- **3-State Outputs Drive Bus Lines or Buffer Memory Address Registers**

- **Data Flow-Through Pinout (All Inputs on Opposite Side From Outputs)**

- **Package Options Include Plastic Small-Outline Packages, Ceramic Chip Carriers, and Plastic and Ceramic DIPs**
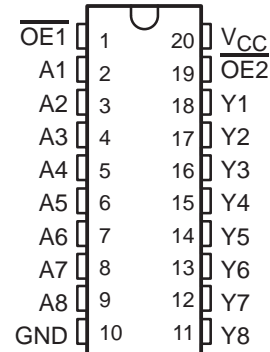
description

The ′F541 octal buffer/line driver is ideal for driving bus lines or buffering memory address registers. The device features inputs and outputs on opposite sides of the package to facilitate printed-circuit-board layout.
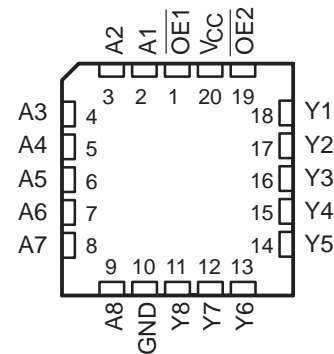
The 3-state control gate is a 2-input AND gate with active-low inputs so that if either output enable ($\overline{OE1}$ or $\overline{OE2}$) input is high, all eight outputs are in the high-impedance state.

The SN54F541 is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74F251 is characterized for operation from 0°C to 70°C.

SN54F541 . . . J PACKAGE
SN74F541 . . . DW OR N PACKAGE
(TOP VIEW)

```
        ┌───┬─∪─┬───┐
 OE1 ┤ 1      20 ├ VCC
  A1 ┤ 2      19 ├ OE2
  A2 ┤ 3      18 ├ Y1
  A3 ┤ 4      17 ├ Y2
  A4 ┤ 5      16 ├ Y3
  A5 ┤ 6      15 ├ Y4
  A6 ┤ 7      14 ├ Y5
  A7 ┤ 8      13 ├ Y6
  A8 ┤ 9      12 ├ Y7
 GND ┤ 10     11 ├ Y8
        └───────────┘
```

SN54F541 . . . FK PACKAGE
(TOP VIEW)

```
          A2  A1  OE1  Vcc  OE2
           3   2   1   20   19
       ┌────────────────────────┐
 A3 ┤ 4                      18 ├ Y1
 A4 ┤ 5                      17 ├ Y2
 A5 ┤ 6                      16 ├ Y3
 A6 ┤ 7                      15 ├ Y4
 A7 ┤ 8                      14 ├ Y5
       └────────────────────────┘
          9   10  11  12  13
          A8  GND Y8  Y7  Y6
```

FUNCTION TABLE

INPUTS			OUTPUT
$\overline{OE1}$	$\overline{OE2}$	A	Y
L	L	L	L
L	L	H	H
H	X	X	Z
X	H	X	Z

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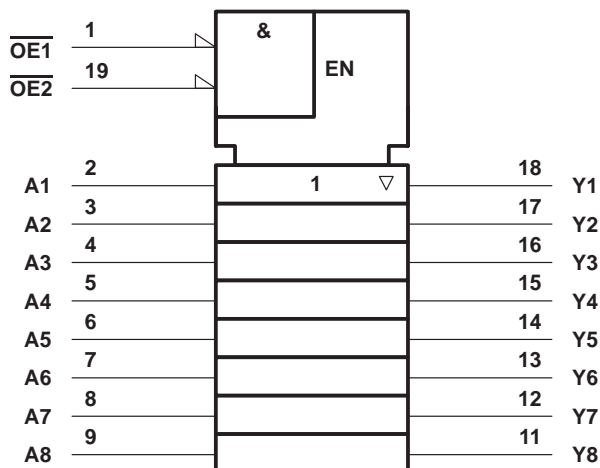![TEXAS INSTRUMENTS logo]

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2–1

SN54F541, SN74F541
OCTAL BUFFERS/DRIVERS
WITH 3-STATE OUTPUTS

SDFS021A – D3126, JANUARY 1989 – REVISED OCTOBER 1993

logic symbol†

```
OE1  1  ─▷      & 
OE2  19 ─▷      EN

A1   2 ────┤ 1      ▽ ├──── 18  Y1
A2   3 ────┤              ├──── 17  Y2
A3   4 ────┤              ├──── 16  Y3
A4   5 ────┤              ├──── 15  Y4
A5   6 ────┤              ├──── 14  Y5
A6   7 ────┤              ├──── 13  Y6
A7   8 ────┤              ├──── 12  Y7
A8   9 ────┤              ├──── 11  Y8
```

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

logic diagram (positive logic)

To Seven Other Channels

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

Supply voltage range, V_{CC} .... −0.5 V to 7 V
Input voltage range, V_I (see Note 1) .... −1.2 V to 7 V
Input current range .... −30 mA to 5 mA
Voltage range applied to any output in the disabled or power-off state .... −0.5 V to 5.5 V
Voltage range applied to any output in the high state .... −0.5 V to V_{CC}
Current into any output in the low state: SN54F541 .... 96 mA
                                          SN74F541 .... 128 mA
Operating free-air temperature range: SN54F541 .... −55°C to 125°C
                                        SN74F541 .... 0°C to 70°C
Storage temperature range .... −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.
NOTE 1: The input voltage ratings may be exceeded provided the input current ratings are observed.

recommended operating conditions

		SN54F541			SN74F541			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.8			0.8	V
I_{IK}	Input clamp current			−18			−18	mA
I_{OH}	High-level output current			−12			−15	mA
I_{OL}	Low-level output current			48			64	mA
T_A	Operating free-air temperature	−55		125	0		70	°C

TEXAS INSTRUMENTS

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

PARAMETER	TEST CONDITIONS		SN54F541			SN74F541			UNIT
			MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}	$V_{CC} = 4.5$ V,	$I_I = -18$ mA			−1.2			−1.2	V
V_{OH}	$V_{CC} = 4.5$ V	$I_{OH} = -3$ mA	2.4	3.3		2.4	3.3		V
		$I_{OH} = -12$ mA	2	3.2					
		$I_{OH} = -15$ mA				2	3.1		
	$V_{CC} = 4.75$ V,	$I_{OH} = -3$ mA				2.7			
V_{OL}	$V_{CC} = 4.5$ V	$I_{OL} = 48$ mA		0.38	0.55				V
		$I_{OL} = 64$ mA					0.42	0.55	
I_{OZH}	$V_{CC} = 5.5$ V,	$V_O = 2.7$ V			50			50	μA
I_{OZL}	$V_{CC} = 5.5$ V,	$V_O = 0.5$ V			−50			−50	μA
I_I	$V_{CC} = 5.5$ V,	$V_I = 7$ V			0.1			0.1	mA
I_{IH}	$V_{CC} = 5.5$ V,	$V_I = 2.7$ V			20			20	μA
I_{IL}	$V_{CC} = 5.5$ V,	$V_I = 0.5$ V			−0.6			−0.6	mA
I_{OS}‡	$V_{CC} = 5.5$ V,	$V_O = 0$	−100		−225	−100		−225	mA
I_{CC}	$V_{CC} = 5.5$ V	Outputs high		28	35		28	35	mA
		Outputs low		62	75		62	75	
		Outputs disabled		40	55		40	55	

† All typical values are at $V_{CC} = 5$ V, $T_A = 25°C$.
‡ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5$ V, $C_L = 50$ pF, $R_L = 500$ Ω, $T_A = 25°C$			$V_{CC} = 4.5$ V to 5.5 V, $C_L = 50$ pF, $R_L = 500$ Ω, T_A = MIN to MAX§				UNIT
			'F541			SN54F541		SN74F541		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	Any A	Y	1.5	3.3	5.5	1	6.5	1.5	6	ns
t_{PHL}			1.5	2.7	5.5	1	6.5	1.5	6	
t_{PZH}	$\overline{OE}$	Y	3	5.8	8	1.7	10	2.5	9.5	ns
t_{PZL}			3.5	6.1	8.5	2.2	10	3	9.5	
t_{PHZ}	$\overline{OE}$	Y	1.5	3.4	6	1	7	1.5	6.5	ns
t_{PLZ}			1.5	2.9	5.5	1	7.5	1.5	6	

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
NOTE 2:   Load circuits and waveforms are shown in Section 1.

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INSTRUMENTS

PACKAGING INFORMATION

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
5962-9175301M2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	N / A for Pkg Type
5962-9175301MRA	ACTIVE	CDIP	J	20	1	TBD	Call TI	N / A for Pkg Type
5962-9175301MSA	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type
SN74F541DBRE4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F541DBRG4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1YEAR
SN74F541DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F541DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F541DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F541DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F541N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74F541NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74F541NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74F541NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SNJ54F541FK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	N / A for Pkg Type
SNJ54F541J	ACTIVE	CDIP	J	20	1	TBD	Call TI	N / A for Pkg Type
SNJ54F541W	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type

[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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J (R—GDIP—T**)   CERAMIC DUAL IN—LINE PACKAGE
14 LEADS SHOWN
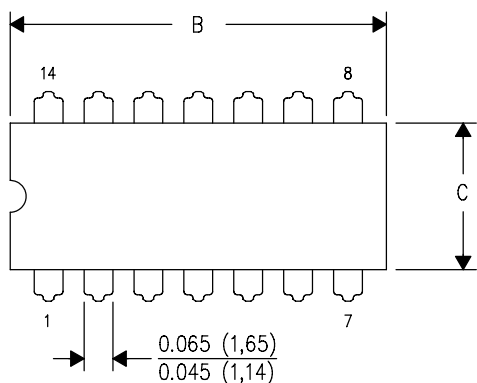
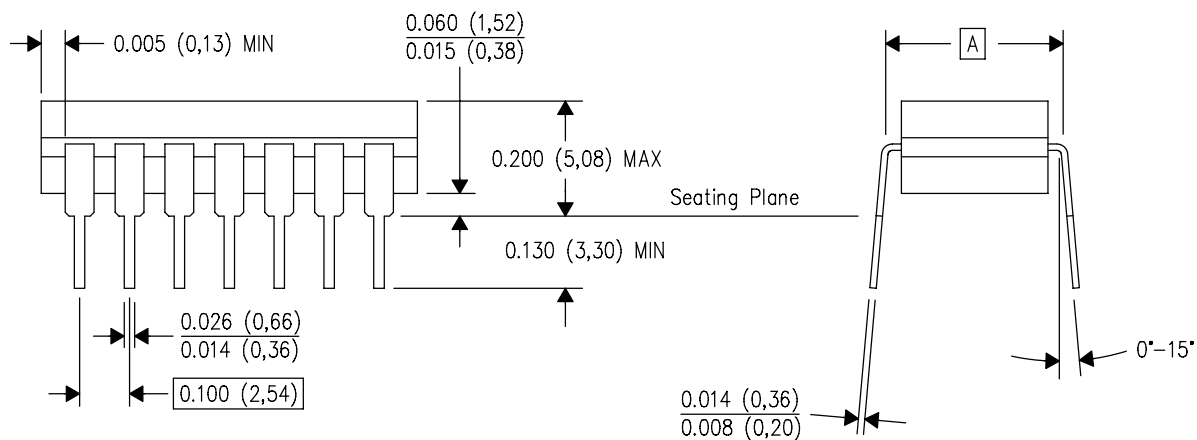| DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	——	——	——	——
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)

B

14   8

0.065 (1,65)
0.045 (1,14)

1   7

C

0.005 (0,13) MIN

0.060 (1,52)
0.015 (0,38)

0.200 (5,08) MAX

Seating Plane

0.130 (3,30) MIN

0.026 (0,66)
0.014 (0,36)

0.100 (2,54)

A

0°—15°

0.014 (0,36)
0.008 (0,20)

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.

W (R–GDFP–F20)   CERAMIC DUAL FLATPACK

Base and Seating Plane

0.045 (1,14) / 0.026 (0,66)

0.300 (7,62) / 0.245 (6,22)

0.100 (2,45) / 0.045 (1,14)

0.009 (0,23) / 0.004 (0,10)

0.320 (8,13) MAX

1   20

0.540 (13,72) MAX

0.022 (0,56) / 0.015 (0,38)

0.050 (1,27)

0.005 (0,13) MIN
4 Places

10   11

0.370 (9,40) / 0.250 (6,35)
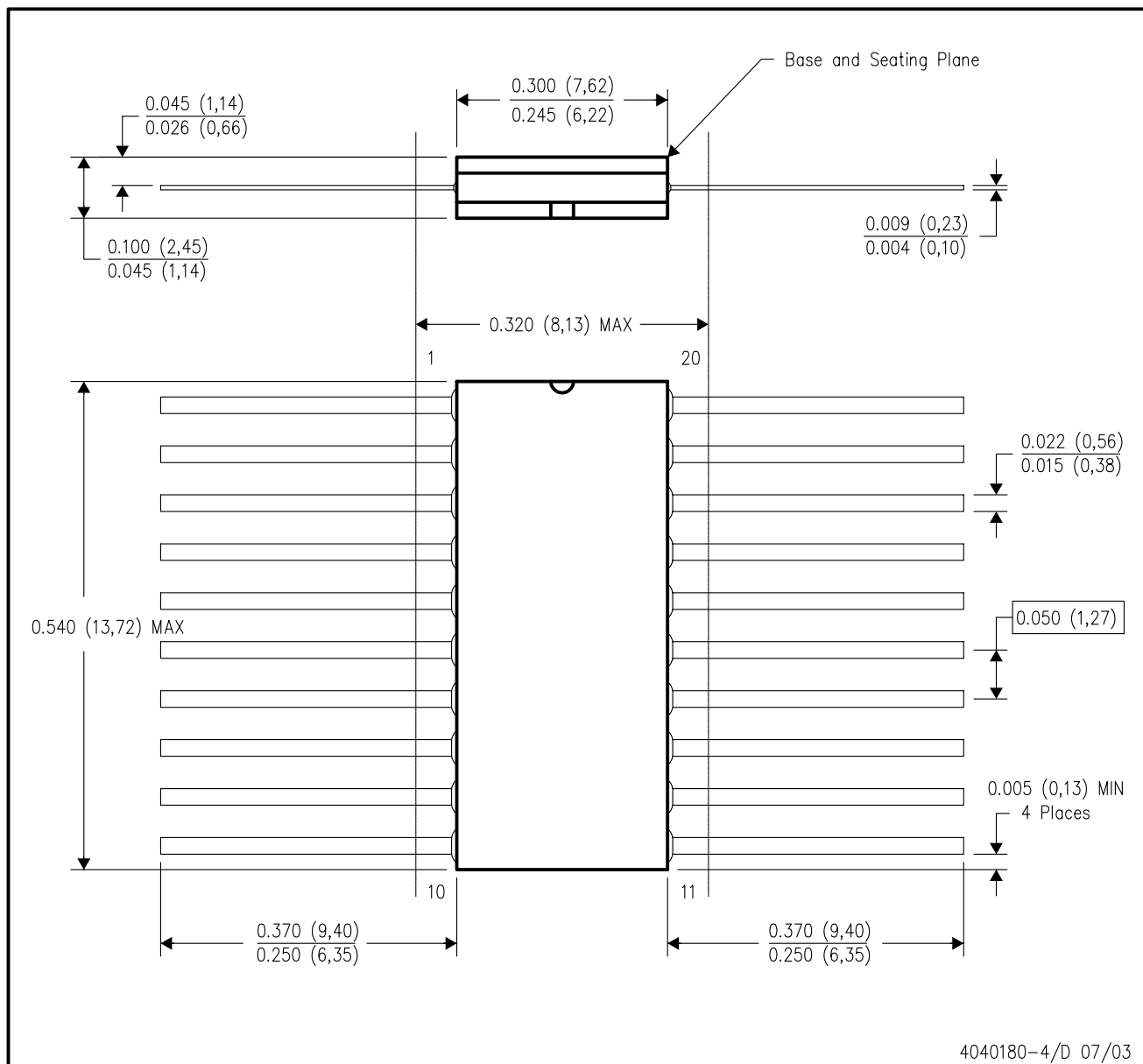
0.370 (9,40) / 0.250 (6,35)

4040180–4/D 07/03

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 GDFP2–F20

FK (S-CQCC-N**)   **LEADLESS CERAMIC CHIP CARRIER**

28 TERMINAL SHOWN

NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.739 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)

0.020 (0,51) / 0.010 (0,25)

0.020 (0,51) / 0.010 (0,25)

0.080 (2,03) / 0.064 (1,63)

0.055 (1,40) / 0.045 (1,14)

0.045 (1,14) / 0.035 (0,89)

0.028 (0,71) / 0.022 (0,54)

0.045 (1,14) / 0.035 (0,89)
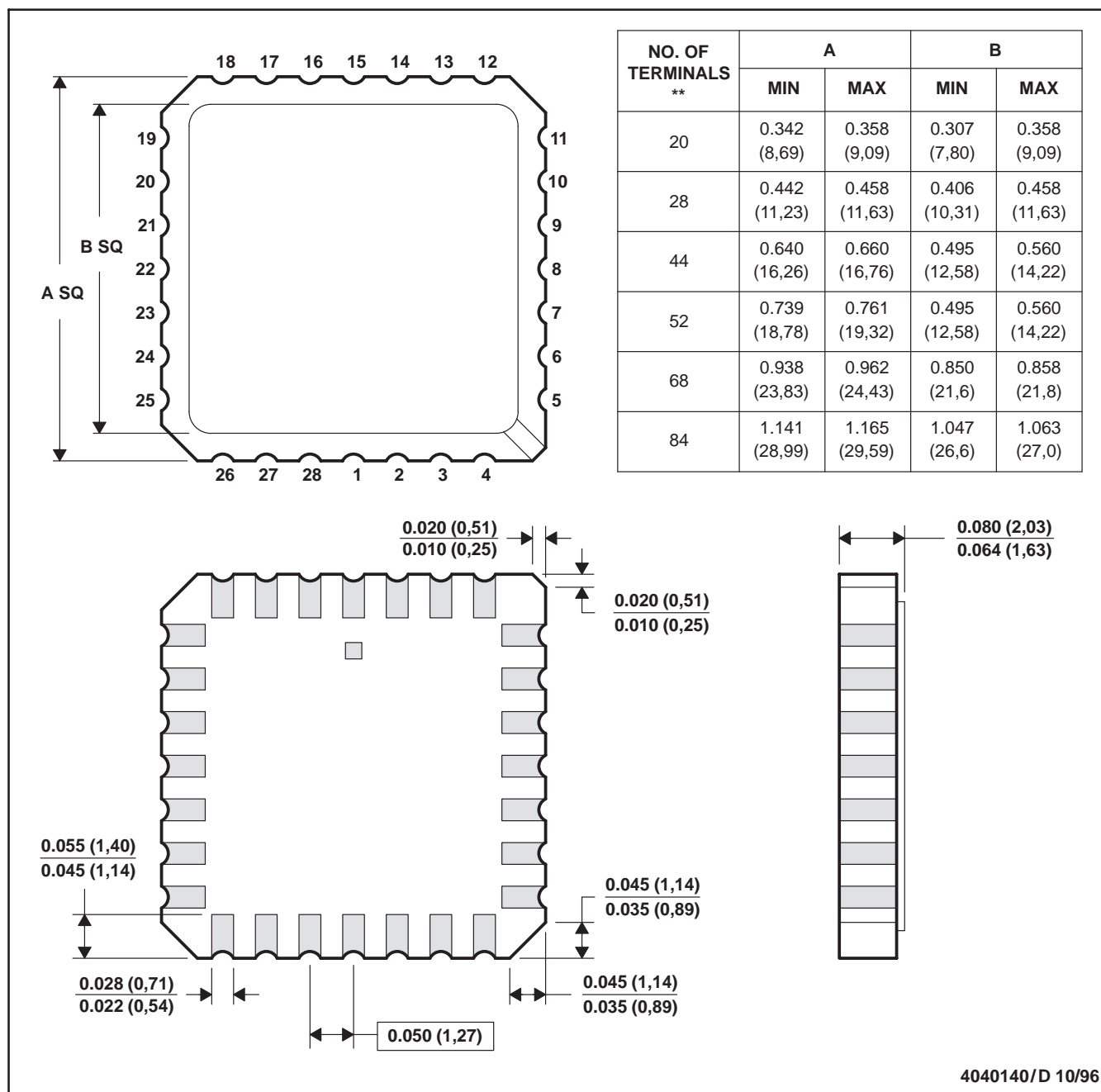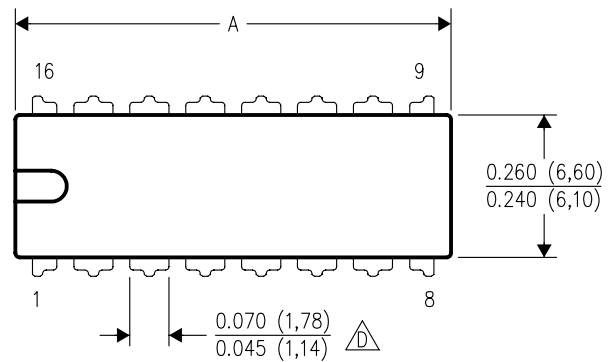
0.050 (1,27)

4040140/D 10/96

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.
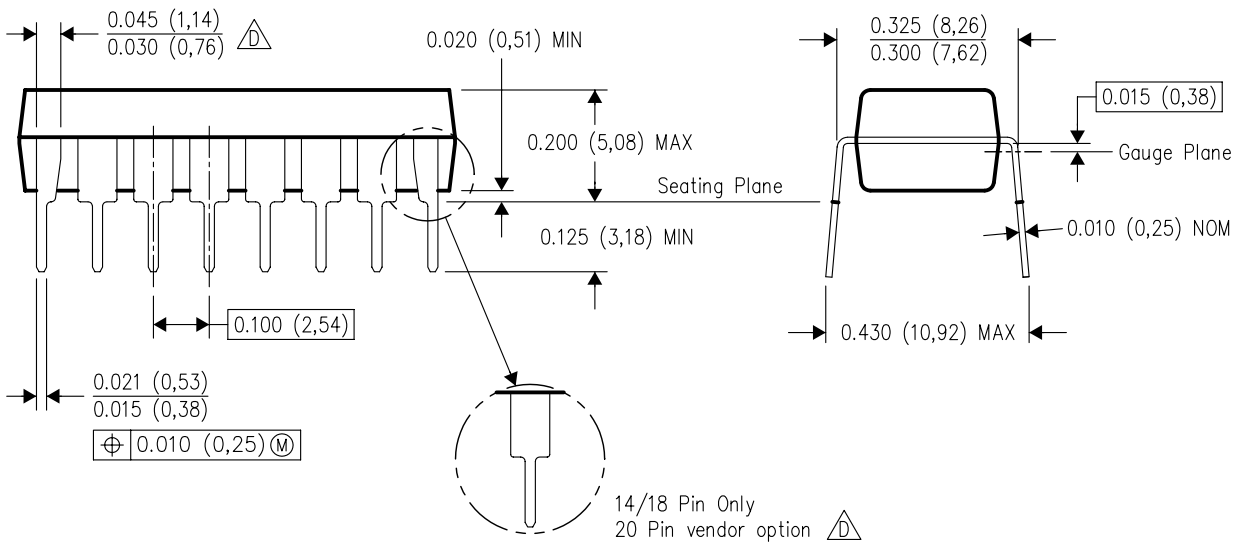E. Falls within JEDEC MS-004

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

16 PINS SHOWN

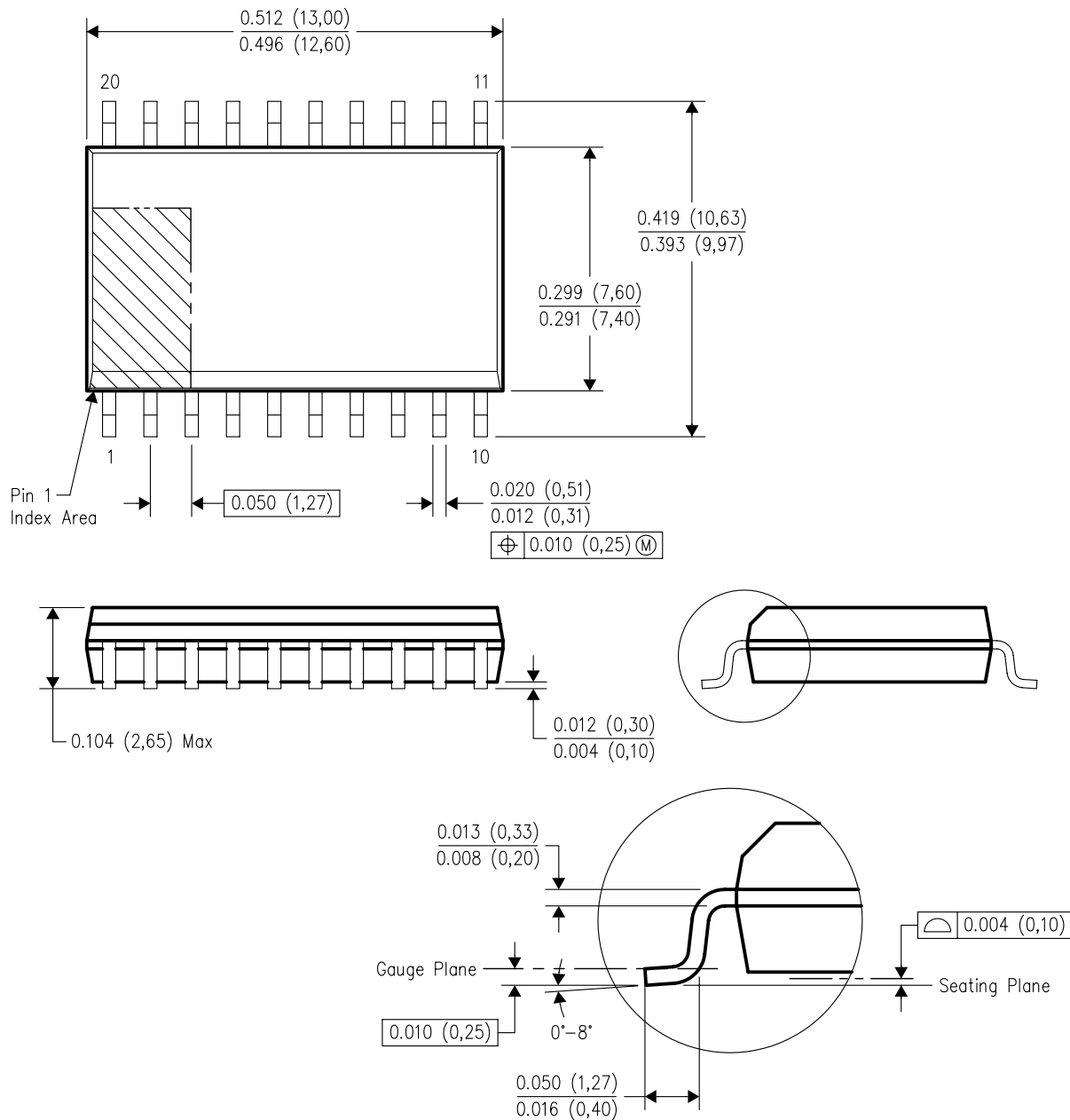| DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS–001 VARIATION	AA	BB	AC	AD

0.260 (6,60) / 0.240 (6,10)

0.070 (1,78) / 0.045 (1,14) ⚠D

0.045 (1,14) / 0.030 (0,76) ⚠D

0.020 (0,51) MIN

0.200 (5,08) MAX

Seating Plane

0.125 (3,18) MIN

0.100 (2,54)

0.021 (0,53) / 0.015 (0,38)

⌖ 0.010 (0,25) Ⓜ

14/18 Pin Only
20 Pin vendor option ⚠D

0.325 (8,26) / 0.300 (7,62)

0.015 (0,38)

Gauge Plane

0.010 (0,25) NOM

0.430 (10,92) MAX

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.

DW (R−PDSO−G20)   PLASTIC SMALL−OUTLINE PACKAGE

0.512 (13,00)
0.496 (12,60)

20   11

0.419 (10,63)
0.393 (9,97)

0.299 (7,60)
0.291 (7,40)

1   10

Pin 1
Index Area

0.050 (1,27)

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

⊕ | 0.010 (0,25) Ⓜ

0.104 (2,65) Max

0.012 (0,30)
0.004 (0,10)

0.013 (0,33)
0.008 (0,20)

△ | 0.004 (0,10)

Gauge Plane

Seating Plane

0.010 (0,25)

0°−8°

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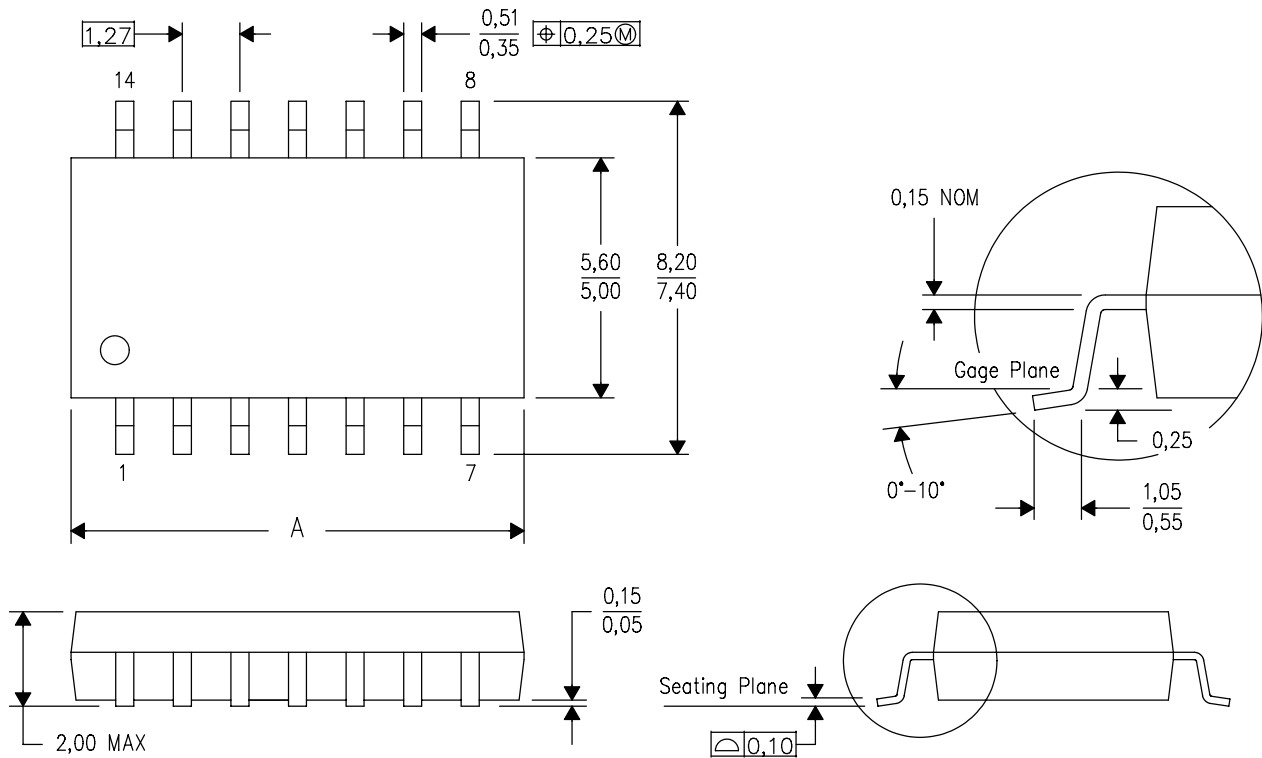0.016 (0,40)

4040000−4/F 06/2004

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−013 variation AC.

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MECHANICAL DATA

PLASTIC SMALL-OUTLINE PACKAGE

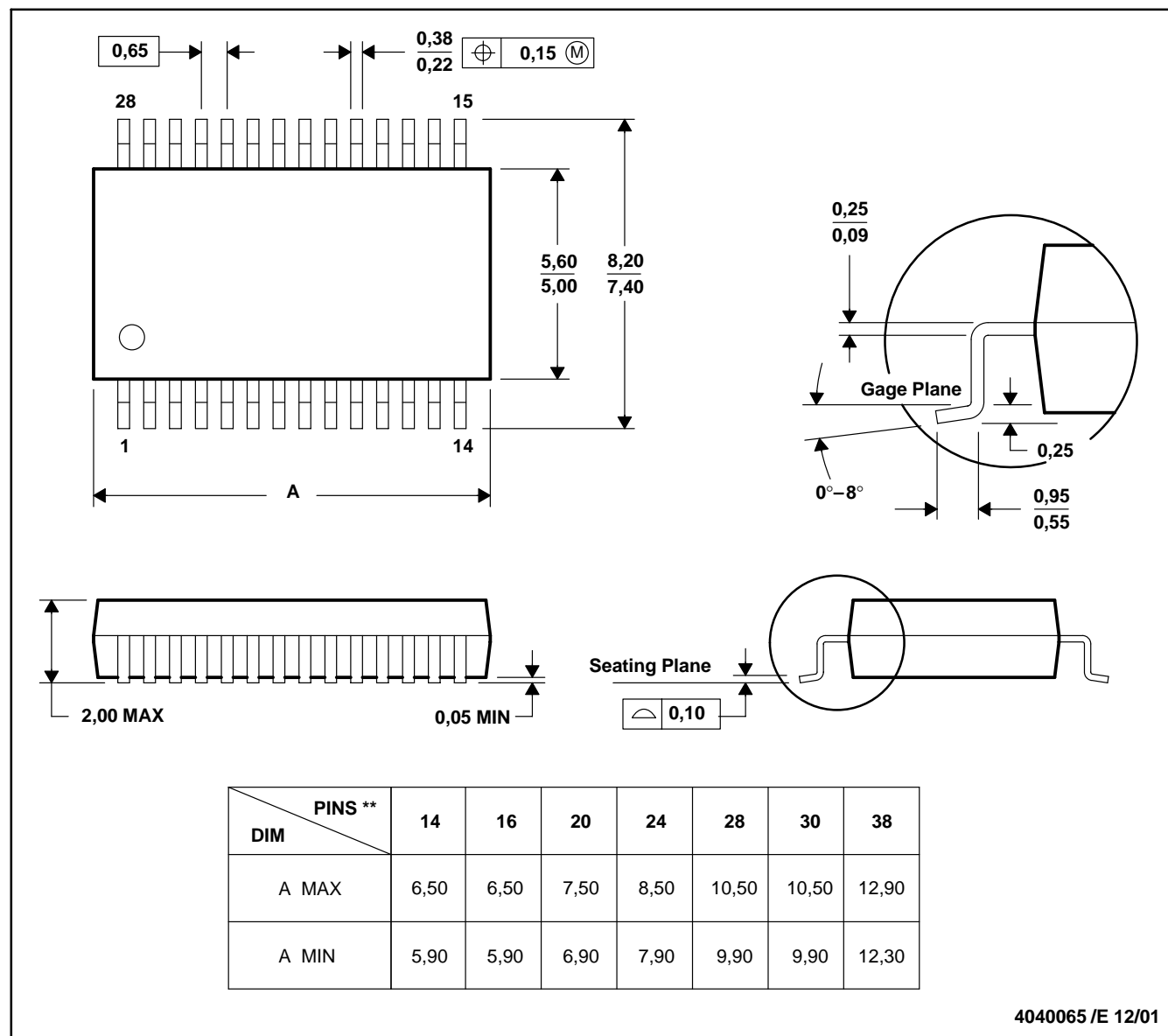| DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

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.

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DB (R-PDSO-G**)   **PLASTIC SMALL-OUTLINE**

28 PINS SHOWN

PINS ** DIM	14	16	20	24	28	30	38
A MAX	6,50	6,50	7,50	8,50	10,50	10,50	12,90
A MIN	5,90	5,90	6,90	7,90	9,90	9,90	12,30

4040065 /E 12/01

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.
         D. Falls within JEDEC MO-150

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		Telephony	www.ti.com/telephony
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