

SN54HC253, SN74HC253
DUAL 4-LINE TO 1-LINE DATA SELECTORS/MUXES
WITH 3-STATE OUTPUTS

SCLS133D – DECEMBER 1982 – REVISED JANUARY 2003

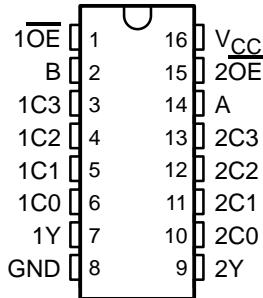
- 3-State Version of 'HC153
- Wide Operating Voltage Range of 2 V to 6 V
- High-Current Inverting Outputs Drive Up To 15 LSTTL Loads
- Low Power Consumption, 80- μ A Max I_{CC}
- Typical $t_{pd} = 9$ ns
- ± 6 -mA Output Drive at 5 V
- Low Input Current of 1 μ A Max
- Permit Multiplexing From n Lines to One Line
- Perform Parallel-to-Serial Conversion

description/ordering information

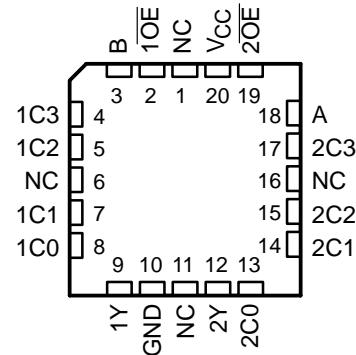
Each of these data selectors/multiplexers contains inverters and drivers to supply full binary decoding data selection to the AND-OR gates. Separate output-control inputs are provided for each of the two 4-line sections.

The 3-state outputs can interface with and drive data lines of bus-organized systems. With all but one of the common outputs disabled (in the high-impedance state), the low impedance of the single enabled output drives the bus line to a high or low logic level. Each output has its own output-enable (\overline{OE}) input. The outputs are disabled when their respective \overline{OE} is high.

SN54HC253 . . . J OR W PACKAGE
SN74HC253 . . . D, DB, N, OR NS PACKAGE
(TOP VIEW)



SN54HC253 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

ORDERING INFORMATION

TA	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	PDIP – N	Tube	SN74HC253N	SN74HC253N
	SOIC – D	Tube	SN74HC253D	HC253
	SOP – NS	Tape and reel	SN74HC253DR	HC253
	SSOP – DB	Tape and reel	SN74HC253DBR	HC253
–55°C to 125°C	CDIP – J	Tube	SNJ54HC253J	SNJ54HC253J
	CFP – W	Tube	SNJ54HC253W	SNJ54HC253W
	LCCC – FK	Tube	SNJ54HC253FK	SNJ54HC253FK

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



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 On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

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FUNCTION TABLE

SELECT†		INPUTS				\overline{OE}	OUTPUT Y
B	A	C0	C1	C2	C3		
X	X	X	X	X	X	H	Z
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
L	H	X	L	X	X	L	L
L	H	X	H	X	X	L	H
H	L	X	X	L	X	L	L
H	L	X	X	H	X	L	H
H	H	X	X	X	L	L	L
H	H	X	X	X	H	L	H

† Select inputs A and B are common to both sections.

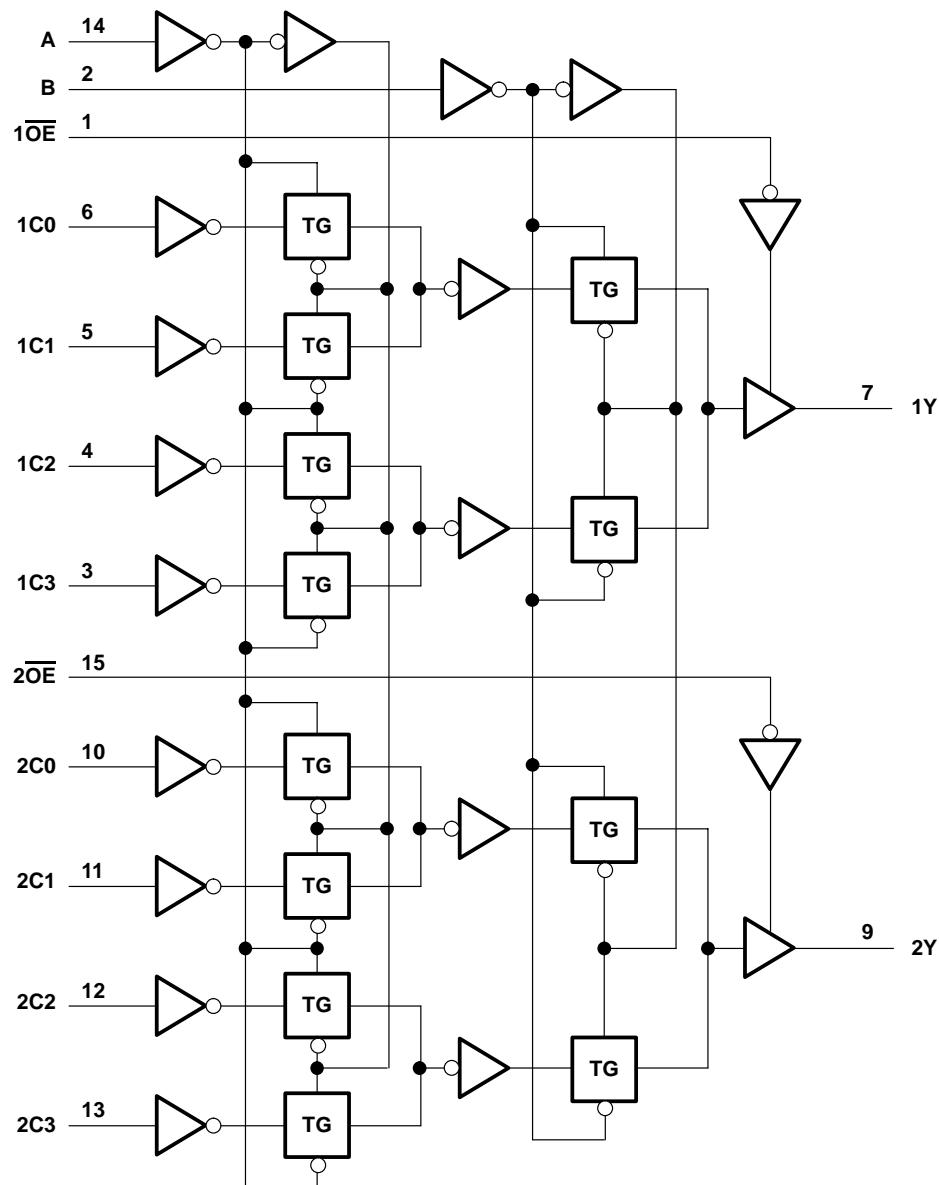


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logic diagram (positive logic)



Pin numbers shown are for the D, DB, J, N, NS, and W packages.

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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

† 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.

NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 3)

			SN54HC253			SN74HC253			UNIT			
			MIN	NOM	MAX	MIN	NOM	MAX				
V _{CC}	Supply voltage			2	5	6	2	5	6	V		
V _{IH}	High-level input voltage	V _{CC} = 2 V	1.5		1.5		V					
		V _{CC} = 4.5 V	3.15		3.15							
		V _{CC} = 6 V	4.2		4.2							
V _{IL}	Low-level input voltage	V _{CC} = 2 V	0.5			0.5			V			
		V _{CC} = 4.5 V	1.35			1.35						
		V _{CC} = 6 V	1.8			1.8						
V _I	Input voltage			0	V _{CC}	0	V _{CC}	V _{CC}	V			
V _O	Output voltage			0	V _{CC}	0	V _{CC}	V _{CC}	V			
Δt/Δv	Input transition rise/fall time	V _{CC} = 2 V	1000			1000			ns			
		V _{CC} = 4.5 V	500			500						
		V _{CC} = 6 V	400			400						
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	V _{CC}	T _A = 25°C			SN54HC253	SN74HC253	UNIT	
			MIN	TYP	MAX	MIN	MAX		
V _{OH}	V _I = V _{IH} or V _{IL}	I _{OH} = -20 µA	2 V	1.9	1.998	1.9	1.9	V	
			4.5 V	4.4	4.499	4.4	4.4		
			6 V	5.9	5.999	5.9	5.9		
		I _{OH} = -6 mA	4.5 V	3.98	4.3	3.7	3.84	V	
			6 V	5.48	5.8	5.2	5.34		
		I _{OL} = 20 µA	2 V	0.002	0.1	0.1	0.1	V	
V _{OL}	V _I = V _{IH} or V _{IL}		4.5 V	0.001	0.1	0.1	0.1		
			6 V	0.001	0.1	0.1	0.1		
			4.5 V	0.17	0.26	0.4	0.33		
			6 V	0.15	0.26	0.4	0.33		
I _I	V _I = V _{CC} or 0	6 V	±0.1	±100	±1000	±1000	±1000	nA	
I _{OZ}	V _O = V _{CC} or 0	6 V	±0.01	±0.5	±10	±10	±5	µA	
I _{CC}	V _I = V _{CC} or 0, I _O = 0	6 V		8	160	160	80	µA	
C _i		2 V to 6 V	3	10	10	10	10	pF	

switching characteristics over recommended operating free-air temperature range, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC}	T _A = 25°C			SN54HC253	SN74HC253	UNIT
				MIN	TYP	MAX	MIN	MAX	
t _{pd}	A or B	Any Y	2 V	62	150	225	190		ns
			4.5 V	19	30	45	38		
			6 V	16	26	38	32		
	Data (Any C)	Y	2 V	54	126	210	175		
			4.5 V	16	28	42	35		
			6 V	13	23	36	30		
t _{en}	OE	Y	2 V	28	100	150	125		ns
			4.5 V	11	20	30	25		
			6 V	9	17	26	21		
t _{dis}	OE	Y	2 V	21	135	203	170		ns
			4.5 V	14	30	45	38		
			6 V	12	35	38	31		
t _t		Y	2 V	28	60	90	75		ns
			4.5 V	8	12	18	15		
			6 V	6	10	15	13		

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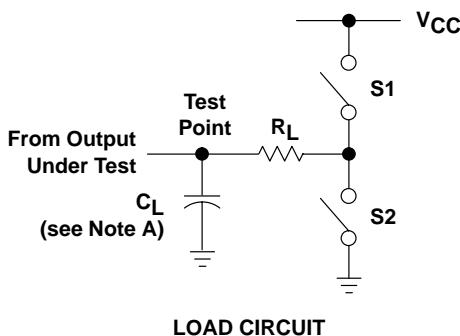
switching characteristics over recommended operating free-air temperature range, $C_L = 150 \text{ pF}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	$T_A = 25^\circ\text{C}$			SN54HC253		SN74HC253		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A or B	Any Y	2 V	76	235		355		295		ns
			4.5 V	23	47		71		59		
			6 V	20	41		60		51		
	Data (Any C)	Y	2 V	68	220		335		275		
			4.5 V	20	44		67		55		
			6 V	17	38		57		51		
t_{en}	\overline{OE}	Y	2 V	44	185		280		230		ns
			4.5 V	16	37		56		46		
			6 V	14	32		48		40		
t_t		Y	2 V	45	210		315		265		ns
			4.5 V	17	42		63		53		
			6 V	13	36		53		45		

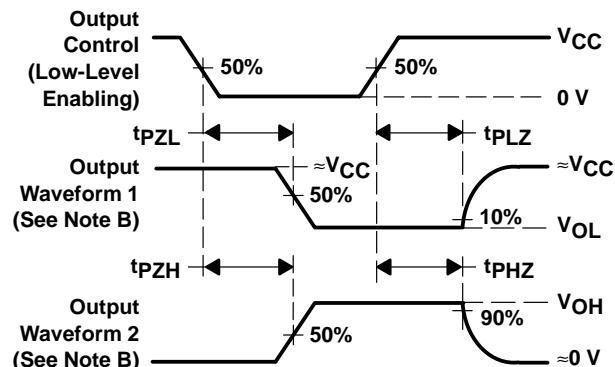
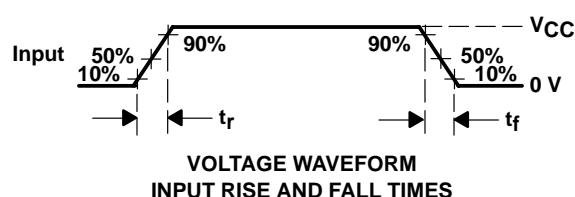
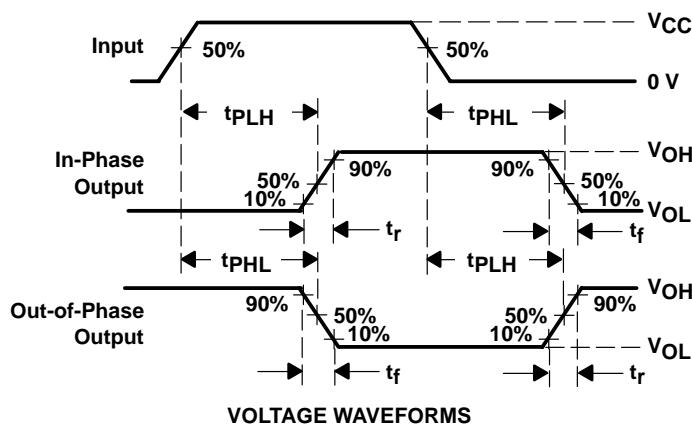
operating characteristics, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
C_{pd} Power dissipation capacitance per multiplexer	No load	45	pF

PARAMETER MEASUREMENT INFORMATION



PARAMETER	R_L	C_L	S1	S2
t_{en}	1 k Ω	50 pF or 150 pF	Open	Closed
			Closed	Open
t_{dis}	1 k Ω	50 pF	Open	Closed
			Closed	Open
t_{pd} or t_t	—	50 pF or 150 pF	Open	Open



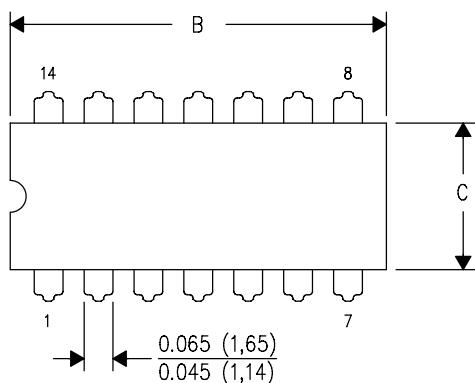
NOTES: A. C_L includes probe and test-fixture capacitance.
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.
 C. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR \leq 1 MHz, Z_O = 50 Ω , t_r = 6 ns, t_f = 6 ns.
 D. The outputs are measured one at a time with one input transition per measurement.
 E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 F. t_{PZL} and t_{PZH} are the same as t_{en} .
 G. t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms

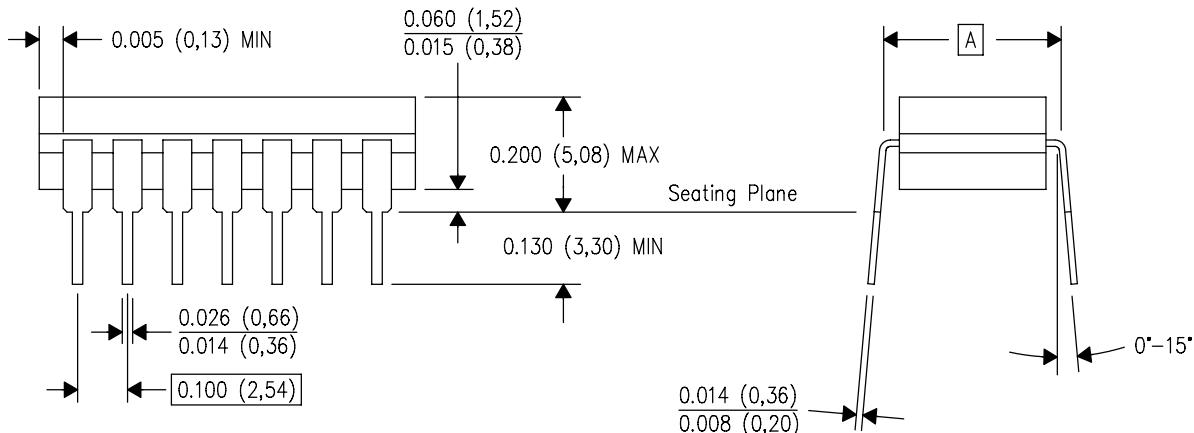
J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



PINS ** DIM	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)



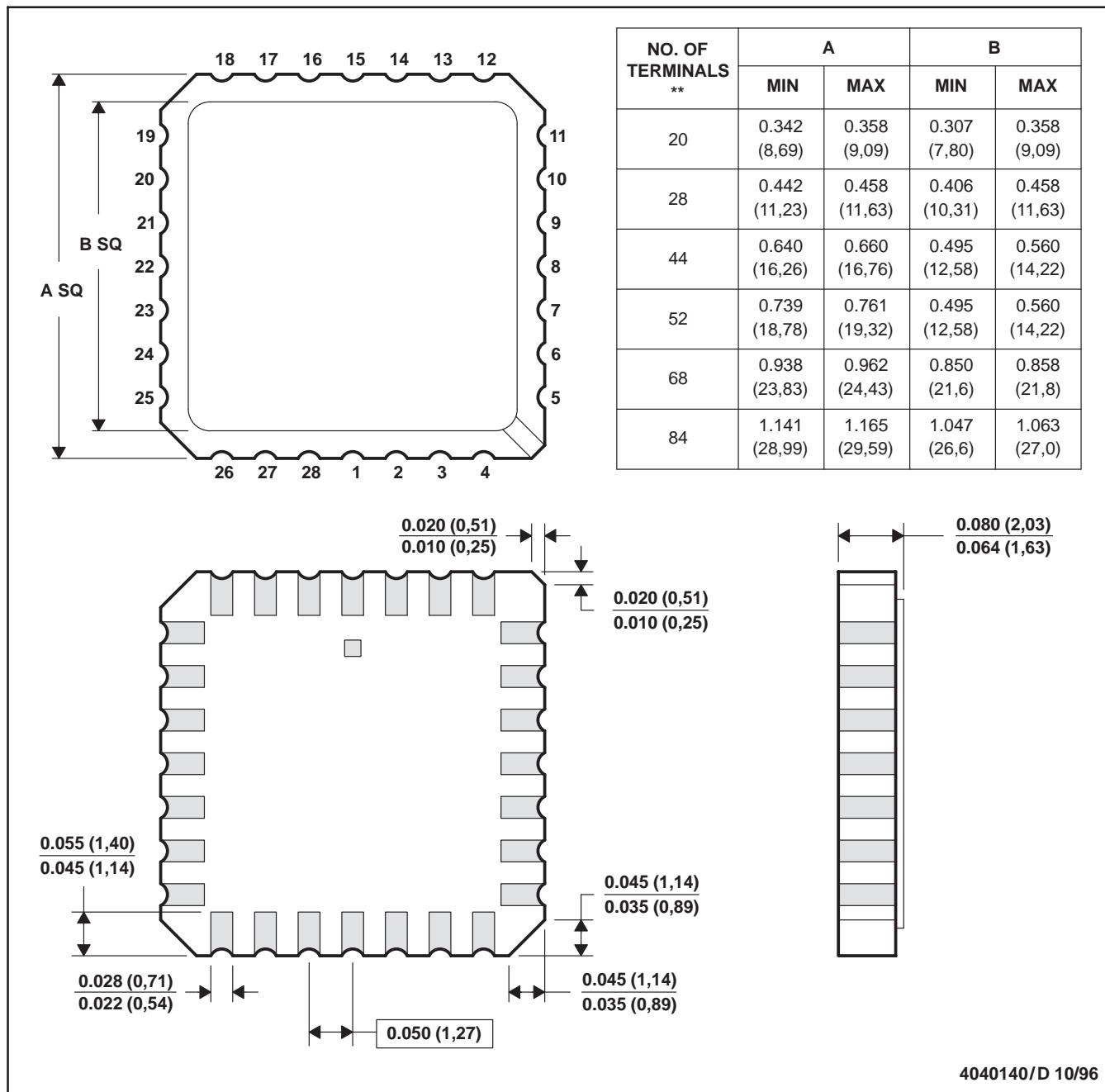
4040083/F 03/03

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.

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



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

B. This drawing is subject to change without notice.

C. This package can be hermetically sealed with a metal lid.

D. The terminals are gold plated.

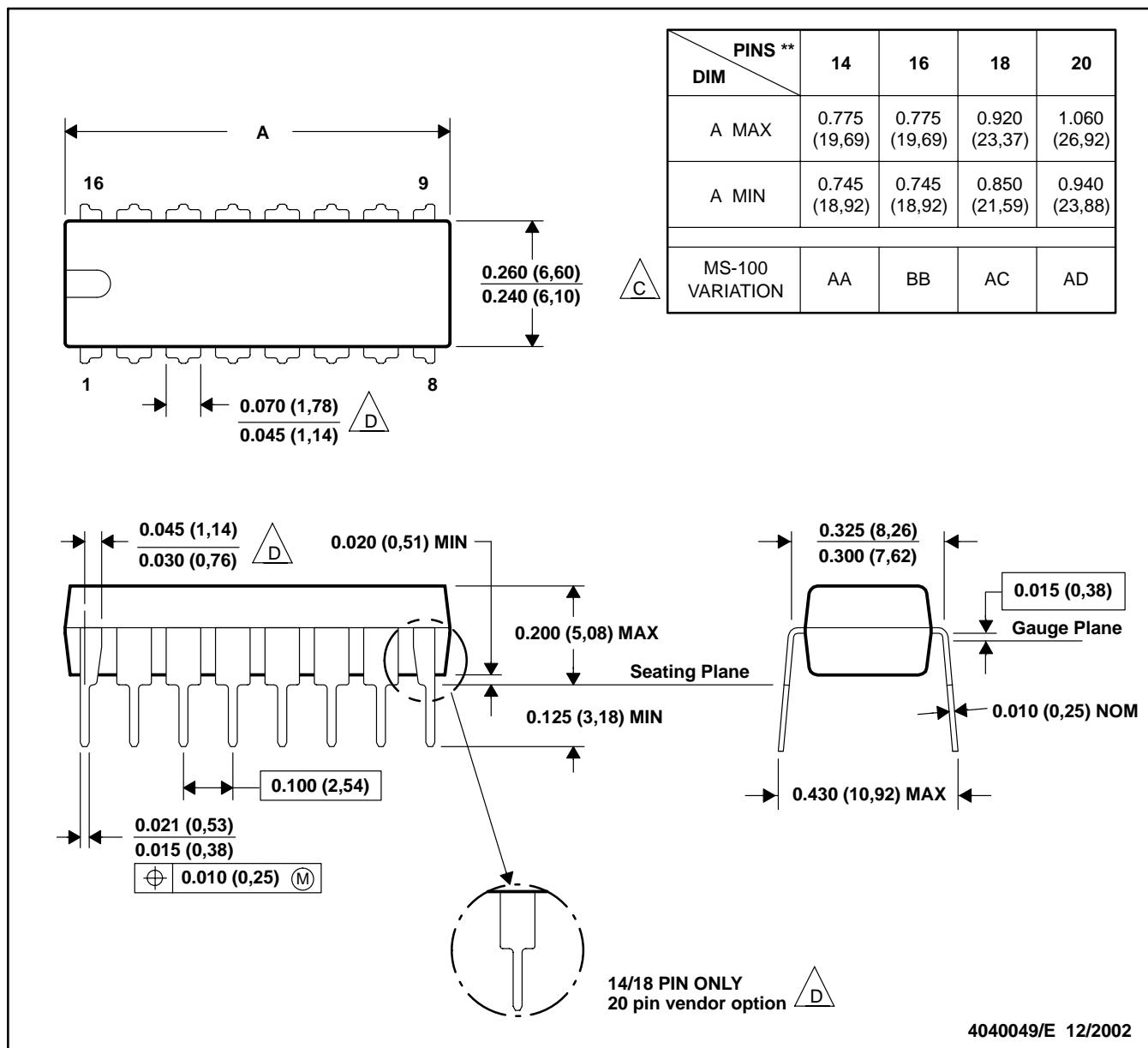
E. Falls within JEDEC MS-004

4040140/D 10/96

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



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

B. This drawing is subject to change without notice.

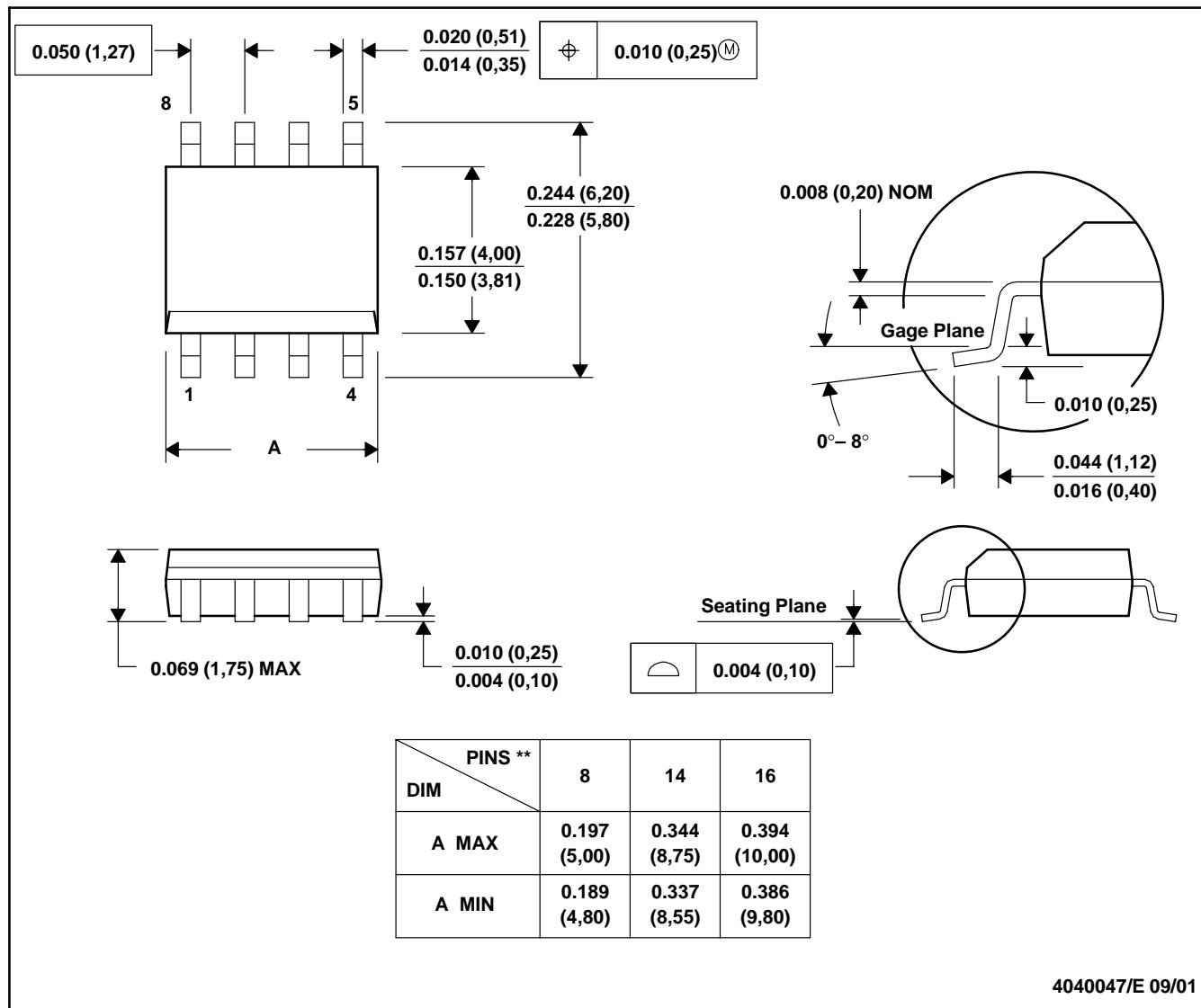
C. Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).

D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

D (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

8 PINS SHOWN



4040047/E 09/01

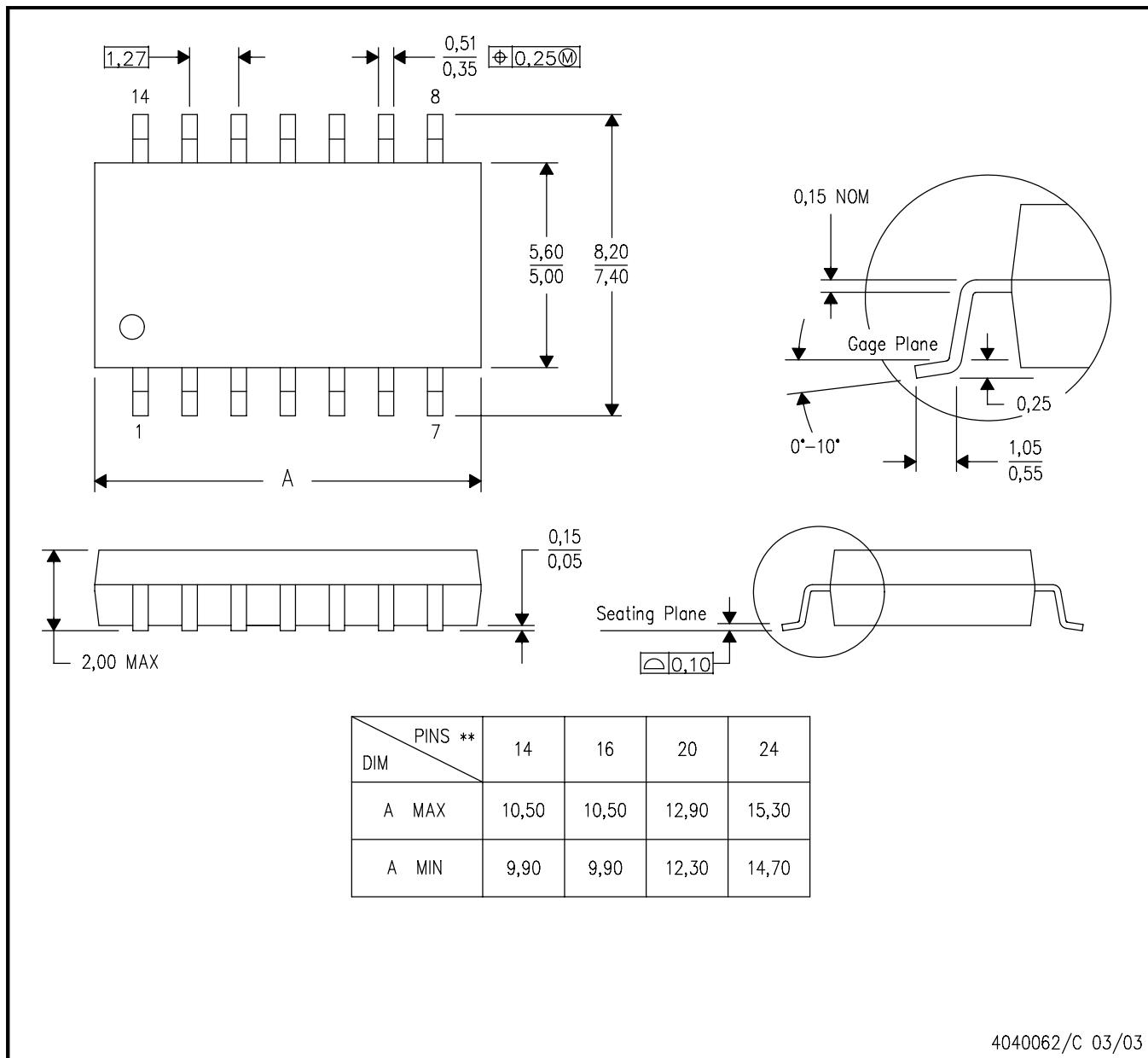
NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0.006 (0.15).
 D. Falls within JEDEC MS-012

MECHANICAL DATA

NS (R-PDSO-G)**

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN

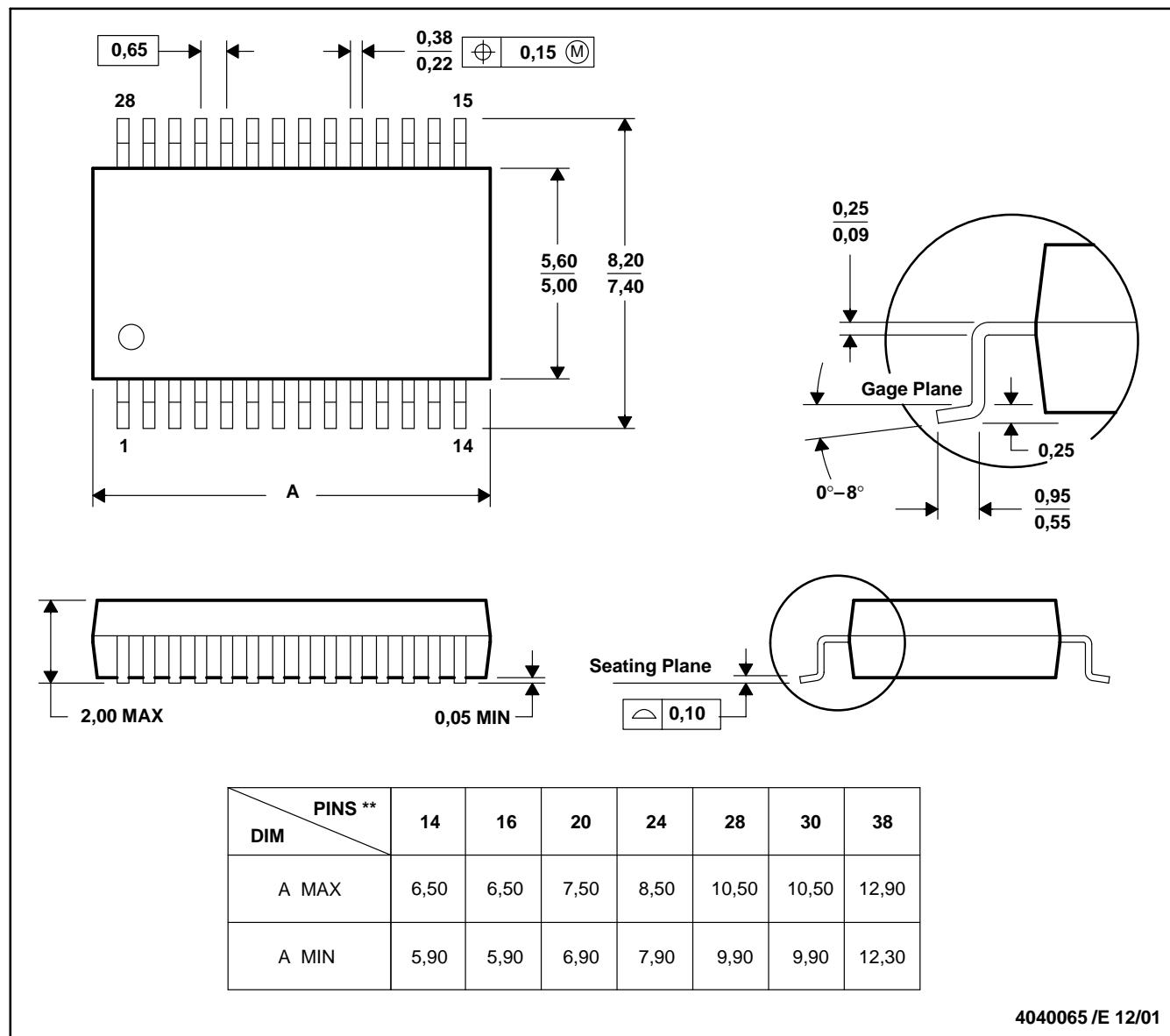


NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

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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