

SN54ABT863, SN74ABT863 9-BIT BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SCBS201E – FEBRUARY 1991 – REVISED JULY 1998

- State-of-the-Art *EPIC-II*[™] BiCMOS Design Significantly Reduces Power Dissipation
- 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 ($-32\text{-mA } I_{OH}$, $64\text{-mA } I_{OL}$)
- Latch-Up Performance Exceeds 500 mA Per JESD 17
- ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model ($C = 200$ pF, $R = 0$)
- Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB) Packages, and Thin Shrink Small-Outline (PW), Ceramic Chip Carriers (FK), Plastic (NT), and Ceramic (JT) DIPs

description

The 'ABT863 devices are 9-bit transceivers designed for asynchronous communication between data buses. The control-function implementation allows for maximum flexibility in timing.

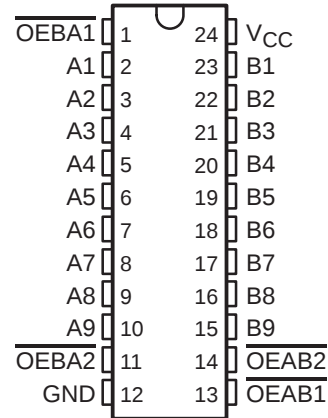
These devices allow noninverted data transmission from the A bus to the B bus or from the B bus to the A bus, depending on the logic levels at the output-enable ($\overline{\text{OEAB}}$ and $\overline{\text{OEBA}}$) inputs.

The outputs are in the high-impedance state during power up and power down. The outputs remain in the high-impedance state while the device is powered down.

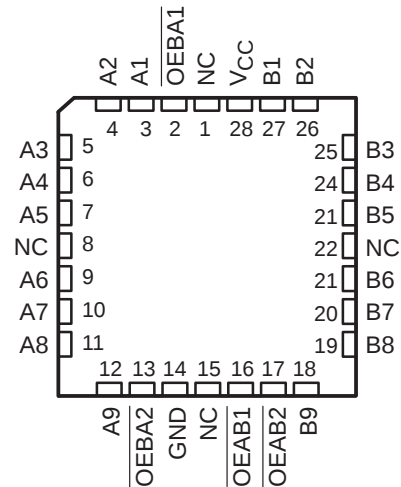
When V_{CC} is between 0 and 2.1 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 2.1 V, $\overline{\text{OE}}$ should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking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

The SN54ABT863 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ABT863 is characterized for operation from -40°C to 85°C .

SN54ABT863 . . . JT PACKAGE
SN74ABT863 . . . DB, DW, NT, OR PW PACKAGE
(TOP VIEW)



SN54ABT863 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection



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**TEXAS
INSTRUMENTS**

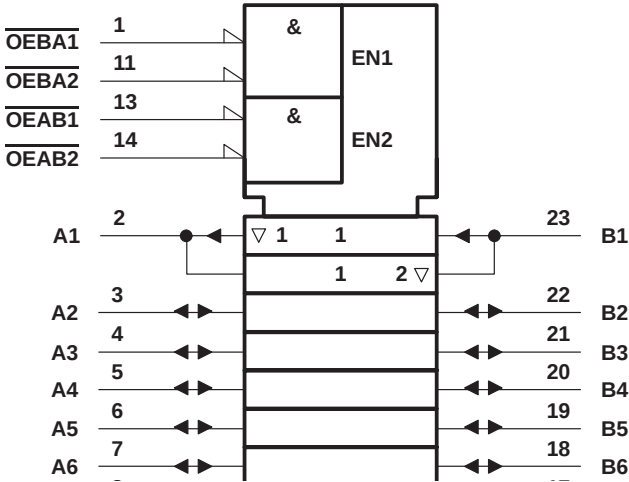
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9-BIT BUS TRANSCEIVERS
WITH 3-STATE OUTPUTS
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FUNCTION TABLE				OPERATION
INPUTS				
OEAB1	OEAB2	OEBA1	OEBA2	
L	L	L	L	Latch A and B
L	L	H	X	A to B
L	L	X	H	
H	X	L	L	B to A
X	H	L	L	
H	X	H	X	Isolation
H	X	X	H	
X	H	X	H	
X	H	H	X	

logic symbol†



Logic diagram of a 2-to-4 decoder circuit. The circuit uses two 2-to-1 multiplexers. The first multiplexer has inputs A1 (pin 2) and OEBA1 (pin 1), and OEBA2 (pin 11) as the select line. Its outputs are connected to pins 13 and 14. The second multiplexer has inputs A1 (pin 2) and OEAB1 (pin 13), and OEAB2 (pin 14) as the select line. Its outputs are connected to pins 23 and B1. The circuit is labeled "To Eight Other Channels" at the bottom.

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recommended operating conditions (see Note 3)

			SN54ABT863		SN74ABT863		UNIT
			MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage		4.5	5.5	4.5	5.5	V
V_{IH}	High-level input voltage		2		2		V
V_{IL}	Low-level input voltage			0.8		0.8	V
V_I	Input voltage		0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current			–24		–32	mA
I_{OL}	Low-level output current			48		64	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	Outputs enabled		5		5	ns/V
$\Delta t/\Delta V_{CC}$	Power-up ramp rate		200		200		$\mu s/V$
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.

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

PARAMETER	TEST CONDITIONS	T _A = 25°C			SN54ABT863		SN74ABT863		UNIT
		MIN	TYP†	MAX	MIN	MAX	MIN	MAX	
V _{IK}	V _{CC} = 4.5 V, I _I = –18 mA			–1.2		–1.2		–1.2	V
V _{OH}	V _{CC} = 4.5 V, I _{OH} = –3 mA	2.5			2.5		2.5		V
	V _{CC} = 5 V, I _{OH} = –3 mA	3			3		3		
	V _{CC} = 4.5 V			2	2				
				2*			2		
V _{OL}	V _{CC} = 4.5 V			0.55	0.55				V
				0.55*			0.55		
V _{hys}			100						mV
I _I	Control inputs	V _{CC} = 0 to 5.5 V, V _I = V _{CC} or GND		±1	±1		±1		µA
	A or B ports	V _{CC} = 2.1 V to 5.5 V, V _I = V _{CC} or GND		±20	±20		±20		
I _{OZPU}	V _{CC} = 0 to 2.1 V, V _O = 0.5 V to 2.7 V, OE = * don't care			±50	±50**		±50		µA
I _{OZPD}	V _{CC} = 2.1 V to 0, V _O = 0.5 V to 2.7 V, OE = * don't care			±50	±50**		±50		µA
I _{OZH} ‡	V _{CC} = 2.1 V to 5.5 V, V _O = 2.7 V, OE ≥ 2 V			10	10		10		µA
I _{OZL} ‡	V _{CC} = 2.1 V to 5.5 V, V _O = 0.5 V, OE ≥ 2 V			–10	–10		–10		µA
I _{off}	V _{CC} = 0, V _I or V _O ≤ 4.5 V			±100*			±100		µA
I _{CEX}	V _{CC} = 5.5 V, V _O = 5.5 V	Outputs high		50	50		50		µA
I _O §	V _{CC} = 5.5 V, V _O = 2.5 V	–50	–100	–225	–50	–225	–50	–225	mA
I _{CC}	A or B ports	V _{CC} = 5.5 V, I _O = 0, V _I = V _{CC} or GND	Outputs high		1	250	250	250	µA
			Outputs low		24	30	38	38	mA
			Outputs disabled		0.5	250	250	250	µA
ΔI _{CC} ¶	Data inputs	V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND	Outputs enabled		1.5	1.5	1.5		mA
			Outputs disabled		0.05	0.05	0.05		
	Control inputs	V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND		1.5	1.5	1.5	1.5		
C _i	Control inputs	V _I = 2.5 V or 0.5 V		4					pF
C _{io}	A or B ports	V _O = 2.5 V or 0.5 V		7					pF

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

** On products compliant to MIL-PRF-38535, this parameter is not production tested.

† All typical values are at V_{CC} = 5 V.

‡ The parameters I_{OZH} and I_{OZL} include the input leakage current.

§ 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_{CC} or GND.

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switching characteristics over recommended ranges of supply voltage and operating free-air temperature, $C_L = 50$ pF (unless otherwise noted) (see Figure 1)

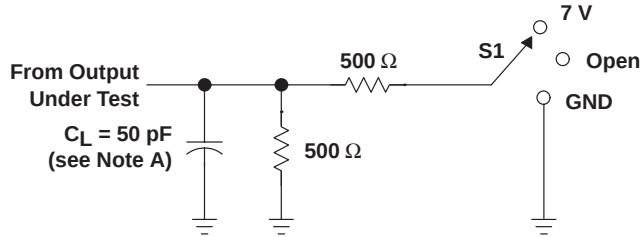
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$			SN54ABT863		SN74ABT863		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A or B	B or A	1	2.6	4.1	1	7	1	5.7	ns
t_{PHL}			1	2.3	3.3	1	3.9	1	3.9	
t_{PZH}	$\overline{OEAB}$ or $\overline{OEBA}$	B or A	1	3.2	4.3	1	5.4	1	5.5	ns
t_{PZL}			1	3.3	4.4	1	5.5	1	5.4	
t_{PHZ}	$\overline{OEAB}$ or $\overline{OEBA}$	B or A	2.5	4.8	6	2.5	6.8	2.5	6.7	ns
t_{PLZ}			1.5	4.4	5.9	1.5	7.8	1.5	6.9	

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PARAMETER MEASUREMENT INFORMATION



TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open

LOAD CIRCUIT

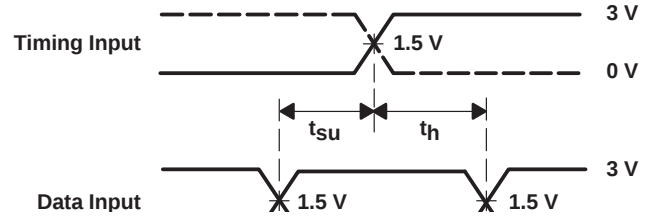
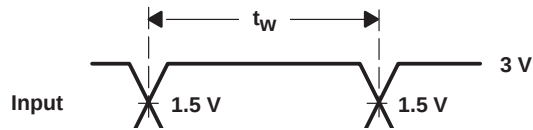


Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74ABT863DBLE	OBSOLETE	SSOP	DB	24		TBD	Call TI	Call TI	-40 to 85		
SN74ABT863DBR	ACTIVE	SSOP	DB	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB863	Samples
SN74ABT863DW	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT863	Samples
SN74ABT863DWR	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT863	Samples

(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.

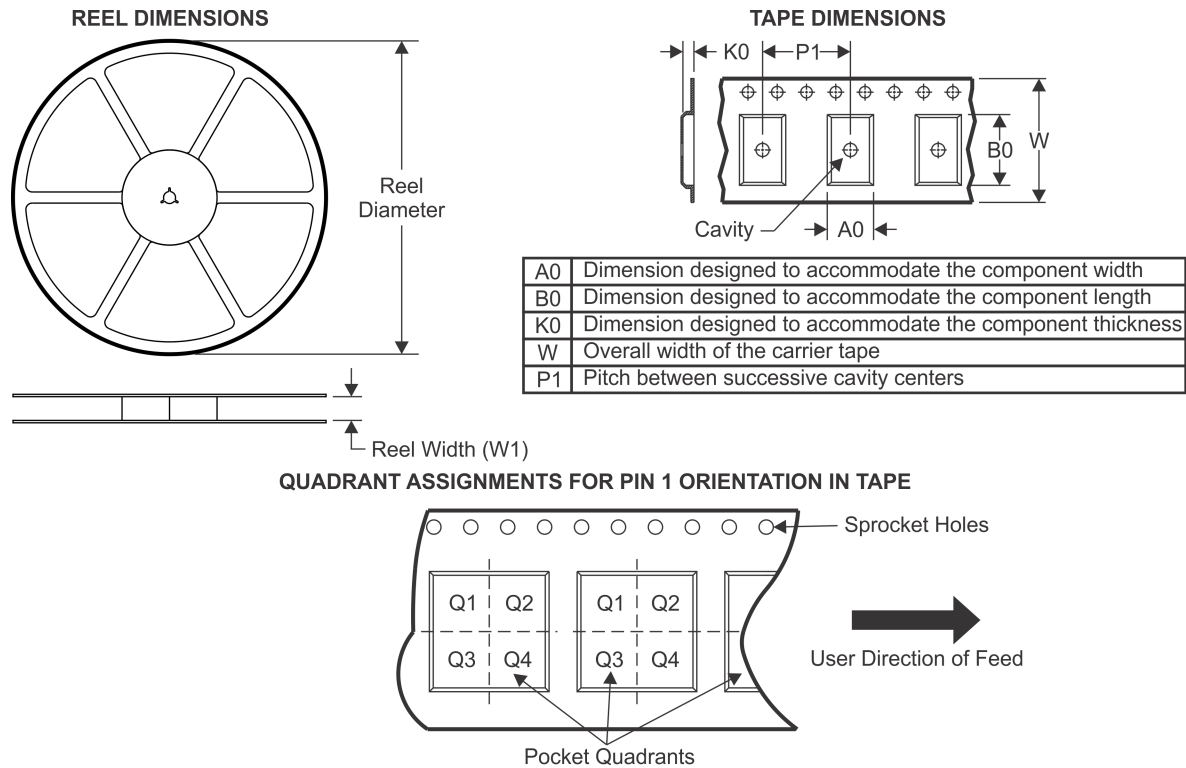
(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

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

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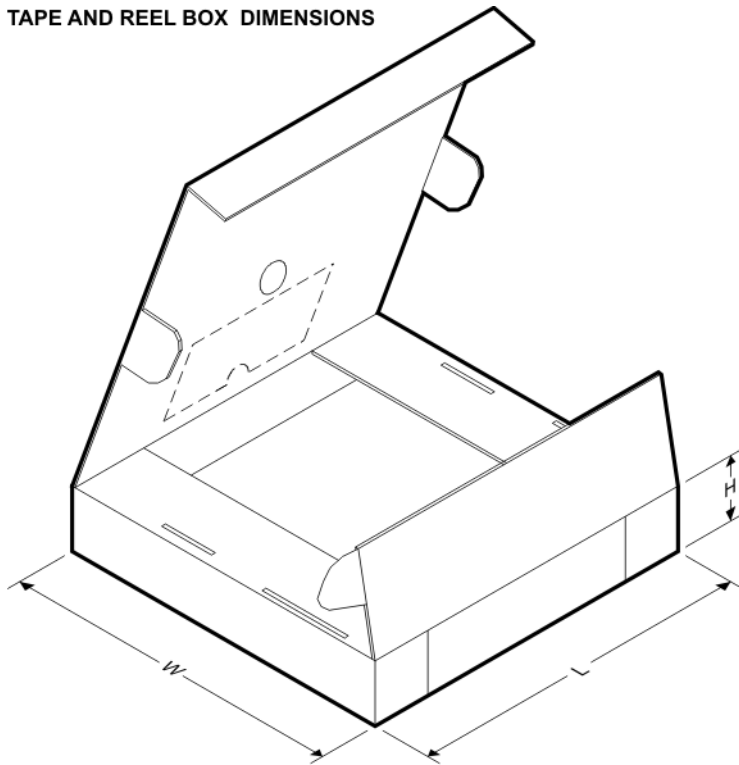
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TAPE AND REEL INFORMATION


*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
SN74ABT863DBR	SSOP	DB	24	2000	330.0	16.4	8.2	8.8	2.5	12.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS

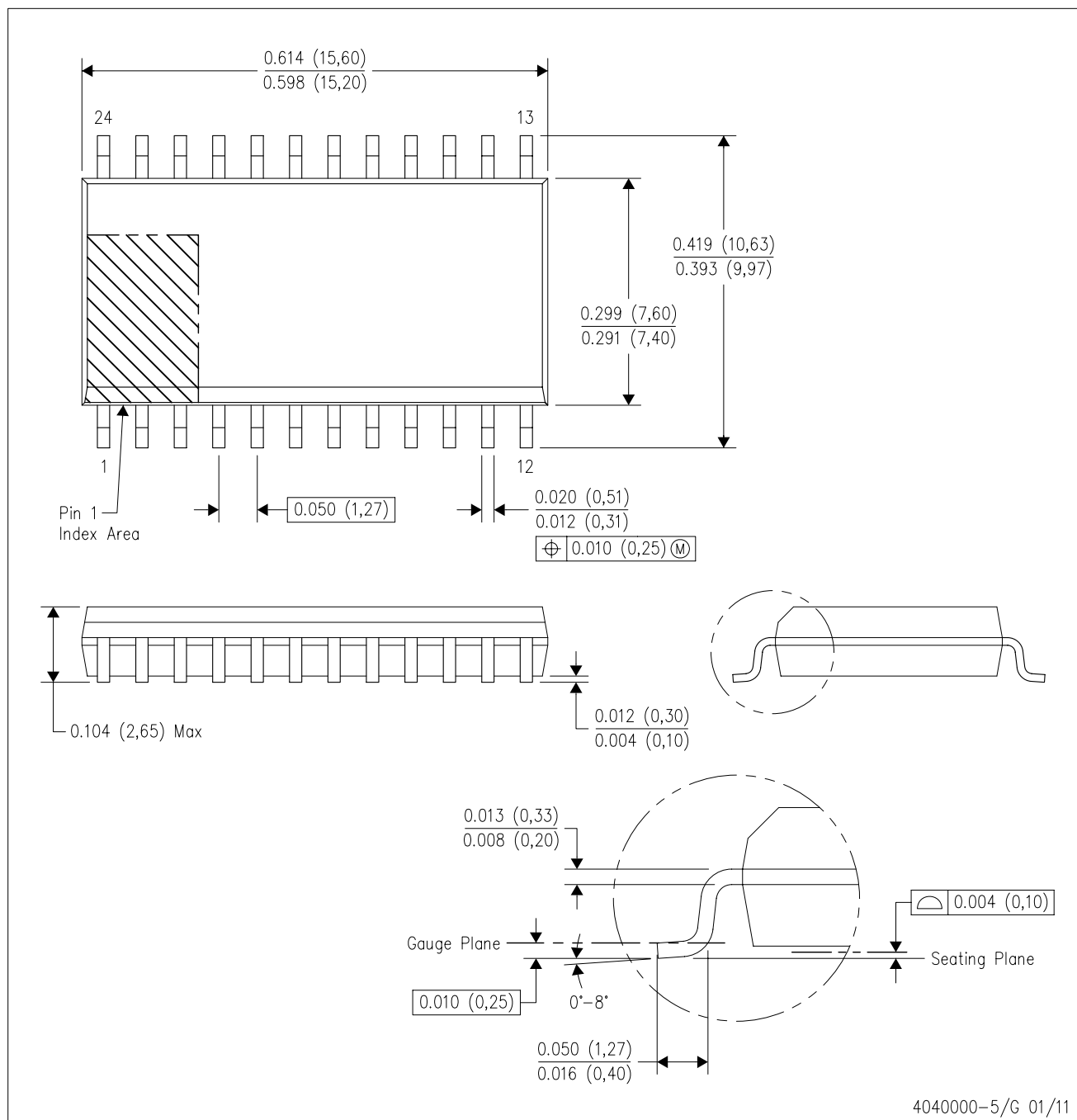


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ABT863DBR	SSOP	DB	24	2000	367.0	367.0	38.0

DW (R-PDSO-G24)

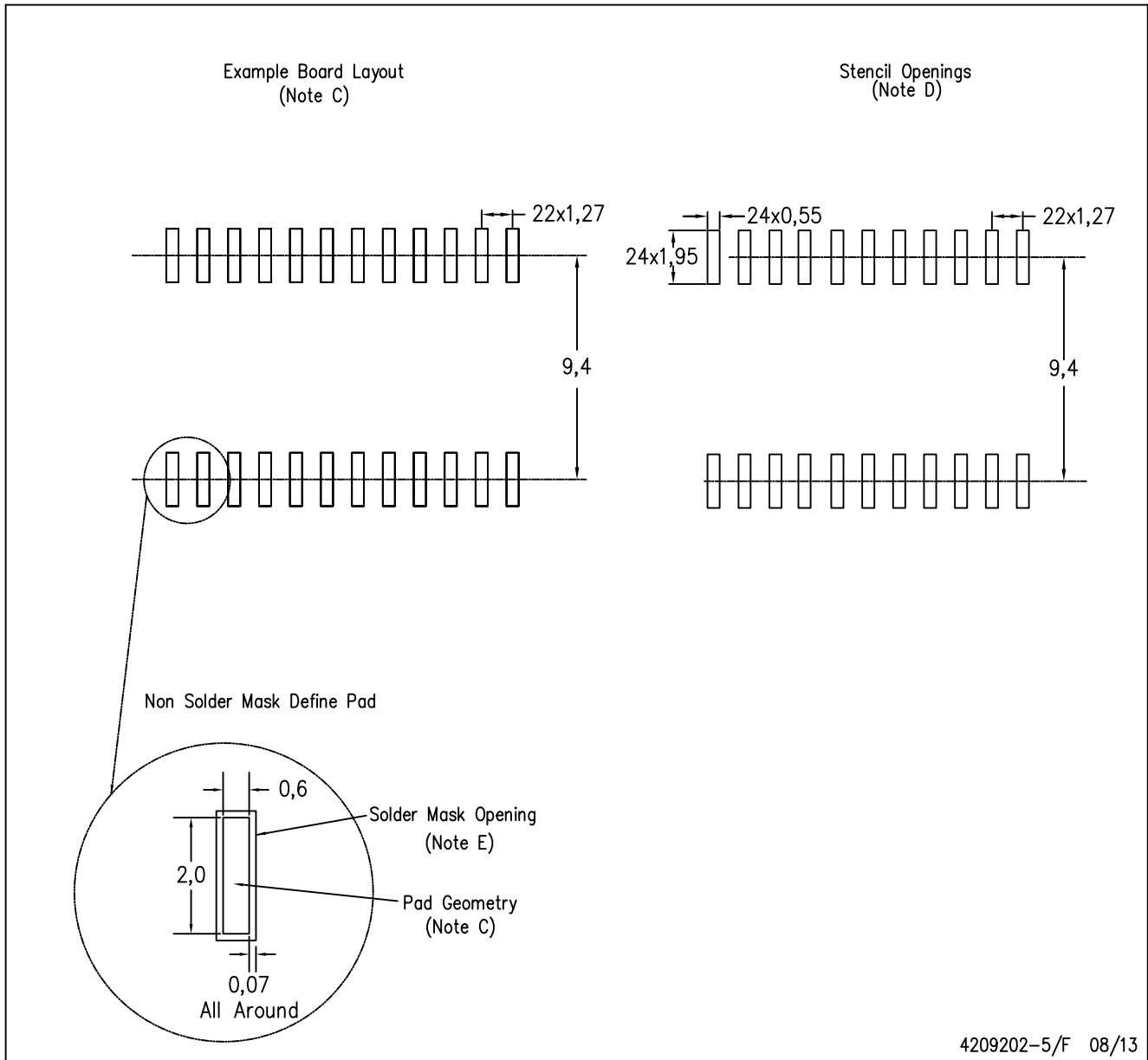
PLASTIC SMALL OUTLINE



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

DW (R-PDSO-G24)

PLASTIC SMALL OUTLINE



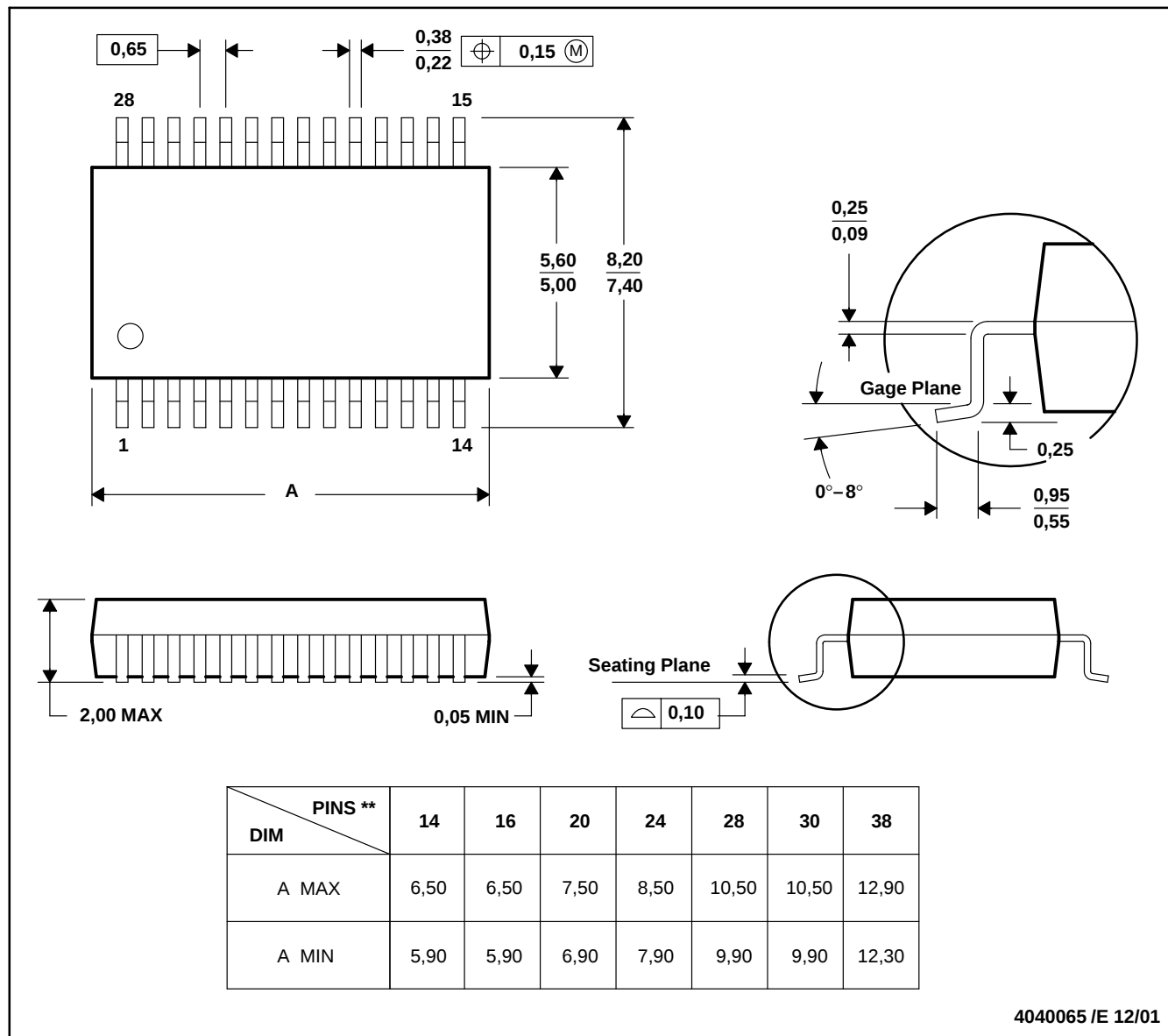
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- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Refer to IPC7351 for alternate board design.
 - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer 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

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