SN54AHCT157, SN74AHCT157 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

SCLS347K - MAY 1996 - REVISED JULY 2003

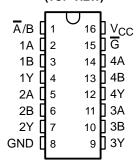
- Inputs Are TTL-Voltage Compatible
- Latch-Up Performance Exceeds 250 mA Per JESD 17

description/ordering information

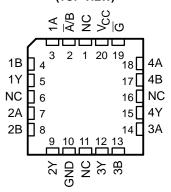
These quadruple 2-line to 1-line data selectors/multiplexers are designed for 4.5-V to $5.5\text{-V}\ \text{V}_{CC}$ operation.

The 'AHCT157 devices feature a common strobe (\overline{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.

SN54AHCT157 . . . J OR W PACKAGE SN74AHCT157 . . . D, DB, DGV, N, NS, OR PW PACKAGE (TOP VIEW)



SN54AHCT157...FK PACKAGE (TOP VIEW)



NC - No internal connection

ORDERING INFORMATION

TA	PACKA	GE†	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	PDIP – N	Tube	SN74AHCT157N	SN74AHCT157N
–40°C to 85°C	SOIC - D	Tube	SN74AHCT157D	AHCT157
	3010 - 15	Tape and reel	SN74AHCT157DR	Anonia
	SOP – NS	Tape and reel	SN74AHCT157NSR	AHCT157
40 0 10 03 0	SSOP – DB	Tape and reel	SN74AHCT157DBR	HB157
	TSSOP – PW	Tube	SN74AHCT157PW	HB157
	1330F = FW	Tape and reel	SN74AHCT157PWR	110107
	TVSOP – DGV	Tape and reel	SN74AHCT157DGVR	HB157
	CDIP – J	Tube	SNJ54AHCT157J	SNJ54AHCT157J
–55°C to 125°C	CFP – W	Tube	SNJ54AHCT157W	SNJ54AHCT157W
1	LCCC – FK	Tube	SNJ54AHCT157K	SNJ54AHCT157FK

[†] Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at 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.

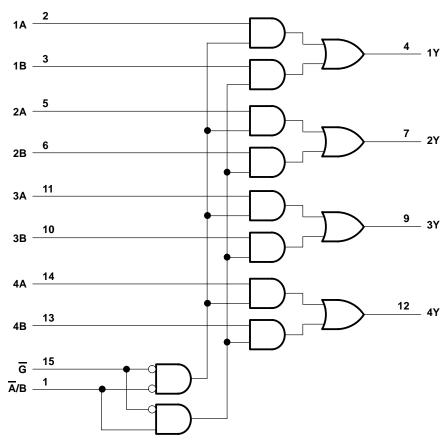


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FUNCTION TABLE

	INPU		OUTPUT	
G	Ā/B	Y		
Н	Х	Χ	Χ	L
L	L	L	X	L
L	L	Н	X	Н
L	Н	Χ	L	L
L	Н	Χ	Н	Н

logic diagram (positive logic)



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

SN54AHCT157, SN74AHCT157 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, VO (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, IOK (VO < 0 or VO > VCO	c)	±20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})		±25 mA
Continuous current through V _{CC} or GND		±50 mA
Package thermal impedance, θ_{JA} (see Note 2):	: D package	73°C/W
•	DB package	82°C/W
	DGV package	120°C/W
	N package	67°C/W
	NS package	64°C/W
	PW package	108°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.

recommended operating conditions (see Note 3)

		SN54AH	CT157	SN74AH	CT157	UNIT
		MIN	MAX	MIN	MAX	UNIT
VCC	Supply voltage	4.5	5.5	4.5	5.5	V
VIH	High-level input voltage	2	7	2		V
VIL	Low-level input voltage		0.8		0.8	V
٧ _I	Input voltage	0	5.5	0	5.5	V
Vo	Output voltage	0	Vcc	0	VCC	V
ЮН	High-level output current	27/	-8		-8	mA
l _{OL}	Low-level output current	70/	8		8	mA
Δt/Δν	Input transition rise or fall time	Q	20		20	ns/V
TA	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.

SN54AHCT157, SN74AHCT157 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 _{CC}	T,	չ = 25°C	;	SN54AHCT157		SN74AHCT157		UNIT	
PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT	
I _{OH} = -50 μA		451/	4.4	4.5		4.4		4.4		.,	
Voн	I _{OH} = -8 mA	4.5 V	3.94			3.8	, A	3.8		V	
\/a.	I _{OL} = 50 μA	4.5 V			0.1		0.1		0.1	٧	
VOL	I _{OL} = 8 mA	4.5 V			0.36		0.44		0.44	V	
lį	V _I = 5.5 V or GND	0 V to 5.5 V			±0.1	4	±1*		±1	μΑ	
ICC	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			2	770	20		20	μΑ	
ΔI _{CC} †	One input at 3.4 V, Other inputs at V _{CC} or GND	5.5 V			1.35	Ota	1.5		1.5	mA	
C _i	V _I = V _{CC} or GND	5 V		2	10				10	pF	

^{*} On products compliant to MIL-PRF-38535, this parameter is not production tested at $V_{CC} = 0 \text{ V}$.

switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V \pm 0.5 V (unless otherwise noted) (see Figure 1)

•	-			_	-													
PARAMETER	FROM	то	LOAD	T _A	= 25°C	;	SN54AH	CT157	SN74AH	CT157	UNIT							
PARAMETER	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNII							
^t PLH	A or B	Y	C: - 15 pE		4.1**	6.4**	1**	7.5**	1	7.5	no							
^t PHL	AUIB	ľ	C _L = 15 pF		4.1**	6.4**	1**	7.5**	1	7.5	ns							
^t PLH	Ā/B	Υ	C: = 15 pE		5.3**	8.1**	1**	9.5**	1	9.5	ne							
t _{PHL}	A/B	ı	C _L = 15 pF		5.3**	8.1**	1**	9.5**	1	9.5	ns							
t _{PLH}	G	Y	C _I = 15 pF		5.6**	8.6**	1**	10**	1	10	ns							
^t PHL	G	Ţ	CL = 15 pr		5.6**	8.6**	1** <	10**	1	10	115							
^t PLH	A or B	V	C 50 pF		5.6	8.7	()	10.8	1	9.8	ns							
^t PHL	AUIB	T T	Ť	ľ	Y	Y	Y	Y	Y	C _L = 50 pF		5.6	8.7	Qĭ	10.8	1	9.8	115
^t PLH	A/B	Y	C _I = 50 pF		6.8	10.4	g 1	13.2	1	12	no							
^t PLH	A/B	ſ	CL = 50 pr		6.8	10.4	1	13.2	1	12	ns							
^t PLH	G	Y	C: - 50 pF		7.1	11	1	13.5	1	12	no							
t _{PHL}	G	ſ	C _L = 50 pF		7.1	11	1	13.5	1	12	ns							

 $^{^{\}star\star}$ On products compliant to MIL-PRF-38535, this parameter is not production tested.

noise characteristics $V_{CC} = 5 \text{ V}$, $C_L = 50 \text{ pF}$, $T_A = 25^{\circ}\text{C}$ (see Note 4)

	PARAMETER	SN7	UNIT		
	PARAMETER	MIN	TYP	MAX	UNIT
V _{OL(P)}	Quiet output, maximum dynamic V _{OL}		0.4	0.8	V
V _{OL(V)}	Quiet output, minimum dynamic V _{OL}		-0.4	-0.8	V
VOH(V)	Quiet output, minimum dynamic V _{OH}		4.8		V
V _{IH(D)}	High-level dynamic input voltage	2		·	V
V _{IL(D)}	Low-level dynamic input voltage			0.8	V

NOTE 4: Characteristics are for surface-mount packages only.



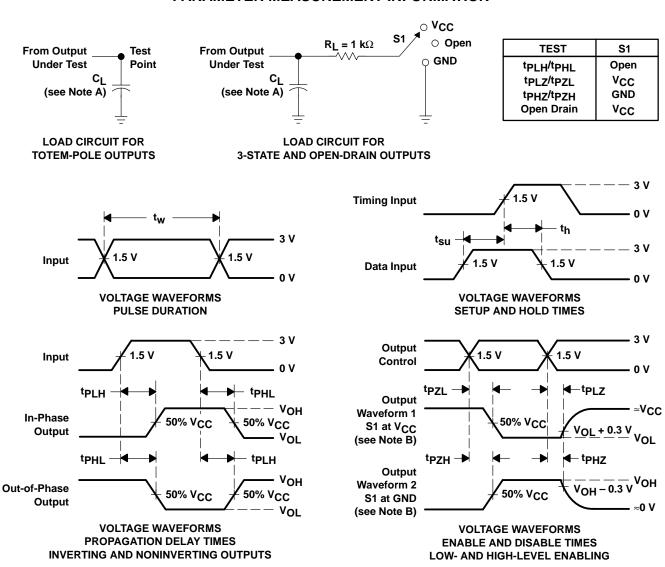
[†] This is the increase in supply current for each input at one of the specified TTL voltage levels rather than 0 V or VCC.

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operating characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER	TEST CONDITIONS	TYP	UNIT
C _{pd} Power dissipation capacitance	No load, f = 1 MHz	11	pF

PARAMETER MEASUREMENT INFORMATION



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 MHz, $Z_O = 50 \Omega$, $t_f \leq$ 3 ns. $t_f \leq$ 3 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







10-Jun-2014

PACKAGING INFORMATION

Orderable Device	Status	Package Type	_	Pins	Package	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
SN74AHCT157D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT157	Samples
SN74AHCT157DBLE	OBSOLETE	SSOP	DB	16		TBD	Call TI	Call TI	-40 to 85		
SN74AHCT157DBR	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB157	Samples
SN74AHCT157DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT157	Samples
SN74AHCT157DGVR	ACTIVE	TVSOP	DGV	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB157	Samples
SN74AHCT157DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT157	Samples
SN74AHCT157N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74AHCT157N	Samples
SN74AHCT157PW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB157	Samples
SN74AHCT157PWLE	OBSOLETE	TSSOP	PW	16		TBD	Call TI	Call TI	-40 to 85		
SN74AHCT157PWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB157	Samples

(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.

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.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

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)

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.



PACKAGE OPTION ADDENDUM

10-Jun-2014

- (3) MSL, Peak Temp. The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.
- (4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.
- (5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.
- (6) Lead/Ball Finish Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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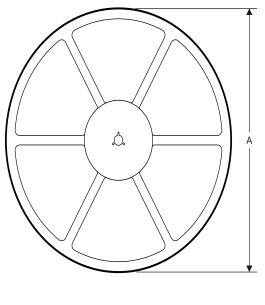
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PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION

REEL DIMENSIONS





TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
В0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

TAPE AND REEL INFORMATION

*All dimensions are nominal

All dimensions are nominal													
Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant	
SN74AHCT157DBR	SSOP	DB	16	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1	
SN74AHCT157DGVR	TVSOP	DGV	16	2000	330.0	12.4	6.8	4.0	1.6	8.0	12.0	Q1	
SN74AHCT157DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1	
SN74AHCT157PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1	

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*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHCT157DBR	SSOP	DB	16	2000	367.0	367.0	38.0
SN74AHCT157DGVR	TVSOP	DGV	16	2000	367.0	367.0	35.0
SN74AHCT157DR	SOIC	D	16	2500	333.2	345.9	28.6
SN74AHCT157PWR	TSSOP	PW	16	2000	367.0	367.0	35.0

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- 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.



DGV (R-PDSO-G**)

24 PINS SHOWN

PLASTIC SMALL-OUTLINE



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-PDS0-G16)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AC.



D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



PW (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
- E. Falls within JEDEC MO-153



PW (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



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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