

# CD54HC573, CD74HC573 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS454A – FEBRUARY 2001 – REVISED APRIL 2003

- 2-V to 6-V  $V_{CC}$  Operation
- Wide Operating Temperature Range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
- 3-State Outputs Directly Drive Bus Lines
- Balanced Propagation Delays and Transition Times
- Bus Driver Outputs Drive Up To 15 LS-TTL Loads
- Significant Power Reduction Compared to LS-TTL Logic ICs

## description/ordering information

The 'HC573 devices are octal transparent D-type latches designed for 2-V to 6-V  $V_{CC}$  operation.

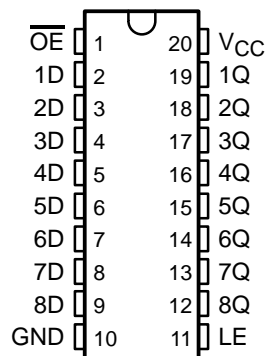
When the latch-enable (LE) input is high, the Q outputs follow the data (D) inputs. When LE is low, the Q outputs are latched at the logic levels of the D inputs.

A buffered output-enable ( $\overline{OE}$ ) input can be used to place the eight outputs in either a normal logic state (high or low) or the high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the capability to drive bus lines without interface or pullup components.

$\overline{OE}$  does not affect the internal operations of the latches. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

CD54HC573 ... F PACKAGE  
CD74HC573 ... E OR M PACKAGE  
(TOP VIEW)



## ORDERING INFORMATION

$T_A$	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
$-55^{\circ}\text{C}$ to $125^{\circ}\text{C}$	PDIP – E	Tube	CD74HC573E	CD74HC573E
	SOIC – M	Tube	CD74HC573M	HC573M
		Tape and reel	CD74HC573M96	
	CDIP – F	Tube	CD54HC573F3A	CD54HC573F3A

† 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.

 **TEXAS  
INSTRUMENTS**

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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.

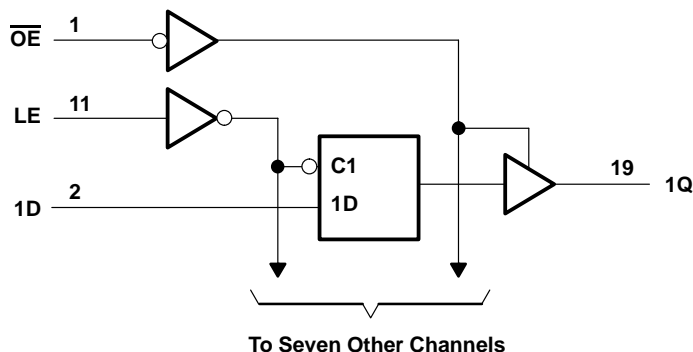
## WITH 3-STATE OUTPUTS

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**FUNCTION TABLE**  
(each latch)

INPUTS			OUTPUT Q
OE	LE	D	
L	H	H	H
L	H	L	L
L	L	X	$Q_0$
H	X	X	Z

**logic diagram (positive logic)**



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

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)	±20 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) (see Note 1)	±20 mA
Continuous output drain current per output, $I_O$ ( $V_O = 0$ to $V_{CC}$ )	±35 mA
Continuous output source or sink current per output, $I_O$ ( $V_O = 0$ to $V_{CC}$ )	±25 mA
Continuous current through $V_{CC}$ or GND	±50 mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): E package	69°C/W
M package	58°C/W
Storage temperature range, $T_{stg}$	−65°C to 150°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. 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 JEDEC 51-7.

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**recommended operating conditions (see Note 3)**

			T <sub>A</sub> = 25°C		T <sub>A</sub> = -55°C TO 125°C		T <sub>A</sub> = -40°C TO 85°C		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
V <sub>CC</sub>	Supply voltage		2	6	2	6	2	6	V
V <sub>IH</sub>	High-level input voltage		V <sub>CC</sub> = 2 V	1.5	1.5	1.5	V		
			V <sub>CC</sub> = 4.5 V	3.15	3.15	3.15			
			V <sub>CC</sub> = 6 V	4.2	4.2	4.2			
V <sub>IL</sub>	Low-level input voltage		V <sub>CC</sub> = 2 V	0.5	0.5	0.5	V		
			V <sub>CC</sub> = 4.5 V	1.35	1.35	1.35			
			V <sub>CC</sub> = 6 V	1.8	1.8	1.8			
V <sub>I</sub>	Input voltage		0	V <sub>CC</sub>	0	V <sub>CC</sub>	0	V <sub>CC</sub>	V
V <sub>O</sub>	Output voltage		0	V <sub>CC</sub>	0	V <sub>CC</sub>	0	V <sub>CC</sub>	V
t <sub>t</sub>	Input transition (rise and fall) time		V <sub>CC</sub> = 2 V	1000	1000	1000	ns		
			V <sub>CC</sub> = 4.5 V	500	500	500			
			V <sub>CC</sub> = 6 V	400	400	400			

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.

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

PARAMETER	TEST CONDITIONS		$V_{CC}$	$T_A = 25^{\circ}\text{C}$		$T_A = -55^{\circ}\text{C}$ TO $125^{\circ}\text{C}$		$T_A = -40^{\circ}\text{C}$ TO $85^{\circ}\text{C}$		UNIT
				MIN	MAX	MIN	MAX	MIN	MAX	
$V_{OH}$	$V_I = V_{IH}$ or $V_{IL}$	$I_{OH} = -20\text{ }\mu\text{A}$	2 V	1.9		1.9		1.9		V
			4.5 V	4.4		4.4		4.4		
			6 V	5.9		5.9		5.9		
		$I_{OH} = -6\text{ mA}$	4.5 V	3.98		3.7		3.84		
		$I_{OH} = -7.8\text{ mA}$	6 V	5.48		5.2		5.34		
$V_{OL}$	$V_I = V_{IH}$ or $V_{IL}$	$I_{OL} = 20\text{ }\mu\text{A}$	2 V		0.1		0.1		0.1	V
			4.5 V		0.1		0.1		0.1	
			6 V		0.1		0.1		0.1	
		$I_{OL} = 6\text{ mA}$	4.5 V		0.26		0.4		0.33	
		$I_{OL} = 7.8\text{ mA}$	6 V		0.26		0.4		0.33	
$I_I$	$V_I = V_{CC}$ or 0		6 V		$\pm 0.1$		$\pm 1$		$\pm 1$	$\mu\text{A}$
$I_{OZ}$	$V_O = V_{CC}$ or 0		6 V		$\pm 0.5$		$\pm 10$		$\pm 5$	$\mu\text{A}$
$I_{CC}$	$V_I = V_{CC}$ or 0, $I_O = 0$		6 V		8		160		80	$\mu\text{A}$
$C_i$					10		10		10	pF
$C_o$					20		20		20	pF

# CD54HC573, CD74HC573

## OCTAL TRANSPARENT D-TYPE LATCHES

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timing requirements over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

	V <sub>CC</sub>	T <sub>A</sub> = 25°C		T <sub>A</sub> = –55°C TO 125°C		T <sub>A</sub> = –40°C TO 85°C		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>w</sub> Pulse duration, LE high	2 V	80		120		100		ns
	4.5 V	16		24		20		
	6 V	14		20		17		
t <sub>su</sub> Setup time, data before LE↓	2 V	50		75		65		ns
	4.5 V	10		15		13		
	6 V	9		13		11		
t <sub>h</sub> Hold time, data after LE↓	2 V	40		60		50		ns
	4.5 V	8		12		10		
	6 V	7		10		9		

switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	V <sub>CC</sub>	T <sub>A</sub> = 25°C		T <sub>A</sub> = –55°C TO 125°C		T <sub>A</sub> = –40°C TO 85°C		UNIT
					MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	D	Q	C <sub>L</sub> = 50 pF	2 V		175		265		220	ns
				4.5 V		35		53		44	
				6 V		30		45		37	
	LE	Q	C <sub>L</sub> = 50 pF	2 V		175		265		220	
				4.5 V		35		53		44	
				6 V		30		45		37	
t <sub>en</sub>	$\overline{\text{OE}}$	Q	C <sub>L</sub> = 50 pF	2 V		150		225		190	ns
				4.5 V		30		45		38	
				6 V		26		38		33	
t <sub>dis</sub>	$\overline{\text{OE}}$	Q	C <sub>L</sub> = 50 pF	2 V		150		225		190	ns
				4.5 V		30		45		38	
				6 V		26		38		33	
t <sub>t</sub>		Q	C <sub>L</sub> = 50 pF	2 V		60		90		75	ns
				4.5 V		12		18		15	
				6 V		10		15		13	

operating characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C

PARAMETER	TYP	UNIT
C <sub>pd</sub> Power dissipation capacitance	51	pF

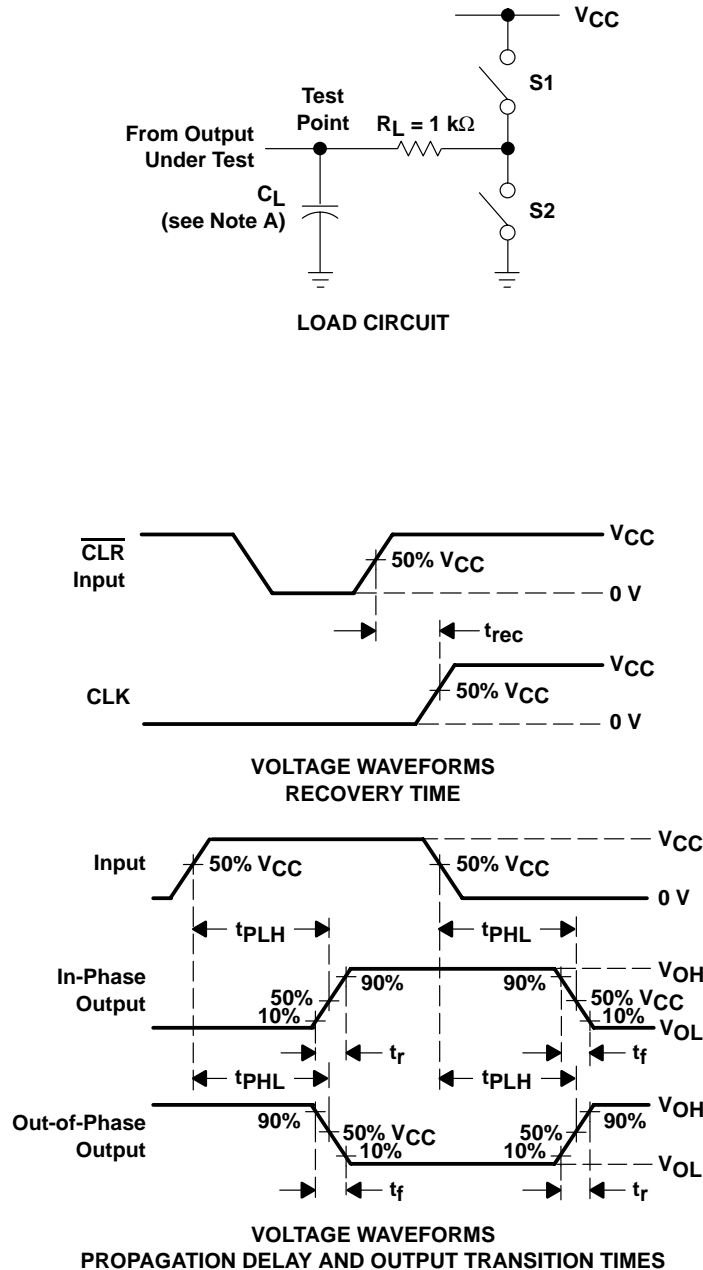


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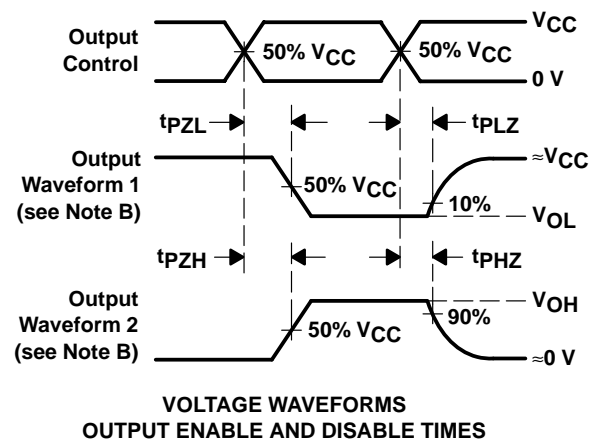
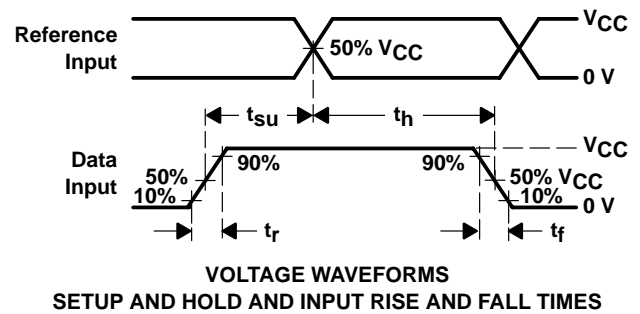
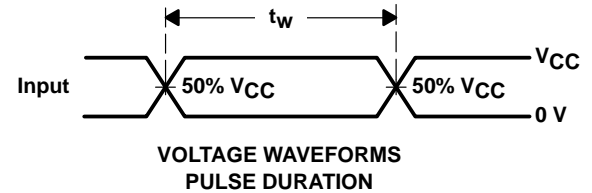
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## PARAMETER MEASUREMENT INFORMATION



PARAMETER		S1	S2
$t_{en}$	$t_{pZH}$	Open	Closed
	$t_{pZL}$	Closed	Open
$t_{dis}$	$t_{PHZ}$	Open	Closed
	$t_{PLZ}$	Closed	Open
$t_{pd}$ or $t_t$		Open	Open



- NOTES:
- $C_L$  includes probe and test-fixture capacitance.
  - Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
  - Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1\text{ MHz}$ ,  $Z_O = 50\text{ }\Omega$ ,  $t_r = 6\text{ ns}$ ,  $t_f = 6\text{ ns}$ .
  - For clock inputs,  $f_{max}$  is measured with the input duty cycle at 50%.
  - The outputs are measured one at a time with one input transition per measurement.
  - $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
  - $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
  - $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

Figure 1. Load Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
CD54HC573F	ACTIVE	CDIP	J	20	1	TBD	A42 SNPB	N / A for Pkg Type
CD54HC573F3A	ACTIVE	CDIP	J	20	1	TBD	A42 SNPB	N / A for Pkg Type
CD74HC573E	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD74HC573EE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD74HC573M	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HC573M96	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HC573M96G4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74HC573MG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

<sup>(1)</sup> 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.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

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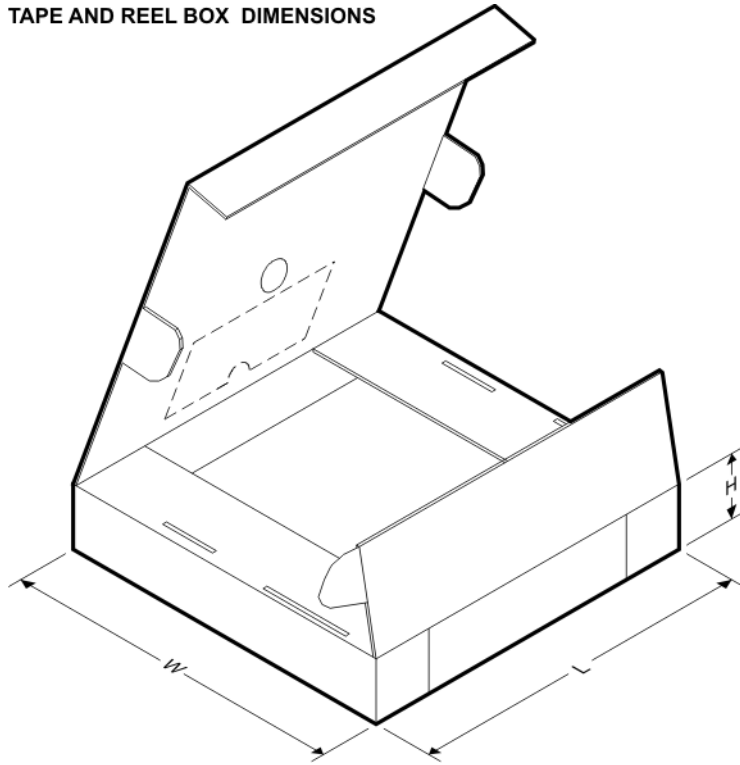
**TAPE AND REEL INFORMATION**



\*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
CD74HC573M96	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD74HC573M96	SOIC	DW	20	2000	346.0	346.0	41.0



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

14 LEADS SHOWN

# CERAMIC DUAL IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- 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 only on press ceramic glass frit seal only.
  - E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

## DW (R-PDSO-G20)

## PLASTIC SMALL-OUTLINE PACKAGE



4040000-4/F 06/2004

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - Falls within JEDEC MS-013 variation AC.

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

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



PINS ** DIM	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	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.
-  Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).  
 The 20 pin end lead shoulder width is a vendor option, either half or full width.

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Broadband	<a href="http://www.ti.com/broadband">www.ti.com/broadband</a>
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