

# SN54ABT827, SN74ABT827 10-BIT BUFFERS/DRIVERS WITH 3-STATE OUTPUTS

SCBS159E – JANUARY 1991 – REVISED APRIL 2005

- State-of-the-Art *EPIC-II<sup>B</sup>*™ BiCMOS Design Significantly Reduces Power Dissipation
- Flow-Through Architecture Optimizes PCB Layout
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17
- Typical  $V_{OLP}$  (Output Ground Bounce) < 1 V at  $V_{CC} = 5$  V,  $T_A = 25^\circ\text{C}$
- High-Impedance State During Power Up and Power Down
- High-Drive Outputs (–32-mA  $I_{OH}$ , 64-mA  $I_{OL}$ )
- Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), and Thin Shrink Small-Outline (PW) Packages, Ceramic Chip Carriers (FK), and Plastic (NT) and Ceramic (JT) DIPs

## description

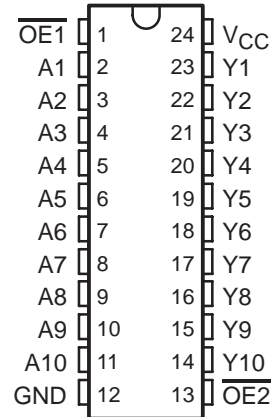
These 10-bit buffers or bus drivers provide a high-performance bus interface for wide data paths or buses carrying parity.

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 ten outputs are in the high-impedance state. The 'ABT827 provides true data at the outputs.

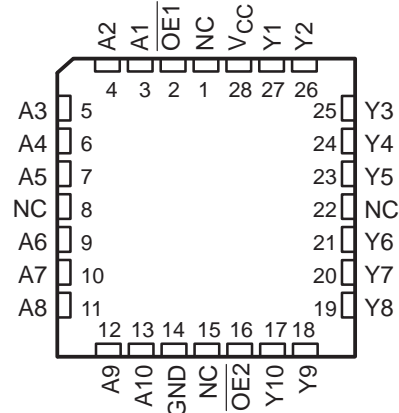
When  $V_{CC}$  is between 0 and 2.1 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 2.1 V,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

The SN54ABT827 is characterized for operation over the full military temperature range of  $-55^\circ\text{C}$  to  $125^\circ\text{C}$ . The SN74ABT827 is characterized for operation from  $-40^\circ\text{C}$  to  $85^\circ\text{C}$ .

SN54ABT827 ... JT PACKAGE  
SN74ABT827 ... DB, DW, NT, OR PW PACKAGE  
(TOP VIEW)



SN54ABT827 ... FK PACKAGE  
(TOP VIEW)



NC – No internal connection

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



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.

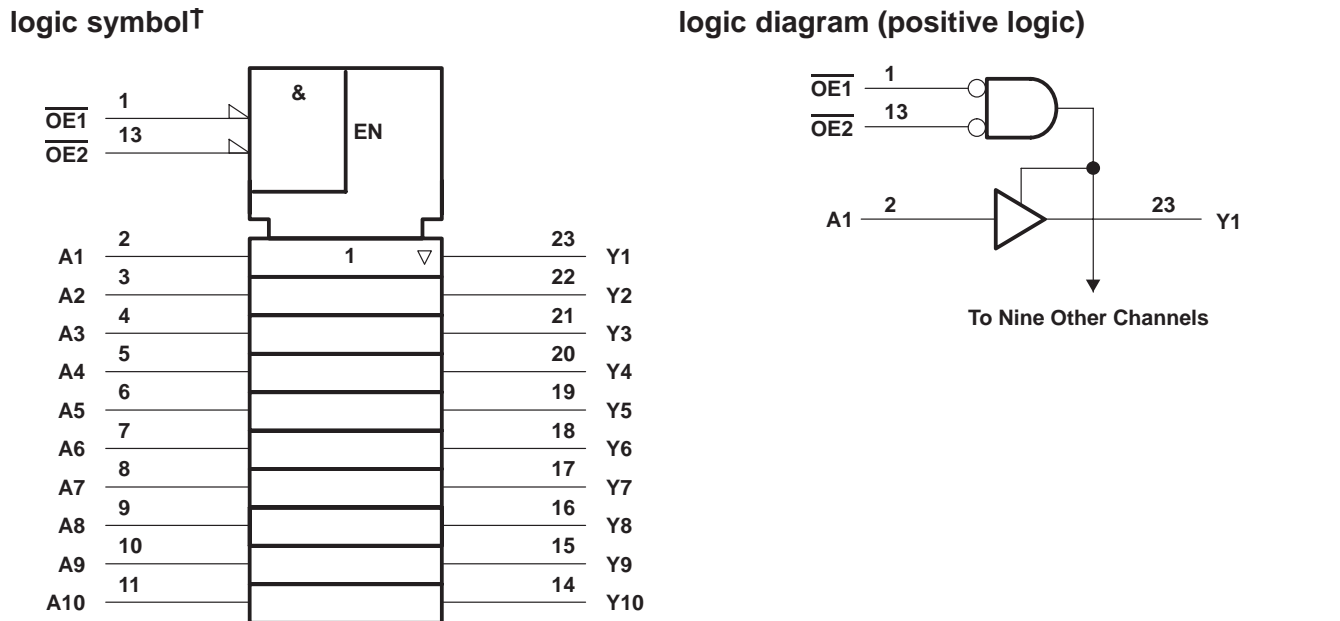
EPIC-II<sup>B</sup> is a trademark of Texas Instruments.

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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† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.  
Pin numbers shown are for the DB, DW, JT, NT, and PW packages.

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)	–0.5 V to 7 V
Voltage range applied to any output in the high or power-off state, $V_O$	–0.5 V to 5.5 V
Current into any output in the low state, $I_O$ : SN54ABT827	96 mA
SN74ABT827	128 mA
Input clamp current, $I_{IK}$ ( $V_I < 0$ )	–18 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ )	–50 mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): DB package	104°C/W
DW package	81°C/W
NT package	67°C/W
PW package	120°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 negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.  
2. The package thermal impedance is calculated in accordance with EIA/JEDEC Std JESD51, except for through-hole packages, which use a trace length of zero.

# SN54ABT827, SN74ABT827 10-BIT BUFFERS/DRIVERS WITH 3-STATE OUTPUTS

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## recommended operating conditions (see Note 3)

		SN54ABT827		SN74ABT827		UNIT
		MIN	MAX	MIN	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5.5	4.5	5.5	V
V <sub>IH</sub>	High-level input voltage	2		2		V
V <sub>IL</sub>	Low-level input voltage		0.8		0.8	V
V <sub>I</sub>	Input voltage	0	V <sub>CC</sub>	0	V <sub>CC</sub>	V
I <sub>OH</sub>	High-level output current		–24		–32	mA
I <sub>OL</sub>	Low-level output current		48		64	mA
Δt/Δv	Input transition rise or fall rate		5		5	ns/V
Δt/ΔV <sub>CC</sub>	Power-up ramp rate	200		200		μs/V
T <sub>A</sub>	Operating free-air temperature	–55	125	–40	85	°C

NOTE 3: Unused inputs must be held high or low to prevent them from floating.



# SN54ABT827, SN74ABT827

## 10-BIT BUFFERS/DRIVERS

### WITH 3-STATE OUTPUTS

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

PARAMETER	TEST CONDITIONS	T <sub>A</sub> = 25°C			SN54ABT827		SN74ABT827		UNIT
		MIN	TYP†	MAX	MIN	MAX	MIN	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = 4.5 V, I <sub>I</sub> = -18 mA			-1.2		-1.2		-1.2	V
V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V, I <sub>OH</sub> = -3 mA	2.5			2.5		2.5		V
	V <sub>CC</sub> = 5 V, I <sub>OH</sub> = -3 mA	3			3		3		
	V <sub>CC</sub> = 4.5 V	I <sub>OH</sub> = -24 mA	2		2				
		I <sub>OH</sub> = -32 mA	2*				2		
V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V	I <sub>OL</sub> = 48 mA		0.55	0.55				V
		I <sub>OL</sub> = 64 mA		0.55*			0.55		
V <sub>hys</sub>			100						mV
I <sub>I</sub>	V <sub>CC</sub> = 0 to 5.5 V, V <sub>I</sub> = V <sub>CC</sub> or GND			±1		±1		±1	μA
I <sub>OZPU</sub> ‡	V <sub>CC</sub> = 0 to 2.1 V, V <sub>O</sub> = 0.5 V to 2.7 V, $\overline{OE} = X$			±50		±10		±50	μA
I <sub>OZPD</sub> ‡	V <sub>CC</sub> = 2.1 V to 0, V <sub>O</sub> = 0.5 V to 2.7 V, $\overline{OE} = X$			±50		±10		±50	μA
I <sub>OZH</sub>	V <sub>CC</sub> = 2.1 V to 5.5 V, V <sub>O</sub> = 2.7 V, $\overline{OE} \geq 2$ V			10§		10		10§	μA
I <sub>OZL</sub>	V <sub>CC</sub> = 2.1 V to 5.5 V, V <sub>O</sub> = 0.5 V, $\overline{OE} \geq 2$ V			-10§		-10		-10§	μA
I <sub>off</sub>	V <sub>CC</sub> = 0, V <sub>I</sub> or V <sub>O</sub> ≤ 5.5 V			±100				±100	μA
I <sub>CEX</sub>	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 5.5 V			50		50		50	μA
I <sub>O</sub> ¶	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.5 V	-50	-140	-225§	-50	-225§	-50	-225§	mA
I <sub>CC</sub>	V <sub>CC</sub> = 5.5 V, I <sub>O</sub> = 0, V <sub>I</sub> = V <sub>CC</sub> or GND			80	250	250	250	250	μA
				35	40§	40§	40§	40§	mA
				80	250	250	250	250	μA
ΔI <sub>CC</sub> #	V <sub>CC</sub> = 5.5 V, One input at 3.4 V, Other inputs at V <sub>CC</sub> or GND			1.5	1.5	1.5	1.5	1.5	mA
				50	50	50	50	50	μA
				1.5	1.5	1.5	1.5	1.5	mA
C <sub>i</sub>	V <sub>I</sub> = 2.5 V or 0.5 V		4						pF
C <sub>o</sub>	V <sub>O</sub> = 2.5 V or 0.5 V		8						pF

\* On products compliant to MIL-PRF-38535, this parameter does not apply.

† All typical values are at V<sub>CC</sub> = 5 V.

‡ This parameter is characterized, but not production tested.

§ This data sheet limit may vary among suppliers.

¶ Not more than one output should be tested at a time, and the duration of the test should not exceed one second.

# This is the increase in supply current for each input that is at the specified TTL voltage level, rather than V<sub>CC</sub> or GND.

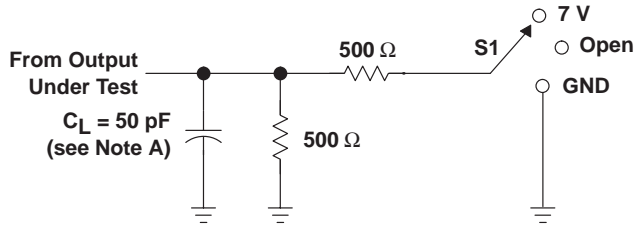
switching characteristics over recommended ranges of supply voltage and operating free-air temperature, C<sub>L</sub> = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25°C			SN54ABT827		SN74ABT827		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A	Y	1.1	2.6	4.4	1.1	4.9	1.1	4.8	ns
t <sub>PHL</sub>			1.1	2.3	4.1	1.1	4.8	1.1	4.7	
t <sub>PZH</sub>	$\overline{OE}$	Y	1§	3.2	5.1	1	6	1§	5.9	ns
t <sub>PZL</sub>			1§	3.3	5.9	1	7.1	1§	6.9	
t <sub>PHZ</sub>	$\overline{OE}$	Y	2	4.9	6.3	2	7	2	6.8	ns
t <sub>PLZ</sub>			1.3§	4.2	6.6	1.3	7.9	1.3§	6.9	

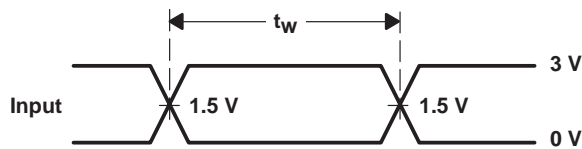
§ This data sheet limit may vary among suppliers.



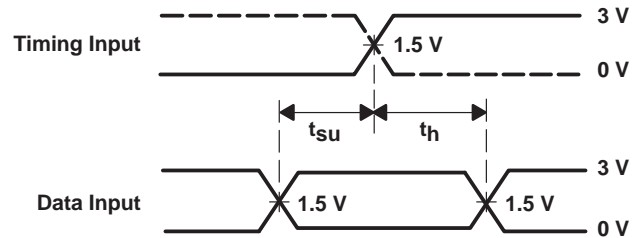
**PARAMETER MEASUREMENT INFORMATION**



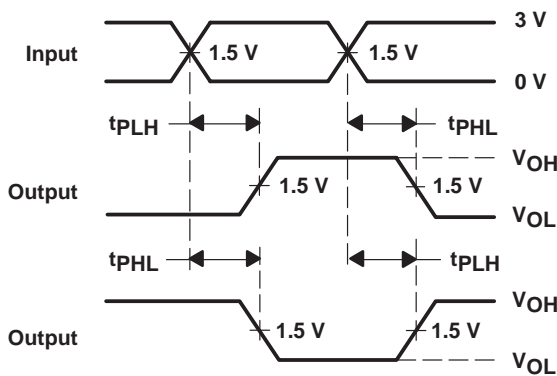
**LOAD CIRCUIT**



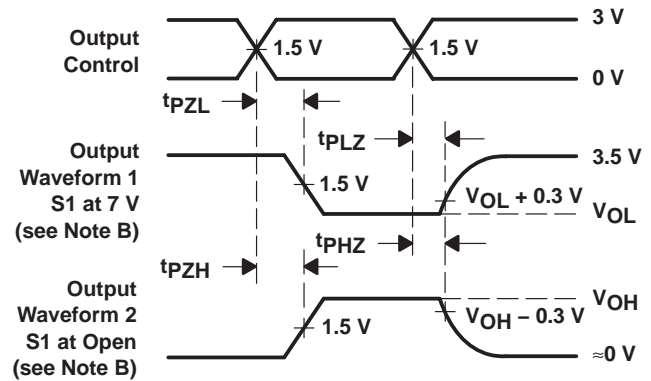
**VOLTAGE WAVEFORMS**  
**PULSE DURATION**



**VOLTAGE WAVEFORMS**  
**SETUP AND HOLD TIMES**



**VOLTAGE WAVEFORMS**  
**PROPAGATION DELAY TIMES**  
**INVERTING AND NONINVERTING OUTPUTS**



**VOLTAGE WAVEFORMS**  
**ENABLE AND DISABLE TIMES**  
**LOW- AND HIGH-LEVEL ENABLING**

- NOTES: A.  $C_L$  includes probe and jig 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:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ .  
 D. The outputs are measured one at a time, with one transition per measurement.

**Figure 1. Load Circuit and Voltage Waveforms**

## PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
<a href="#">5962-9450901QKA</a>	Active	Production	CFP (W)   24	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9450901QK A SNJ54ABT827W
<a href="#">5962-9450901QLA</a>	Active	Production	CDIP (JT)   24	15   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9450901QL A SNJ54ABT827JT
<a href="#">SN74ABT827DBR</a>	Active	Production	SSOP (DB)   24	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB827
SN74ABT827DBR.B	Active	Production	SSOP (DB)   24	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB827
<a href="#">SN74ABT827DW</a>	Active	Production	SOIC (DW)   24	25   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT827
SN74ABT827DW.B	Active	Production	SOIC (DW)   24	25   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT827
<a href="#">SN74ABT827DWR</a>	Active	Production	SOIC (DW)   24	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT827
SN74ABT827DWR.B	Active	Production	SOIC (DW)   24	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT827
<a href="#">SN74ABT827PW</a>	Active	Production	TSSOP (PW)   24	60   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB827
SN74ABT827PW.B	Active	Production	TSSOP (PW)   24	60   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB827
<a href="#">SN74ABT827PWR</a>	Active	Production	TSSOP (PW)   24	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB827
SN74ABT827PWR.B	Active	Production	TSSOP (PW)   24	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB827
SN74ABT827PWRG4	Active	Production	TSSOP (PW)   24	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB827
SN74ABT827PWRG4.B	Active	Production	TSSOP (PW)   24	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB827
<a href="#">SNJ54ABT827JT</a>	Active	Production	CDIP (JT)   24	15   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9450901QL A SNJ54ABT827JT
<a href="#">SNJ54ABT827W</a>	Active	Production	CFP (W)   24	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9450901QK A SNJ54ABT827W

(1) **Status:** For more details on status, see our [product life cycle](#).

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

**(4) Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

**(5) MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

**(6) Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

**OTHER QUALIFIED VERSIONS OF SN54ABT827, SN74ABT827 :**

- Catalog : [SN74ABT827](#)
- Military : [SN54ABT827](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

## 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
SN74ABT827DBR	SSOP	DB	24	2000	330.0	16.4	8.2	8.8	2.5	12.0	16.0	Q1
SN74ABT827DWR	SOIC	DW	24	2000	330.0	24.4	10.75	15.7	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)
SN74ABT827DBR	SSOP	DB	24	2000	353.0	353.0	32.0
SN74ABT827DWR	SOIC	DW	24	2000	350.0	350.0	43.0

## TUBE

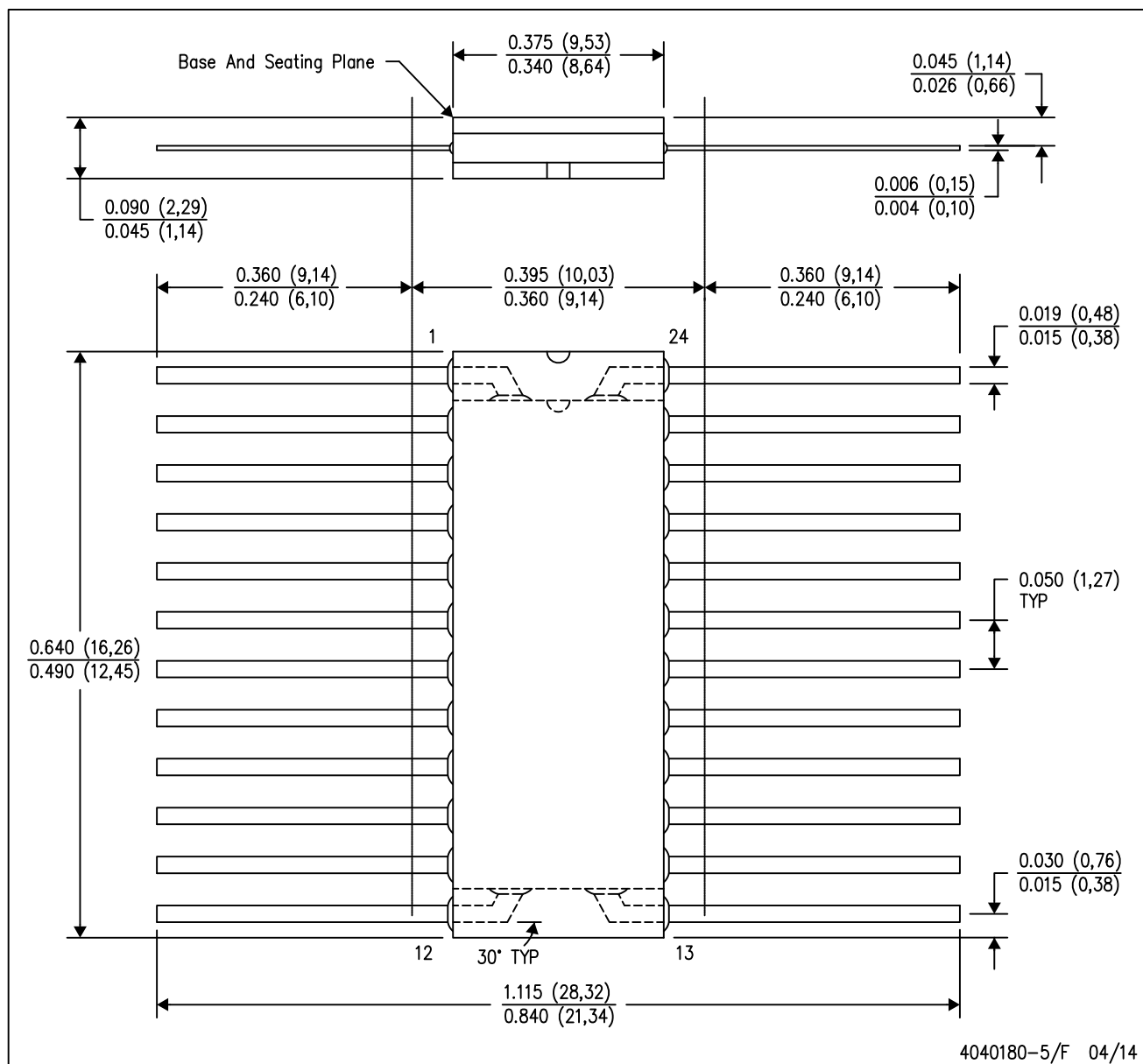


\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
5962-9450901QKA	W	CFP	24	25	506.98	26.16	6220	NA
SN74ABT827DW	DW	SOIC	24	25	506.98	12.7	4826	6.6
SN74ABT827DW.B	DW	SOIC	24	25	506.98	12.7	4826	6.6
SN74ABT827PW	PW	TSSOP	24	60	530	10.2	3600	3.5
SN74ABT827PW.B	PW	TSSOP	24	60	530	10.2	3600	3.5
SNJ54ABT827W	W	CFP	24	25	506.98	26.16	6220	NA

W (R-GDFP-F24)

CERAMIC DUAL FLATPACK



## NOTES:

- All linear dimensions are in inches (millimeters).
- This drawing is subject to change without notice.
- This package can be hermetically sealed with a ceramic lid using glass frit.
- Index point is provided on cap for terminal identification only.
- Falls within Mil-Std 1835 GDFP2-F20

DW (R-PDSO-G24)

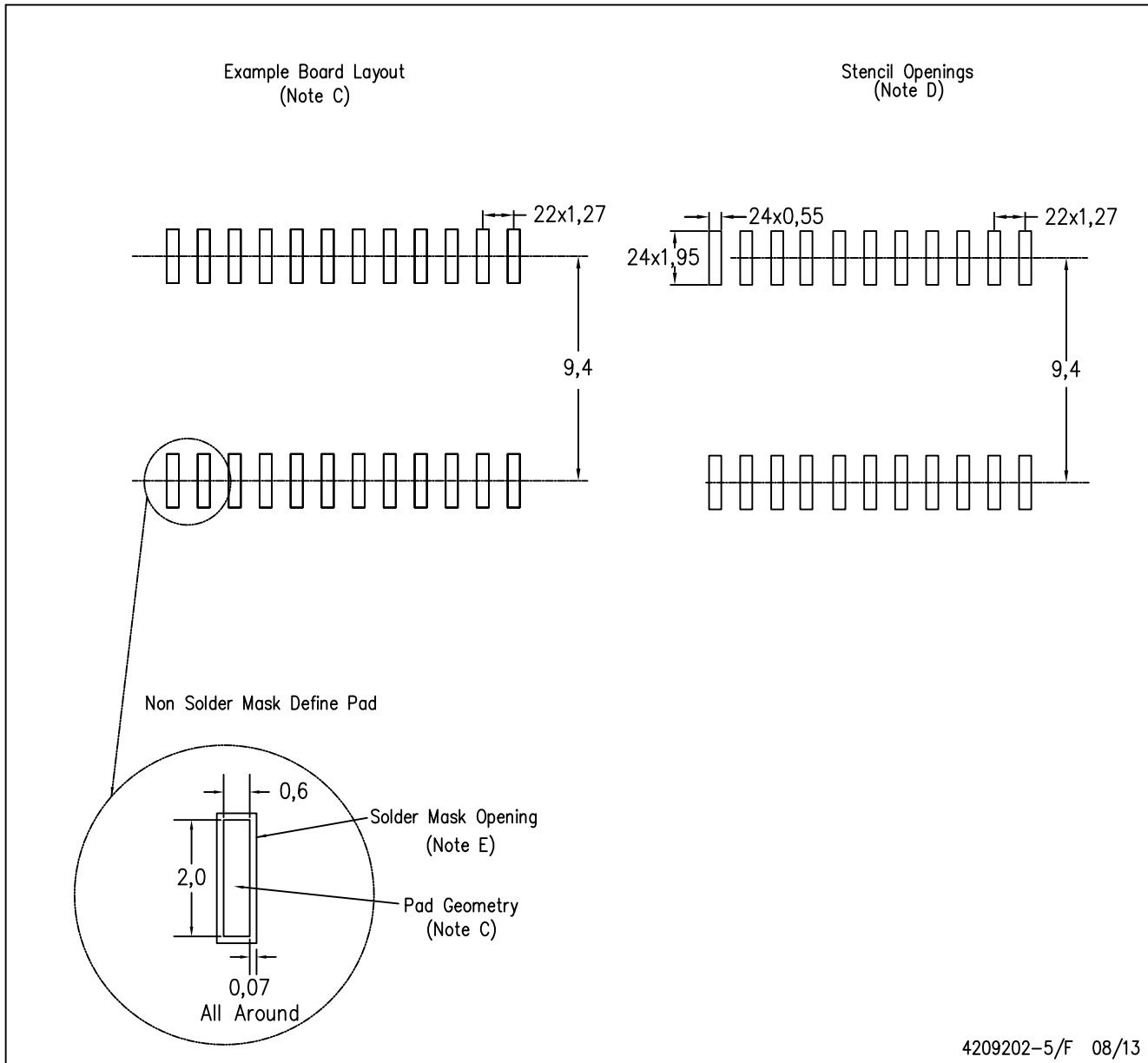
PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
  - 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 AD.

DW (R-PDSO-G24)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Refer to IPC7351 for alternate board design.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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

## PLASTIC SMALL-OUTLINE

28 PINS SHOWN

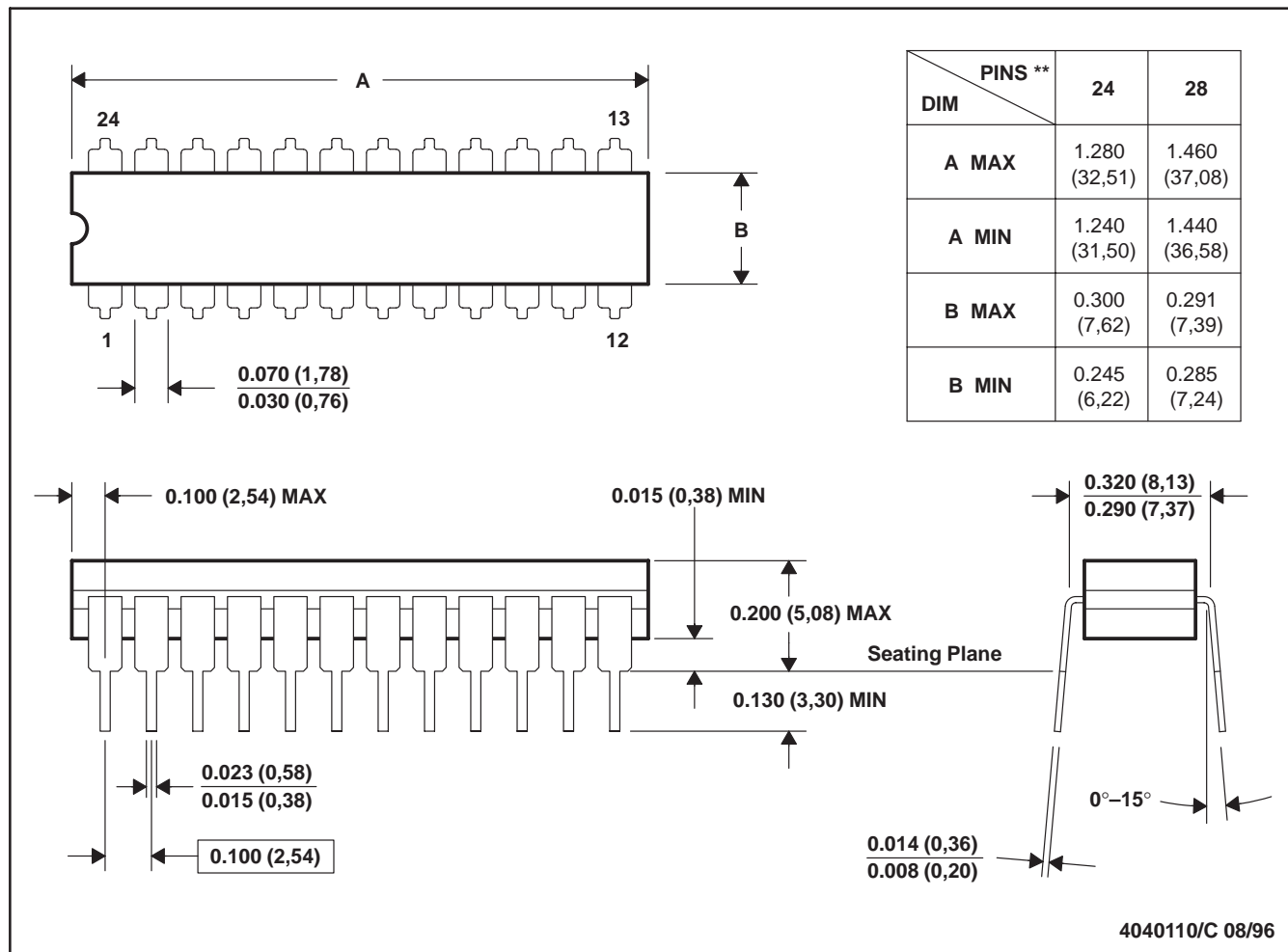


- NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.  
 D. Falls within JEDEC MO-150

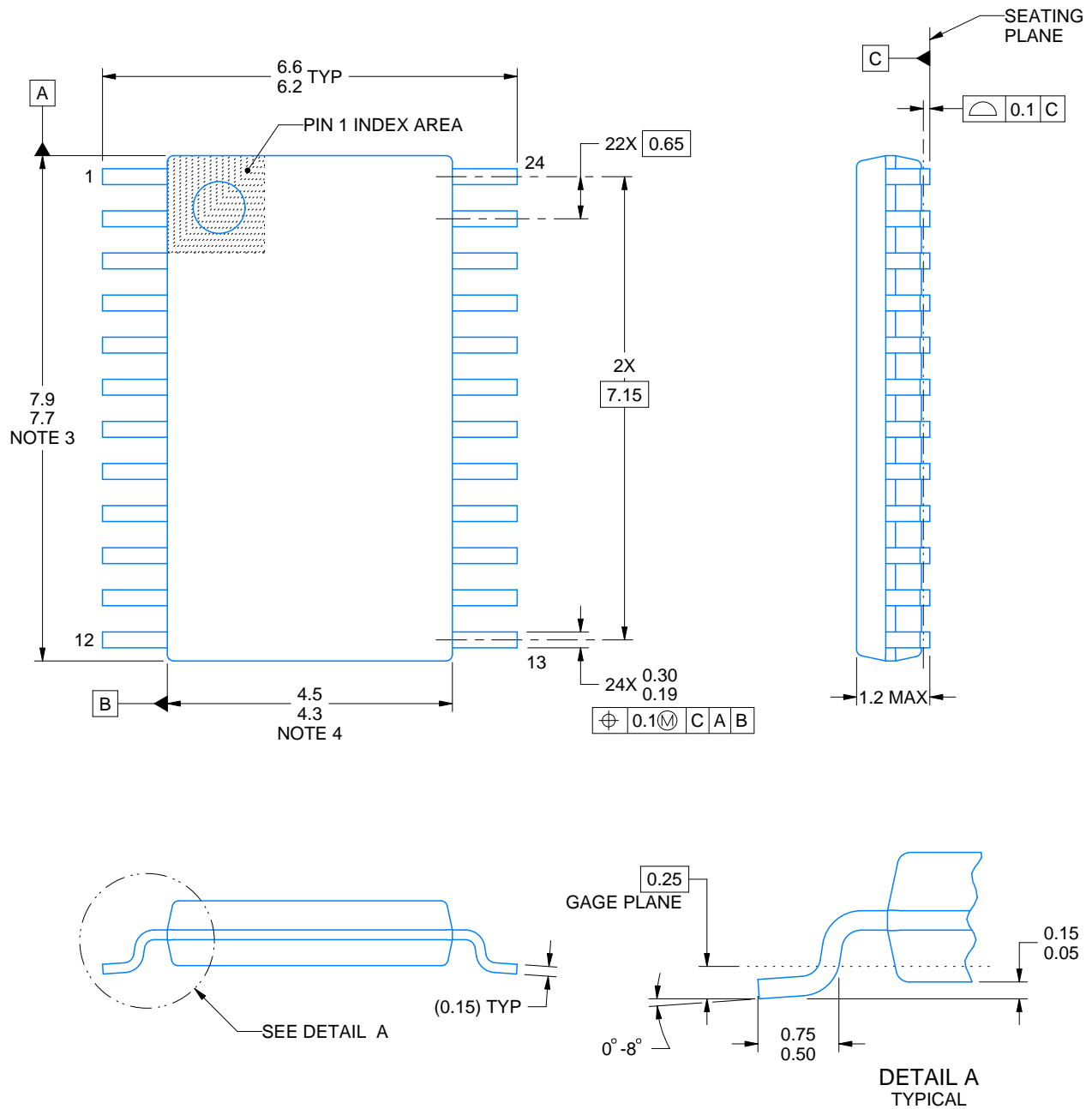
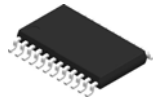
## JT (R-GDIP-T\*\*)

## CERAMIC DUAL-IN-LINE

24 LEADS 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 ceramic lid using glass frit.  
 D. Index point is provided on cap for terminal identification.  
 E. Falls within MIL STD 1835 GDIP3-T24, GDIP4-T28, and JEDEC MO-058 AA, MO-058 AB



4220208/A 02/2017

## NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.



# EXAMPLE BOARD LAYOUT

PW0024A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



4220208/A 02/2017

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

PW0024A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 10X

4220208/A 02/2017

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

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