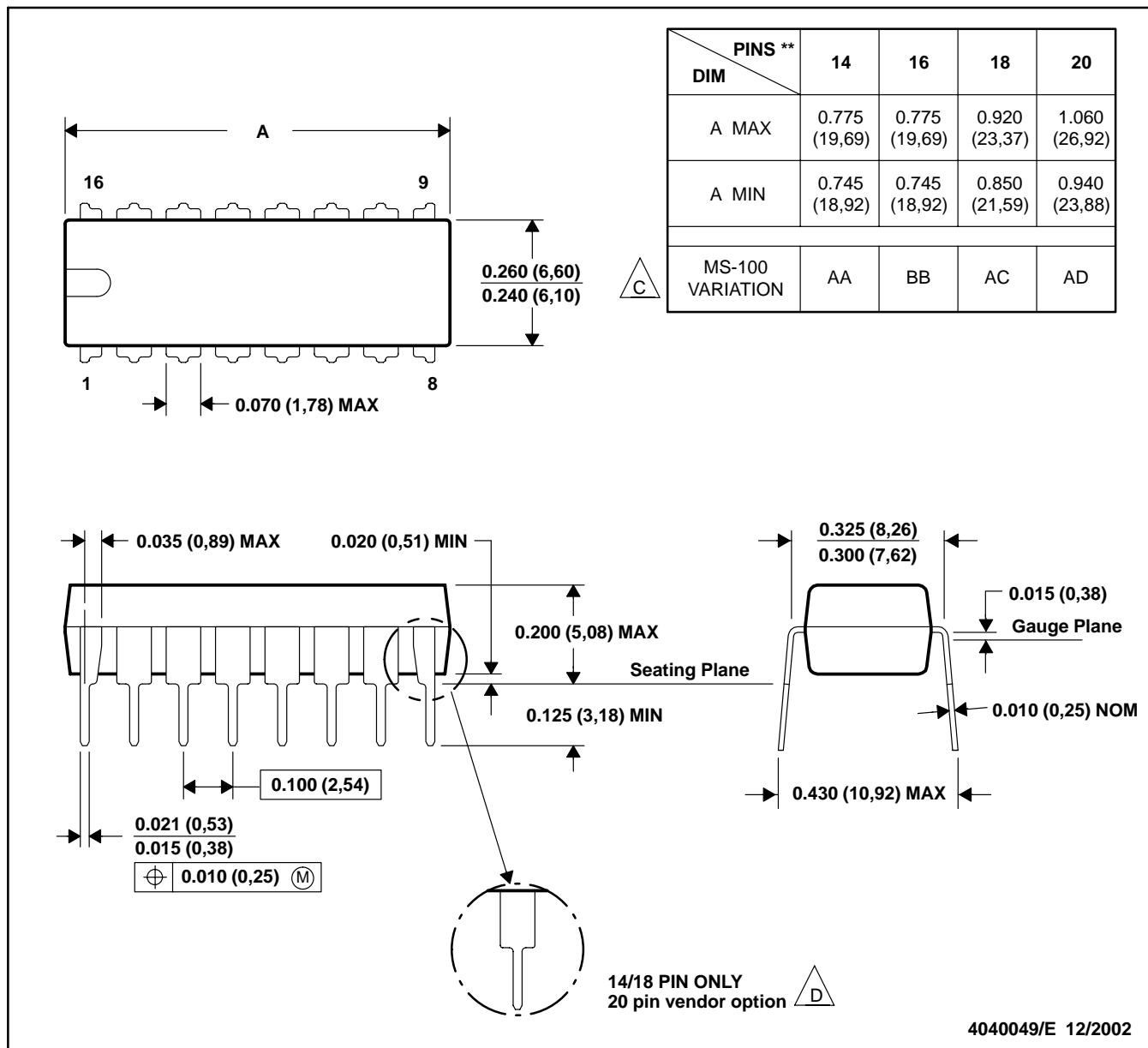
# MECHANICAL

MPDI002C – JANUARY 1995 – REVISED DECEMBER 20002

N (R-PDIP-T\*\*)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



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).

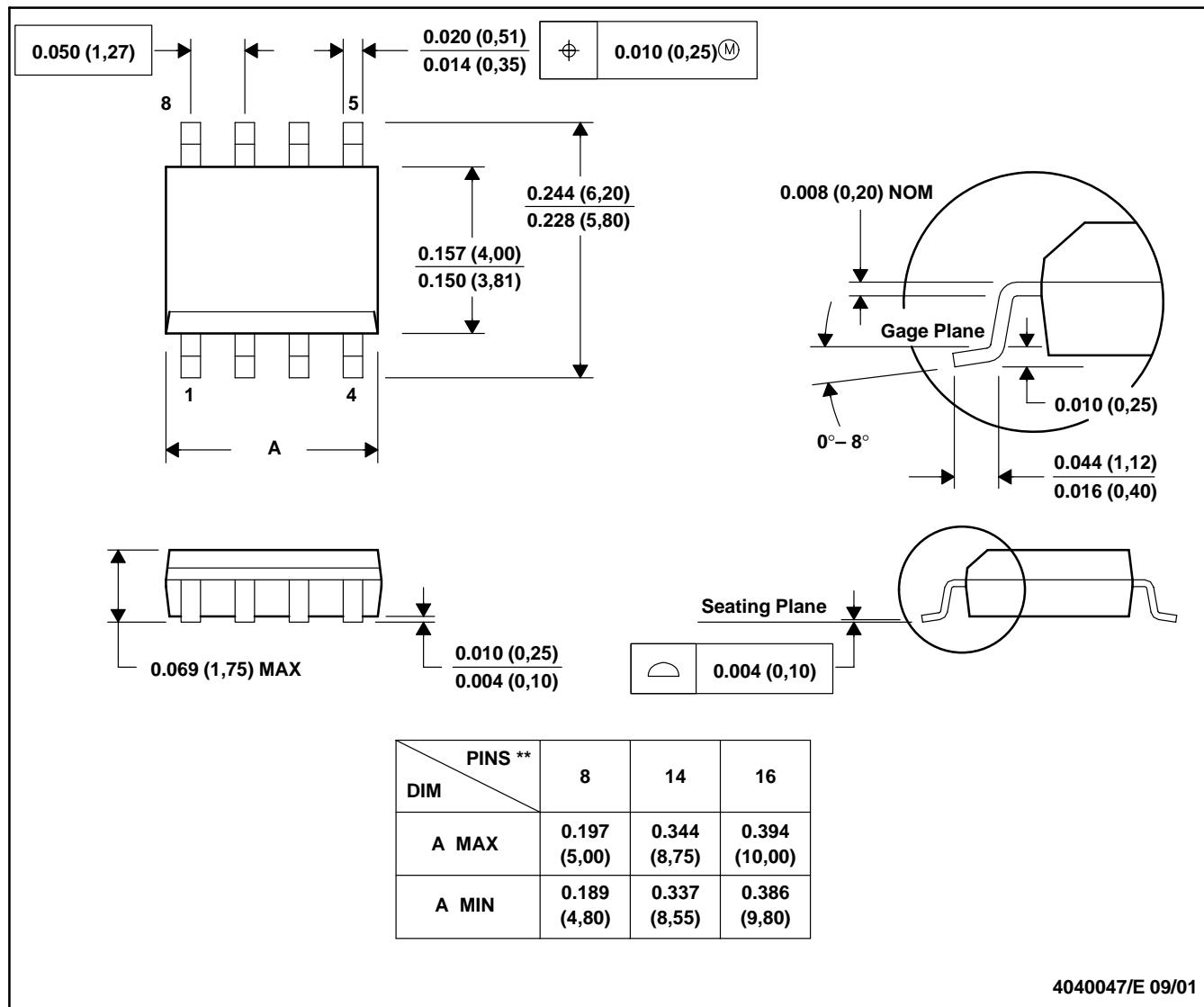
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

4040049/E 12/2002

## D (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE PACKAGE

8 PINS SHOWN



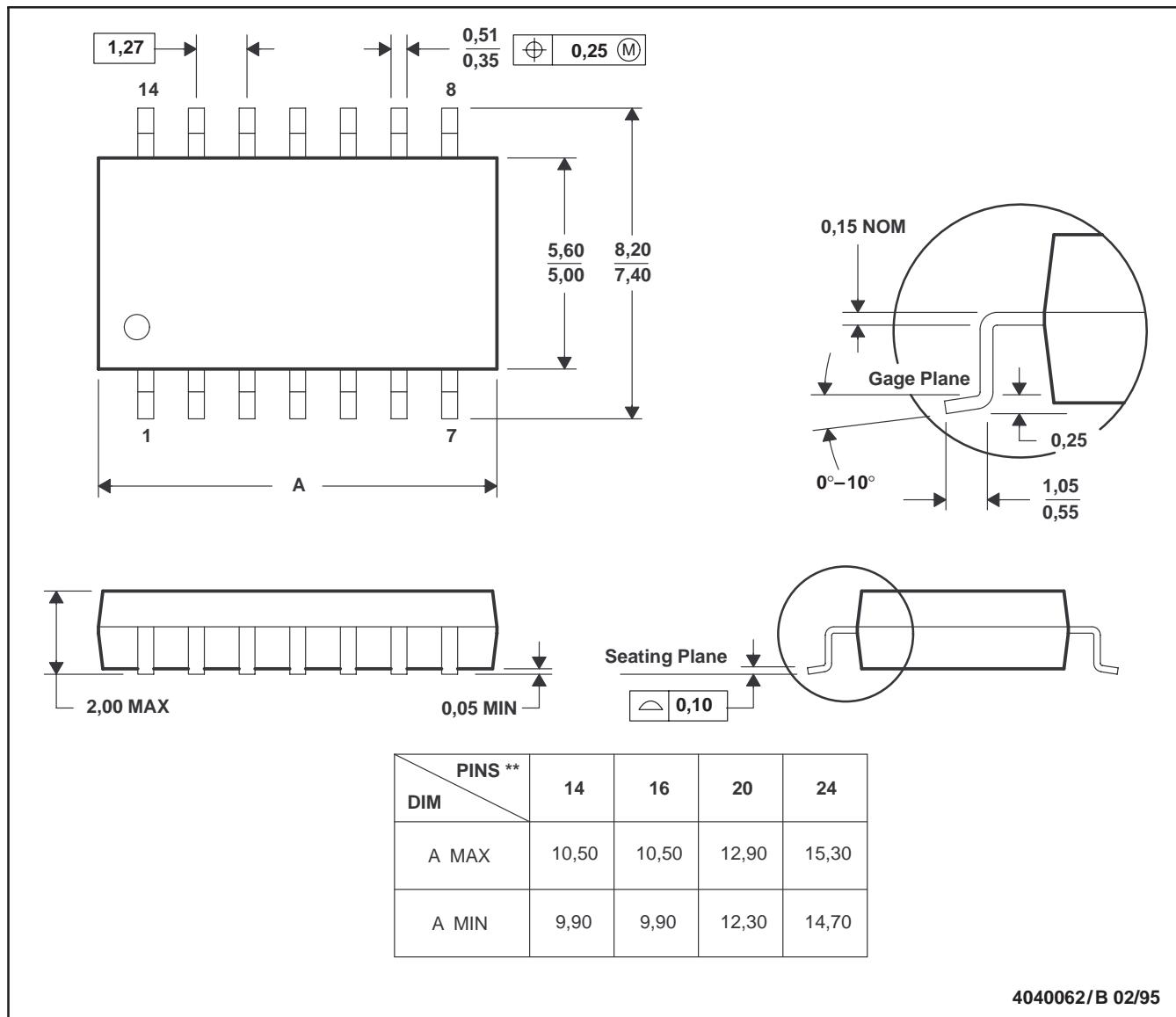
4040047/E 09/01

- NOTES: A. All linear dimensions are in inches (millimeters).  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0.006 (0.15).  
 D. Falls within JEDEC MS-012

## NS (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



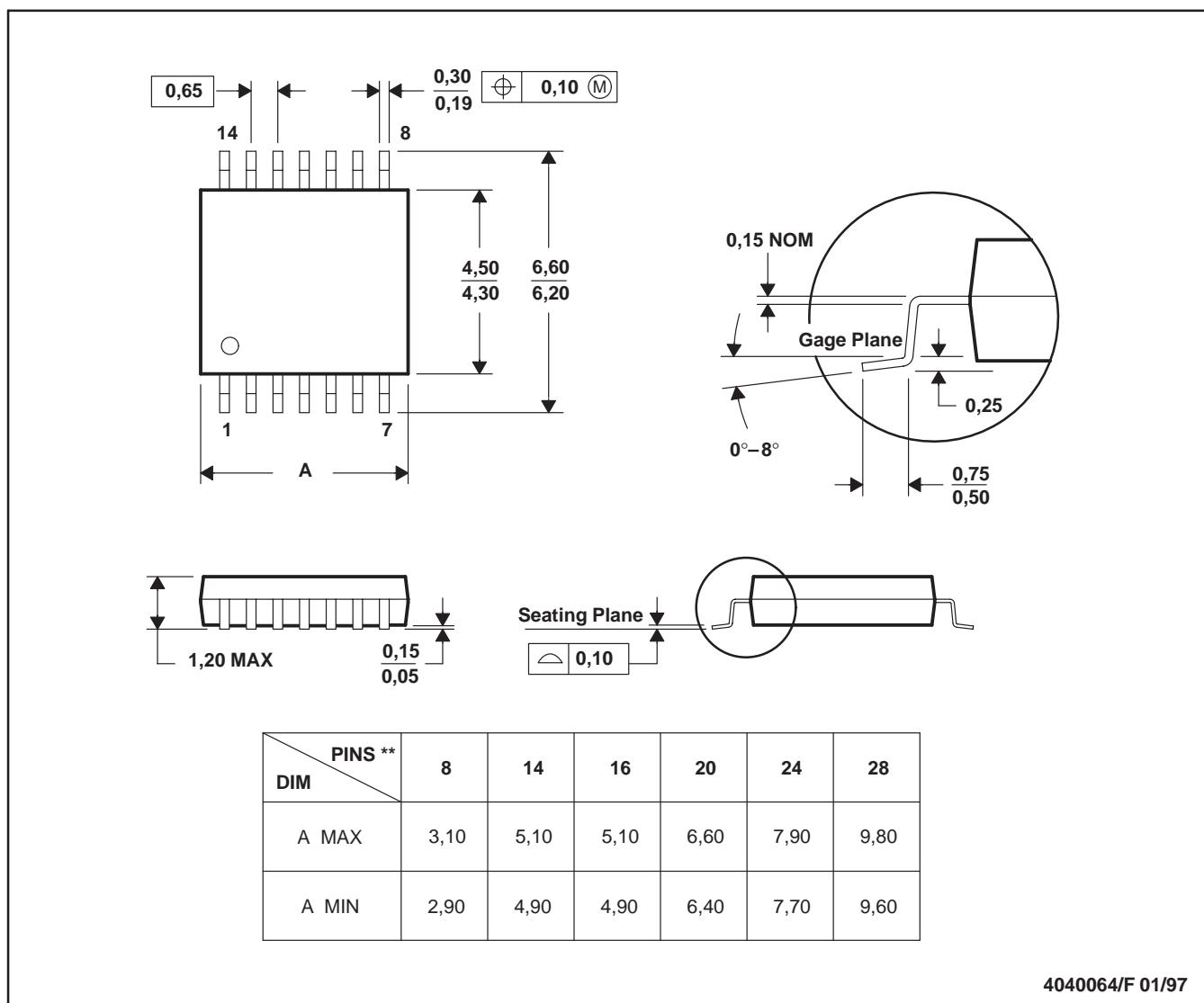
4040062/B 02/95

- 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.

## PW (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Body dimensions do not include mold flash or protrusion not to exceed 0,15.
  - Falls within JEDEC MO-153

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