

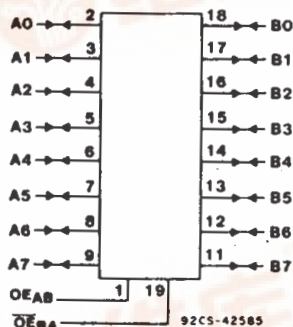
CD54/74AC623

CD54/74ACT623

Advance Information



Data sheet acquired from Harris Semiconductor
SCHS286A – October 2003



FUNCTIONAL DIAGRAM

Octal-Bus Transceiver, 3-State, Non-Inverting

Type Features:

- Buffered inputs
- Typical propagation delay:
4.5 ns @ $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$, $C_L = 50\text{ pF}$

The RCA CD54/74AC623 and CD54/74ACT623 octal-bus transceivers use the RCA ADVANCED CMOS technology. They are non-inverting, 3-state, bidirectional transceiver-buffers that allow for two-way transmission from "A" bus to "B" bus or "B" bus to "A" bus, depending on the logic levels of the Output Enable (OE_{AB} , OE_{BA}) inputs.

The dual Output Enable provision gives these devices the capability to store data by simultaneously enabling OE_{AB} and OE_{BA} . Each output reinforces its input under these conditions, and when all other data sources to the bus lines are at high-impedance, both sets of bus lines will remain in their last states.

The CD74AC623 is supplied in 20-lead dual-in-line plastic packages (E suffix) and in 20-lead small-outline packages (M, M96, and NSR suffixes). The CD74ACT623 is supplied in 20-lead small-outline packages (M96 suffix). Both package types are operable over the following temperature ranges: Commercial (0 to 70°C); Industrial (-40 to $+85^\circ\text{C}$); and Extended Industrial/Military (-55 to $+125^\circ\text{C}$).

The CD54AC623 and CD54ACT623, available in chip form (H suffix), are operable over the -55 to $+125^\circ\text{C}$ temperature range.

Family Features:

- Exceeds 2-kV ESD Protection - MIL-STD-883, Method 3015
- SCR-Latchup-resistant CMOS process and circuit design
- Speed of bipolar FAST*/AS/S with significantly reduced power consumption
- Balanced propagation delays
- AC types feature 1.5-V to 5.5-V operation and balanced noise immunity at 30% of the supply
- $\pm 24\text{-mA}$ output drive current
 - Fanout to 15 FAST* ICs
 - Drives 50-ohm transmission lines

*FAST is a Registered Trademark of Fairchild Semiconductor Corp.

TRUTH TABLE

OUTPUT ENABLE INPUTS		OPERATION
OE_{BA}	OE_{AB}	
L	L	B DATA TO A BUS
H	H	A DATA TO B BUS
H	L	ISOLATION
L	H	B DATA TO A BUS, A DATA TO B BUS

H = High level, L = Low level

Note: To prevent excess currents in the High-Z (isolation) modes, all I/O terminals should be terminated with 10 k Ω to 1 M Ω resistors.

Technical Data CD54/74AC623CD54/74ACT623

MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE (V_{CC})	-0.5 to 6 V
DC INPUT DIODE CURRENT, I_{IK} (for $V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V)	± 20 mA
DC OUTPUT DIODE CURRENT, I_{OK} (for $V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V)	± 50 mA
DC OUTPUT SOURCE OR SINK CURRENT per Output Pin, I_O (for $V_O > -0.5$ V or $V_O < V_{CC} + 0.5$ V)	± 50 mA
DC V_{CC} or GROUND CURRENT (I_{CC} or I_{GND})	± 100 mA*
POWER DISSIPATION PER PACKAGE (P_D):	
For $T_A = -55$ to $+100^\circ\text{C}$ (PACKAGE TYPE E)	500 mW
For $T_A = +100$ to $+125^\circ\text{C}$ (PACKAGE TYPE E)	Derate Linearly at 8 mW/ $^\circ\text{C}$ to 300 mW
For $T_A = -55$ to $+70^\circ\text{C}$ (PACKAGE TYPE M)	400 mW
For $T_A = +70$ to $+125^\circ\text{C}$ (PACKAGE TYPE M)	Derate Linearly at 6 mW/ $^\circ\text{C}$ to 70 mW
OPERATING-TEMPERATURE RANGE (T_A)	-55 to $+125^\circ\text{C}$
STORAGE TEMPERATURE (T_{STG})	-65 to $+150^\circ\text{C}$
LEAD TEMPERATURE (DURING SOLDERING):	
At distance $1/16 \pm 1/32$ in. (1.59 ± 0.79 mm) from case for 10 s maximum	$+265^\circ\text{C}$
Unit inserted into PC board min. thickness $1/16$ in. (1.59 mm) with solder contacting lead tips only	$+300^\circ\text{C}$

*For up to 4 outputs per device; add ± 25 mA for each additional output.

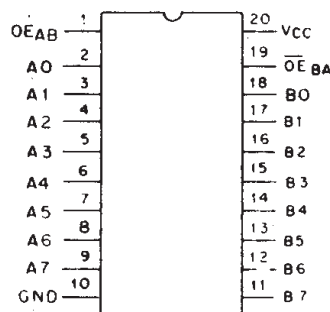
RECOMMENDED OPERATING CONDITIONS:

For maximum reliability, normal operating conditions should be selected so that operation is always within the following ranges:

CHARACTERISTIC	LIMITS		UNITS
	MIN.	MAX.	
Supply-Voltage Range, V_{CC} *: (For T_A = Full Package-Temperature Range) AC Types ACT Types			
	1.5	5.5	V
	4.5	5.5	V
DC Input or Output Voltage, V_I , V_O	0	V_{CC}	V
Operating Temperature, T_A	-55	$+125$	$^\circ\text{C}$
Input Rise and Fall Slew Rate, dt/dv at 1.5 V to 3 V (AC Types) at 3.6 V to 5.5 V (AC Types) at 4.5 V to 5.5 V (ACT Types)	0	50	ns/V
	0	20	ns/V
	0	10	ns/V

*Unless otherwise specified, all voltages are referenced to ground.

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92CS 4258C

TERMINAL ASSIGNMENT

Technical Data

CD54/74AC623

CD54/74ACT623

STATIC ELECTRICAL CHARACTERISTICS: AC Series

CHARACTERISTICS	TEST CONDITIONS		V _{cc} (V)	AMBIENT TEMPERATURE (T _A) - °C						UNITS
				+25		-40 to +85		-55 to +125		
	V _I (V)	I _O (mA)		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
High-Level Input Voltage V _{IH}			1.5	1.2	—	1.2	—	1.2	—	V
			3	2.1	—	2.1	—	2.1	—	
			5.5	3.85	—	3.85	—	3.85	—	
Low-Level Input Voltage V _{IL}			1.5	—	0.3	—	0.3	—	0.3	V
			3	—	0.9	—	0.9	—	0.9	
			5.5	—	1.65	—	1.65	—	1.65	
High-Level Output Voltage V _{OH}	V _{IH} or V _{IL}	-0.05	1.5	1.4	—	1.4	—	1.4	—	V
		-0.05	3	2.9	—	2.9	—	2.9	—	
		-0.05	4.5	4.4	—	4.4	—	4.4	—	
		-4	3	2.58	—	2.48	—	2.4	—	
		-24	4.5	3.94	—	3.8	—	3.7	—	
	#, *	-75	5.5	—	—	3.85	—	—	—	
		-50	5.5	—	—	—	—	3.85	—	
Low-Level Output Voltage V _{OL}	V _{IH} or V _{IL}	0.05	1.5	—	0.1	—	0.1	—	0.1	V
		0.05	3	—	0.1	—	0.1	—	0.1	
		0.05	4.5	—	0.1	—	0.1	—	0.1	
		12	3	—	0.36	—	0.44	—	0.5	
		24	4.5	—	0.36	—	0.44	—	0.5	
	#, *	75	5.5	—	—	—	1.65	—	—	
		50	5.5	—	—	—	—	—	1.65	
Input Leakage Current I _I	V _{cc} or GND		5.5	—	±0.1	—	±1	—	±1	μA
3-State Leakage Current I _{OZ}	V _{IH} or V _{IL} V _O = V _{cc} or GND		5.5	—	±0.5	—	±5	—	±10	μA
Quiescent Supply Current, MSI I _{cc}	V _{cc} or GND	0	5.5	—	8	—	80	—	160	μA

#Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.

*Test verifies a minimum 50-ohm transmission-line-drive capability at +85°C, 75 ohms at +125°C.

Technical Data
CD54/74AC623
CD54/74ACT623

STATIC ELECTRICAL CHARACTERISTICS: ACT Series

CHARACTERISTICS	TEST CONDITIONS		V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C						UNITS
				+25		-40 to +85		-55 to +125		
	V _I (V)	I _O (mA)		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
High-Level Input Voltage V _{IH}			4.5 to 5.5	2	—	2	—	2	—	V
Low-Level Input Voltage V _{IL}			4.5 to 5.5	—	0.8	—	0.8	—	0.8	V
High-Level Output Voltage V _{OH}	V _{IH} or V _{IL} #, * {	-0.05	4.5	4.4	—	4.4	—	4.4	—	V
		-24	4.5	3.94	—	3.8	—	3.7	—	
		-75	5.5	—	—	3.85	—	—	—	
		-50	5.5	—	—	—	—	3.85	—	
Low-Level Output Voltage V _{OL}	V _{IH} or V _{IL} #, * {	0.05	4.5	—	0.1	—	0.1	—	0.1	V
		24	4.5	—	0.36	—	0.44	—	0.5	
		75	5.5	—	—	—	1.65	—	—	
		50	5.5	—	—	—	—	—	1.65	
Input Leakage Current I _I	V _{CC} or GND		5.5	—	±0.1	—	±1	—	±1	μA
3-State Leakage Current I _{OZ}	V _{IH} or V _{IL} V _O = V _{CC} or GND		5.5	—	±0.5	—	±5	—	±10	μA
Quiescent Supply Current, MSI I _{CC}	V _{CC} or GND	0	5.5	—	8	—	80	—	160	μA
Additional Quiescent Supply Current per Input Pin TTL Inputs High 1 Unit Load ΔI _{CC}	V _{CC} -2.1		4.5 to 5.5	—	2.4	—	2.8	—	3	mA

#Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.

*Test verifies a minimum 50-ohm transmission-line-drive capability at +85°C, 75 ohms at +125°C.

ACT INPUT LOADING TABLE

INPUT	UNIT LOAD*
A_n, B_n	0.83
\overline{OE}_{BA}	0.64
OE_{AB}	0.15

*Unit load is ΔI_{CC} limit specified in Static Characteristics Chart, e.g., 2.4 mA max. @ 25°C.

Technical Data

CD54/74AC623 CD54/74ACT623

SWITCHING CHARACTERISTICS: AC Series; $t_r, t_f = 3 \text{ ns}$, $C_L = 50 \text{ pF}$

CHARACTERISTICS	SYMBOL	V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C				UNITS
			-40 to +85		-55 to +125		
			MIN.	MAX.	MIN.	MAX.	
Propagation Delays: Data to Output	t _{PLH} t _{PHL}	1.5 3.3* 5†	— 3.5 2.5	108 12.2 8.7	— 3.4 2.4	120 13.4 9.6	ns
Output Disable to Output	t _{PLZ} t _{PHZ}	1.5 3.3 5	— 4.8 3.5	153 17.1 12.2	— 4.7 3.4	168 18.8 13.4	ns
Output Enable to Output	t _{PZL} t _{PZH}	1.5 3.3 5	— 4.8 3.5	153 17.1 12.2	— 4.7 3.4	168 18.8 13.4	ns
Power Dissipation Capacitance	C _{PD} §	—	66 Typ.		66 Typ.		pF
Min. (Valley) V _{OH} During Switching of Other Outputs (Output Under Test Not Switching)	V _{OHV} See Fig. 1	5	4 Typ. @ 25°C				V
Max. (Peak) V _{OL} During Switching of Other Outputs (Output Under Test Not Switching)	V _{OLP} See Fig. 1	5	1 Typ. @ 25°C				V
Input Capacitance	C _I	—	—	10	—	10	pF
3-State Output Capacitance	C _O	—	—	15	—	15	pF

SWITCHING CHARACTERISTICS: ACT Series; $t_r, t_f = 3 \text{ ns}$, $C_L = 50 \text{ pF}$

CHARACTERISTICS	SYMBOL	V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C				UNITS
			-40 to +85		-55 to +125		
			MIN.	MAX.	MIN.	MAX.	
Propagation Delays: Data to Output	t _{PLH} t _{PHL}	5†	2.7	9.6	2.7	10.6	ns
Output Disable to Output	t _{PLZ} t _{PHZ}	5	3.7	13.1	3.6	14.4	ns
Output Enable to Output	t _{PZH} t _{PZL}	5	3.7	13.1	3.6	14.4	ns
Power Dissipation Capacitance	C _{PD} §	—	66 Typ.		66 Typ.		pF
Min. (Valley) V _{OH} During Switching of Other Outputs (Output Under Test Not Switching)	V _{OHV} See Fig. 1	5	4 Typ. @ 25°C				V
Max. (Peak) V _{OL} During Switching of Other Outputs (Output Under Test Not Switching)	V _{OLP} See Fig. 1	5	1 Typ. @ 25°C				V
Input Capacitance	C _I	—	—	10	—	10	pF
3-State Output Capacitance	C _O	—	—	15	—	15	pF

*3.3 V: min. is @ 3.6 V
max. is @ 3 V

†5 V: min. is @ 5.5 V
max. is @ 4.5 V

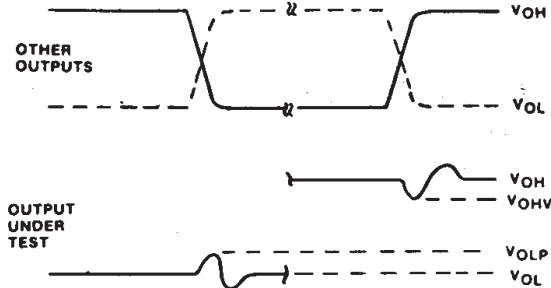
$\S C_{PD}$ is used to determine the dynamic power consumption, per channel.

For AC series: $P_D = V_{CC}^2 f_i (C_{PD} + C_L)$

For ACT series: $P_D = V_{CC}^2 f_i (C_{PD} + C_L) + V_{CC} \Delta I_{CC}$ where f_i = input frequency
 C_L = output load capacitance
 V_{CC} = supply voltage.

CD54/74AC623 CD54/74ACT623

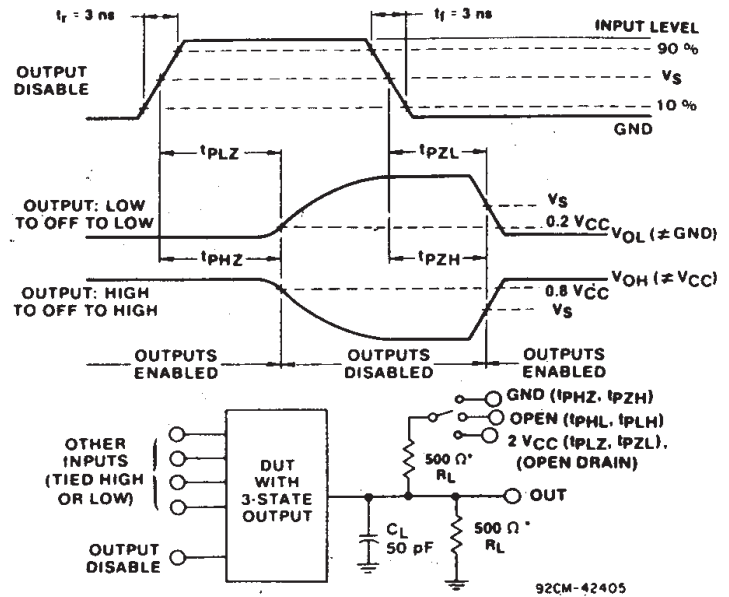
PARAMETER MEASUREMENT INFORMATION



NOTES:

1. VOHV and VOLP are measured with respect to a ground reference near the output under test.
2. INPUT PULSES HAVE THE FOLLOWING CHARACTERISTICS:
PRR ≤ 1 MHz, $t_r = 3$ ns, $t_f = 3$ ns, SKEW 1 ns.
3. R.F. FIXTURE WITH 700-MHz DESIGN RULES REQUIRED.
IC SHOULD BE SOLDERED INTO TEST BOARD AND BYPASSED WITH 0.1 μ F CAPACITOR. SCOPE AND PROBES REQUIRE 700-MHz BANDWIDTH.

92CS-4240E

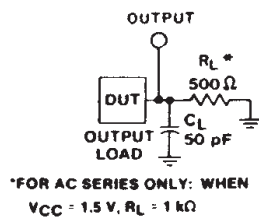


*FOR AC SERIES ONLY: WHEN $V_{CC} = 1.5$ V, $R_L = 1$ k Ω

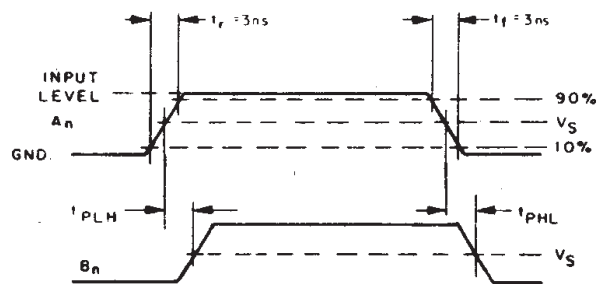
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Fig. 1 - Simultaneous switching transient waveforms.

Fig. 2 - Three-state propagation delay times and test circuit.



92CS-42589



92CS-42587

Fig. 3 - Propagation delay times and test circuit.

	CD54/74AC	CD54/74ACT
Input Level	V_{CC}	3 V
Input Switching Voltage, V_S	0.5 V_{CC}	1.5 V
Output Switching Voltage, V_S	0.5 V_{CC}	0.5 V_{CC}

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
CD54ACT623F3A	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
CD74AC623E	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
CD74AC623EE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
CD74AC623M	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74AC623M96	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74AC623M96E4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74AC623ME4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74AC623NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74AC623NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74ACT623M96	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD74ACT623M96E4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽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.

OBSELETE: 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.

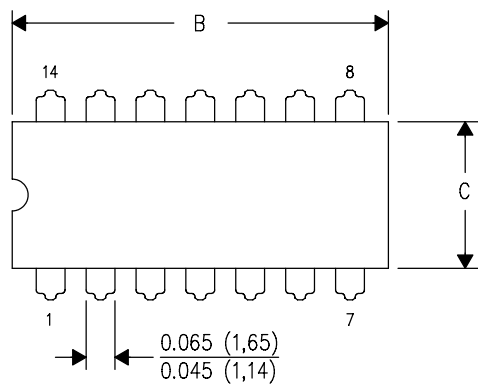
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J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



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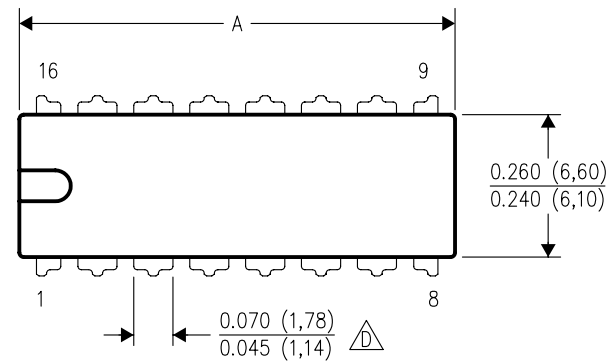
- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package is hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

MECHANICAL DATA

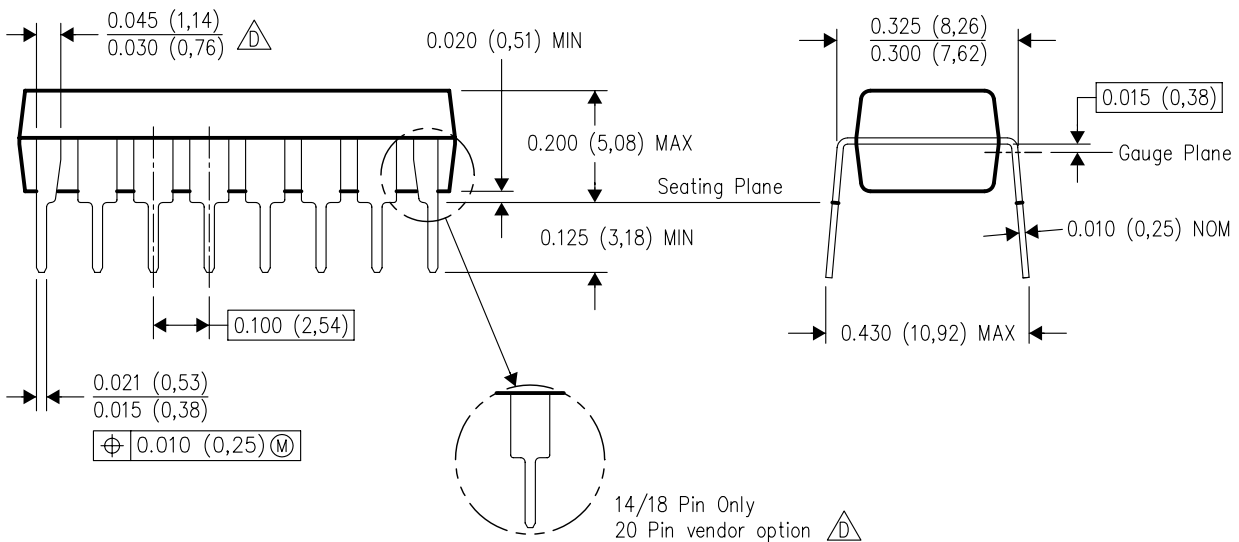
N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



PINS **	14	16	18	20
DIM				
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD



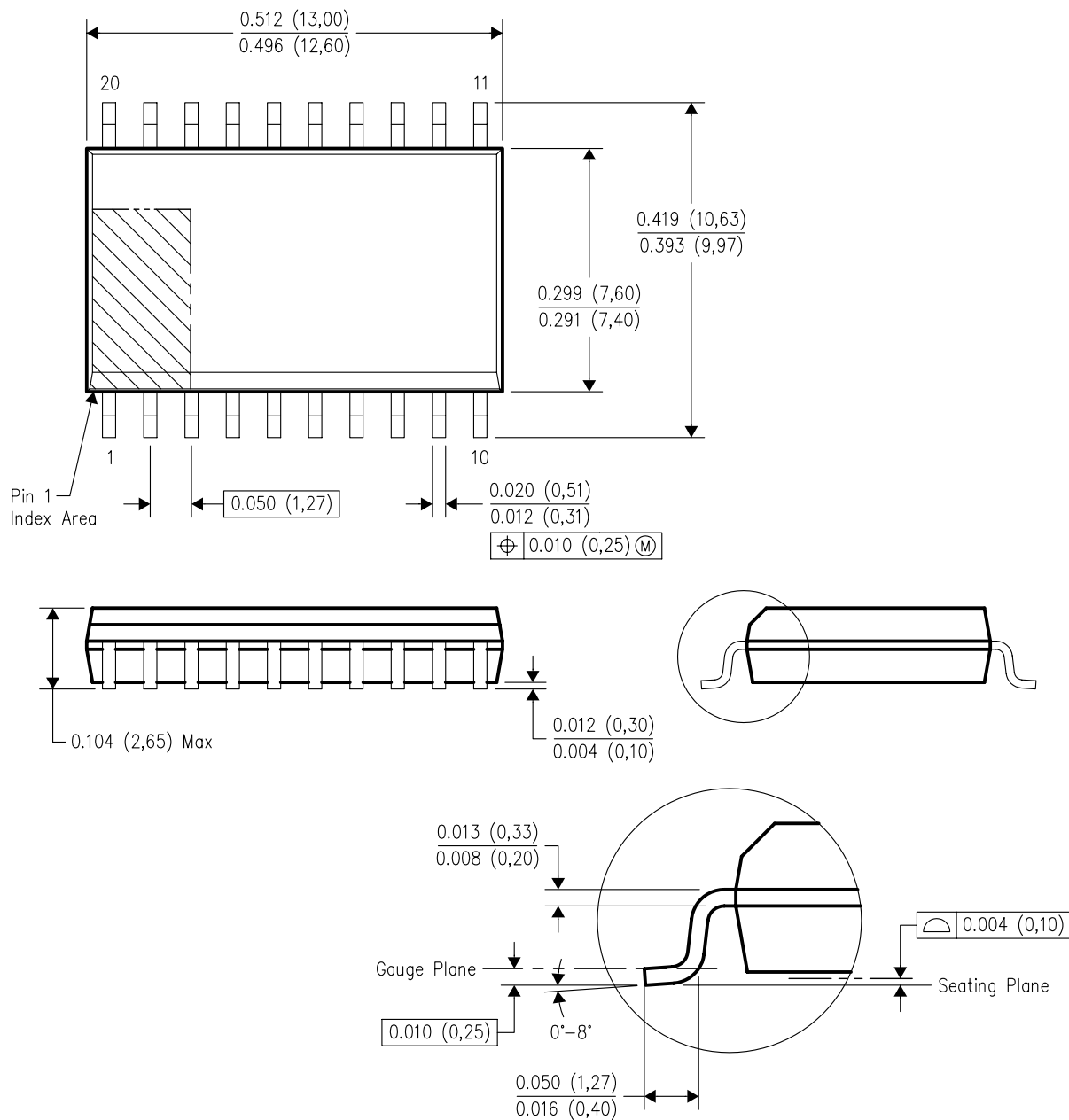
4040049/E 12/2002

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

MECHANICAL DATA

DW (R-PDSO-G20)

PLASTIC SMALL-OUTLINE PACKAGE



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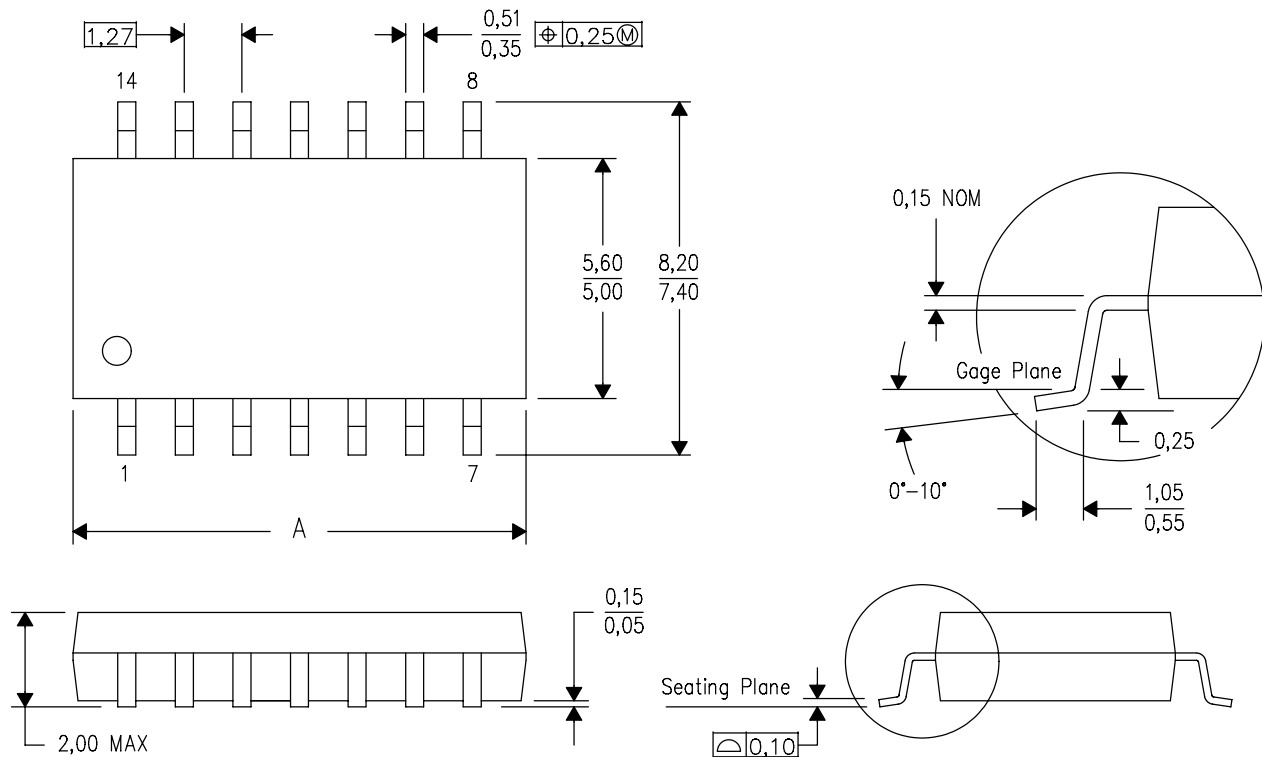
- NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MS-013 variation AC.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

4040062/C 03/03

- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

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