

The SN54125, SN54126, SN74125, SN74126, and SN54LS126A are obsolete and are no longer supplied.

SN54125, SN54126, SN54LS125A, SN54LS126A, SN74125, SN74126, SN74LS125A, SN74LS126A QUADRUPLE BUS BUFFERS WITH 3-STATE OUTPUTS

SDLS044A – DECEMBER 1983 – REVISED MARCH 2002

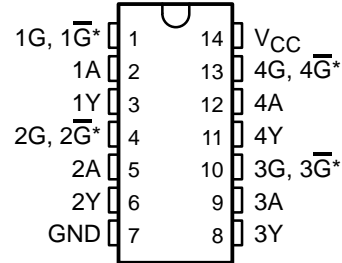
- Quad Bus Buffers
- 3-State Outputs
- Separate Control for Each Channel

description

These bus buffers feature three-state outputs that, when enabled, have the low impedance characteristics of a TTL output with additional drive capability at high logic levels to permit driving heavily loaded bus lines without external pullup resistors. When disabled, both output transistors are turned off, presenting a high-impedance state to the bus so the output will act neither as a significant load nor as a driver. The '125 and 'LS125A devices' outputs are disabled when \bar{G} is high. The '126 and 'LS126A devices' outputs are disabled when G is low.

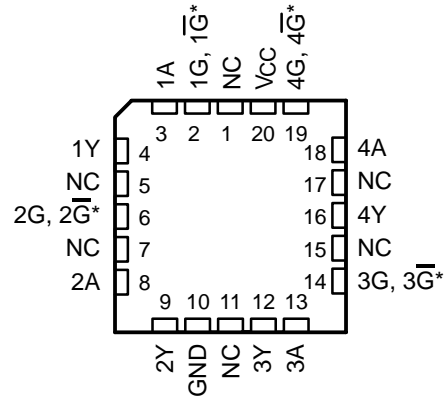
SN54125, SN54126, SN54LS125A,
SN54LS126A . . . J OR W PACKAGE
SN74125, SN74126 . . . N PACKAGE
SN74LS125A, SN74LS126A . . . D, N, OR NS PACKAGE

(TOP VIEW)



\bar{G} on '125 and 'LS125A devices;
G on 126 and 'LS126A devices

SN54LS125A, SN54LS126A . . . FK PACKAGE
(TOP VIEW)



\bar{G} on '125 and 'LS125A devices;
G on 126 and 'LS126A devices
NC – No internal connection



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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.

**SN54125, SN54126, SN54LS125A, SN54LS126A,
SN74125, SN74126, SN74LS125A, SN74LS126A
QUADRUPLE BUS BUFFERS WITH 3-STATE OUTPUTS**

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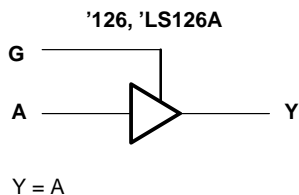
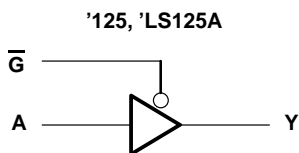
The SN54125, SN54126, SN74125,
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obsolete and are no longer supplied.

ORDERING INFORMATION

T _A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	PDIP – N	Tube	SN74LS125AN	SN74LS125AN
		Tube	SN74LS126AN	SN74LS126AN
	SOIC – D	Tube	SN74LS125AD	LS125A
		Tape and reel	SN74LS125ADR	
		Tube	SN74LS126AD	LS126A
		Tape and reel	SN74LS126ADR	
	SOP – NS	Tape and reel	SN74LS125ANSR	74LS125A
Tape and reel		SN74LS126ANSR	74LS126A	
–55°C to 125°C	CDIP – J	Tube	SN54LS125AJ	SN54LS125AJ
		Tube	SNJ54LS125AJ	SNJ54LS125AJ
	CFP – W	Tube	SNJ54LS125AW	SNJ54LS125AW
	LCCC – FK	Tube	SNJ54LS125AFK	SNJ54LS125AFK

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

logic diagram (each gate)

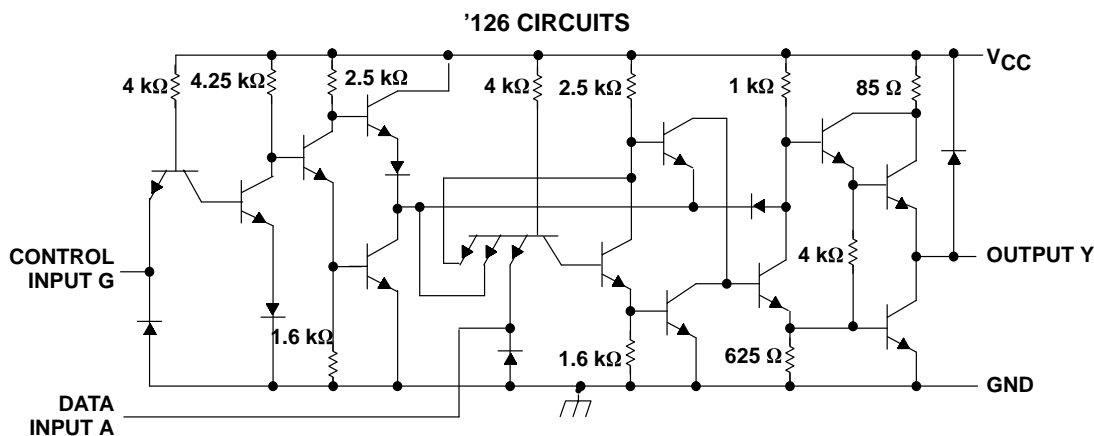
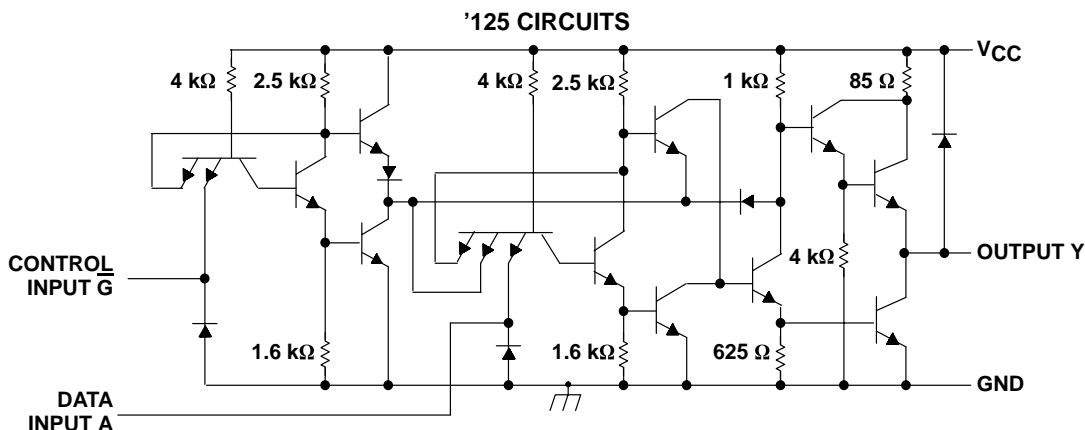


**SN54125, SN54126, SN54LS125A, SN54LS126A,
SN74125, SN74126, SN74LS125A, SN74LS126A
QUADRUPLE BUS BUFFERS WITH 3-STATE OUTPUTS**

The SN54125, SN54126, SN74125, SN74126, and SN54LS126A are obsolete and are no longer supplied.

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schematics (each gate)



absolute maximum ratings over operating free-air temperature (unless otherwise noted)†
(**'125 and '126**)

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage, V_I	5.5 V
Package thermal impedance, θ_{JA} (see Note 2): N package	80°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. Voltage values are with respect to network ground terminal.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

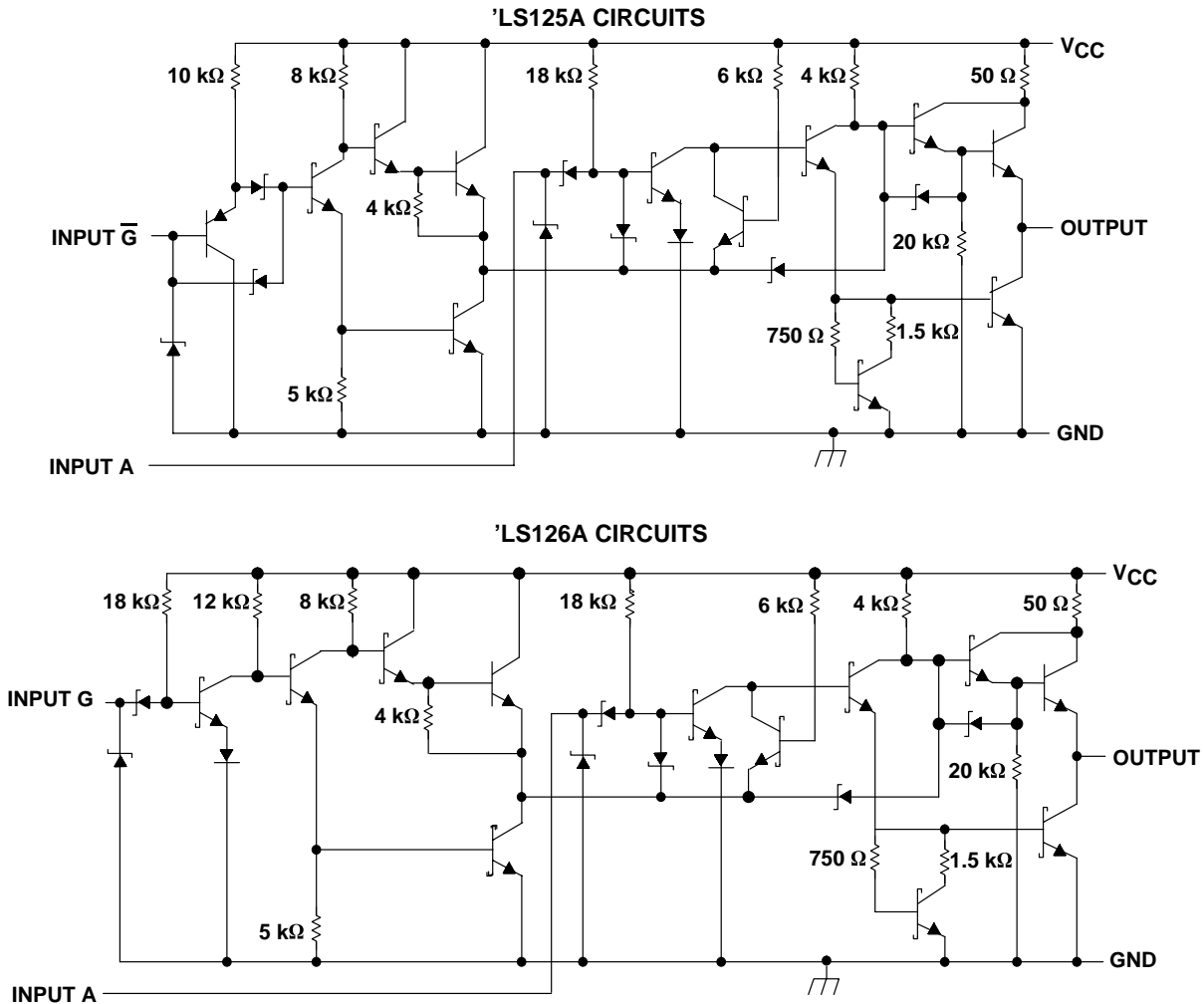


**SN54125, SN54126, SN54LS125A, SN54LS126A,
SN74125, SN74126, SN74LS125A, SN74LS126A
QUADRUPLE BUS BUFFERS WITH 3-STATE OUTPUTS**

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The SN54125, SN54126, SN74125,
SN74126, and SN54LS126A are
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schematics (each gate)



Resistor values shown are nominal.

absolute maximum ratings over operating free-air temperature (unless otherwise noted)†
('LS125A and 'LS126A)

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage, V_I	7 V
Package thermal impedance, θ_{JA} (see Note 2): D package	86°C/W
N package	80°C/W
NS package	76°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. Voltage values are with respect to network ground terminal.
2. The package thermal impedance is calculated in accordance with JESD 51-7.



The SN54125, SN54126, SN74125, SN74126, and SN54LS126A are obsolete and are no longer supplied.

SN54125, SN54126, SN54LS125A, SN54LS126A, SN74125, SN74126, SN74LS125A, SN74LS126A QUADRUPLE BUS BUFFERS WITH 3-STATE OUTPUTS

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recommended operating conditions

		SN54125 SN54126			SN74125 SN74126			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V _{IH}	High-level input voltage	2			2			V
V _{IL}	Low-level input voltage			0.8			0.8	V
I _{OH}	High-level output current			-2			-5.2	mA
I _{OL}	Low-level output current			16			16	mA
T _A	Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†		SN54125 SN54126			SN74125 SN74126			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V _{IK}	V _{CC} = MIN, I _I = -12 mA				-1.5			-1.5	V
V _{OH}	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = 0.8 V	I _{OH} = -2 mA	2.4	3.3					V
		I _{OH} = -5.2 mA				2.4	3.1		
V _{OL}	V _{CC} = MIN, I _{OL} = 16 mA	V _{IH} = 2 V, V _{IL} = 0.8 V			0.4			0.4	V
I _{OZ}	V _{CC} = MAX, V _{IL} = 0.8 V	V _{IH} = 2 V, V _O = 2.4 V			40			40	μA
		V _{IH} = 2 V, V _O = 0.4 V			-40			-40	
I _I	V _{CC} = MAX, V _I = 6.5 V			1			1	mA	
I _{IH}	V _{CC} = MAX, V _I = 2.4 V			40			40	μA	
I _{IL}	V _{CC} = MAX, V _I = 0.4 V			-1.6			-1.6	mA	
I _{OS} §	V _{CC} = MAX			-30		-70	-28	-70	mA
I _{CC}	V _{CC} = MAX (see Note 3)	'125	32	54			32	54	mA
		'126	36	62			36	62	

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

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

§ Not more than one output should be shorted at a time.

NOTE 3: Data inputs = 0 V; output control = 4.5 V for '125 and 0 V for '126.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see Figure 1)

PARAMETER	TEST CONDITIONS		SN54125 SN74125			SN54126 SN74126			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
t _{PLH}	R _L = 400 Ω, C _L = 50 pF		8	13		8	13	ns	
t _{PHL}			12	18		12	18		
t _{PZH}	R _L = 400 Ω, C _L = 50 pF		11	17		11	18	ns	
t _{PZL}			16	25		16	25		
t _{PHZ}	R _L = 400 Ω, C _L = 5 pF		5	8		10	16	ns	
t _{PLZ}			7	12		12	18		



**SN54125, SN54126, SN54LS125A, SN54LS126A,
SN74125, SN74126, SN74LS125A, SN74LS126A
QUADRUPLE BUS BUFFERS WITH 3-STATE OUTPUTS**

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The SN54125, SN54126, SN74125,
SN74126, and SN54LS126A are
obsolete and are no longer supplied.

recommended operating conditions

		SN54LS125A SN54LS126A			SN74LS125A SN74LS126A			UNIT		
		MIN	NOM	MAX	MIN	NOM	MAX			
V _{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V		
V _{IH}	High-level input voltage	2			2			V		
V _{IL}	Low-level input voltage	0.7			0.8			V		
I _{OH}	High-level output current	-1			-2.6			mA		
I _{OL}	Low-level output current	12			24			mA		
T _A	Operating free-air temperature	-55			125			0	70	°C

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

PARAMETER	TEST CONDITIONS†		SN54LS125A SN54LS126A			SN74LS125A SN74LS126A			UNIT			
			MIN	TYP‡	MAX	MIN	TYP‡	MAX				
V _{IK}	V _{CC} = MIN, I _I = -18 mA		-1.5			-1.5			V			
V _{OH}	V _{CC} = MIN, V _{IH} = 2 V	V _{IL} = 0.7 V, I _{OH} = -1 mA	2.4						V			
		V _{IL} = 0.8 V, I _{OH} = -2.6 mA				2.4						
V _{OL}	V _{CC} = MIN, V _{IH} = 2 V	V _{IL} = 0.7 V, I _{OL} = 12 mA	0.25		0.4				V			
		V _{IL} = 0.8 V, I _{OL} = 12 mA			0.25		0.4					
		V _{IL} = 0.8 V, I _{OL} = 24 mA			0.35		0.5					
I _{OZ}	V _{CC} = MAX, V _{IH} = 2 V,	V _{IL} = 0.7 V	V _O = 2.4 V		20				µA			
			V _O = 0.4 V		-20							
		V _{IL} = 0.8 V	V _O = 2.4 V				20					
			V _O = 0.4 V				-20					
I _I	V _{CC} = MAX, V _I = 7 V		0.1			0.1			mA			
I _{IH}	V _{CC} = MAX, V _I = 2.7 V		20			20			µA			
I _{IL}	V _{CC} = MAX, V _I = 0.4 V	'LS125A-G inputs		-0.2			-0.2			mA		
		'LS125A-A inputs; 'LS126A All inputs		-0.4			-0.4					
I _{OS} §	V _{CC} = MAX		-40		-225		-40		-225		mA	
I _{CC}	V _{CC} = MAX (see Note 4)	'LS125A		11		20		11		20		mA
		'LS126A		12		22		12		22		

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

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

§ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

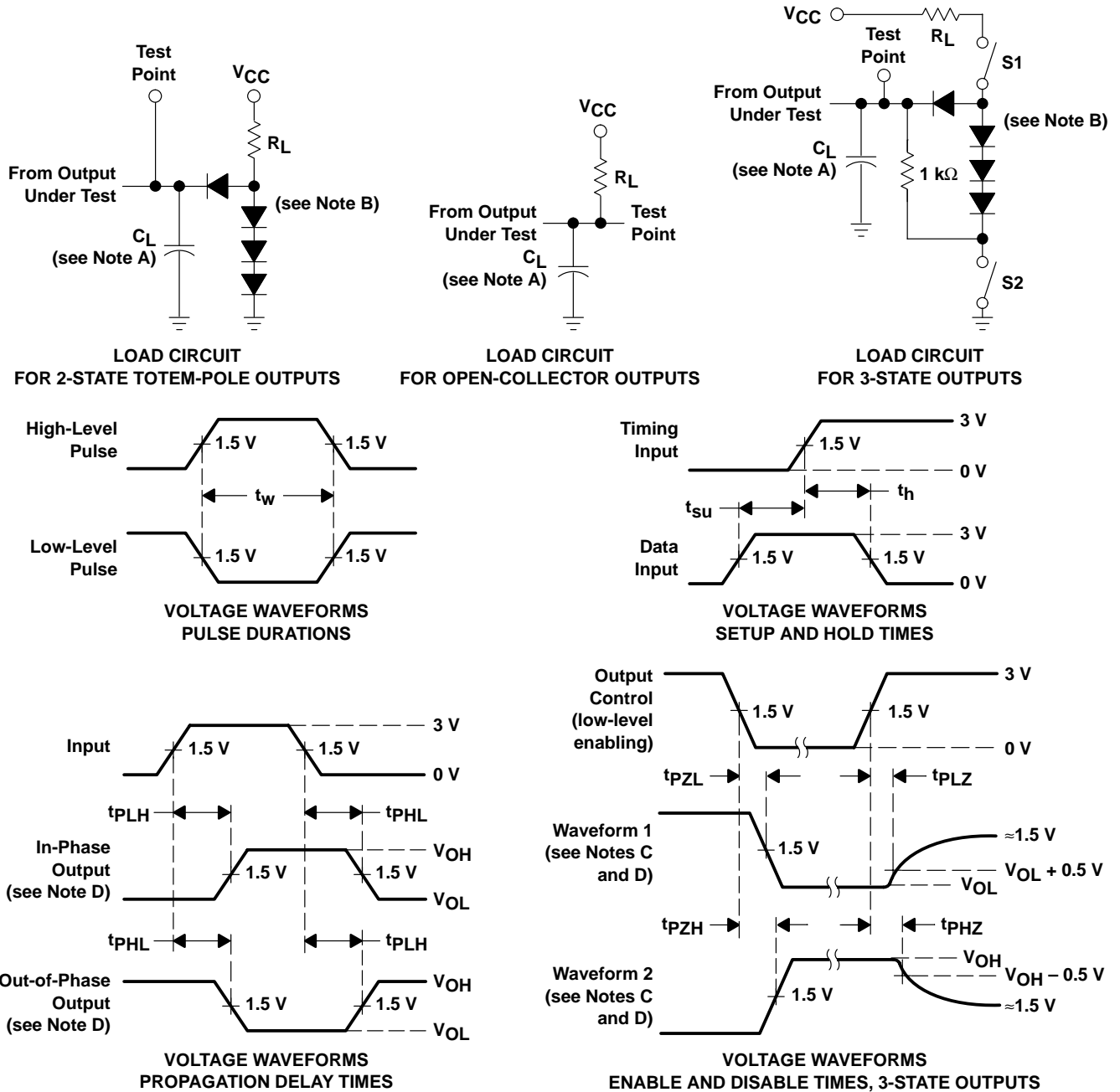
NOTE 4: Data inputs = 0 V; output control = 4.5 V for 'LS125A and 0 V for 'LS126A.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see Figure 1)

PARAMETER	TEST CONDITIONS		SN54LS125A SN74LS125A			SN54LS126A SN74LS126A			UNIT		
			MIN	TYP	MAX	MIN	TYP	MAX			
t _{PLH}	R _L = 667 Ω,	C _L = 45 pF	9		15		9		15		ns
t _{PHL}			7		18		8		18		
t _{PZH}	R _L = 667 Ω,	C _L = 45 pF	12		20		16		25		ns
t _{PZL}			15		25		21		35		
t _{PHZ}	R _L = 667 Ω,	C _L = 5 pF	20			25			ns		
t _{PLZ}			20			25					



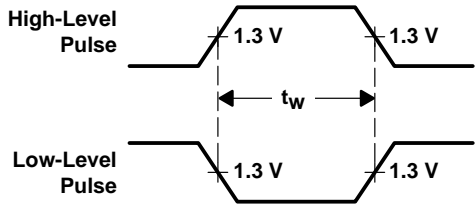
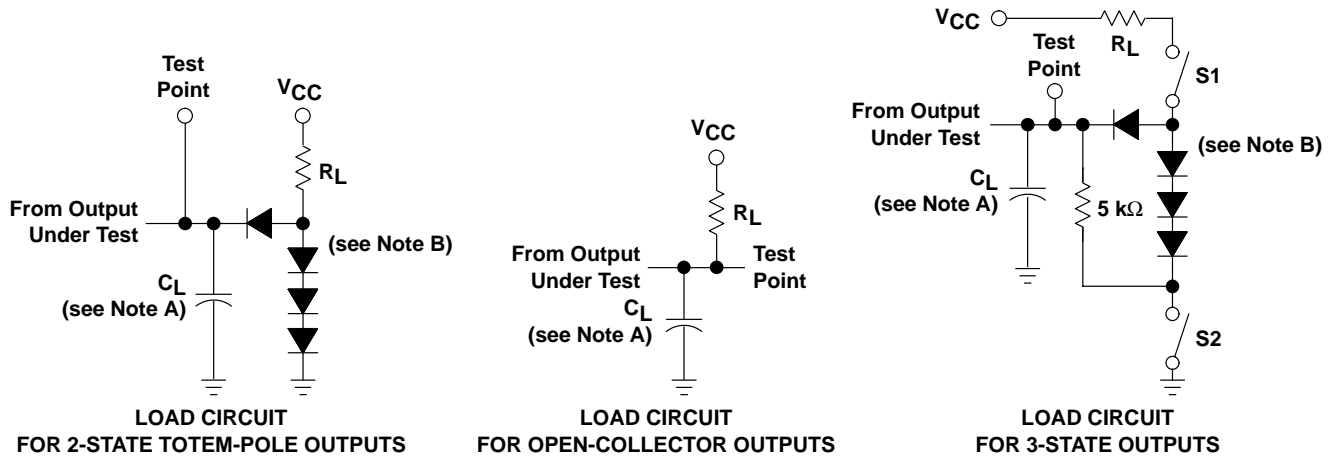
PARAMETER MEASUREMENT INFORMATION
SERIES 54/74 DEVICES



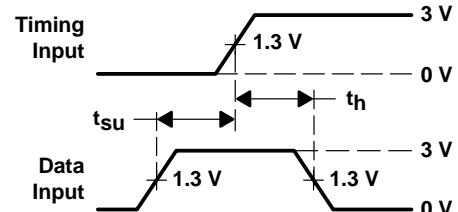
- NOTES: A. C_L includes probe and jig capacitance.
 B. All diodes are 1N3064 or equivalent.
 C. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 D. S1 and S2 are closed for t_{PLH} , t_{PHL} , t_{PHZ} , and t_{PLZ} ; S1 is open and S2 is closed for t_{PZH} ; S1 is closed and S2 is open for t_{PZL} .
 E. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1$ MHz, $Z_O \approx 50 \Omega$; t_r and $t_f \leq 7$ ns for Series 54/74 devices and t_r and $t_f \leq 2.5$ ns for Series 54S/74S devices.
 F. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms

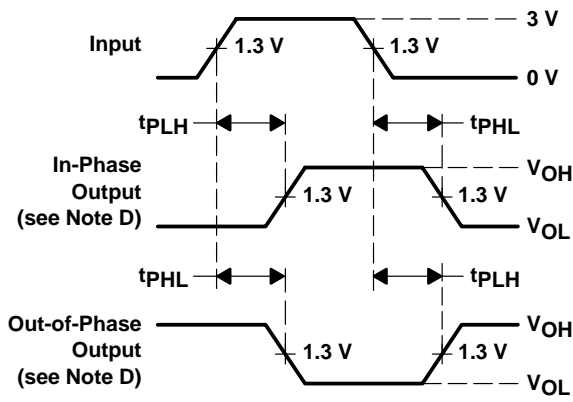
PARAMETER MEASUREMENT INFORMATION
 SERIES 54LS/74LS DEVICES



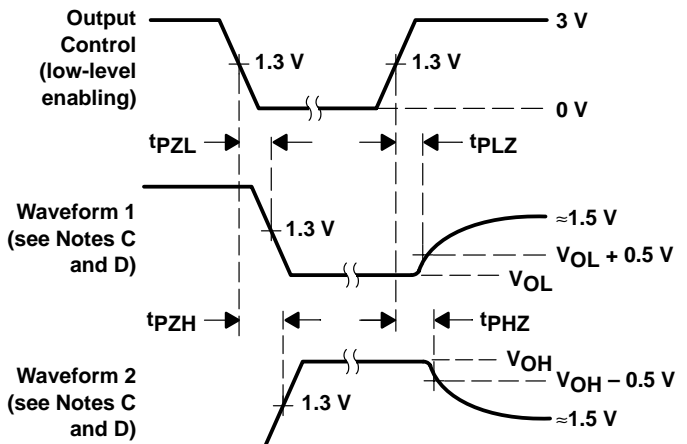
VOLTAGE WAVEFORMS
 PULSE DURATIONS



VOLTAGE WAVEFORMS
 SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
 PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
 ENABLE AND DISABLE TIMES, 3-STATE OUTPUTS

- NOTES:
- C_L includes probe and jig capacitance.
 - All diodes are 1N3064 or equivalent.
 - 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.
 - S1 and S2 are closed for t_{PLH} , t_{PHL} , t_{PHZ} , and t_{PLZ} ; S1 is open and S2 is closed for t_{PZH} ; S1 is closed and S2 is open for t_{PZL} .
 - Phase relationships between inputs and outputs have been chosen arbitrarily for these examples.
 - All input pulses are supplied by generators having the following characteristics: $PRR \leq 1$ MHz, $Z_O \approx 50 \Omega$, $t_r \leq 1.5$ ns, $t_f \leq 2.6$ ns.
 - The outputs are measured one at a time with one input transition per measurement.

Figure 2. Load Circuits and Voltage Waveforms

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
JM38510/32301B2A	ACTIVE	LCCC	FK	20	1	None	Call TI	Level-NC-NC-NC
JM38510/32301BCA	ACTIVE	CDIP	J	14	1	None	Call TI	Level-NC-NC-NC
JM38510/32301BDA	ACTIVE	CFP	W	14	1	None	Call TI	Level-NC-NC-NC
JM38510/32301SCA	ACTIVE	CDIP	J	14	1	None	Call TI	Level-NC-NC-NC
JM38510/32301SDA	ACTIVE	CFP	W	14	1	None	Call TI	Level-NC-NC-NC
SN54126J	OBSOLETE	CDIP	J	14		None	Call TI	Call TI
SN54LS125AJ	ACTIVE	CDIP	J	14	1	None	Call TI	Level-NC-NC-NC
SN74125N	OBSOLETE	PDIP	N	14		None	Call TI	Call TI
SN74125N3	OBSOLETE	PDIP	N	14		None	Call TI	Call TI
SN74126N	OBSOLETE	PDIP	N	14		None	Call TI	Call TI
SN74LS125AD	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS125ADBR	ACTIVE	SSOP	DB	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS125ADR	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS125AN	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS125AN3	OBSOLETE	PDIP	N	14		None	Call TI	Call TI
SN74LS125ANSR	ACTIVE	SO	NS	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS126AD	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS126ADR	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS126AJ	OBSOLETE	CDIP	J	14		None	Call TI	Call TI
SN74LS126AN	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS126ANSR	ACTIVE	SO	NS	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SNJ54126J	OBSOLETE	CDIP	J	14		None	Call TI	Call TI
SNJ54126W	OBSOLETE	CFP	W	14		None	Call TI	Call TI
SNJ54LS125AFK	ACTIVE	LCCC	FK	20	1	None	Call TI	Level-NC-NC-NC
SNJ54LS125AJ	ACTIVE	CDIP	J	14	1	None	Call TI	Level-NC-NC-NC
SNJ54LS125AW	ACTIVE	CFP	W	14	1	None	Call TI	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 - May not be currently available - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

None: Not yet available Lead (Pb-Free).

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" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

⁽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)



4040083/F 03/03

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

W (R-GDFP-F14)

CERAMIC DUAL FLATPACK

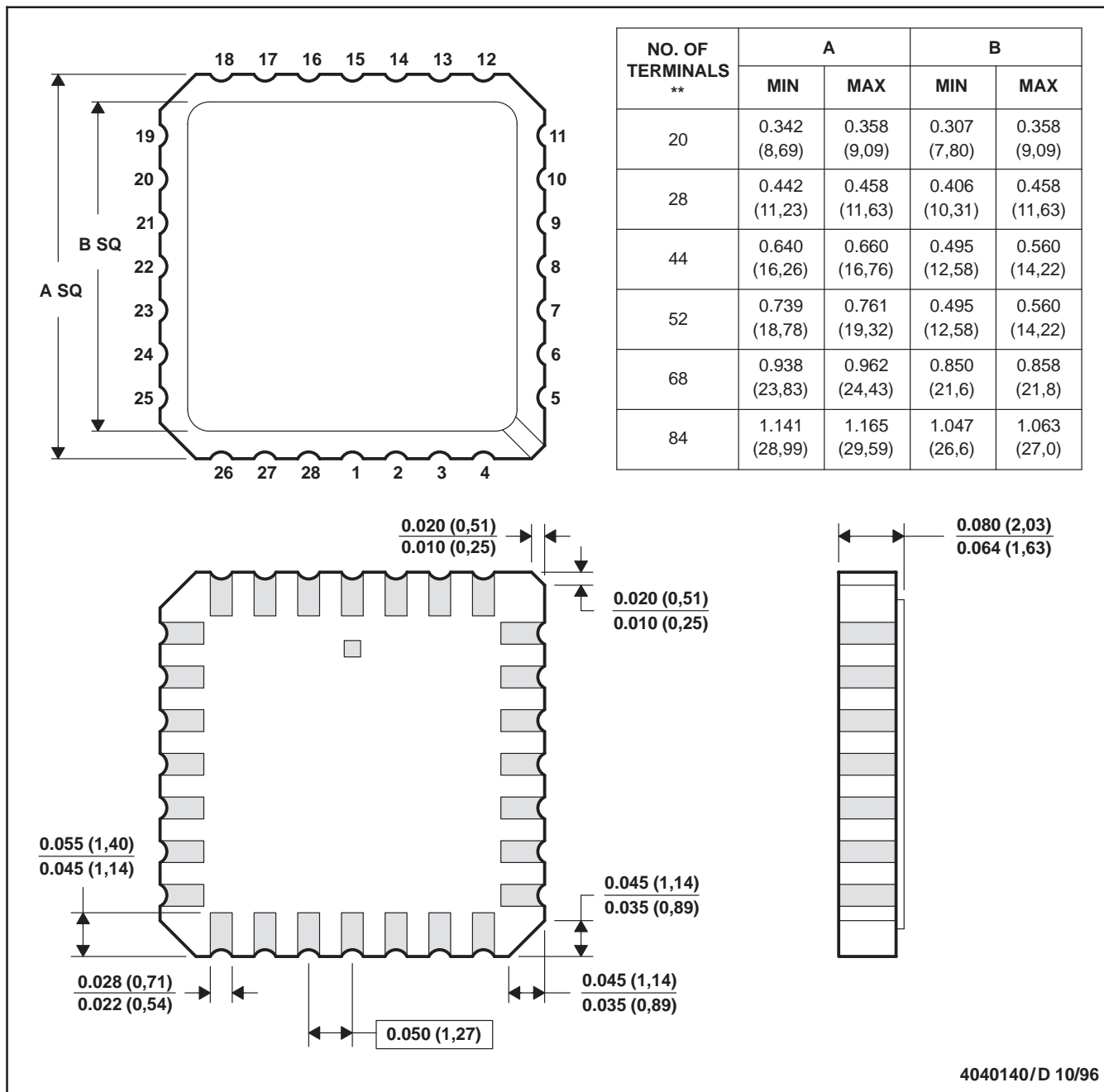


- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within MIL STD 1835 GDFP1-F14 and JEDEC MO-092AB

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



4040140/D 10/96

- 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

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

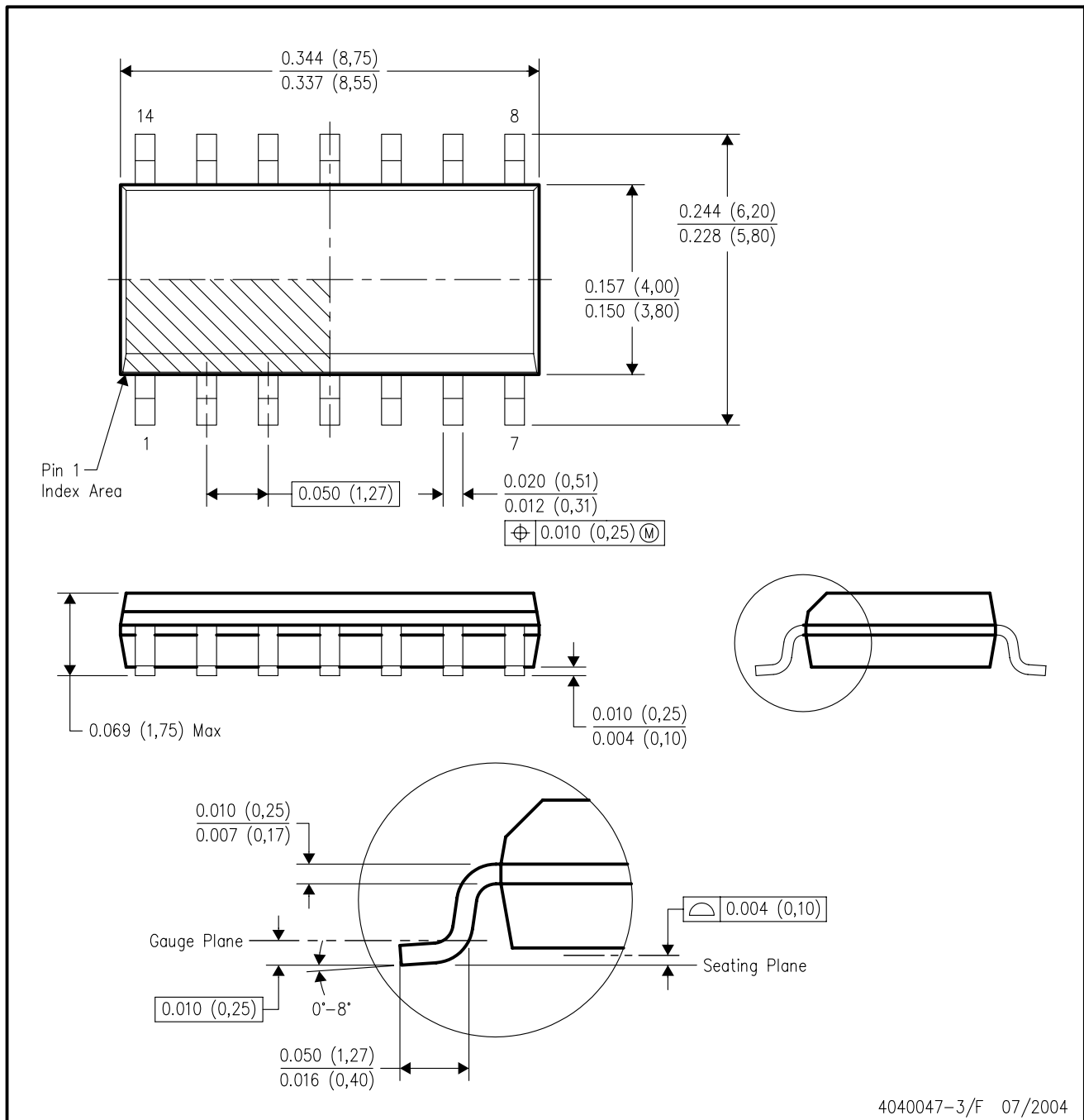
16 PINS SHOWN



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

D (R-PDSO-G14)

PLASTIC SMALL-OUTLINE PACKAGE



- 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 variation AB.

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



4040065 /E 12/01

- 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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