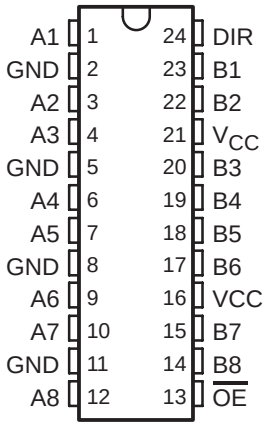
- **State-of-the-Art BiCMOS Design Significantly Reduces I_{CCZ}**
- **ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)**
- **Designed to Facilitate Incident-Wave Switching for Line Impedances of 25 Ω or Greater**
- **Distributed V_{CC} 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.

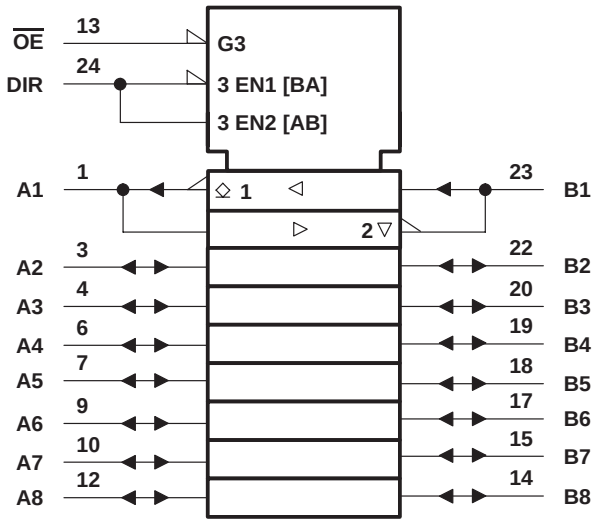
The SN74BCT25642 is capable of sinking 188-mA I_{OL} (A port), which facilitates switching 25-Ω transmission lines on the incident wave. It is designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented transceivers. The distributed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

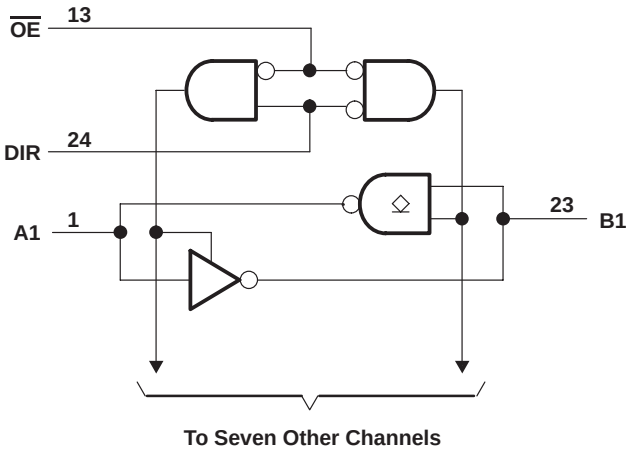
INPUTS		OPERATION
$\overline{OE}$	DIR	
L	L	$\overline{B}$ data to A bus
L	H	$\overline{A}$ data to B bus
H	X	Isolation

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	A port			5.5	V
I_{IK}	Input clamp current				−18	mA
I_{OH}	High-level output current	B port			− 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 V,	I_I = −18 mA			−1.2	V
V_{OH}	Any B	V_{CC} = 4.75 V,	I_{OH} = − 1 mA	2.7			V
		V_{CC} = 4.5 V,	I_{OH} = −3 mA	2.4	3.3		
V_{OL}	Any A	V_{CC} = 4.5 V	I_{OL} = 94 mA		0.42	0.55	V
			I_{OL} = 188 mA			0.7	
	Any B	V_{CC} = 4.5 V,	I_{OL} = 24 mA		0.35	0.5	
I_{OH}	Any A	V_{CC} = 4.5 V,	V_{OH} = 5.5 V			0.1	mA
I_I	A and B	V_{CC} = 5.5 V,	V_I = 5.5 V			0.25	mA
	DIR and $\overline{OE}$					0.1	
I_{IH}‡	A and B	V_{CC} = 5.5 V,	V_I = 2.7 V			70	µA
	DIR and $\overline{OE}$					20	
I_{IL}‡	A and B	V_{CC} = 5.5 V,	V_I = 0.5 V			−0.6	mA
	DIR and $\overline{OE}$					−0.6	
I_{OS}§	Any B	V_{CC} = 5.5 V,	V_O = 0	−60		−150	mA
I_{CCL}	A to B	V_{CC} = 5.5 V			40	64	mA
	B to A				78	125	
I_{CCH}	A to B	V_{CC} = 5.5 V			25	40	mA
	B to A				34	55	
I_{CCZ}	A to B	V_{CC} = 5.5 V			7.6	13	mA
C_i	Control inputs	V_{CC} = 5 V,	V_O = 2.5 V or 0.5 V		8		pF
C_{io}	A port	V_{CC} = 5 V,	V_I = 2.5 V or 0.5 V		15		pF
	B port				8		

† All typical values are at V_{CC} = 5 V, T_A = 25°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.

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°C			R1 = 500 Ω†, R2 = 500 Ω		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	

† For A port, R1 = 100 Ω.

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

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74BCT25642DW	ACTIVE	SOIC	DW	24	25	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	BCT25642	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) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

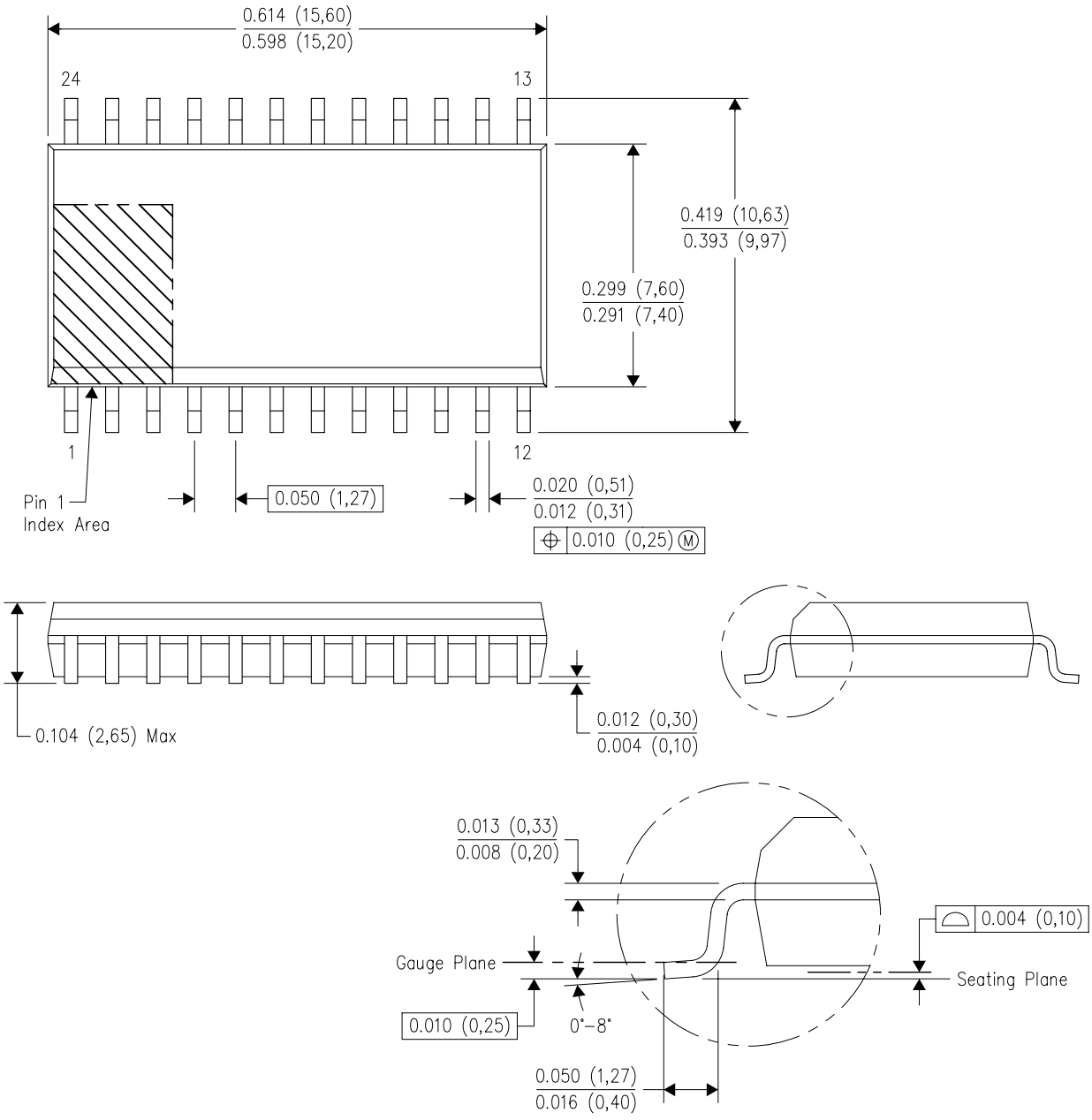
(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(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 finish/Ball material - Orderable Devices 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.

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.

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