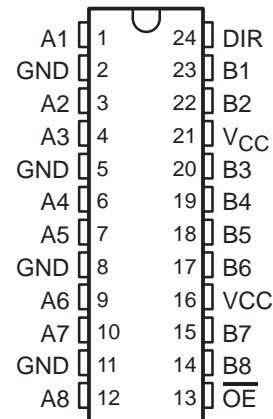


- State-of-the-Art BiCMOS Design Significantly Reduces  $I_{CCZ}$
- ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015; Exceeds 200 V Using Machine Model ( $C = 200$  pF,  $R = 0$ )
- Designed to Facilitate Incident-Wave Switching for Line Impedances of 25 Ω or Greater
- Distributed  $V_{CC}$  and GND Pins Minimize Noise Generated by the Simultaneous Switching of Outputs
- The A Port Features Open-Collector Outputs That Provide 188-mA  $I_{OL}$  to Allow for Heavy DC Loading on Open-Collector Outputs
- Eliminates Need for 3-State Overlap Protection on A Ports
- Package Options Include Plastic Small-Outline (DW) Packages and Standard Plastic 300-mil DIPs (NT)

DW OR NT PACKAGE  
(TOP VIEW)



## description

This 25-Ω octal bus transceiver is designed for asynchronous communication between data buses. The device transmits data from the A bus to the B bus or from the B bus to the A bus depending upon the level at the direction-control (DIR) input. The output-enable ( $\overline{OE}$ ) input can be used to disable the device so the buses are effectively isolated.

The SN74BCT25642 is capable of sinking 188-mA  $I_{OL}$  (A port), which facilitates switching 25-Ω transmission lines on the incident wave. It is designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented transceivers. The distributed  $V_{CC}$  and GND pins minimize the noise generated by the simultaneous switching of the outputs.

The SN74BCT25642 is characterized for operation from 0°C to 70°C.

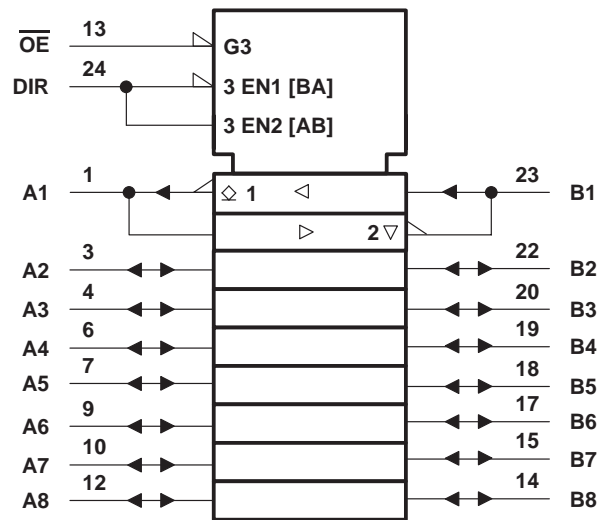
FUNCTION TABLE

INPUTS		OPERATION
$\overline{OE}$	DIR	
L	L	$\overline{B}$ data to A bus
L	H	$\overline{A}$ data to B bus
H	X	Isolation

# SN74BCT25642 25-Ω OCTAL BUS TRANSCEIVER

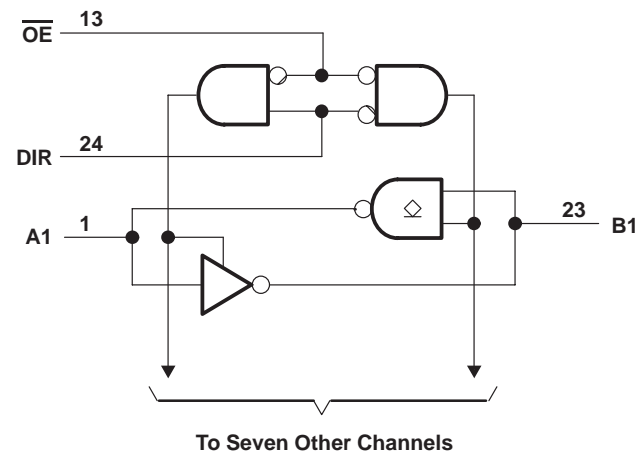
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logic symbol†



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

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 voltage range, $V_I$ : Control inputs (see Note 1)	–0.5 V to 7 V
I/O ports (see Note 1)	–0.5 V to 5.5 V
Voltage range applied to any output in the disabled or power-off state, $V_O$	–0.5 V to 5.5 V
Voltage range applied to any output in the high state, $V_O$	–0.5 V to $V_{CC}$
Input clamp current, $I_{IK}$ ( $V_I < 0$ )	–30 mA
Current into any output in the low state, $I_O$ : A ports	376 mA
B ports	48 mA
Operating free-air temperature range	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 and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

recommended operating conditions (see Note 2)

		MIN	NOM	MAX	UNIT
$V_{CC}$	Supply voltage	4.5	5	5.5	V
$V_{IH}$	High-level input voltage	2			V
$V_{IL}$	Low-level input voltage			0.8	V
$V_{OH}$	High-level output voltage			5.5	V
$I_{IK}$	Input clamp current			–18	mA
$I_{OH}$	High-level output current			–3	mA
$I_{OL}$	Low-level output current	A port		188	mA
		B port		24	
$T_A$	Operating free-air temperature	0		70	°C

NOTE 2: Unused or floating pins (input or I/O) must be held high or low.

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

PARAMETER		TEST CONDITIONS		MIN	TYP†	MAX	UNIT
$V_{IK}$		$V_{CC} = 4.5\text{ V}$ ,	$I_I = -18\text{ mA}$			–1.2	V
$V_{OH}$	Any B	$V_{CC} = 4.75\text{ V}$ ,	$I_{OH} = -1\text{ mA}$	2.7			V
		$V_{CC} = 4.5\text{ V}$ ,	$I_{OH} = -3\text{ mA}$	2.4	3.3		
$V_{OL}$	Any A	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 94\text{ mA}$	0.42	0.55		V
			$I_{OL} = 188\text{ mA}$		0.7		
	Any B	$V_{CC} = 4.5\text{ V}$ ,	$I_{OL} = 24\text{ mA}$	0.35	0.5		
$I_{OH}$	Any A	$V_{CC} = 4.5\text{ V}$ ,	$V_{OH} = 5.5\text{ V}$			0.1	mA
$I_I$	A and B	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 5.5\text{ V}$			0.25	mA
	DIR and $\overline{OE}$					0.1	
$I_{IH}^\ddagger$	A and B	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 2.7\text{ V}$			70	$\mu\text{A}$
	DIR and $\overline{OE}$					20	
$I_{IL}^\ddagger$	A and B	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 0.5\text{ V}$			–0.6	mA
	DIR and $\overline{OE}$					–0.6	
$I_{OS}^\S$	Any B	$V_{CC} = 5.5\text{ V}$ ,	$V_O = 0$	–60		–150	mA
$I_{CCL}$	A to B	$V_{CC} = 5.5\text{ V}$			40	64	mA
	B to A				78	125	
$I_{CCH}$	A to B	$V_{CC} = 5.5\text{ V}$			25	40	mA
	B to A				34	55	
$I_{CCZ}$	A to B	$V_{CC} = 5.5\text{ V}$			7.6	13	mA
$C_i$	Control inputs	$V_{CC} = 5\text{ V}$ ,	$V_O = 2.5\text{ V}$ or $0.5\text{ V}$		8		pF
$C_{io}$	A port	$V_{CC} = 5\text{ V}$ ,	$V_I = 2.5\text{ V}$ or $0.5\text{ V}$		15		pF
	B port				8		

† All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

‡ For I/O ports, the parameters  $I_{IH}$  and  $I_{IL}$  include the off-state output current.

§ Not more than one output should be shorted at a time, and the duration of the short-circuit should not exceed 10 ms.

# SN74BCT25642

## 25-Ω OCTAL BUS TRANSCEIVER

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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 Note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$			$R1 = 500\ \Omega^\dagger$ , $R2 = 500\ \Omega$		UNIT
			MIN	TYP	MAX	MIN	MAX	
$t_{PLH}$	A	B	0.8	3.2	6	0.8	6.2	ns
$t_{PHL}$			0.5	2	3.9	0.5	4	
$t_{PLH}$	B	A	1.5	3.2	5.7	1.5	6.3	ns
$t_{PHL}$			1.7	4.5	4.8	1.7	5.9	
$t_{PLH}$	$\overline{OE}$	A	2.8	5.5	10.4	2.8	11.6	ns
$t_{PHL}$			4.6	8.6	11.3	4.6	11.3	
$t_{PZH}$	$\overline{OE}$	B	3.3	5.7	8.1	3.3	9.1	ns
$t_{PZL}$			3.8	6.6	8.8	3.8	9.8	
$t_{PHZ}$	$\overline{OE}$	B	1.8	4.6	7	1.8	7.3	ns
$t_{PLZ}$			1.4	4.3	6.7	1.4	7.3	

$^\dagger$  For A port,  $R1 = 100\ \Omega$ .

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.



## PACKAGING INFORMATION

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
SN74BCT25642DW	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74BCT25642DWE4	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74BCT25642DWG4	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74BCT25642DWR	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74BCT25642DWRE4	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74BCT25642DWRG4	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74BCT25642NT	ACTIVE	PDIP	NT	24	15	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74BCT25642NTE4	ACTIVE	PDIP	NT	24	15	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type

<sup>(1)</sup> 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.

**OBSELETE:** TI has discontinued the production of the device.

<sup>(2)</sup> 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.

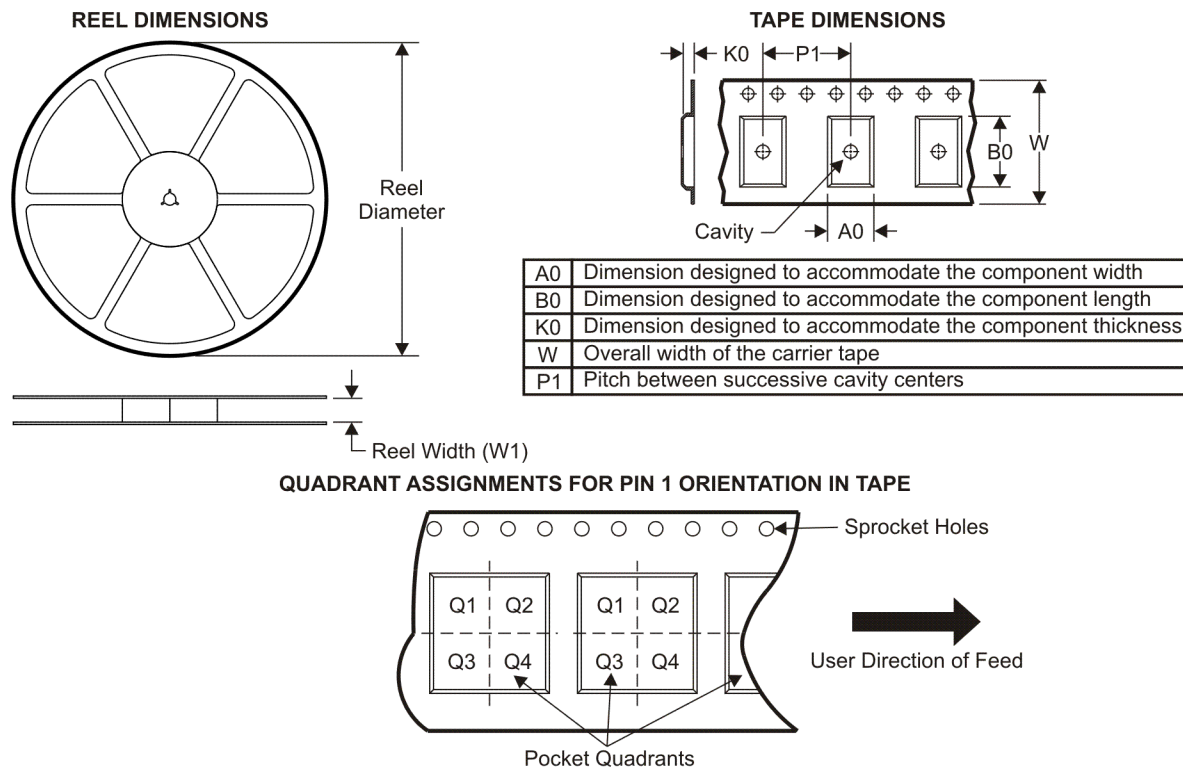
**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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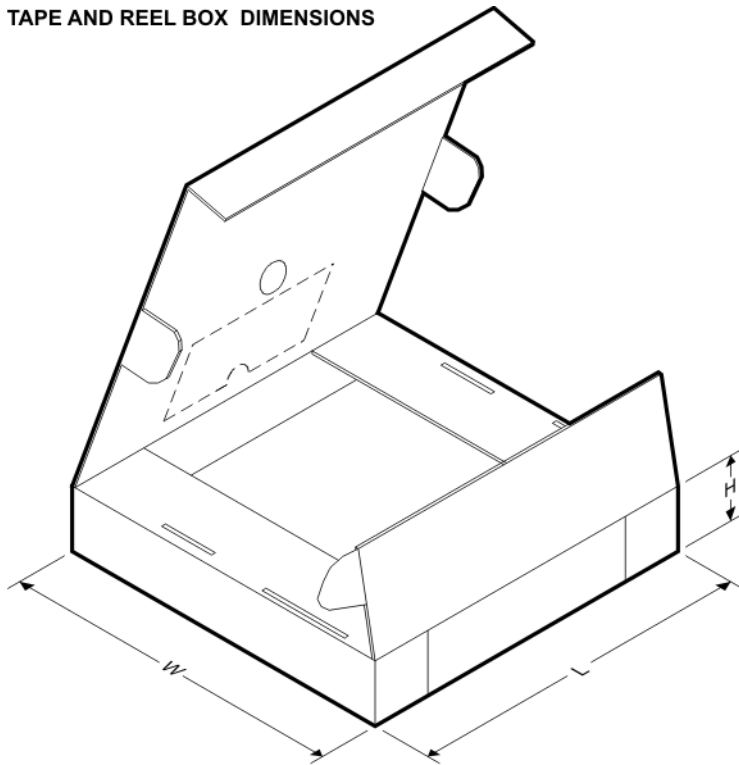
**TAPE AND REEL INFORMATION**



\*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
SN74BCT25642DWR	SOIC	DW	24	2000	330.0	24.4	10.75	15.7	2.7	12.0	24.0	Q1

## TAPE AND REEL BOX DIMENSIONS



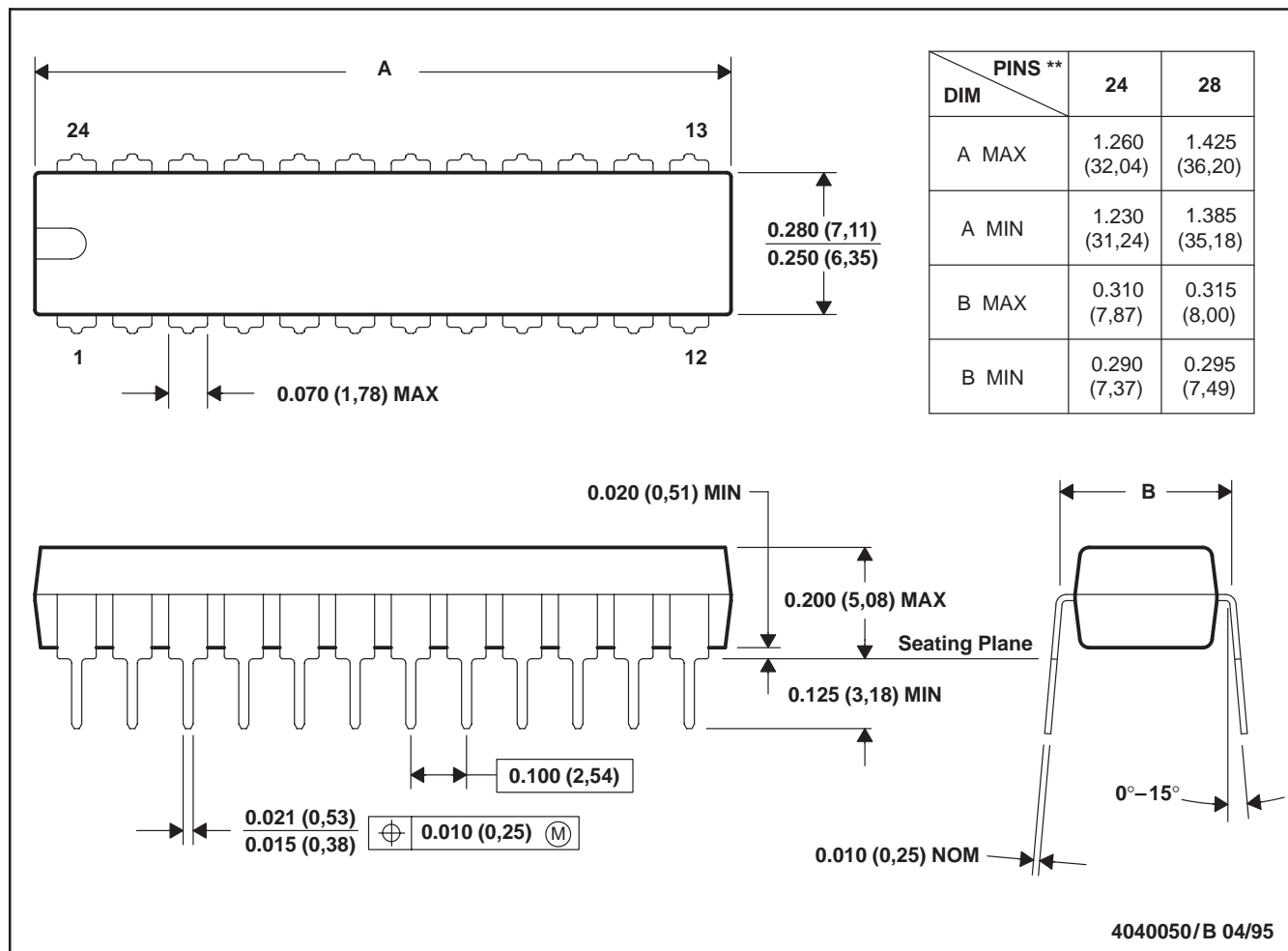
\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74BCT25642DWR	SOIC	DW	24	2000	346.0	346.0	41.0

## NT (R-PDIP-T\*\*)

## PLASTIC DUAL-IN-LINE PACKAGE

24 PINS SHOWN

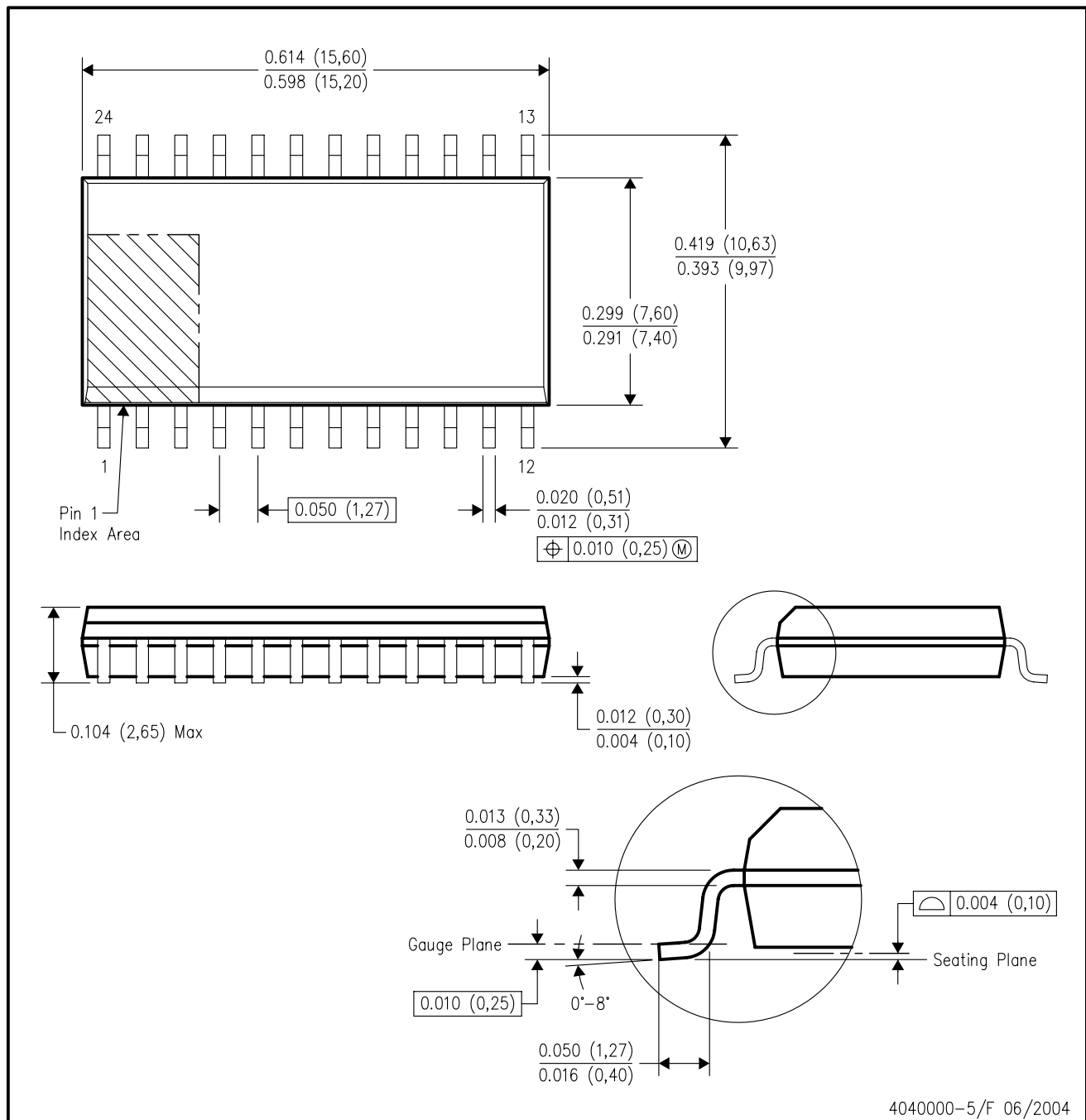


- NOTES: A. All linear dimensions are in inches (millimeters).  
 B. This drawing is subject to change without notice.



## DW (R-PDSO-G24)

## PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- All linear dimensions are in inches (millimeters).
  - 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.

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