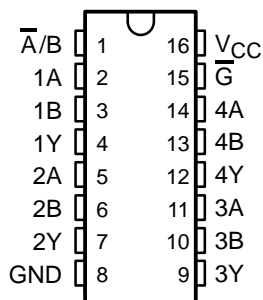


# SN54LVC157A, SN74LVC157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

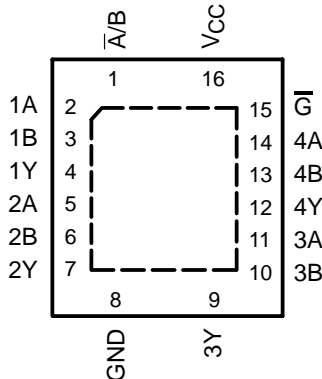
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- Operate From 1.65 V to 3.6 V
- Inputs Accept Voltages to 5.5 V
- Max  $t_{pd}$  of 5.2 ns at 3.3 V
- Typical  $V_{OLP}$  (Output Ground Bounce)  $<0.8$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- Typical  $V_{OHV}$  (Output  $V_{OH}$  Undershoot)  $>2$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)

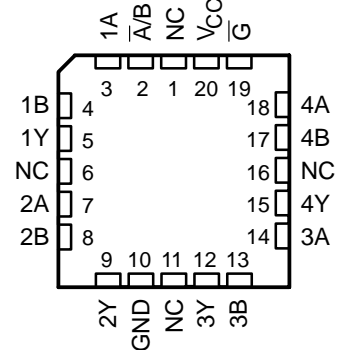
SN54LVC157A ... J OR W PACKAGE  
SN74LVC157A ... D, DB, NS,  
OR PW PACKAGE  
(TOP VIEW)



SN74LVC157A ... RGY PACKAGE  
(TOP VIEW)



SN54LVC157A ... FK PACKAGE  
(TOP VIEW)



NC – No internal connection

## description/ordering information

These quadruple 2-line to 1-line data selectors/multiplexers are designed for 1.65-V to 3.6-V  $V_{CC}$  operation.

The 'LVC157A devices feature a common strobe ( $\bar{G}$ ) input. When  $\bar{G}$  is high, all outputs are low. When  $\bar{G}$  is low, a 4-bit word is selected from one of two sources and is routed to the four outputs. The devices provide true data.

Inputs can be driven from either 3.3-V or 5-V devices. This feature allows the use of these devices as translators in a mixed 3.3-V/5-V system environment.

## ORDERING INFORMATION

$T_A$	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	QFN – RGY	Tape and reel	SN74LVC157ARGYR	LC157A
	SOIC – D	Tube	SN74LVC157AD	LVC157A
		Tape and reel	SN74LVC157ADR	
	SOP – NS	Tape and reel	SN74LVC157ANSR	LVC157A
	SSOP – DB	Tape and reel	SN74LVC157ADBR	LC157A
TSSOP – PW	Tape and reel	SN74LVC157APWR	LC157A	
-55°C to 125°C	CDIP – J	Tube	SNJ54LVC157AJ	SNJ54LVC157AJ
	CFP – W	Tube	SNJ54LVC157AW	SNJ54LVC157AW
	LCCC – FK	Tube	SNJ54LVC157AFK	SNJ54LVC157AFK

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



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS  
INSTRUMENTS**

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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.

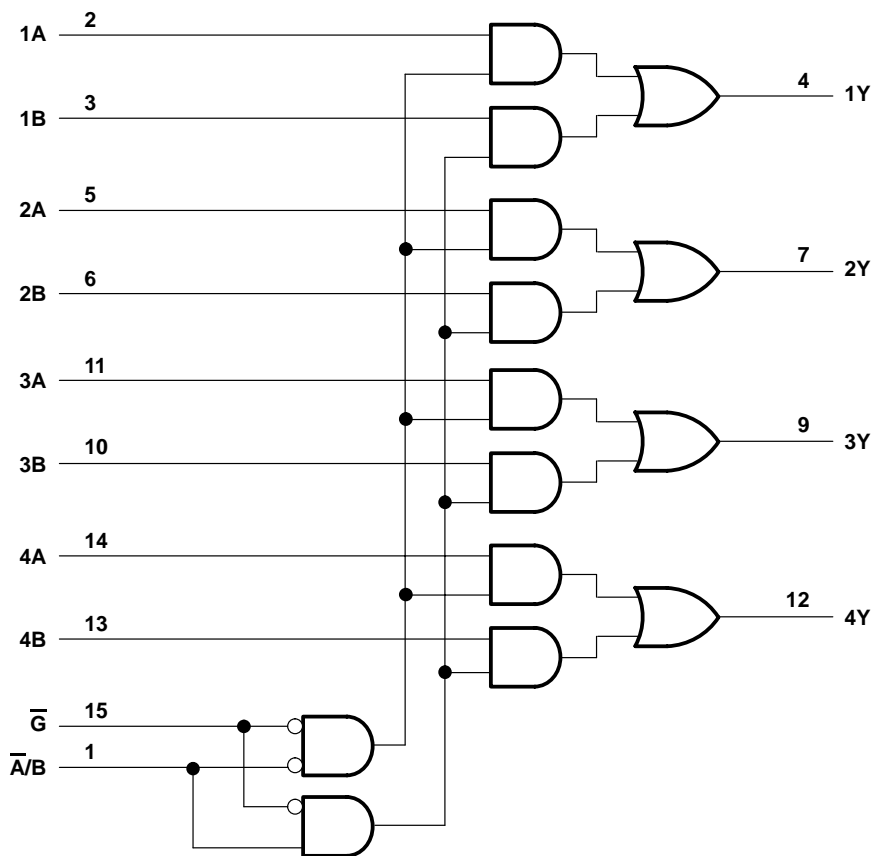
# SN54LVC157A, SN74LVC157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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FUNCTION TABLE

INPUTS				OUTPUT
$\bar{G}$	$\bar{A}/B$	A	B	Y
H	X	X	X	L
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H

## logic diagram (positive logic)



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

# SN54LVC157A, SN74LVC157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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

Supply voltage range, $V_{CC}$	–0.5 V to 6.5 V
Input voltage range, $V_I$ (see Note 1)	–0.5 V to 6.5 V
Output voltage range, $V_O$ (see Notes 1 and 2)	–0.5 V to $V_{CC} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ )	–50 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ )	–50 mA
Continuous output current, $I_O$	±50 mA
Continuous current through $V_{CC}$ or GND	±100 mA
Package thermal impedance, $\theta_{JA}$ (see Note 3): D package	73°C/W
(see Note 3): DB package	82°C/W
(see Note 3): NS package	64°C/W
(see Note 3): PW package	108°C/W
(see Note 4): RGY package	39°C/W
Storage temperature range, $T_{stg}$	–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.

- NOTES:
1. The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
  2. The value of  $V_{CC}$  is provided in the recommended operating conditions table.
  3. The package thermal impedance is calculated in accordance with JESD 51-7.
  4. The package thermal impedance is calculated in accordance with JESD 51-5.

## recommended operating conditions (see Note 5)

		SN54LVC157A		SN74LVC157A		UNIT	
		MIN	MAX	MIN	MAX		
$V_{CC}$	Supply voltage	Operating	2	3.6	1.65	3.6	V
		Data retention only	1.5		1.5		
$V_{IH}$	High-level input voltage	$V_{CC} = 1.65$ V to 1.95 V			$0.65 \times V_{CC}$		V
		$V_{CC} = 2.3$ V to 2.7 V			1.7		
		$V_{CC} = 2.7$ V to 3.6 V	2		2		
$V_{IL}$	Low-level input voltage	$V_{CC} = 1.65$ V to 1.95 V			$0.35 \times V_{CC}$		V
		$V_{CC} = 2.3$ V to 2.7 V			0.7		
		$V_{CC} = 2.7$ V to 3.6 V		0.8	0.8		
$V_I$	Input voltage	0	5.5	0	5.5	V	
$V_O$	Output voltage	0	$V_{CC}$	0	$V_{CC}$	V	
$I_{OH}$	High-level output current	$V_{CC} = 1.65$ V			–4		mA
		$V_{CC} = 2.3$ V			–8		
		$V_{CC} = 2.7$ V		–12	–12		
		$V_{CC} = 3$ V		–24	–24		
$I_{OL}$	Low-level output current	$V_{CC} = 1.65$ V			4		mA
		$V_{CC} = 2.3$ V			8		
		$V_{CC} = 2.7$ V		12	12		
		$V_{CC} = 3$ V		24	24		
$\Delta t/\Delta v$	Input transition rise or fall rate		10		10	ns/V	
$T_A$	Operating free-air temperature	–55	125	–40	85	°C	

NOTE 5: 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.



# SN54LVC157A, SN74LVC157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	SN54LVC157A		SN74LVC157A			UNIT
			MIN	MAX	MIN	TYP†	MAX	
V <sub>OH</sub>	I <sub>OH</sub> = -100 μA	1.65 V to 3.6 V			V <sub>CC</sub> -0.2			V
		2.7 V to 3.6 V	V <sub>CC</sub> -0.2					
	I <sub>OH</sub> = -4 mA	1.65 V			1.2			
	I <sub>OH</sub> = -8 mA	2.3 V			1.7			
	I <sub>OH</sub> = -12 mA	2.7 V	2.2		2.2			
		3 V	2.4		2.4			
I <sub>OH</sub> = -24 mA	3 V	2.2		2.2				
V <sub>OL</sub>	I <sub>OL</sub> = 100 μA	1.65 V to 3.6 V			0.2			V
		2.7 V to 3.6 V	0.2					
	I <sub>OL</sub> = 4 mA	1.65 V			0.45			
	I <sub>OL</sub> = 8 mA	2.3 V			0.7			
	I <sub>OL</sub> = 12 mA	2.7 V		0.4	0.4			
3 V			0.55	0.55				
I <sub>I</sub>	All inputs	V <sub>I</sub> = 5.5 V or GND	3.6 V		±5		±5	μA
I <sub>CC</sub>		V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0	3.6 V		10		10	μA
ΔI <sub>CC</sub>		One input at V <sub>CC</sub> - 0.6 V, Other inputs at V <sub>CC</sub> or GND	2.7 V to 3.6 V		500		500	μA
C <sub>i</sub>		V <sub>I</sub> = V <sub>CC</sub> or GND	3.3 V				5	pF

† All typical values are at V<sub>CC</sub> = 3.3 V, T<sub>A</sub> = 25°C.

switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54LVC157A				UNIT
			V <sub>CC</sub> = 2.7 V		V <sub>CC</sub> = 3.3 V ± 0.3 V		
			MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A or B	Y	6.2		0.8	5.4	ns
	$\overline{A/B}$		8.2		0.8	7	
	$\overline{G}$		7.8		0.8	6.5	

switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN74LVC157A						UNIT	
			V <sub>CC</sub> = 1.8 V	V <sub>CC</sub> = 2.5 V ± 0.2 V		V <sub>CC</sub> = 2.7 V		V <sub>CC</sub> = 3.3 V ± 0.3 V		
			TYP	MIN	MAX	MIN	MAX	MIN		MAX
t <sub>pd</sub>	A or B	Y	13.9	1	7.9		5.9	1	5.2	ns
	$\overline{A/B}$		16.1	1	10.1		8.1	1	6.8	
	$\overline{G}$		15.8	1	9.8		7.8	1	6.5	
t <sub>sk(o)</sub>								1	ns	



# SN54LVC157A, SN74LVC157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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

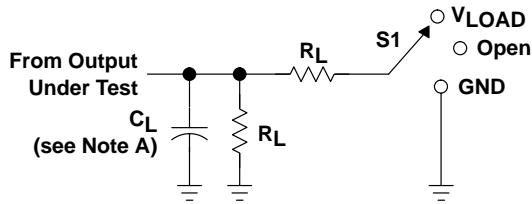
PARAMETER	TEST CONDITIONS	$V_{CC} = 1.8\text{ V}$	$V_{CC} = 2.5\text{ V}$	$V_{CC} = 3.3\text{ V}$	UNIT
		TYP	TYP	TYP	
$C_{pd}$ Power dissipation capacitance	$f = 10\text{ MHz}$	14*	15*	16	pF

\* On products compliant to MIL-PRF-38535, this parameter does not apply.

# SN54LVC157A, SN74LVC157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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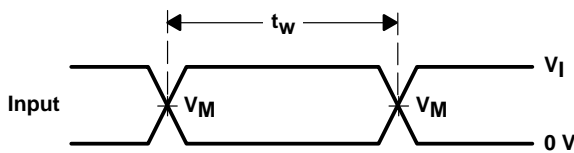
## PARAMETER MEASUREMENT INFORMATION



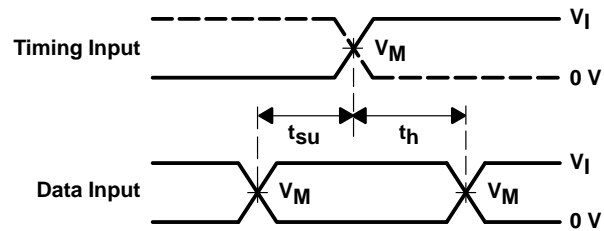
LOAD CIRCUIT

TEST	S1
$t_{PLH}/t_{PHL}$	Open
$t_{PLZ}/t_{PZL}$	$V_{LOAD}$
$t_{PHZ}/t_{PZH}$	$GND$

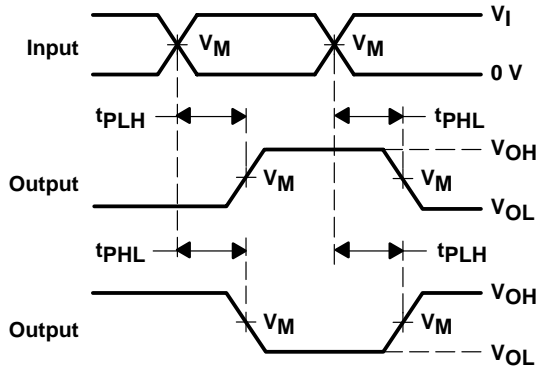
$V_{CC}$	INPUTS		$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
	$V_I$	$t_r/t_f$					
$1.8 V \pm 0.15 V$	$V_{CC}$	$\leq 2 \text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	1 k $\Omega$	0.15 V
$2.5 V \pm 0.2 V$	$V_{CC}$	$\leq 2 \text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	500 $\Omega$	0.15 V
2.7 V	2.7 V	$\leq 2.5 \text{ ns}$	1.5 V	6 V	50 pF	500 $\Omega$	0.3 V
$3.3 V \pm 0.3 V$	2.7 V	$\leq 2.5 \text{ ns}$	1.5 V	6 V	50 pF	500 $\Omega$	0.3 V



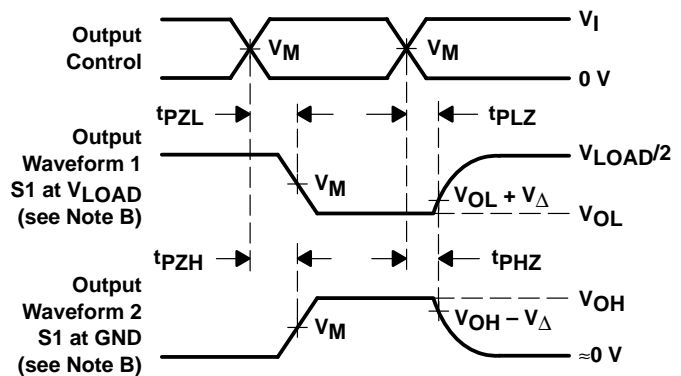
VOLTAGE WAVEFORMS  
PULSE DURATION



VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES  
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS  
ENABLE AND DISABLE TIMES  
LOW- AND HIGH-LEVEL ENABLING

- NOTES:
- $C_L$  includes probe and jig capacitance.
  - Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
  - All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ .
  - The outputs are measured one at a time with one transition per measurement.
  - $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
  - $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
  - $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
  - All parameters and waveforms are not applicable to all devices.

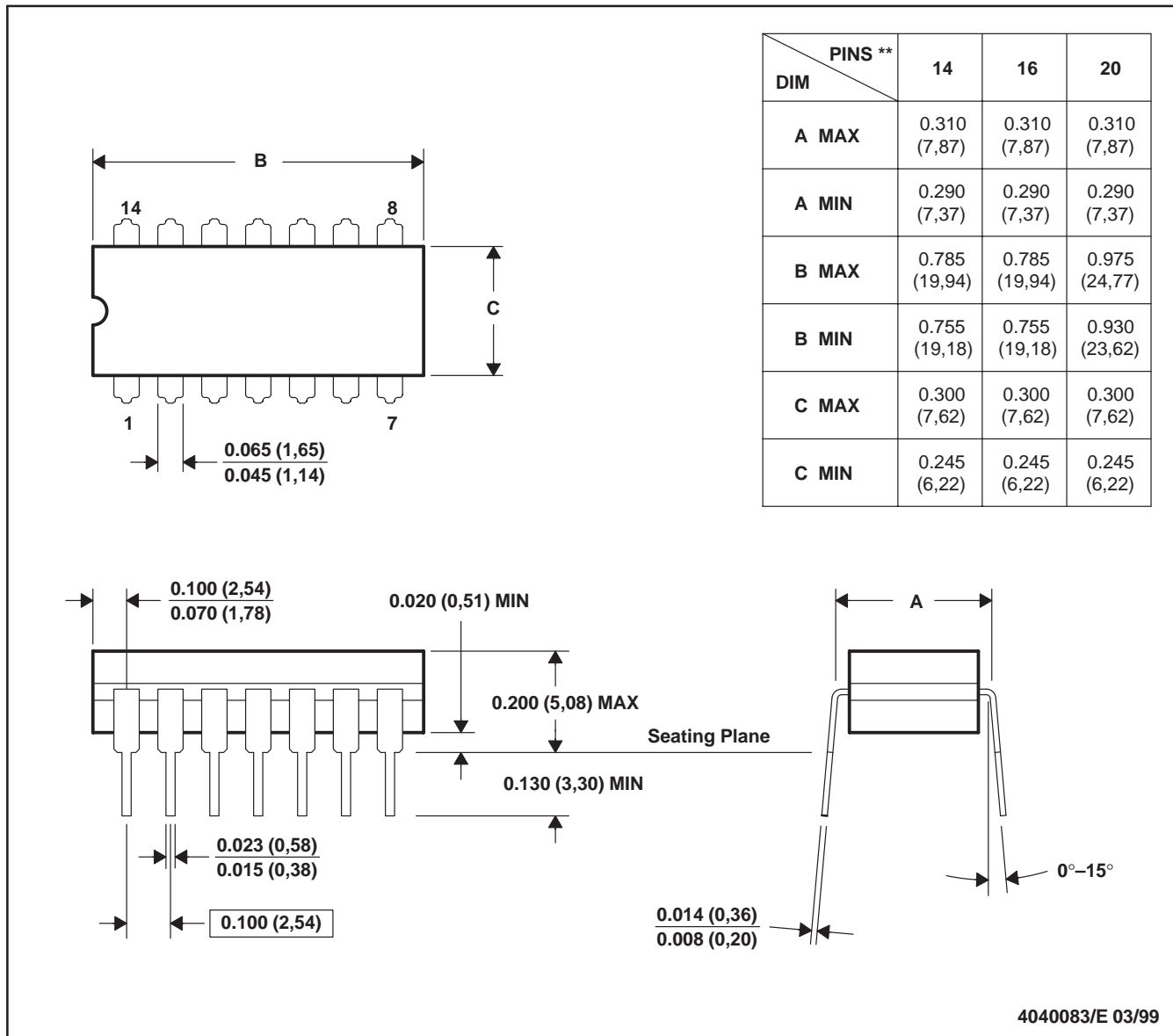
Figure 1. Load Circuit and Voltage Waveforms



J (R-GDIP-T\*\*)

CERAMIC DUAL-IN-LINE

14 LEADS SHOWN



- 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.  
 E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, and GDIP1-T20



FK (S-CQCC-N\*\*)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



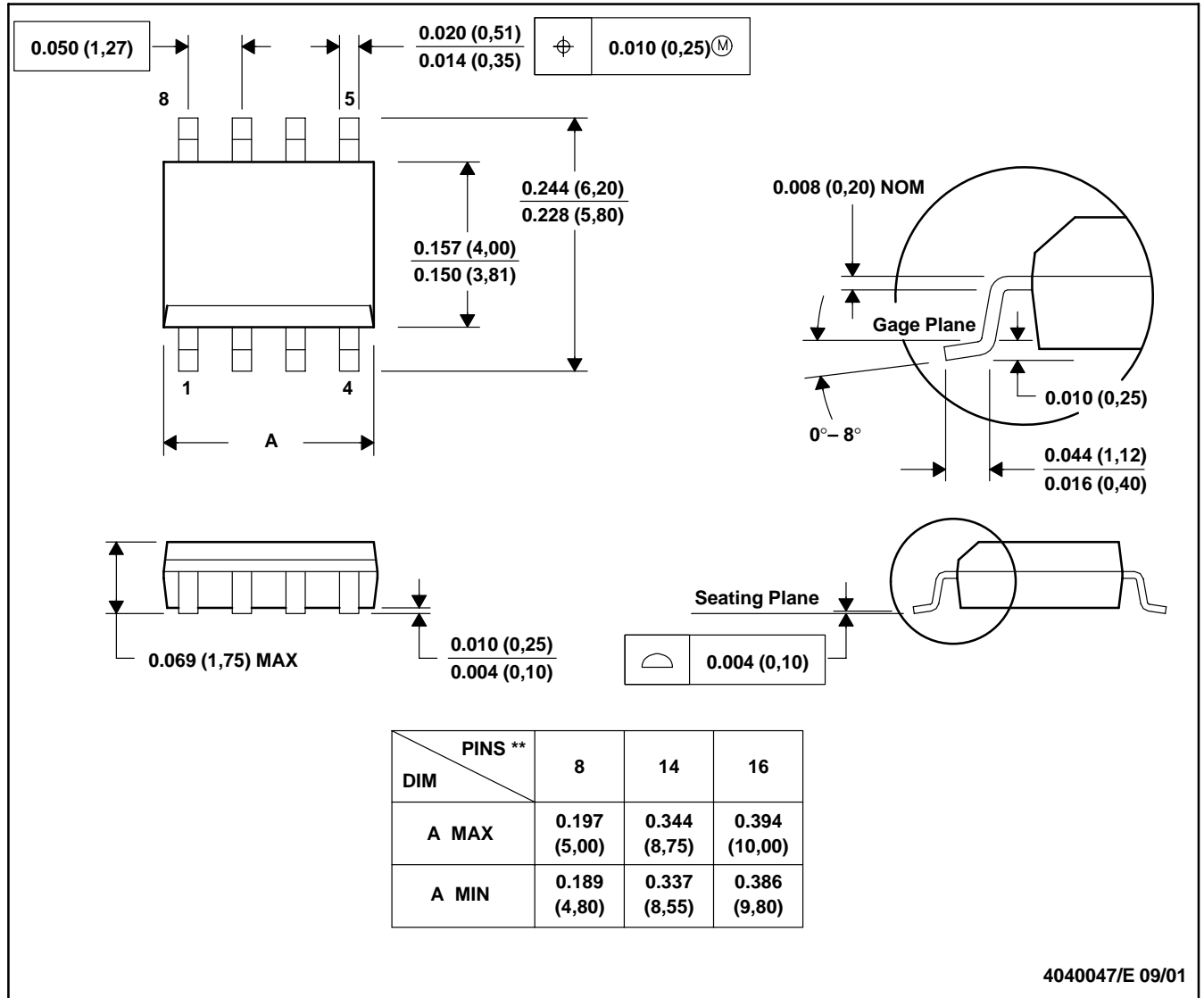
- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package can be hermetically sealed with a metal lid.
  - D. The terminals are gold plated.
  - E. Falls within JEDEC MS-004



D (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

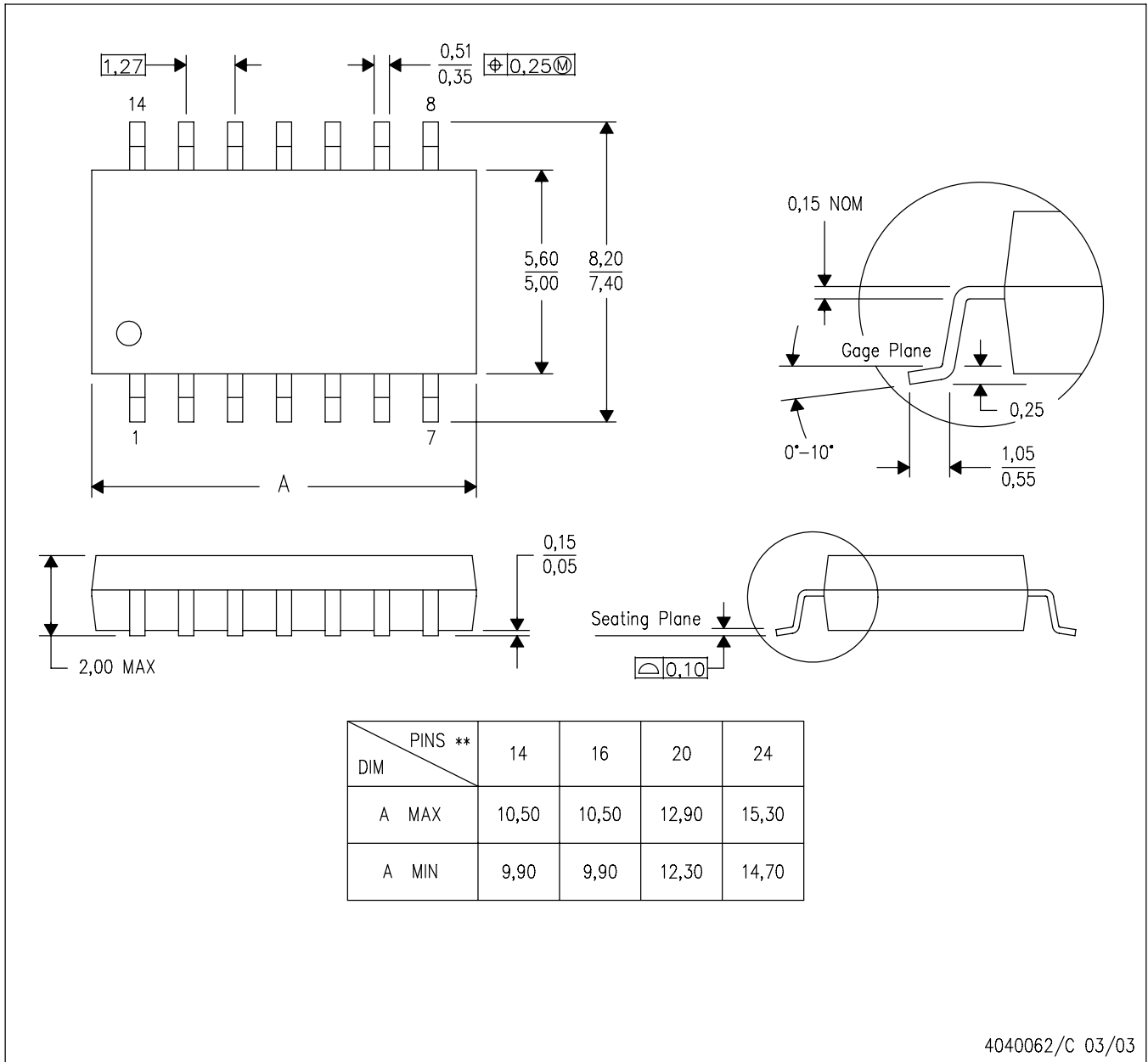
8 PINS SHOWN



- 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

NS (R-PDSO-G\*\*)   
 14-PIN SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



4040062/C 03/03

- 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

PW (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



4040064/F 01/97

- 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-153

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