- **Operating Voltage Range of 4.5 V to 5.5 V**
- **High-Current Outputs Drive Up To 15 LSTTL Loads**
- **Low Power Consumption, 80-μA Max I_{CC}**
- **Typical t_{pd} = 13 ns**
- **±6-mA Output Drive at 5 V**
- **Low Input Current of 1 μA Max**
- **Inputs Are TTL-Voltage Compatible**
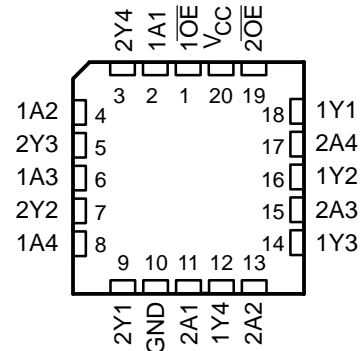- **3-State Outputs Drive Bus Lines or Buffer Memory Address Registers**

description/ordering information

These octal buffers and line drivers are designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. The 'HCT244 devices are organized as two 4-bit buffers/drivers with separate output-enable ($\overline{OE}$) inputs. When $\overline{OE}$ is low, the device passes noninverted data from the A inputs to the Y outputs. When $\overline{OE}$ is high, the outputs are in the high-impedance state.

SN54HCT244 . . . J OR W PACKAGE
SN74HCT244 . . . DB, DW, N, NS, OR PW PACKAGE
(TOP VIEW)

```
        _____
1OE  [ 1     20 ] VCC
1A1  [ 2     19 ] 2OE
2Y4  [ 3     18 ] 1Y1
1A2  [ 4     17 ] 2A4
2Y3  [ 5     16 ] 1Y2
1A3  [ 6     15 ] 2A3
2Y2  [ 7     14 ] 1Y3
1A4  [ 8     13 ] 2A2
2Y1  [ 9     12 ] 1Y4
GND  [ 10    11 ] 2A1
```
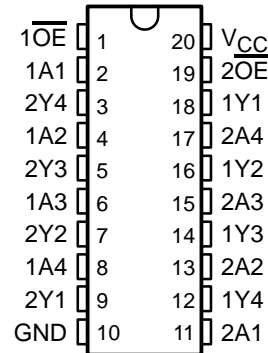
SN54HCT244 . . . FK PACKAGE
(TOP VIEW)

```
        2Y4 1A1 1OE VCC 2OE
         3   2   1  20  19
1A2 [ 4              18 ] 1Y1
2Y3 [ 5              17 ] 2A4
1A3 [ 6              16 ] 1Y2
2Y2 [ 7              15 ] 2A3
1A4 [ 8              14 ] 1Y3
         9  10  11  12  13
        2Y1 GND 2A1 1Y4 2A2
```

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
−40°C to 85°C	PDIP – N	Tube	SN74HCT244N	SN74HCT244N
	SOIC – DW	Tube	SN74HCT244DW	HCT244
		Tape and reel	SN74HCT244DWR	
	SOP – NS	Tape and reel	SN74HCT244NSR	HCT244
	SSOP – DB	Tape and reel	SN74HCT244DBR	HT244
	TSSOP – PW	Tube	SN74HCT244PW	HT244
		Tape and reel	SN74HCT244PWR	
−55°C to 125°C	CDIP – J	Tube	SNJ54HCT244J	SNJ54HCT244J
	CFP – W	Tube	SNJ54HCT244W	SNJ54HCT244W
	LCCC – FK	Tube	SNJ54HCT244FK	SNJ54HCT244FK

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

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

FUNCTION TABLE
(each buffer/driver)

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

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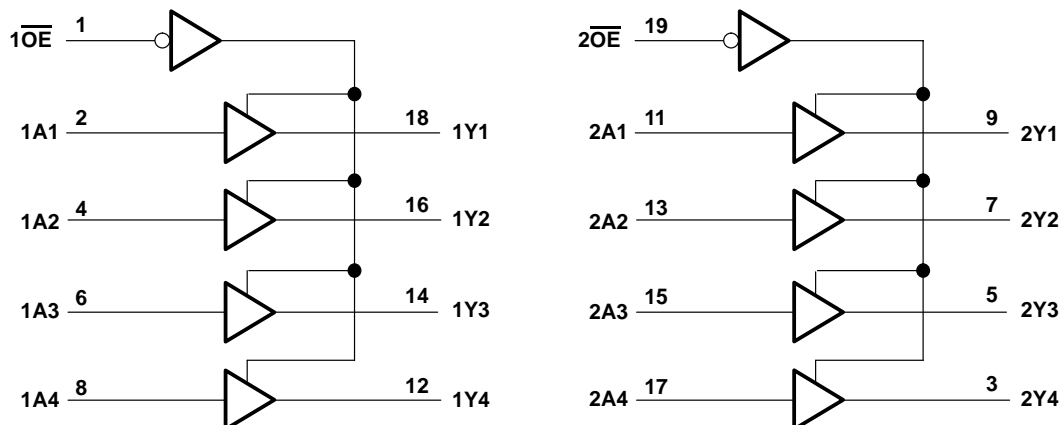
absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

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 current, I_O (V_O = 0 to V_{CC}) .... ±35 mA
Continuous current through V_{CC} or GND .... ±70 mA
Package thermal impedance, θ_{JA} (see Note 2): DB package .... 70°C/W
                                                     DW package .... 58°C/W
                                                     N package .... 69°C/W
                                                     NS package .... 60°C/W
                                                     PW package .... 83°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.

TEXAS INSTRUMENTS

recommended operating conditions (see Note 3)

			SN54HCT244			SN74HCT244			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	V_{CC} = 4.5 V to 5.5 V	2			2			V
V_{IL}	Low-level input voltage	V_{CC} = 4.5 V to 5.5 V			0.8			0.8	V
V_I	Input voltage		0		V_{CC}	0		V_{CC}	V
V_O	Output voltage		0		V_{CC}	0		V_{CC}	V
$\Delta t/\Delta v$	Input transition rise/fall time				500			500	ns
T_A	Operating free-air temperature		−55		125	−40		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.

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

PARAMETER	TEST CONDITIONS		V_{CC}	T_A = 25°C			SN54HCT244		SN74HCT244		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}	V_I = V_{IH} or V_{IL}	I_{OH} = −20 µA	4.5 V	4.4	4.499		4.4		4.4		V
		I_{OH} = −6 mA		3.98	4.3		3.7		3.84		
V_{OL}	V_I = V_{IH} or V_{IL}	I_{OL} = 20 µA	4.5 V		0.001	0.1		0.1		0.1	V
		I_{OL} = 6 mA			0.17	0.26		0.4		0.33	
I_I	V_I = V_{CC} or 0		5.5 V		±0.1	±100		±1000		±1000	nA
I_{OZ}	V_O = V_{CC} or 0, V_I = V_{IH} or V_{IL}		5.5 V		±0.01	±0.5		±10		±5	µA
I_{CC}	V_I = V_{CC} or 0, I_O = 0		5.5 V			8		160		80	µA
ΔI_{CC}†	One input at 0.5 V or 2.4 V, Other inputs at 0 or V_{CC}		5.5 V		1.4	2.4		3		2.9	mA
C_i			4.5 V to 5.5 V		3	10		10		10	pF

† This is the increase in supply current for each input that is at one of the specified TTL voltage levels, rather than 0 V or V_{CC}.

switching characteristics over recommended operating free-air temperature range, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	T_A = 25°C			SN54HCT244		SN74HCT244		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A	Y	4.5 V		15	28		42		35	ns
			5.5 V		13	25		38		32	
t_{en}	$\overline{OE}$	Y	4.5 V		21	35		53		44	ns
			5.5 V		19	32		48		40	
t_{dis}	$\overline{OE}$	Y	4.5 V		19	35		53		44	ns
			5.5 V		18	32		48		40	
t_t		Y	4.5 V		8	12		18		15	ns
			5.5 V		7	11		16		14	

switching characteristics over recommended operating free-air temperature range, C_L = 150 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	$T_A = 25°C$			SN54HCT244		SN74HCT244		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A	Y	4.5 V		21	45		68		56	ns
			5.5 V		18	40		61		51	
t_{en}	$\overline{OE}$	Y	4.5 V		25	52		79		65	ns
			5.5 V		22	47		71		59	
t_t		Y	4.5 V		17	42		63		53	ns
			5.5 V		14	38		57		48	

operating characteristics, T_A = 25°C

PARAMETER	TEST CONDITIONS	TYP	UNIT
C_{pd} Power dissipation capacitance per buffer/driver	No load	40	pF

TEXAS
INSTRUMENTS

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

PARAMETER MEASUREMENT INFORMATION

LOAD CIRCUIT
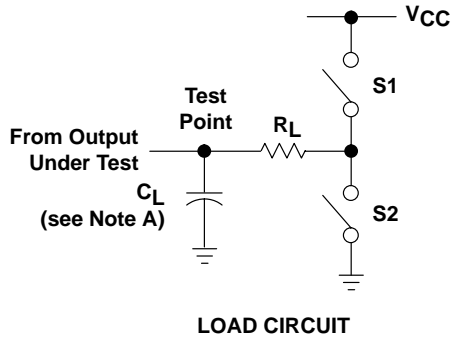
PARAMETER		R_L	C_L	S1	S2
t_{en}	t_{PZH}	1 kΩ	50 pF or 150 pF	Open	Closed
	t_{PZL}			Closed	Open
t_{dis}	t_{PHZ}	1 kΩ	50 pF	Open	Closed
	t_{PLZ}			Closed	Open
t_{pd} or t_t		—	50 pF or 150 pF	Open	Open

VOLTAGE WAVEFORM
INPUT RISE AND FALL TIMES

VOLTAGE WAVEFORMS
PROPAGATION DELAY AND OUTPUT RISE AND FALL TIMES

VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES FOR 3-STATE OUTPUTS
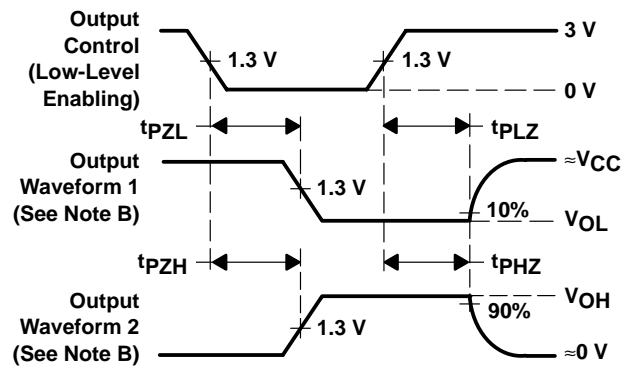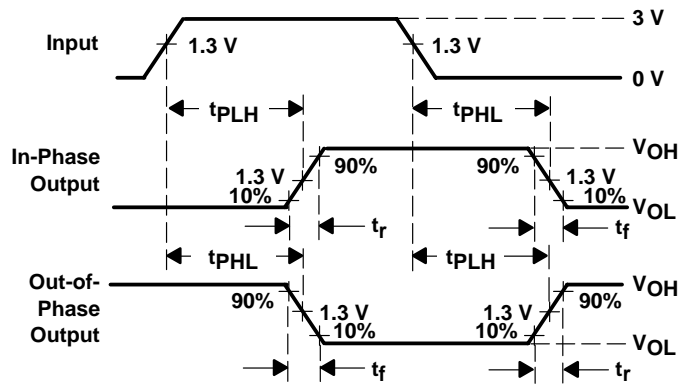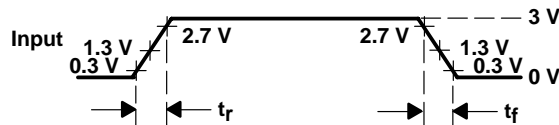
NOTES: A. C_L includes probe and test-fixture capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.
Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
C. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r = 6 ns, t_f = 6 ns.
D. The outputs are measured one at a time with one input transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
F. t_{PZL} and t_{PZH} are the same as t_{en}.
G. t_{PLH} and t_{PHL} are the same as t_{pd}.

Figure 1. Load Circuit and Voltage Waveforms

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

$\frac{0.065\ (1,65)}{0.045\ (1,14)}$

1   7

C

0.005 (0,13) MIN

$\frac{0.060\ (1,52)}{0.015\ (0,38)}$

0.200 (5,08) MAX

Seating Plane

0.130 (3,30) MIN

$\frac{0.026\ (0,66)}{0.014\ (0,36)}$

0.100 (2,54)

A

0°−15°

$\frac{0.014\ (0,36)}{0.008\ (0,20)}$

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.

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)

4040140 / D 10/96
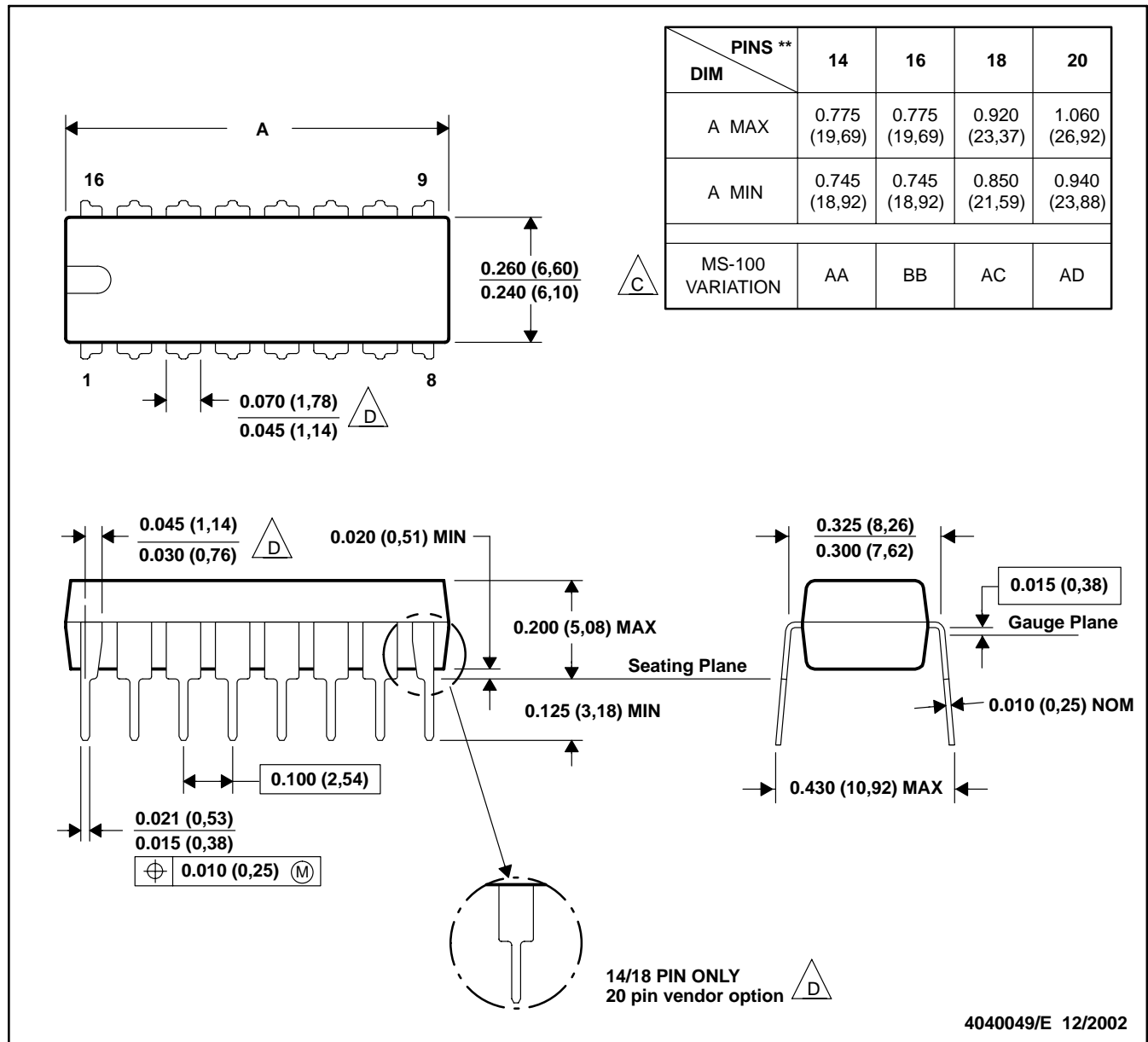
NOTES: A. All linear dimensions are in inches (millimeters).
           B. This drawing is subject to change without notice.
           C. This package can be hermetically sealed with a metal lid.
           D. The terminals are gold plated.
           E. Falls within JEDEC MS-004

TEXAS INSTRUMENTS

MECHANICAL

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-100 VARIATION	AA	BB	AC	AD

A

16   9

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

/C\

1   8

0.070 (1,78)
0.045 (1,14) /D\

0.045 (1,14)
0.030 (0,76) /D\

0.020 (0,51) MIN

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

0.015 (0,38)
Gauge Plane

0.200 (5,08) MAX

Seating Plane

0.125 (3,18) MIN

0.010 (0,25) NOM

0.100 (2,54)

0.430 (10,92) MAX

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

⊕ 0.010 (0,25) Ⓜ

14/18 PIN ONLY
20 pin vendor option /D\

4040049/E 12/2002

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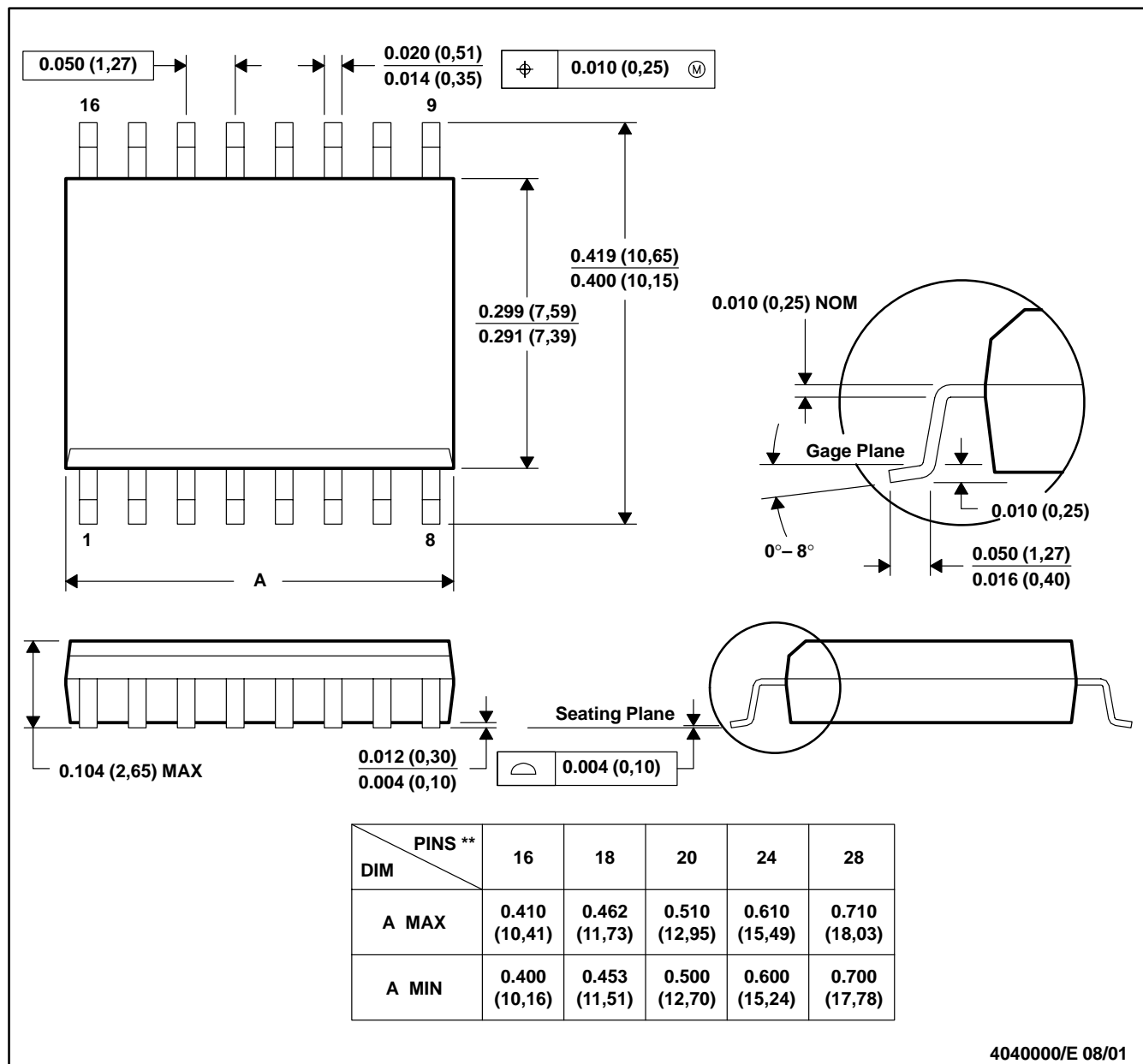   B. This drawing is subject to change without notice.
     /C\ Falls within JEDEC MS-001, except 18 and 20 pin minimum body lrngth (Dim A).
     /D\ The 20 pin end lead shoulder width is a vendor option, either half or full width.

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

16 PINS SHOWN

0.050 (1,27)

0.020 (0,51)
0.014 (0,35)

⊕ 0.010 (0,25) Ⓜ

16   9

0.419 (10,65)
0.400 (10,15)

0.299 (7,59)
0.291 (7,39)

0.010 (0,25) NOM

Gage Plane

0.010 (0,25)

0°– 8°

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

1   8

A

0.104 (2,65) MAX

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

Seating Plane

⌒ 0.004 (0,10)

PINS ** DIM	16	18	20	24	28
A MAX	0.410 (10,41)	0.462 (11,73)	0.510 (12,95)	0.610 (15,49)	0.710 (18,03)
A MIN	0.400 (10,16)	0.453 (11,51)	0.500 (12,70)	0.600 (15,24)	0.700 (17,78)

4040000/E 08/01

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-013

TEXAS INSTRUMENTS

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

14-PINS SHOWN

1,27

0,51 / 0,35   ⊕ 0,25 Ⓜ

14

8

5,60 / 5,00   8,20 / 7,40

1

7

A

0,15 NOM

Gage Plane

0,25

0°–10°

1,05 / 0,55

0,15 / 0,05

2,00 MAX

Seating Plane

⬒ 0,10

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.

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

28 PINS SHOWN

DIM \ PINS **	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

1

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

14 PINS SHOWN

DIM ╲ PINS **	8	14	16	20	24	28
A MAX	3,10	5,10	5,10	6,60	7,90	9,80
A MIN	2,90	4,90	4,90	6,40	7,70	9,60

4040064/F 01/97

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-153

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