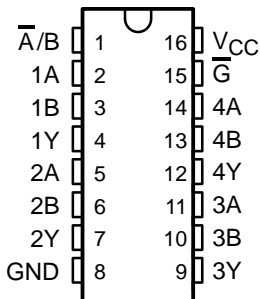


# SN54AHC157, SN74AHC157 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

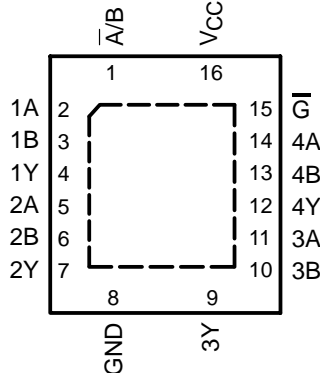
SCLS345I – MAY 1996 – REVISED JULY 2003

- Operating Range 2-V to 5.5-V  $V_{CC}$
- 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)

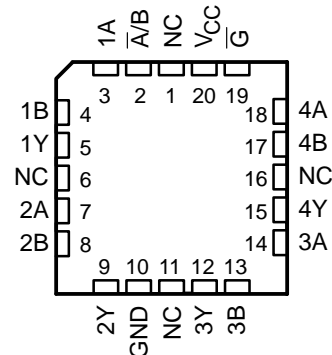
SN54AHC157 . . . J OR W PACKAGE  
SN74AHC157 . . . D, DB, DGV, N, NS,  
OR PW PACKAGE  
(TOP VIEW)



SN74AHC157 . . . RGY PACKAGE  
(TOP VIEW)



SN54AHC157 . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

## description/ordering information

These quadruple 2-line to 1-line data selectors/multiplexers are designed for 2-V to 5.5-V  $V_{CC}$  operation.

The 'AHC157 devices feature a common strobe ( $\bar{G}$ ) input. When the strobe is high, all outputs are low. When the strobe 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.

## ORDERING INFORMATION

$T_A$	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	QFN – RGY	Tape and reel	SN74AHC157RGYR	HA157
	PDIP – N	Tube	SN74AHC157N	SN74AHC157N
	SOIC – D	Tube	SN74AHC157D	AHC157
		Tape and reel	SN74AHC157DR	
	SOP – NS	Tape and reel	SN74AHC157NSR	AHC157
	SSOP – DB	Tape and reel	SN74AHC157DBR	HA157
	TSSOP – PW	Tube	SN74AHC157PW	HA157
Tape and reel		SN74AHC157PWR		
–55°C to 125°C	TVSOP – DGV	Tape and reel	SN74AHC157DGVR	HA157
	CDIP – J	Tube	SNJ54AHC157J	SNJ54AHC157J
	CFP – W	Tube	SNJ54AHC157W	SNJ54AHC157W
	LCCC – FK	Tube	SNJ54AHC157FK	SNJ54AHC157FK

† 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).



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.

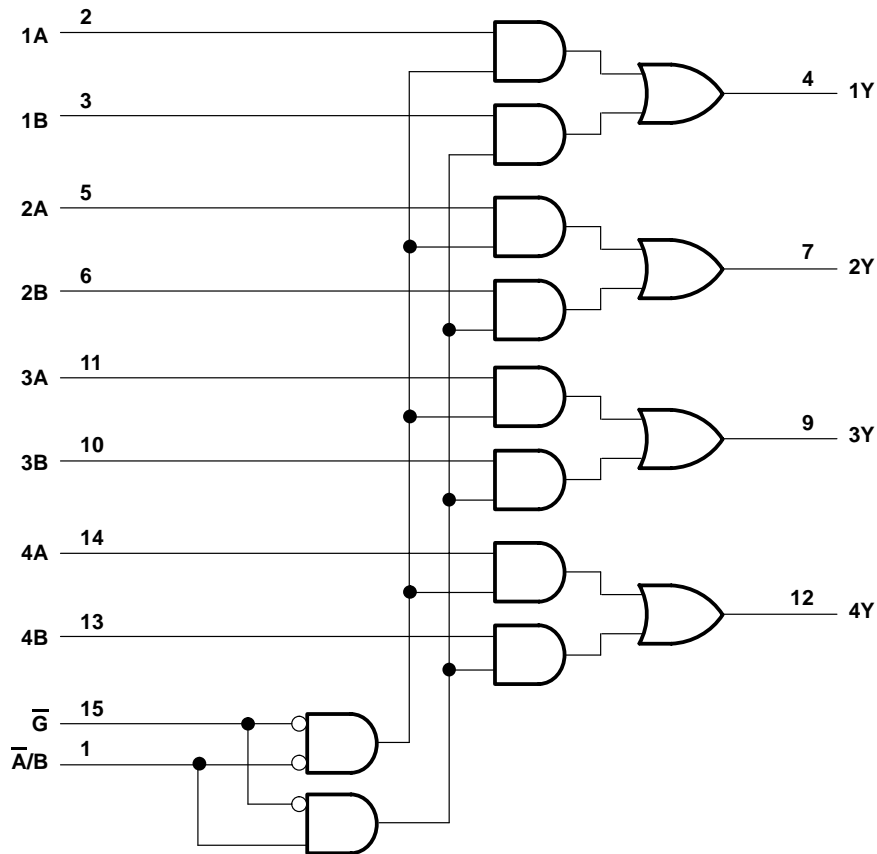
# SN54AHC157, SN74AHC157 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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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, DGV, J, N, NS, PW, RGY, and W packages.

# SN54AHC157, SN74AHC157 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 7 V
Input voltage range, $V_I$ (see Note 1) .....	-0.5 V to 7 V
Output voltage range, $V_O$ (see Note 1) .....	-0.5 V to $V_{CC} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ ) .....	-20 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) .....	$\pm 20$ mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	$\pm 25$ mA
Continuous current through $V_{CC}$ or GND .....	$\pm 50$ mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): D package .....	73°C/W
(see Note 2): DB package .....	82°C/W
(see Note 2): DGV package .....	120°C/W
(see Note 2): N package .....	67°C/W
(see Note 2): NS package .....	64°C/W
(see Note 2): PW package .....	108°C/W
(see Note 3): 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 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.

3. The package thermal impedance is calculated in accordance with JESD 51-5.

## recommended operating conditions (see Note 4)

		SN54AHC157		SN74AHC157		UNIT
		MIN	MAX	MIN	MAX	
$V_{CC}$	Supply voltage	2	5.5	2	5.5	V
$V_{IH}$	High-level input voltage	$V_{CC} = 2$ V		1.5		V
		$V_{CC} = 3$ V		2.1		
		$V_{CC} = 5.5$ V		3.85		
$V_{IL}$	Low-level input voltage	$V_{CC} = 2$ V		0.5		V
		$V_{CC} = 3$ V		0.9		
		$V_{CC} = 5.5$ V		1.65		
$V_I$	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	$V_{CC} = 2$ V		-50		$\mu$ A
		$V_{CC} = 3.3$ V $\pm 0.3$ V		-4		mA
		$V_{CC} = 5$ V $\pm 0.5$ V		-8		mA
$I_{OL}$	Low-level output current	$V_{CC} = 2$ V		50		$\mu$ A
		$V_{CC} = 3.3$ V $\pm 0.3$ V		4		mA
		$V_{CC} = 5$ V $\pm 0.5$ V		8		mA
$\Delta t/\Delta v$	Input transition rise or fall rate	$V_{CC} = 3.3$ V $\pm 0.3$ V		100		ns/V
		$V_{CC} = 5$ V $\pm 0.5$ V		20		
$T_A$	Operating free-air temperature	-55	125	-40	85	°C

NOTE 4: 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.



# SN54AHC157, SN74AHC157 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>	T <sub>A</sub> = 25°C			SN54AHC157		SN74AHC157		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V <sub>OH</sub>	I <sub>OH</sub> = -50 μA	2 V	1.9	2		1.9		1.9	V	
		3 V	2.9	3		2.9		2.9		
		4.5 V	4.4	4.5		4.4		4.4		
	I <sub>OH</sub> = -4 mA	3 V	2.58			2.48		2.48		
	I <sub>OH</sub> = -8 mA	4.5 V	3.94			3.8		3.8		
V <sub>OL</sub>	I <sub>OL</sub> = 50 μA	2 V			0.1		0.1	0.1	V	
		3 V			0.1		0.1	0.1		
		4.5 V			0.1		0.1	0.1		
	I <sub>OL</sub> = 4 mA	3 V			0.36		0.5	0.44		
	I <sub>OL</sub> = 8 mA	4.5 V			0.36		0.5	0.44		
I <sub>I</sub>	A or B inputs	V <sub>I</sub> = 5.5 V or GND	0 V to 5.5 V			±0.1		±1*	±1	μA
I <sub>CC</sub>		V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0	5.5 V			4		40	40	μA
C <sub>i</sub>		V <sub>I</sub> = V <sub>CC</sub> or GND	5 V		2	10			10	pF

\* On products compliant to MIL-PRF-38535, this parameter is not production tested at V<sub>CC</sub> = 0 V.

switching characteristics over recommended operating free-air temperature range, V<sub>CC</sub> = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T <sub>A</sub> = 25°C			SN54AHC157		SN74AHC157		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A or B	Y	C <sub>L</sub> = 15 pF	6.2**	9.7**		1**	11.5**	1	11.5	ns
t <sub>PHL</sub>				6.2**	9.7**		1**	11.5**	1	11.5	
t <sub>PLH</sub>	A̅/B	Y	C <sub>L</sub> = 15 pF	8.4**	13.2**		1**	15.5**	1	15.5	ns
t <sub>PHL</sub>				8.4**	13.2**		1**	15.5**	1	15.5	
t <sub>PLH</sub>	G̅	Y	C <sub>L</sub> = 15 pF	8.7**	13.6**		1**	16**	1	16	ns
t <sub>PHL</sub>				8.7**	13.6**		1**	16**	1	16	
t <sub>PLH</sub>	A or B	Y	C <sub>L</sub> = 50 pF	8.7	13.2		1	15	1	15	ns
t <sub>PHL</sub>				8.7	13.2		1	15	1	15	
t <sub>PLH</sub>	A̅/B	Y	C <sub>L</sub> = 50 pF	10.9	16.7		1	19	1	19	ns
t <sub>PHL</sub>				10.9	16.7		1	19	1	19	
t <sub>PLH</sub>	G̅	Y	C <sub>L</sub> = 50 pF	11.2	17.1		1	19.5	1	19.5	ns
t <sub>PHL</sub>				11.2	17.1		1	19.5	1	19.5	

\*\* On products compliant to MIL-PRF-38535, this parameter is not production tested.



# SN54AHC157, SN74AHC157 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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**switching characteristics over recommended operating free-air temperature range,  
V<sub>CC</sub> = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T <sub>A</sub> = 25°C			SN54AHC157		SN74AHC157		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A or B	Y	C <sub>L</sub> = 15 pF	4.1*	6.4*	1*	7.5*	1	7.5	ns	
t <sub>PHL</sub>				4.1*	6.4*	1*	7.5*	1	7.5		
t <sub>PLH</sub>	$\bar{A}/B$	Y	C <sub>L</sub> = 15 pF	5.3*	8.1*	1*	9.5*	1	9.5	ns	
t <sub>PHL</sub>				5.3*	8.1*	1*	9.5*	1	9.5		
t <sub>PLH</sub>	$\bar{G}$	Y	C <sub>L</sub> = 15 pF	5.6*	8.6*	1*	10*	1	10	ns	
t <sub>PHL</sub>				5.6*	8.6*	1*	10*	1	10		
t <sub>PLH</sub>	A or B	Y	C <sub>L</sub> = 50 pF	5.6	8.4	1	9.5	1	9.5	ns	
t <sub>PHL</sub>				5.6	8.4	1	9.5	1	9.5		
t <sub>PLH</sub>	$\bar{A}/B$	Y	C <sub>L</sub> = 50 pF	6.8	10.1	1	11.5	1	11.5	ns	
t <sub>PHL</sub>				6.8	10.1	1	11.5	1	11.5		
t <sub>PLH</sub>	$\bar{G}$	Y	C <sub>L</sub> = 50 pF	7.1	10.6	1	12	1	12	ns	
t <sub>PHL</sub>				7.1	10.6	1	12	1	12		

\* On products compliant to MIL-PRF-38535, this parameter is not production tested.

**noise characteristics V<sub>CC</sub> = 5 V, C<sub>L</sub> = 50 pF, T<sub>A</sub> = 25°C (see Note 5)**

PARAMETER		SN74AHC157			UNIT
		MIN	TYP	MAX	
V <sub>OL(P)</sub>	Quiet output, maximum dynamic V <sub>OL</sub>			0.8	V
V <sub>OL(V)</sub>	Quiet output, minimum dynamic V <sub>OL</sub>			-0.8	V
V <sub>OH(V)</sub>	Quiet output, minimum dynamic V <sub>OH</sub>		4.8		V
V <sub>IH(D)</sub>	High-level dynamic input voltage		3.5		V
V <sub>IL(D)</sub>	Low-level dynamic input voltage			1.5	V

NOTE 5: Characteristics are for surface-mount packages only.

**operating characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C**

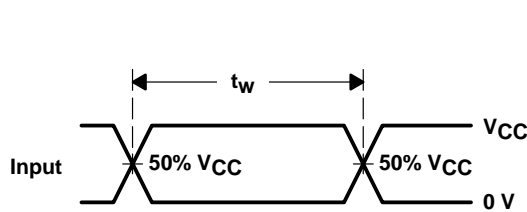
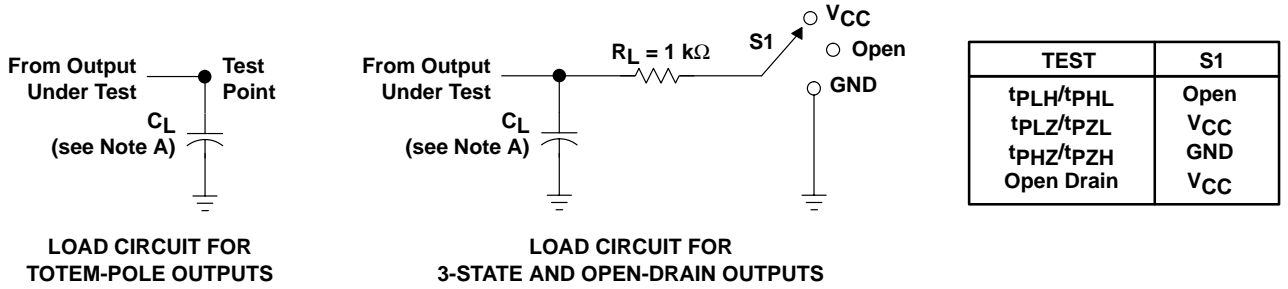
PARAMETER		TEST CONDITIONS	TYP	UNIT
C <sub>pd</sub>	Power dissipation capacitance	No load, f = 1 MHz	11	pF



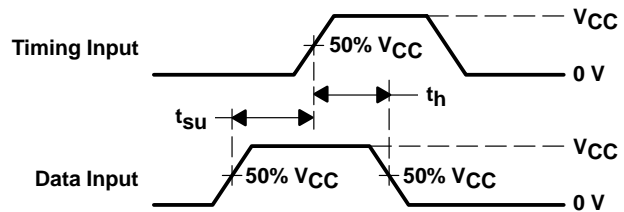
# SN54AHC157, SN74AHC157 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

SCLS345I – MAY 1996 – REVISED JULY 2003

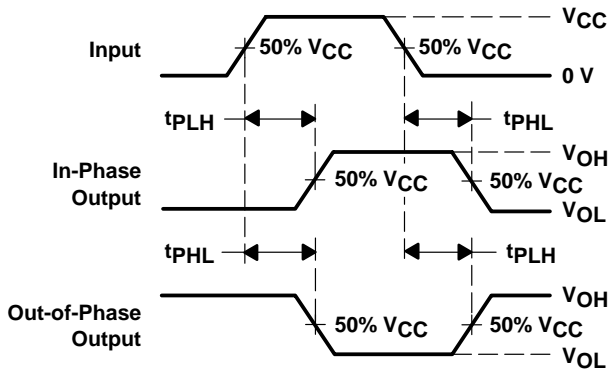
## PARAMETER MEASUREMENT INFORMATION



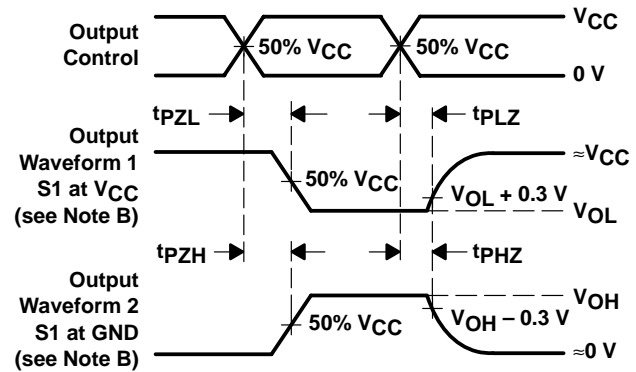
VOLTAGE WAVEFORMS  
PULSE DURATION



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:
- A.  $C_L$  includes probe and jig capacitance.
  - B. 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.
  - C. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1\text{ MHz}$ ,  $Z_O = 50\ \Omega$ ,  $t_r \leq 3\text{ ns}$ ,  $t_f \leq 3\text{ ns}$ .
  - D. The outputs are measured one at a time with one input transition per measurement.
  - E. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
5962-9764201Q2A	ACTIVE	LCCC	FK	20	1	None	Call TI	Level-NC-NC-NC
5962-9764201QEA	ACTIVE	CDIP	J	16	1	None	Call TI	Level-NC-NC-NC
5962-9764201QFA	ACTIVE	CFP	W	16	1	None	Call TI	Level-NC-NC-NC
SN74AHC157D	ACTIVE	SOIC	D	16	40	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74AHC157DBLE	OBSOLETE	SSOP	DB	16		None	Call TI	Call TI
SN74AHC157DBR	ACTIVE	SSOP	DB	16	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74AHC157DGVR	ACTIVE	TVSOP	DGV	16	2000	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SN74AHC157DR	ACTIVE	SOIC	D	16	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74AHC157N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74AHC157NSR	ACTIVE	SO	NS	16	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74AHC157PW	ACTIVE	TSSOP	PW	16	90	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SN74AHC157PWLE	OBSOLETE	TSSOP	PW	16		None	Call TI	Call TI
SN74AHC157PWR	ACTIVE	TSSOP	PW	16	2000	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SN74AHC157RGYR	ACTIVE	QFN	RGY	16	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1YEAR
SNJ54AHC157FK	ACTIVE	LCCC	FK	20	1	None	Call TI	Level-NC-NC-NC
SNJ54AHC157J	ACTIVE	CDIP	J	16	1	None	Call TI	Level-NC-NC-NC
SNJ54AHC157W	ACTIVE	CFP	W	16	1	None	Call TI	Level-NC-NC-NC

<sup>(1)</sup> 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.

<sup>(2)</sup> 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.

<sup>(3)</sup> 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)

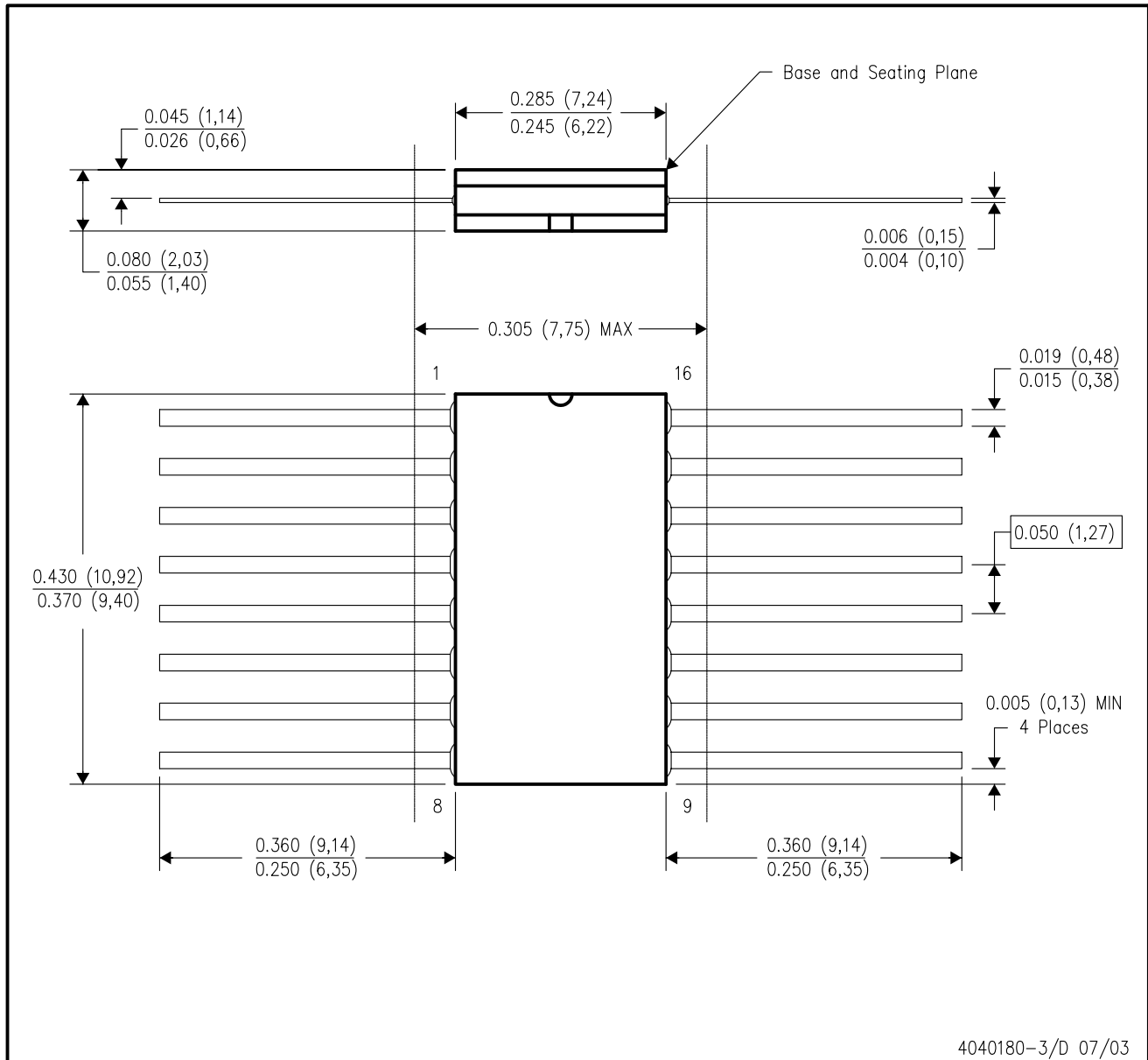


4040083/F 03/03

- 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-F16)

CERAMIC DUAL FLATPACK



- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package can be hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only.
  - Falls within MIL STD 1835 GDFP1-F16 and JEDEC MO-092AC

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

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



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.

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

PLASTIC SMALL-OUTLINE

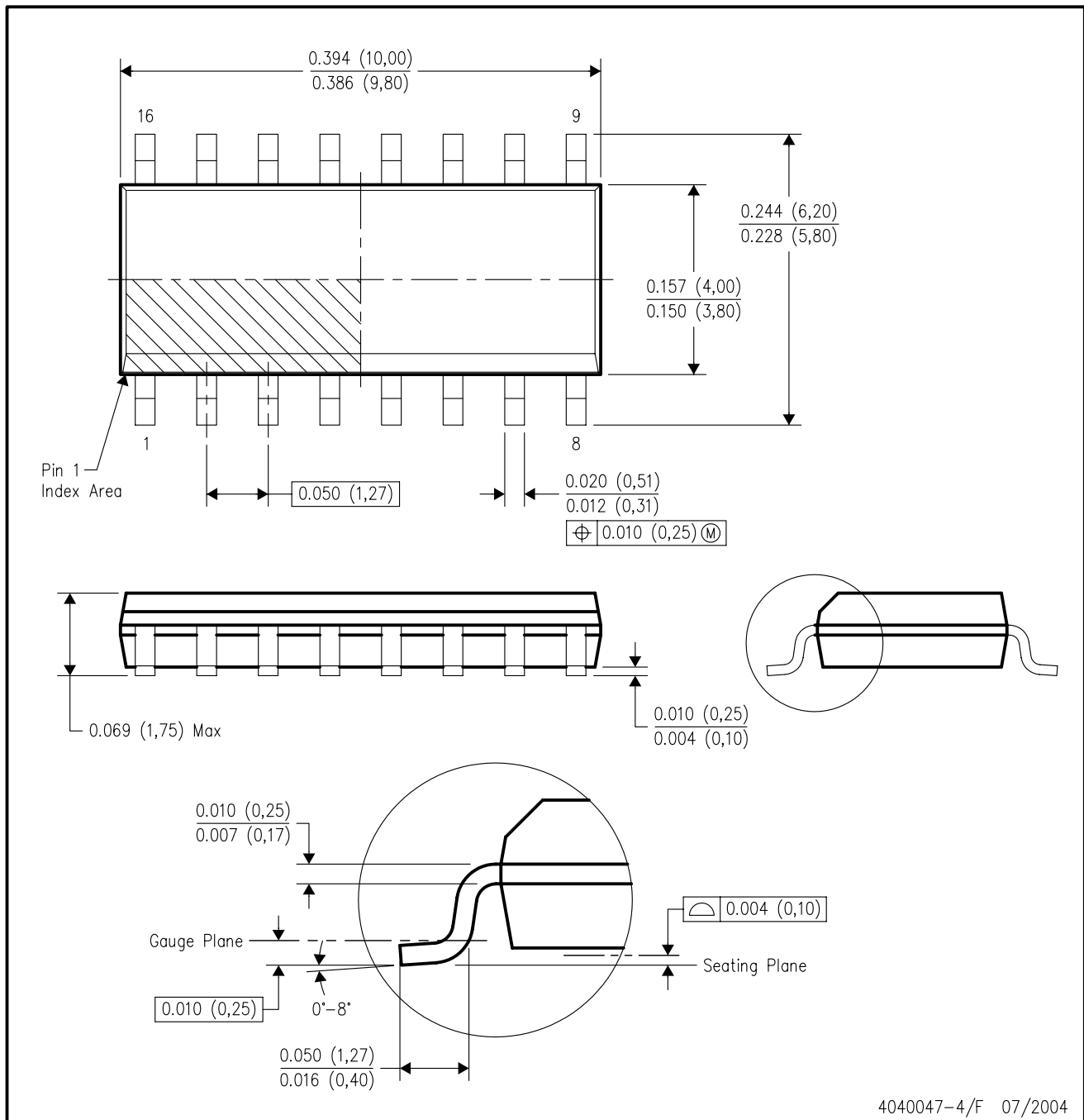
24 PINS SHOWN



- 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 per side.  
 D. Falls within JEDEC: 24/48 Pins – MO-153  
 14/16/20/56 Pins – MO-194

D (R-PDSO-G16)

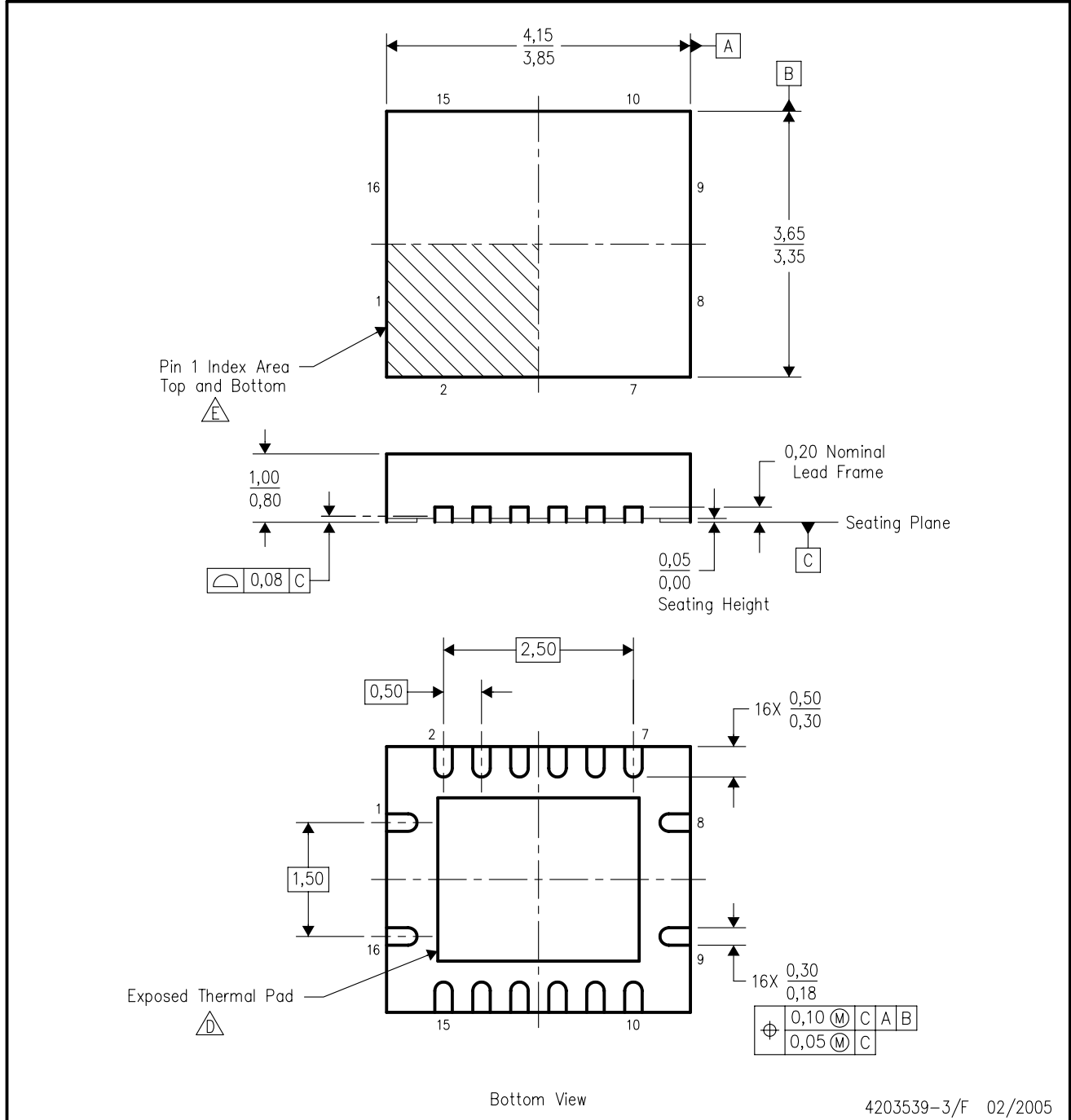
PLASTIC SMALL-OUTLINE PACKAGE





- 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 AC.

RGY (R-PQFP-N16)

PLASTIC QUAD FLATPACK



4203539-3/F 02/2005

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. QFN (Quad Flatpack No-Lead) package configuration.
  -  The package thermal pad must be soldered to the board for thermal and mechanical performance. See the Product Data Sheet for details regarding the exposed thermal pad dimensions.
  -  Pin 1 identifiers are located on both top and bottom of the package and within the zone indicated. The Pin 1 identifiers are either a molded, marked, or metal feature.
  - F. Package complies to JEDEC MO-241 variation BB.

# 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

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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