

SN54ALS157A, SN54ALS158 SN74ALS157A, SN74ALS158, SN74AS157, SN74AS158 QUADRUPLE 1-OF-2 DATA SELECTORS/MULTIPLEXERS

SDAS081C – APRIL 1982 – REVISED DECEMBER 1994

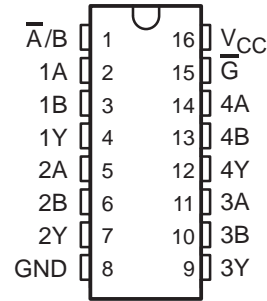
- Buffered Inputs and Outputs
- Package Options Include Plastic Small-Outline (D) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

description

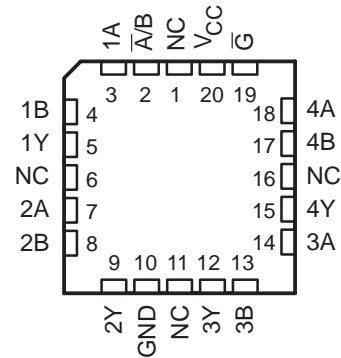
These data selectors/multiplexers contain inverters and drivers to supply full data selection to the four output gates. A separate strobe (\overline{G}) input is provided. A 4-bit word is selected from one of two sources and is routed to the four outputs. The 'ALS157A and SN74AS157 present true data. The 'ALS158 and SN74AS158 present inverted data to minimize propagation delay time.

The SN54ALS157A and SN54ALS158 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS157A, SN74ALS158, SN74AS157, and SN74AS158 are characterized for operation from 0°C to 70°C .

SN54ALS157A, SN54ALS158 . . . J PACKAGE
SN74ALS157A, SN74ALS158,
SN74AS157, SN74AS158 . . . D OR N PACKAGE
(TOP VIEW)



SN54ALS157A, SN54ALS158 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

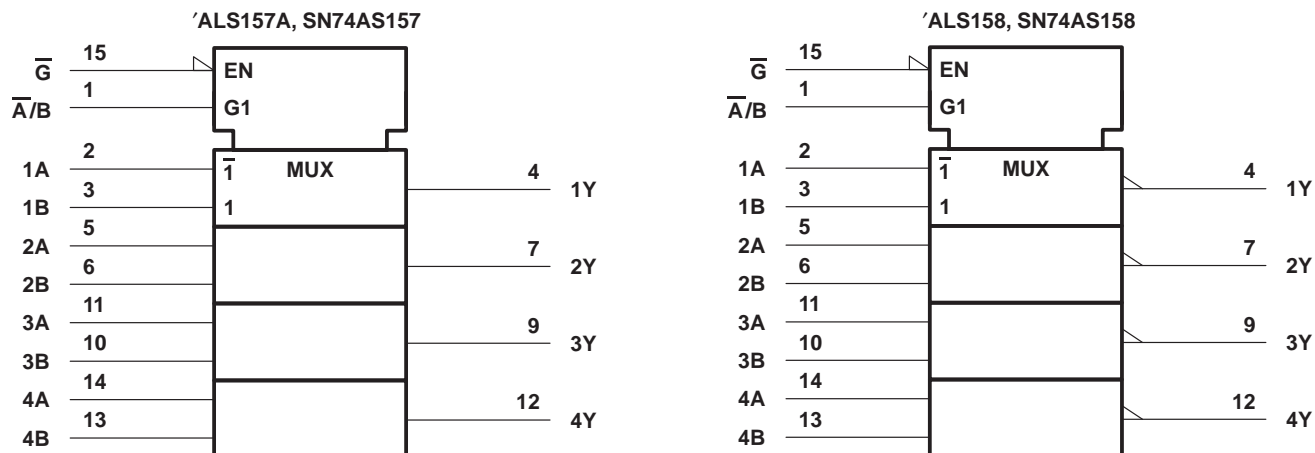
FUNCTION TABLE

INPUTS				OUTPUT Y	
\overline{G}	$\overline{A/B}$	DATA		'ALS157A SN74AS157	'ALS158 SN74AS158
		A	B		
H	X	X	X	L	H
L	L	L	X	L	H
L	L	H	X	H	L
L	H	X	L	L	H
L	H	X	H	H	L

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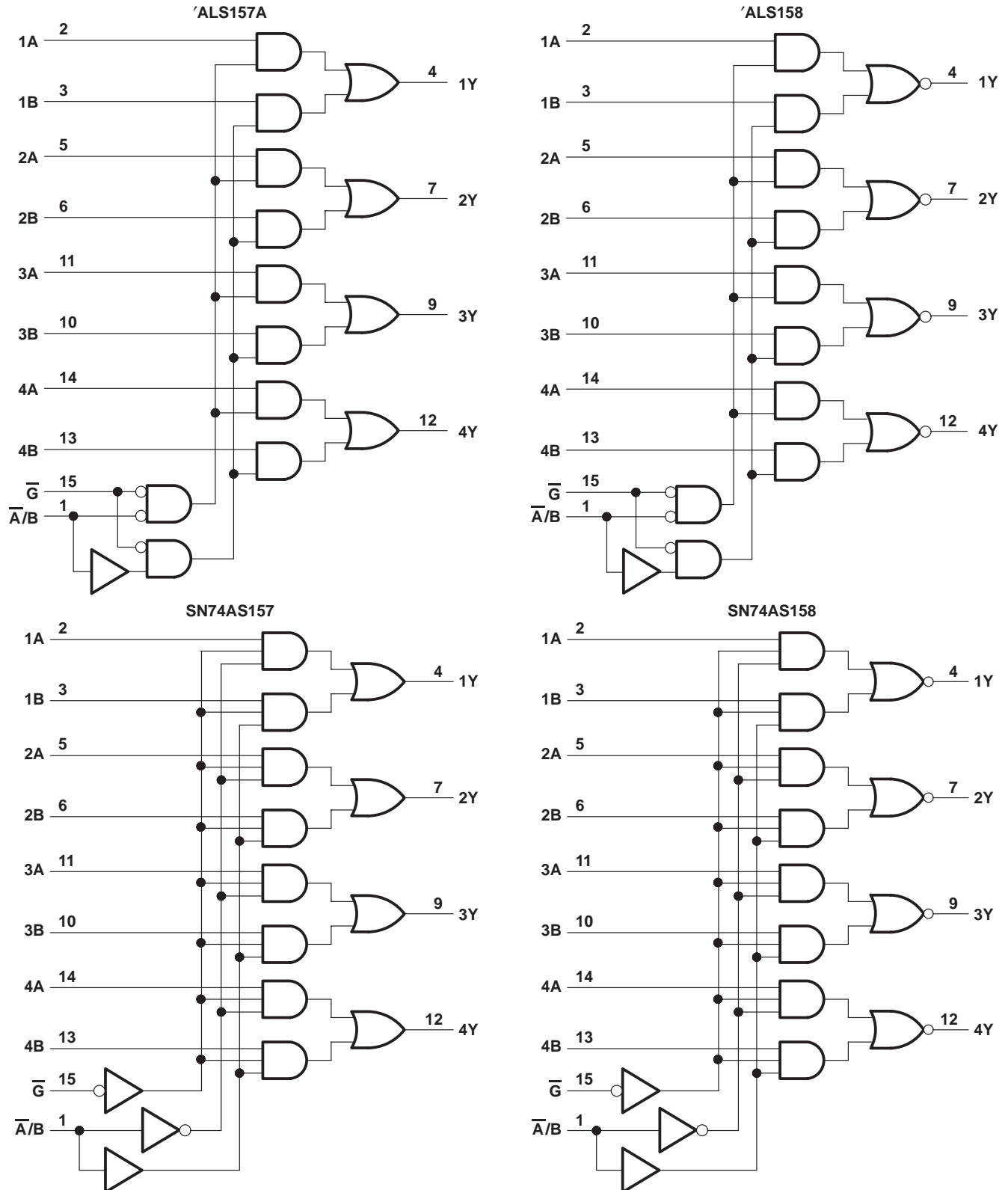
logic symbols†



† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
 Pin numbers shown are for the D, J, and N packages.

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SN74ALS157A, SN74ALS158, SN74AS157, SN74AS158
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logic diagrams (positive logic)



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

SN54ALS157A, SN54ALS158 SN74ALS157A, SN74ALS158, SN74AS157, SN74AS158 QUAD 1-OF-2 DATA SELECTORS/MULTIPLEXERS

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

Supply voltage, V_{CC}	7 V
Input voltage, V_I	7 V
Operating free-air temperature range, T_A : SN54ALS157A, SN54ALS158	–55°C to 125°C
SN74ALS157A, SN74ALS158	0°C to 70°C
Storage temperature range	–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.

recommended operating conditions

		SN54ALS157A SN54ALS158			SN74ALS157A SN74ALS158			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	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			–0.4			–0.4	mA
I_{OL}	Low-level output current			4			8	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	SN54ALS157A SN54ALS158		SN74ALS157A SN74ALS158		UNIT
			MIN	TYP‡	MAX	MIN	
V _{IK}		V _{CC} = 4.5 V, I _I = –18 mA	–1.2		–1.2		V
V _{OH}		V _{CC} = 4.5 V to 5.5 V, I _{OH} = –0.4 mA	V _{CC} – 2		V _{CC} – 2		V
V _{OL}		V _{CC} = 4.5 V	I _{OL} = 4 mA		0.25 0.4		V
			I _{OL} = 8 mA		0.35 0.5		
I _I		V _{CC} = 5.5 V, V _I = 7 V	0.1		0.1		mA
I _{IH}		V _{CC} = 5.5 V, V _I = 2.7 V	20		20		μA
I _{IL}		V _{CC} = 5.5 V, V _I = 0.4 V	–0.1		–0.1		mA
I _O §		V _{CC} = 5.5 V, V _O = 2.25 V	–20 –112		–30 –112		mA
I _{CC}	‡ALS157A	V _{CC} = 5.5 V, See Note 1	6 11		6 11		mA
	‡ALS158		5 10		5 10		

[‡] All typical values are at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$.

^{\S} The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

NOTE 1: I_{CC} is measured with 4.5 V applied to all inputs and all outputs open.



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SN54ALS157A, SN54ALS158
SN74ALS157A, SN74ALS158, SN74AS157, SN74AS158
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switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, C _L = 50 pF, R _L = 500 Ω, T _A = 25°C	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX†				UNIT
			'ALS157A	SN54ALS157A		SN74ALS157A		
			TYP	MIN	MAX	MIN	MAX	
t _{PLH}	A or B	Y	9	4	17	4	14	ns
t _{PHL}			6	2	15	2	12	
t _{PLH}	A̅/B	Y	15	7	28	7	24	ns
t _{PHL}			9	4	20	4	17	
t _{PLH}	G̅	Y	14	7	25	7	20	ns
t _{PHL}			10	4	18	4	13	

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

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5\text{ V}$, $C_L = 50\text{ pF}$, $R_L = 500\ \Omega$, $T_A = 25^\circ\text{C}$	$V_{CC} = 4.5\text{ V to } 5.5\text{ V}$, $C_L = 50\text{ pF}$, $R_L = 500\ \Omega$, $T_A = \text{MIN to MAX}^\dagger$				UNIT
			'ALS158	SN54ALS158		SN74ALS158		
			TYP	MIN	MAX	MIN	MAX	
t _{PLH}	A or B	Y	9	4	18	4	15	ns
t _{PHL}			5	2	12	2	8	
t _{PLH}	\overline{A}/B	Y	13	5	22	5	18	ns
t _{PHL}			13	5	22	5	18	
t _{PLH}	\overline{G}	Y	13	5	22	5	18	ns
t _{PHL}			13	5	22	5	18	

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

SN54ALS157A, SN54ALS158
SN74ALS157A, SN74ALS158, SN74AS157, SN74AS158
QUAD 1-OF-2 DATA SELECTORS/MULTIPLEXERS

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

Supply voltage, V_{CC}	7 V
Input voltage, V_I	7 V
Operating free-air temperature range, T_A : SN74AS157, SN74AS158	0°C to 70°C
Storage temperature range	–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.

recommended operating conditions

		SN74AS157 SN74AS158			UNIT
		MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			V
V_{IL}	Low-level input voltage			0.8	V
I_{OH}	High-level output current			–2	mA
I_{OL}	Low-level output current			20	mA
T_A	Operating free-air temperature	0		70	°C

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

PARAMETER		TEST CONDITIONS	SN74AS157 SN74AS158			UNIT
			MIN	TYP‡	MAX	
V_{IK}		$V_{CC} = 4.5\text{ V}$, $I_I = -18\text{ mA}$			–1.2	V
V_{OH}		$V_{CC} = 4.5\text{ V to } 5.5\text{ V}$, $I_{OH} = -2\text{ mA}$	$V_{CC} - 2$			V
V_{OL}		$V_{CC} = 4.5\text{ V}$, $I_{OL} = 20\text{ mA}$		0.35	0.5	V
I_I	\bar{A}/B	$V_{CC} = 5.5\text{ V}$, $V_I = 7\text{ V}$			0.2	mA
	A, B, or \bar{G}				0.1	
I_{IH}	\bar{A}/B	$V_{CC} = 5.5\text{ V}$, $V_I = 2.7\text{ V}$			40	μA
	A, B, or \bar{G}				20	
I_{IL}	\bar{A}/B	$V_{CC} = 5.5\text{ V}$, $V_I = 0.4\text{ V}$			–1	mA
	A, B, or \bar{G}				–0.5	
$I_{O\text{§}}$		$V_{CC} = 5.5\text{ V}$, $V_O = 2.25\text{ V}$	–30		–112	mA
I_{CC}	SN74AS157	$V_{CC} = 5.5\text{ V}$		17.5	28	mA
	SN74AS158			15.6	22.5	

‡ All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

§ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .



switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX†		UNIT
			SN74AS157		
			MIN	MAX	
t _{PLH}	A or B	Y	1	6	ns
t _{PHL}			1	5.5	
t _{PLH}	\bar{A}/B	Y	2	11	ns
t _{PHL}			2	10	
t _{PLH}	\bar{G}	Y	2	10.5	ns
t _{PHL}			2	7.5	

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

switching characteristics (see Figure 1)

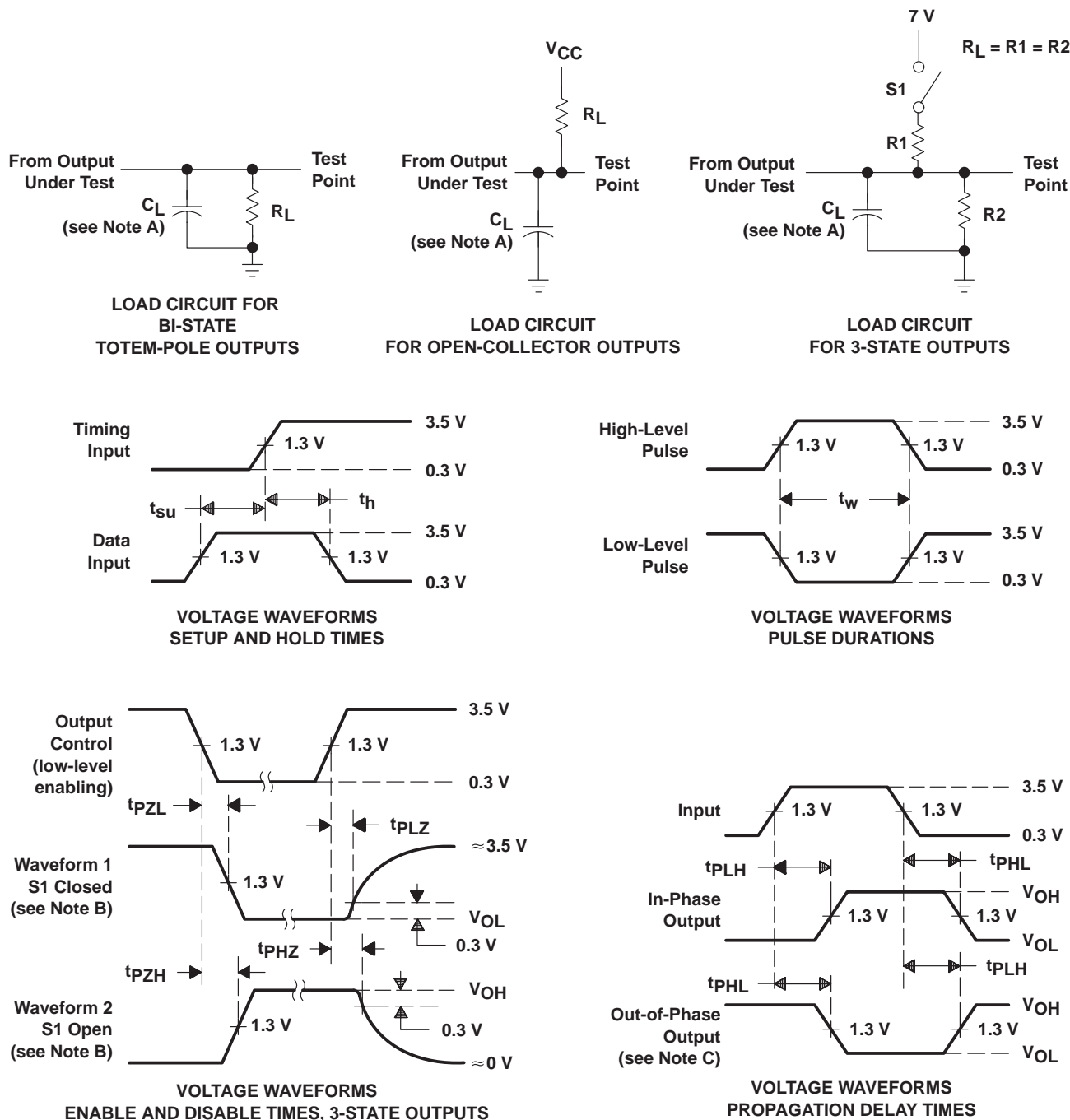
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX†		UNIT
			SN74AS158		
			MIN	MAX	
t _{PLH}	A or B	Y	1	5	ns
t _{PHL}			1	4.5	
t _{PLH}	\overline{A}/B	Y	2	9.5	ns
t _{PHL}			2	10.5	
t _{PLH}	\overline{G}	Y	2	6.5	ns
t _{PHL}			2	10	

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

SN54ALS157A, SN54ALS158
SN74ALS157A, SN74ALS158, SN74AS157, SN74AS158
QUAD 1-OF-2 DATA SELECTORS/MULTIPLEXERS

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PARAMETER MEASUREMENT INFORMATION
SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



- 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. When measuring propagation delay items of 3-state outputs, switch S1 is open.
D. All input pulses have the following characteristics: $PRR \leq 1$ MHz, $t_r = t_f = 2$ ns, duty cycle = 50%.
E. The outputs are measured one at a time with one transition per measurement.

Figure 1. 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⁾
5962-86869012A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
5962-8686901EA	ACTIVE	CDIP	J	16	1	TBD	Call TI	Level-NC-NC-NC
5962-8686901FA	ACTIVE	CFP	W	16	1	TBD	Call TI	Level-NC-NC-NC
5962-88625012A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
5962-8862501EA	ACTIVE	CDIP	J	16	1	TBD	Call TI	Level-NC-NC-NC
5962-8862501FA	ACTIVE	CFP	W	16	1	TBD	Call TI	Level-NC-NC-NC
SN54ALS157AJ	ACTIVE	CDIP	J	16	1	TBD	Call TI	Level-NC-NC-NC
SN54ALS158J	ACTIVE	CDIP	J	16	1	TBD	Call TI	Level-NC-NC-NC
SN74ALS157AD	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS157ADE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS157ADR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS157ADRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS157AN	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74ALS157AN3	OBSOLETE	PDIP	N	16		TBD	Call TI	Call TI
SN74ALS157ANE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74ALS157ANSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS157ANSRE4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS158D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS158DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS158DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS158DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS158N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74ALS158NE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74ALS158NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS158NSRE4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS157D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS157DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS157DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS157DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
no Sb/Br)								
SN74AS157N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74AS157N3	OBSOLETE	PDIP	N	16		TBD	Call TI	Call TI
SN74AS157NE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74AS157NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS157NSRE4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS158D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS158DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS158DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS158DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS158N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74AS158NE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74AS158NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS158NSRE4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SNJ54ALS157AFK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54ALS157AJ	ACTIVE	CDIP	J	16	1	TBD	Call TI	Level-NC-NC-NC
SNJ54ALS157AW	ACTIVE	CFP	W	16	1	TBD	Call TI	Level-NC-NC-NC
SNJ54ALS158FK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54ALS158J	ACTIVE	CDIP	J	16	1	TBD	Call TI	Level-NC-NC-NC
SNJ54ALS158W	ACTIVE	CFP	W	16	1	TBD	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 - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

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.

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)

⁽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



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.

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

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD



4040049/E 12/2002

- 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-G16)

PLASTIC SMALL-OUTLINE PACKAGE



4040047-4/F 07/2004

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

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.

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