- **AC Types Feature 1.5-V to 5.5-V Operation and Balanced Noise Immunity at 30% of the Supply Voltage**
- **8-Line to 1-Line Multiplexers Can Perform as:**
  - **Boolean Function Generators**
  - **Parallel-to-Serial Converters**
  - **Data Source Selectors**
- **Speed of Bipolar F, AS, and S, With Significantly Reduced Power Consumption**
- **Balanced Propagation Delays**
- **±24-mA Output Drive Current**
  - **Fanout to 15 F Devices**
- **SCR-Latchup-Resistant CMOS Process and Circuit Design**
- **Exceeds 2-kV ESD Protection Per MIL-STD-883, Method 3015**

E OR M PACKAGE
(TOP VIEW)

D3	1	16 V$_{CC}$
D2	2	15 D4
D1	3	14 D5
D0	4	13 D6
Y	5	12 D7
W	6	11 A
$\overline{G}$	7	10 B
GND	8	9 C
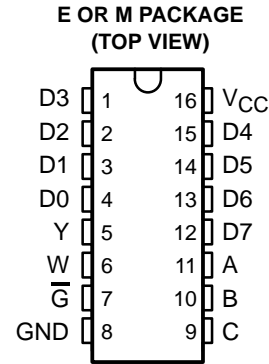
description/ordering information

This data selector/multiplexer provides full binary decoding to select one of eight data sources. The strobe ($\overline{G}$) input must be at a low logic level to enable the inputs. A high level at the strobe terminal forces the W output high and the Y output low.

ORDERING INFORMATION

T$_A$	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
−55°C to 125°C	PDIP – E	Tube	CD74AC151E	CD74AC151E
	SOIC – M	Tape and reel	CD74AC151M96	AC151M

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

FUNCTION TABLE

INPUTS				OUTPUTS	
SELECT			STROBE	Y	W
C	B	A	$\overline{G}$		
X	X	X	H	L	H
L	L	L	L	D0	$\overline{D0}$
L	L	H	L	D1	$\overline{D1}$
L	H	L	L	D2	$\overline{D2}$
L	H	H	L	D3	$\overline{D3}$
H	L	L	L	D4	$\overline{D4}$
H	L	H	L	D5	$\overline{D5}$
H	H	L	L	D6	$\overline{D6}$
H	H	H	L	D7	$\overline{D7}$

D0, D1 . . . D7 = the level of the respective D input

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.

TEXAS INSTRUMENTS

CD74AC151
8-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER

SCHS333 – MARCH 2003

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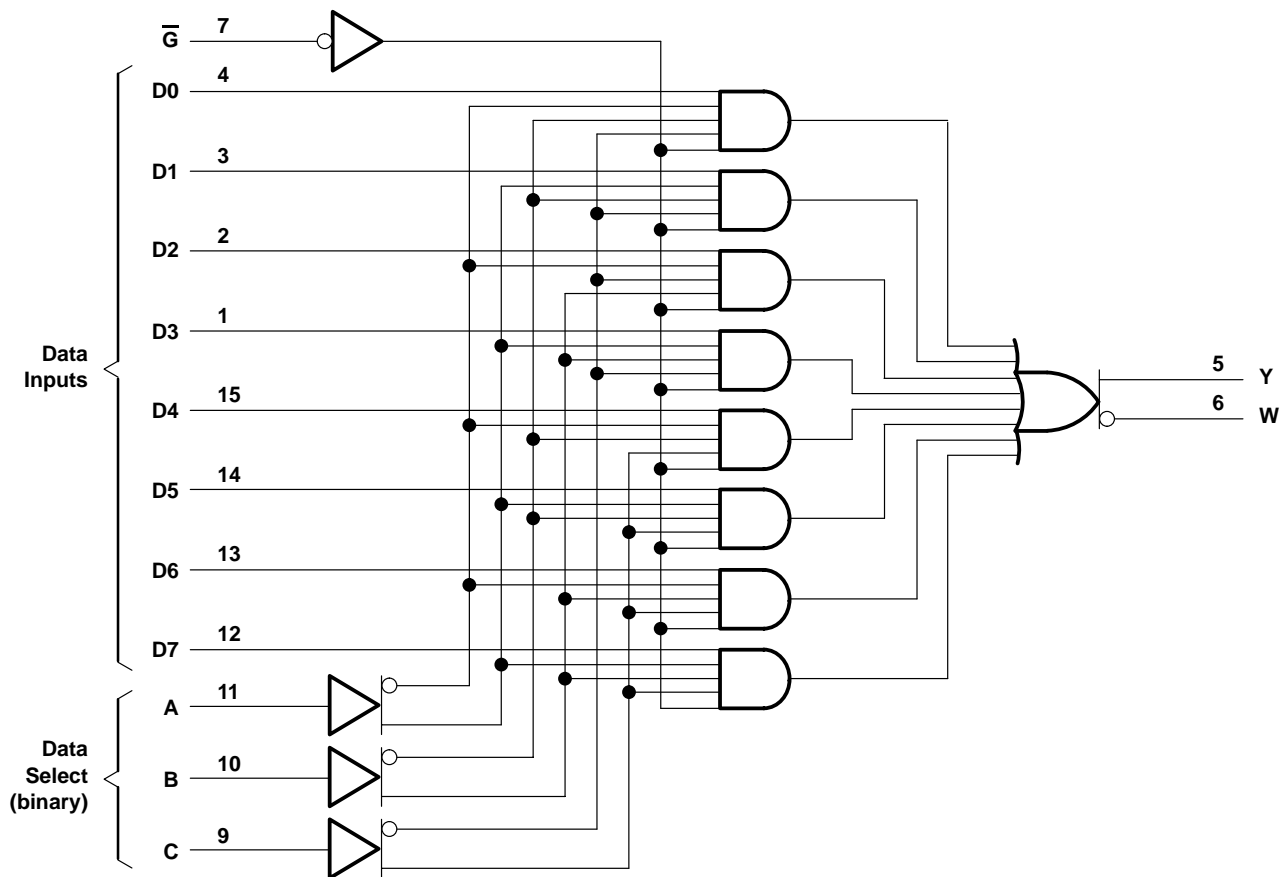
absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, V_{CC} .... –0.5 V to 6 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) .... ±50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC}) .... ±50 mA
Continuous current through V_{CC} or GND .... ±100 mA
Package thermal impedance, θ_{JA} (see Note 2): E package .... 67°C/W
　　　　　　　　　　　　　　　　　　　　　　 M package .... 73°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 JESD 51-7.

recommended operating conditions (see Note 3)

			$T_A = 25°C$ MIN	MAX	−55°C to 125°C MIN	MAX	−40°C to 85°C MIN	MAX	UNIT
V_{CC}	Supply voltage		1.5	5.5	1.5	5.5	1.5	5.5	V
V_{IH}	High-level input voltage	V_{CC} = 1.5 V	1.2		1.2		1.2		V
		V_{CC} = 3 V	2.1		2.1		2.1		
		V_{CC} = 5.5 V	3.85		3.85		3.85		
V_{IL}	Low-level input voltage	V_{CC} = 1.5 V		0.3		0.3		0.3	V
		V_{CC} = 3 V		0.9		0.9		0.9	
		V_{CC} = 5.5 V		1.65		1.65		1.65	
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
I_{OH}	High-level output current	V_{CC} = 4.5 V to 5.5 V		−24		−24		−24	mA
I_{OL}	Low-level output current	V_{CC} = 4.5 V to 5.5 V		24		24		24	mA
$\Delta t / \Delta v$	Input transition rise or fall rate	V_{CC} = 1.5 V to 3 V		50		50		50	ns/V
		V_{CC} = 3.6 V to 5.5 V		20		20		20	

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}	$T_A = 25°C$ MIN	MAX	−55°C to 125°C MIN	MAX	−40°C to 85°C MIN	MAX	UNIT
V_{OH}	$V_I = V_{IH}$ or V_{IL}	I_{OH} = −50 μA	1.5 V	1.4		1.4		1.4		V
			3 V	2.9		2.9		2.9		
			4.5 V	4.4		4.4		4.4		
		I_{OH} = −4 mA	3 V	2.58		2.4		2.48		
		I_{OH} = −24 mA	4.5 V	3.94		3.7		3.8		
		I_{OH} = −50 mA†	5.5 V			3.85				
		I_{OH} = −75 mA†	5.5 V					3.85		
V_{OL}	$V_I = V_{IH}$ or V_{IL}	I_{OL} = 50 μA	1.5 V		0.1		0.1		0.1	V
			3 V		0.1		0.1		0.1	
			4.5 V		0.1		0.1		0.1	
		I_{OL} = 12 mA	3 V		0.36		0.5		0.44	
		I_{OL} = 24 mA	4.5 V		0.36		0.5		0.44	
		I_{OL} = 50 mA†	5.5 V				1.65		−	
		I_{OL} = 75 mA†	5.5 V						1.65	
I_I	$V_I = V_{CC}$ or GND		5.5 V		±0.1		±1		±1	μA
I_{CC}	$V_I = V_{CC}$ or GND, I_O = 0		5.5 V		8		160		80	μA
C_i					10		10		10	pF

† Test one output at a time, not exceeding 1-second duration. Measurement is made by forcing indicated current and measuring voltage to minimize power dissipation. Test verifies a minimum 50-Ω transmission-line drive capability at 85°C and 75-Ω transmission-line drive capability at 125°C.

switching characteristics over recommended operating free-air temperature range,
V_{CC} = 1.5 V, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	−55°C to 125°C		−40°C to 85°C		UNIT
			MIN	MAX	MIN	MAX	
t_{PLH}	D	Y		169		152	ns
t_{PHL}				169		152	
t_{PLH}	D	W		186		169	ns
t_{PHL}				186		169	
t_{PLH}	A, B, or C	Y		228		207	ns
t_{PHL}				228		207	
t_{PLH}	A, B, or C	W		245		223	ns
t_{PHL}				245		223	
t_{PLH}	$\overline{G}$	Y		153		139	ns
t_{PHL}				153		139	
t_{PLH}	$\overline{G}$	W		169		153	ns
t_{PHL}				169		153	

switching characteristics over recommended operating free-air temperature range,
V_{CC} = 3.3 V ± 0.3 V, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	−55°C to 125°C		−40°C to 85°C		UNIT
			MIN	MAX	MIN	MAX	
t_{PLH}	D	Y	4.7	18.9	4.9	17.1	ns
t_{PHL}			4.7	18.9	4.9	17.1	
t_{PLH}	D	W	5.2	20.9	5.4	19	ns
t_{PHL}			5.2	20.9	5.4	19	
t_{PLH}	A, B, or C	Y	6.4	25.5	6.6	23.2	ns
t_{PHL}			6.4	25.5	6.6	23.2	
t_{PLH}	A, B, or C	W	6.9	27.4	7.1	24.9	ns
t_{PHL}			6.9	27.4	7.1	24.9	
t_{PLH}	$\overline{G}$	Y	4.3	17.1	4.4	15.5	ns
t_{PHL}			4.3	17.1	4.4	15.5	
t_{PLH}	$\overline{G}$	W	4.7	18.9	4.9	17.2	ns
t_{PHL}			4.7	18.9	4.9	17.2	

switching characteristics over recommended operating free-air temperature range,
V_{CC} = 5 V ± 0.5 V, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	−55°C to 125°C		−40°C to 85°C		UNIT
			MIN	MAX	MIN	MAX	
t_{PLH}	D	Y	3.4	13.5	3.5	12.3	ns
t_{PHL}			3.4	13.5	3.5	12.3	
t_{PLH}	D	W	3.7	14.9	3.8	13.5	ns
t_{PHL}			3.7	14.9	3.8	13.5	
t_{PLH}	A, B, or C	Y	4.6	18.2	4.7	16.5	ns
t_{PHL}			4.6	18.2	4.7	16.5	
t_{PLH}	A, B, or C	W	4.9	19.6	5.1	17.8	ns
t_{PHL}			4.9	19.6	5.1	17.8	
t_{PLH}	$\overline{G}$	Y	3.1	12.2	3.1	11.1	ns
t_{PHL}			3.1	12.2	3.1	11.1	
t_{PLH}	$\overline{G}$	W	3.4	13.5	3.5	12.3	ns
t_{PHL}			3.4	13.5	3.5	12.3	

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

PARAMETER		TYP	UNIT
C_{pd}	Power dissipation capacitance	120	pF

PARAMETER MEASUREMENT INFORMATION
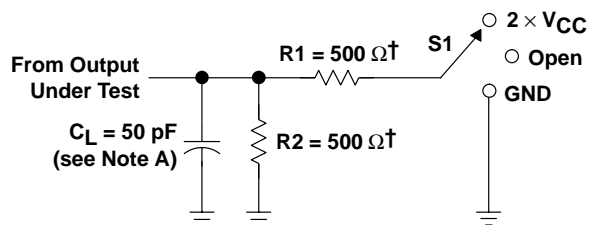
† When V_{CC} = 1.5 V, R1 = R2 = 1 kΩ

LOAD CIRCUIT

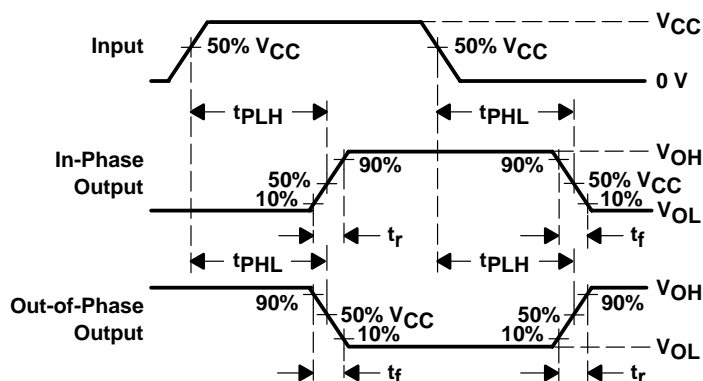| TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	$2 \times V_{CC}$
t_{PHZ}/t_{PZH}	GND
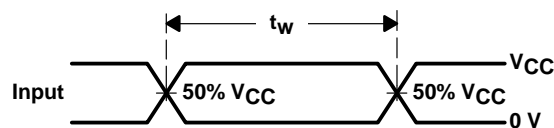
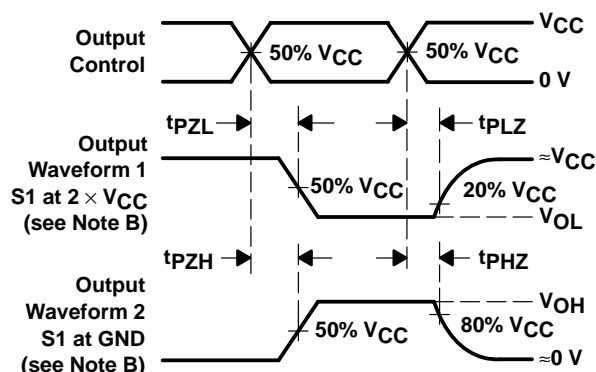**VOLTAGE WAVEFORMS**
PULSE DURATION
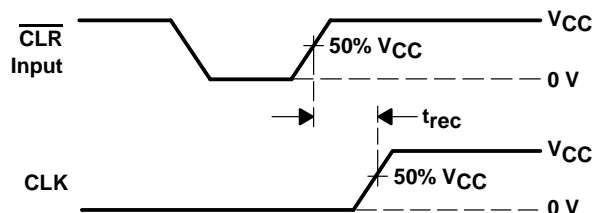
VOLTAGE WAVEFORMS
RECOVERY TIME
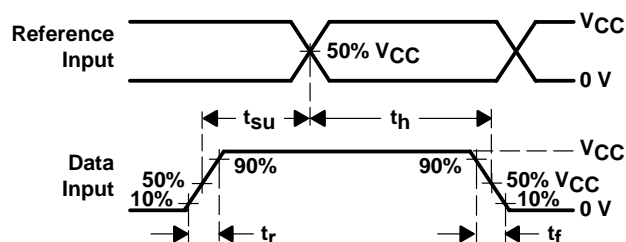
VOLTAGE WAVEFORMS
SETUP AND HOLD AND INPUT RISE AND FALL TIMES

VOLTAGE WAVEFORMS
PROPAGATION DELAY AND OUTPUT TRANSITION TIMES

VOLTAGE WAVEFORMS
OUTPUT ENABLE AND DISABLE TIMES

NOTES: A. C_L includes probe and test-fixture capacitance.
  B. 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.
  C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r = 3 ns, t_f = 3 ns.
     Phase relationships between waveforms are arbitrary.
  D. For clock inputs, f_{max} is measured with the input duty cycle at 50%.
  E. The outputs are measured one at a time with one input transition per measurement.
  F. t_{PLH} and t_{PHL} are the same as t_{pd}.
  G. t_{PZL} and t_{PZH} are the same as t_{en}.
  H. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
  I. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

TEXAS INSTRUMENTS

POST OFFICE BOX 655303 ● DALLAS, TEXAS 75265

PACKAGING INFORMATION

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
CD74AC151E	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD74AC151EE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD74AC151M96	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74AC151M96E4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

[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] 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)

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

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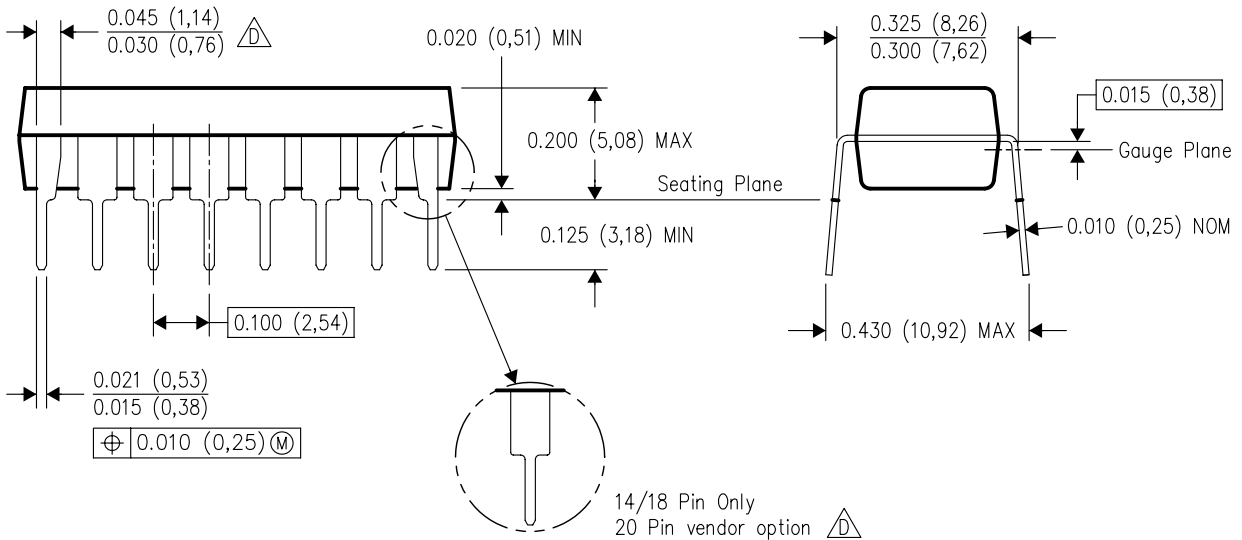
N (R−PDIP−T**)　　　　PLASTIC DUAL−IN−LINE PACKAGE

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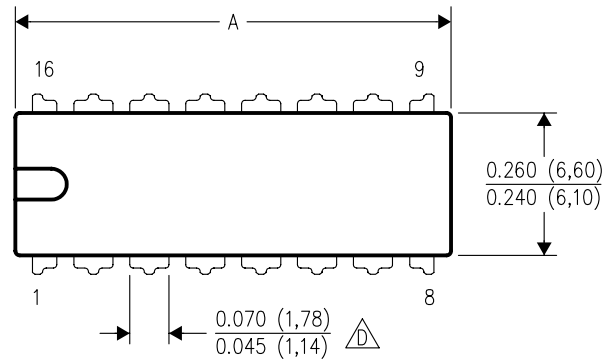
PINS ** DIM	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS−001 VARIATION	AA	BB	AC	AD

4040049/E 12/2002

NOTES:　A.　All linear dimensions are in inches (millimeters).
　　　　B.　This drawing is subject to change without notice.
　　　　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.

D (R−PDSO−G16) PLASTIC SMALL−OUTLINE PACKAGE

0.394 (10,00)
0.386 (9,80)

16   9

0.244 (6,20)
0.228 (5,80)

0.157 (4,00)
0.150 (3,80)

1   8

Pin 1
Index Area

0.050 (1,27)

0.020 (0,51)
0.012 (0,31)

⊕ | 0.010 (0,25) Ⓜ

0.069 (1,75) Max

0.010 (0,25)
0.004 (0,10)

0.010 (0,25)
0.007 (0,17)

0.004 (0,10)

Gauge Plane

Seating Plane

0.010 (0,25)   0°−8°

0.050 (1,27)
0.016 (0,40)

4040047−4/F   07/2004

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 variation AC.

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