

OCTAL TRANSCEIVER WITH PARITY GENERATOR/CHECKER AND 3-STATE OUTPUTS

SDFS027A – D3217, JANUARY 1989 – REVISED OCTOBER 1993

- Combines 'F245 and 'F280B Functions in One Package
- High-Impedance N-P-N Inputs for Reduced Loading (70 μ A in Low and High States)
- High Output Drive and Light Bus Loading
- 3-State B Outputs Sink 64 mA and Source 15 mA
- Input Diodes for Termination Effects
- Package Options Include Plastic Small-Outline Packages and Standard Plastic 300-mil DIPs

description

The SN74F657 contains eight noninverting buffers with 3-state outputs and an 8-bit parity generator/checker. It is intended for bus-oriented applications. The buffers have a specified current sinking capability of 24 mA at the A port and 64 mA at the B port.

The transmit/receive ($\overline{T/R}$) input determines the direction of the data flow through the bidirectional transceivers. When $\overline{T/R}$ is high, data is transmitted from the A port to the B port. When $\overline{T/R}$ is low, data is received at the A port from the B port.

When the output enable ($\overline{OE}$) input is high, both the A and B ports are placed in a high-impedance state (disabled). The ODD/EVEN input allows the user to select between odd or even parity systems. When transmitting from A port to B port ($\overline{T/R}$ high), PARITY is an output from the generator/checker. When receiving from B port to A port ($\overline{T/R}$ low), PARITY is an input.

When transmitting ($\overline{T/R}$ high), the parity select (ODD/EVEN) input is made high or low as appropriate. The A port is then polled to determine the number of high bits. The PARITY output goes to the logic state determined by ODD/EVEN and the number of high bits on A port. When ODD/EVEN is low (for even parity) and the number of high bits on A port is odd, the PARITY will be high, transmitting even parity. If the number of high bits on A port is even, the PARITY will be low, keeping even parity.

When in the receive mode ($\overline{T/R}$ low), the B port is polled to determine the number of high bits. If ODD/EVEN is low (for even parity) and the number of highs on B port is:

1. Odd and the PARITY input is high, then $\overline{ERR}$ will be high signifying no error.
2. Even and the PARITY input is high, then $\overline{ERR}$ will be low indicating an error.

The SN74F657 is characterized for operation from 0°C to 70°C.

DW OR NT PACKAGE
(TOP VIEW)

$\overline{T/R}$	1	24	$\overline{OE}$
A1	2	23	B1
A2	3	22	B2
A3	4	21	B3
A4	5	20	B4
A5	6	19	GND
V_{CC}	7	18	GND
A6	8	17	B5
A7	9	16	B6
A8	10	15	B7
ODD/EVEN	11	14	B8
$\overline{ERR}$	12	13	PARITY

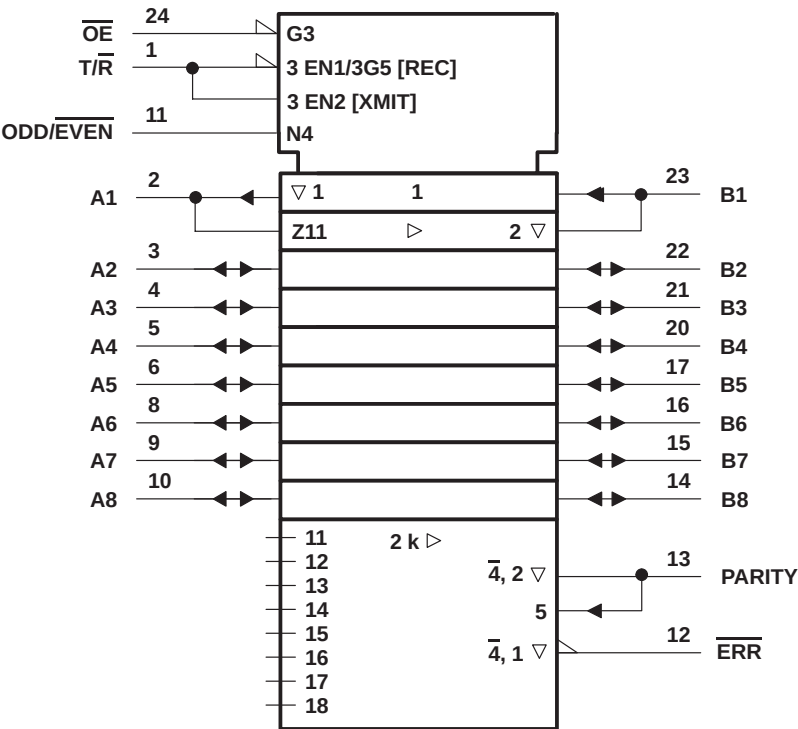
SN74F657

OCTAL TRANSCEIVER WITH PARITY GENERATOR/CHECKER
AND 3-STATE OUTPUTS

SDFS027A – D3217, JANUARY 1989 – REVISED OCTOBER 1993

FUNCTION TABLE						
NUMBER OF A OR B INPUTS THAT ARE HIGH	INPUTS			INPUT/OUTPUT PARITY	OUTPUTS	
	$\overline{\text{OE}}$	$\text{T}/\overline{\text{R}}$	$\text{ODD}/\overline{\text{EVEN}}$		$\overline{\text{ERR}}$	OUTPUT MODE
0, 2, 4, 6, 8	L	H	H	H	Z	Transmit
	L	H	L	L	Z	Transmit
	L	L	H	H	H	Receive
	L	L	H	L	L	Receive
	L	L	L	H	L	Receive
	L	L	L	L	H	Receive
1, 3, 5, 7	L	H	H	L	Z	Transmit
	L	H	L	H	Z	Transmit
	L	L	H	H	L	Receive
	L	L	H	L	H	Receive
	L	L	L	H	H	Receive
	L	L	L	L	L	Receive
Don't care	H	X	X	Z	Z	Z

logic symbol†



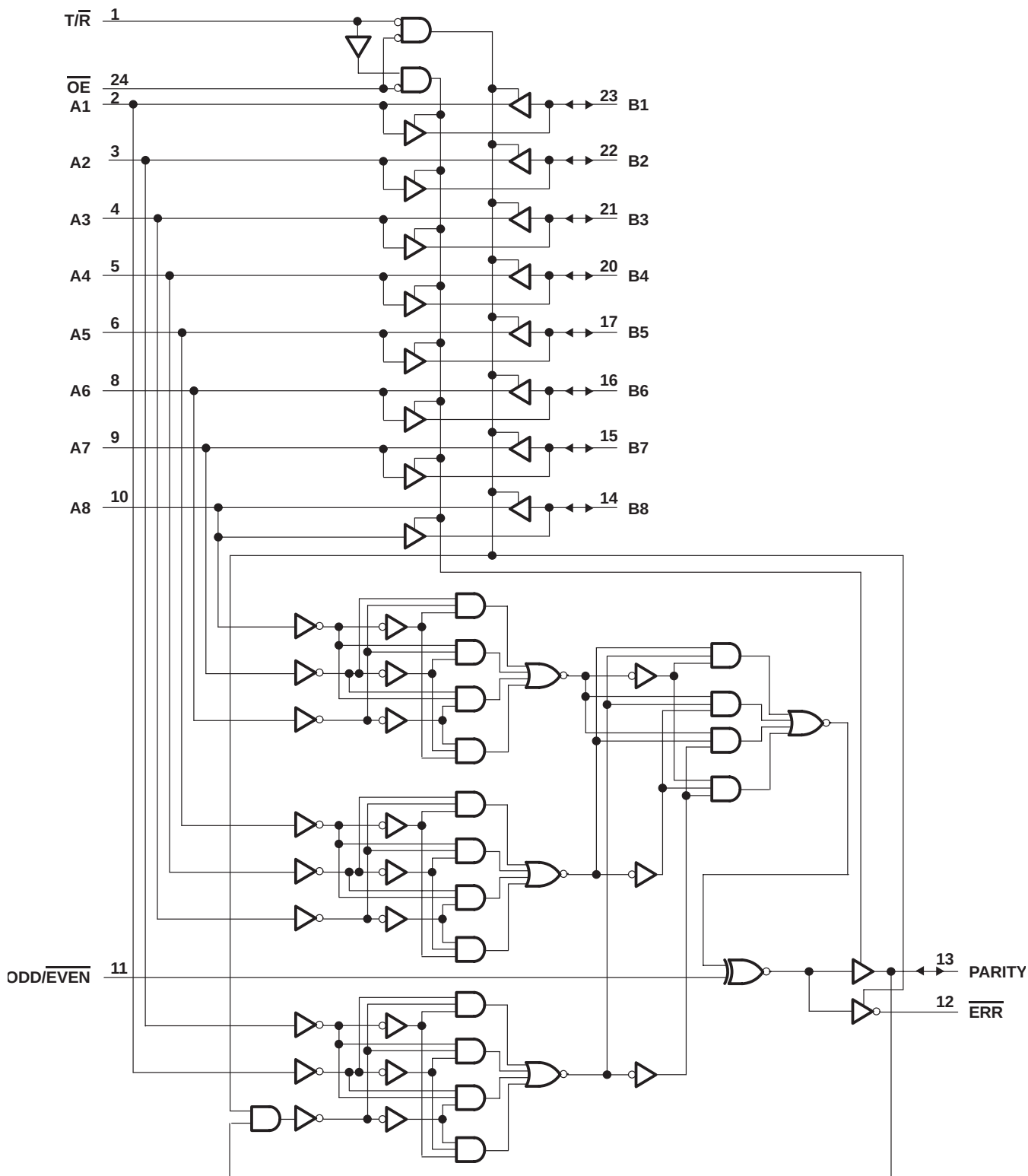
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

SN74F657

OCTAL TRANSCEIVER WITH PARITY GENERATOR/CHECKER AND 3-STATE OUTPUTS

SDFS027A – D3217, JANUARY 1989 – REVISED OCTOBER 1993

logic diagram (positive logic)



SN74F657

OCTAL TRANSCEIVER WITH PARITY GENERATOR/CHECKER
AND 3-STATE OUTPUTS

SDFS027A – D3217, JANUARY 1989 – REVISED OCTOBER 1993

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 (excluding I/O ports) (see Note 1)	–1.2 V to 7 V
Input current range	–30 mA to 5 mA
Voltage range applied to any output in the disabled or power-off state	–0.5 V to 5.5 V
Voltage range applied to any output in the high state	–0.5 V to V_{CC}
Current into any output in the low state: A1–A8	48 mA
B1–B8	128 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-voltage ratings may be exceeded provided the input-current ratings are observed.

recommended operating conditions

			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
I_{OH}	High-level output current	A1–A8			– 3	mA
		B1–B8, PARITY, $\overline{ERR}$			– 12	
I_{OL}	Low-level output current	A1–A8			24	mA
		B1–B8, PARITY, $\overline{ERR}$			64	
T_A	Operating free-air temperature		0		70	°C

SN74F657

OCTAL TRANSCEIVER WITH PARITY GENERATOR/CHECKER AND 3-STATE OUTPUTS

SDFS027A – D3217, JANUARY 1989 – REVISED OCTOBER 1993

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 output	$V_{CC} = 4.5\text{ V}$,	$I_{OH} = -3\text{ mA}$	2.4	3.3		V
	B1–B8, PARITY, $\overline{ERR}$	$V_{CC} = 4.5\text{ V}$,	$I_{OH} = -15\text{ mA}$	2	3.1		
	Any output	$V_{CC} = 4.75\text{ V}$,	$I_{OH} = -1\text{ mA to } -3\text{ mA}$	2.7			
V_{OL}	A1–A8	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 24\text{ mA}$		0.35	0.5	V
	B1–B8, PARITY, $\overline{ERR}$		$I_{OL} = 64\text{ mA}$		0.42	0.55	
I_I	$T/\overline{R}$	$V_{CC} = 0$,	$V_I = 7\text{ V}$,			0.1	mA
	$\overline{OE}$	$V_{CC} = 0$,	$V_I = 7\text{ V}$,			0.1	
	$\overline{ODD/EVEN}$	$V_{CC} = 0$,	$V_I = 7\text{ V}$			0.1	
	A1–A8	$V_{CC} = 5.5\text{ V}$,	$V_I = 7\text{ V}$			2	
	B1–B8					1	
$I_{IH}^{\ddagger}$	A, B, PARITY	$V_{CC} = 5.5\text{ V}$,	$V_I = 2.7\text{ V}$			70	μA
	$T/\overline{R}$, $\overline{OE}$					40	
	$\overline{ODD/EVEN}$					20	
$I_{IL}^{\ddagger}$	A, B, PARITY	$V_{CC} = 5.5\text{ V}$,	$V_I = 0.5\text{ V}$			-70	μA
	$T/\overline{R}$, $\overline{OE}$					-40	
	$\overline{ODD/EVEN}$					-20	
$I_{OS}^{\S}$	A1–A8	$V_{CC} = 5.5\text{ V}$,	$V_O = 0$	-60		-150	mA
	B1–B8			-100		-225	
I_{OZH}	$\overline{ERR}$	$V_{CC} = 5.5\text{ V}$,	$V_I = 2.7\text{ V}$			50	μA
I_{OZL}	$\overline{ERR}$	$V_{CC} = 5.5\text{ V}$,	$V_I = 0.5\text{ V}$			-50	μA
I_{CCH}		$V_{CC} = 5.5\text{ V}$			90	125	mA
I_{CCL}		$V_{CC} = 5.5\text{ V}$			106	150	mA
I_{CCZ}		$V_{CC} = 5.5\text{ V}$			98	145	mA

[†] 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 one second.

SN74F657

OCTAL TRANSCEIVER WITH PARITY GENERATOR/CHECKER AND 3-STATE OUTPUTS

SDFS027A – D3217, JANUARY 1989 – REVISED OCTOBER 1993

switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, C _L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T _A = 25°C			V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T _A = MIN to MAX †		UNIT
			MIN	TYP	MAX	MIN	MAX	
t _{PLH}	A or B	B or A	2.5	4.2	7.5	2.5	8	ns
t _{PHL}			3	4	7.5	3	8	
t _{PLH}	A	PARITY	6	8.4	14	6	16	ns
t _{PHL}			6.8	8.5	15	6.8	16	
t _{PLH}	ODD/EVEN	PARITY, $\overline{\text{ERR}}$	4	6.4	11	4	12	ns
t _{PHL}			4.5	6.9	11.5	4.5	12.5	
t _{PLH}	B	$\overline{\text{ERR}}$	8	12.7	20.5	7.5	22.5	ns
t _{PHL}			8	13.4	20.5	7.5	22.5	
t _{PLH}	PARITY	$\overline{\text{ERR}}$	6	8.1	15.5	6	16.5	ns
t _{PHL}			7.5	8.8	15.5	7.5	17	
t _{PZH}	OE	A, B, PARITY, or $\overline{\text{ERR}}$ ‡	3	5.3	8	3	9	ns
t _{PZL}			4	5.4	9.5	4	11	
t _{PHZ}	$\overline{\text{OE}}$	A, B, PARITY, or $\overline{\text{ERR}}$ ‡	2	4.2	7.5	2	8	ns
t _{PLZ}			2	3.7	6	2	6.5	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ These delay times reflect the 3-state recovery time only and not the signal through the buffers or parity check circuitry. To assure valid information at the $\overline{\text{ERR}}$ output pin, time must be allowed for the signal to propagate through the drivers (B to A), and to the $\overline{\text{ERR}}$ output. Valid data at the $\overline{\text{ERR}}$ output is greater than or equal to (B to A) + (A to PARITY).

NOTE 2: Load circuits and waveforms are shown in Section 1.

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN74F657DW	ACTIVE	SOIC	DW	24	25	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR/ Level-1-235C-UNLIM
SN74F657DWR	ACTIVE	SOIC	DW	24	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR/ Level-1-235C-UNLIM
SN74F657NT	ACTIVE	PDIP	NT	24	15	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC

⁽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) 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.

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.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

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.

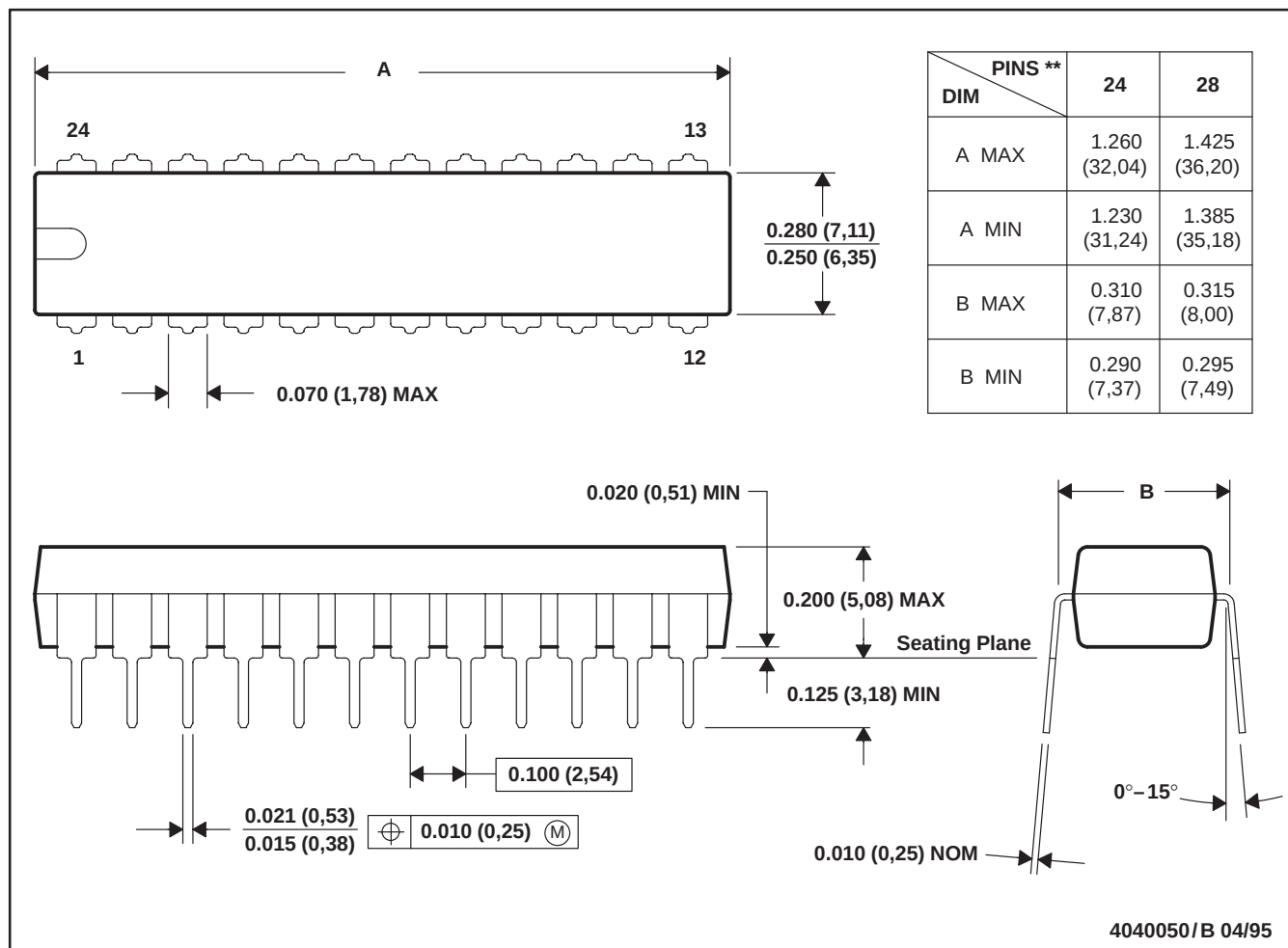
MECHANICAL DATA

MPDI004 – OCTOBER 1994

NT (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

24 PINS SHOWN

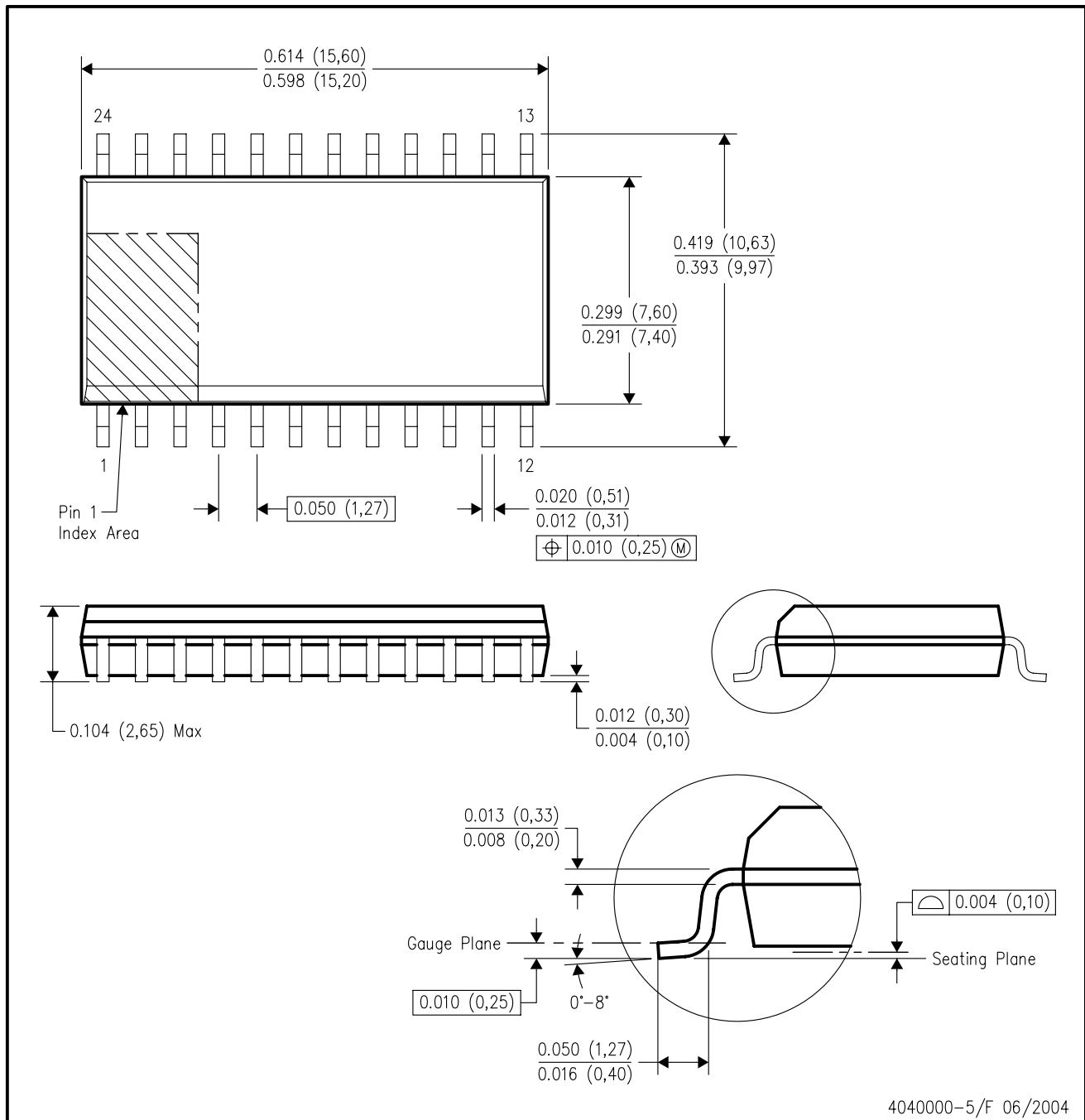


NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.

MECHANICAL DATA

DW (R-PDSO-G24)

PLASTIC SMALL-OUTLINE PACKAGE



4040000-5/F 06/2004

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DSP	dsp.ti.com
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com

Applications

Audio	www.ti.com/audio
Automotive	www.ti.com/automotive
Broadband	www.ti.com/broadband
Digital Control	www.ti.com/digitalcontrol
Military	www.ti.com/military
Optical Networking	www.ti.com/opticalnetwork
Security	www.ti.com/security
Telephony	www.ti.com/telephony
Video & Imaging	www.ti.com/video
Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265