SDAS205A - APRIL 1982 - REVISED DECEMBER 1994

8-Line to 1-Line Multiplexers Can Perform as:

Boolean Function Generators Parallel-to-Serial Converters Data Source Selectors

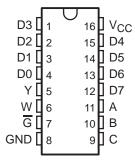
- Input Clamping Diodes Simplify System Design
- Package Options Include Plastic Small-Outline (D) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

description

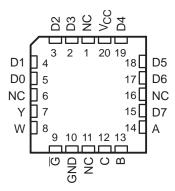
These data selectors/multiplexers provide full binary decoding to select one-of-eight data sources. The strobe (\overline{G}) input must be at a low logic level to enable the inputs. A high level at the strobe terminal forces the W output high and the Y output low.

The SN54ALS151 is characterized for operation over the full military temperature range of -55° C to 125°C. The SN74ALS151 and SN74AS151 are characterized for operation from 0°C to 70°C.

SN54ALS151 . . . J PACKAGE SN74ALS151, SN74AS151 . . . D OR N PACKAGE (TOP VIEW)



SN54ALS151 . . . FK PACKAGE (TOP VIEW)



NC - No internal connection

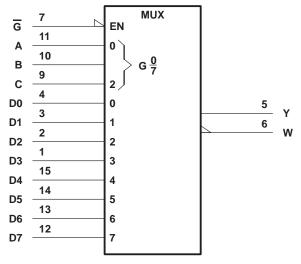
FUNCTION TABLE

	INI	PUTS		OUTPUTS			
	SELECT	1	STROBE				
С	В	Α	G	Υ	W		
Х	Х	Χ	Н	L	Н		
L	L	L	L	D0	D0		
L	L	Н	L	D1	D1		
L	Н	L	L	D2	D2		
L	Н	Н	L	D3	D3		
Н	L	L	L	D4	D4		
Н	L	Н	L	D5	D5		
Н	Н	L	L	D6	D6		
Н	Н	Н	L	D7	D7		

H = high level, L = low level, X = irrelevant D0, D1, ... D7 = the level of the respective D input

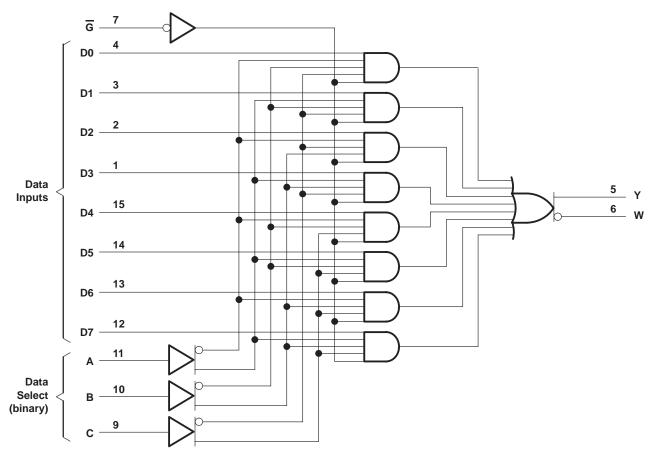
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logic symbol†



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

logic diagram (positive logic)



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



SN54ALS151, SN74ALS151, SN74AS151 1-OF-8 DATA SELECTORS/MULTIPLEXERS

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

Supply voltage, V _{CC}	
Input voltage, V _I	
Operating free-air temperature range, T _A : SN54ALS151	–55°C to 125°C
SN74ALS151	0°C to 70°C
Storage temperature range	–65°C to 150°C

recommended operating conditions

		SN	54ALS1	51	SN74ALS151			LINUT
		MIN	NOM	MAX	MIN	NOM	MAX	UNIT
Vcc	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
VIH	High-level input voltage	2			2			V
V _{IL}	Low-level input voltage			0.7			8.0	V
IOH	High-level output current			-1			-2.6	mA
loL	Low-level output current			12			24	mA
TA	Operating free-air temperature	-55		125	0		70	°C

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

		TEST SOURITIONS			51	SN	51		
PARAMETER	TEST C	ONDITIONS	MIN	TYP‡	MAX	MIN	TYP‡	MAX	UNIT
VIK	$V_{CC} = 4.5 \text{ V},$	$I_{I} = -18 \text{ mA}$			-1.5			-1.5	V
	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V},$	$I_{OH} = -0.4 \text{ mA}$	V _{CC} -2)		V _{CC} -2)		
VOH	V 45V	$I_{OH} = -1 \text{ mA}$	2.4	3.3					V
	$V_{CC} = 4.5 \text{ V}$	$I_{OH} = -2.6 \text{ mA}$				2.4	3.2		
V	V _{CC} = 4.5 V	I _{OL} = 12 mA		0.25	0.4		0.25	0.4	V
V _{OL}		I _{OL} = 24 mA					0.35	0.5	V
lį	$V_{CC} = 5.5 V,$	V _I = 7 V			0.1			0.1	mA
lіН	V _{CC} = 5.5 V,	V _I = 2.7 V			20			20	μΑ
I _{IL}	$V_{CC} = 5.5 V,$	V _I = 0.4 V			-0.1			-0.1	mA
ΙΟ [§]	$V_{CC} = 5.5 \text{ V},$	V _O = 2.25 V	-20		-112	-30		-112	mA
Icc	$V_{CC} = 5.5 \text{ V},$	Inputs at 4.5 V		7.5	12		7.5	12	mA

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



[†] 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.

[§] The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, IOS.

SN54ALS151, SN74ALS151, SN74AS151 1-OF-8 DATA SELECTORS/MULTIPLEXERS

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switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _C C _L R _L T _A	UNIT			
	(2.7)	(331131)	SN54A	LS151	SN74A	LS151	
			MIN	MAX	MIN	MAX	
^t PLH	A B 01 C	Υ	4	21	4	18	20
t _{PHL}	A, B, or C	Ť	7	35	8	24	ns
^t PLH	A D or C	W	5	36	7	24	ns
^t PHL	A, B, or C	VV	7	26	7	23	
^t PLH	A D	Υ	3	14	3	10	ns
^t PHL	Any D	Y	5	21	5	15	
t _{PLH}	A D	W	3	23	3	15	20
t _{PHL}	Any D	VV	4	20	4	15	ns
t _{PLH}	ΘI	Υ	4	21	4	18	
^t PHL	G	ĭ	4	25	4	19	ns
^t PLH	OI.	W	5	27	5	19	ne
^t PHL	9	v V	5	26	5	23	ns

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

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 : SN74AS151	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

		SN74AS151			
		MIN	NOM	MAX	UNIT
Vсс	Supply voltage	4.5	5	5.5	V
VIH	High-level input voltage	2			V
VIL	Low-level input voltage			0.8	V
IOH	High-level output current			-15	mA
lOL	Low-level output current			48	mA
TA	Operating free-air temperature	0		70	°C

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

				SN	74AS15	51		
	PARAMETER	TEST CONI	DITIONS	MIN	TYP [†]	MAX	UNIT	
۷ıĸ		V _{CC} = 4.5 V,	I _I = –18 mA			-1.2	V	
.,		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V},$	$I_{OH} = -2 \text{ mA}$	V _{CC} -2			.,	
VOH		$V_{CC} = 4.5 V,$	$I_{OH} = -15 \text{ mA}$	2.4	3.2		V	
VOL		$V_{CC} = 4.5 V,$	I _{OL} = 48 mA		0.35	0.5	V	
	A, B, or C	V 55V				0.2		
Ч	All others	$V_{CC} = 5.5 V$,	V _I = 7 V			0.1	mA	
	A, B, or C					40		
ΙΗ	All others	$V_{CC} = 5.5 V$,	$V_{ } = 2.7 \text{ V}$			20	μΑ	
	A, B, or C					-1		
ΊL	All others	$V_{CC} = 5.5 \text{ V},$	$V_I = 0.4 V$			-0.5	mA	
1 _O ‡		V _{CC} = 5.5 V,	V _O = 2.25 V	-30		-112	mA	
Icc		V _{CC} = 5.5 V			18.6	30	mA	

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

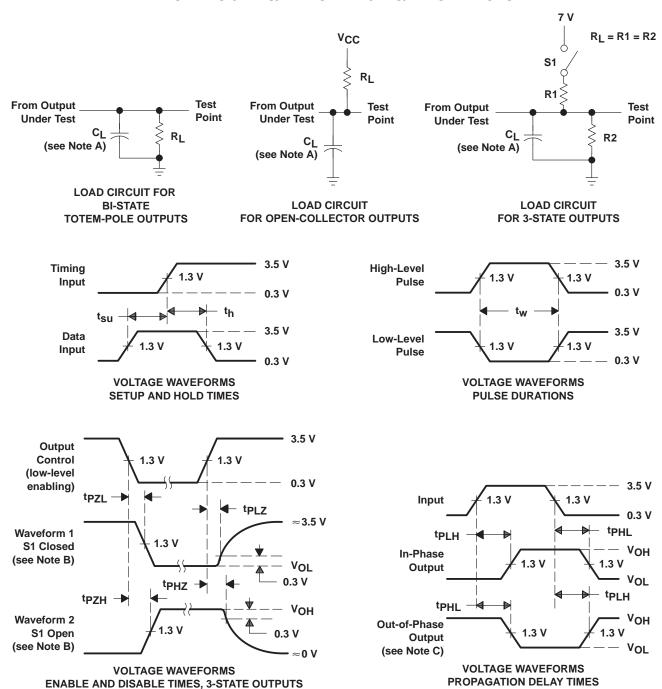
switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 C _L = 50 p R _L = 500 T _A = MIN	UNIT	
			MIN	MAX	
^t PLH	4.5.	.,	4.5	14.5	
^t PHL	A, B, or C	Y	4.5	15	ns
^t PLH	A B 22 C	14/	4	12	ns
^t PHL	A, B, or C	W	4	12	
^t PLH	A D	Υ	3	10.5	ns
^t PHL	Any D	Ť	3	11	
^t PLH	Anvi D	10/	2	6.5	
^t PHL	Any D	W	1	4.5	ns
^t PLH	G	Υ	4.5	14	
^t PHL	G	Ť	3	11	ns
^t PLH		W	1.5	6	ne
^t PHL	<u> </u>	VV	3	10	ns

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

[‡] The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, los.

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, $t_f = t_f = 2$ 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







17-Dec-2015

PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
8414101EA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8414101EA SNJ54ALS151J	Samples
SN74ALS151D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS151	Samples
SN74ALS151DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS151	Samples
SN74ALS151DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS151	Samples
SN74ALS151N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74ALS151N	Samples
SN74ALS151N3	OBSOLETE	PDIP	N	16		TBD	Call TI	Call TI	0 to 70		
SN74ALS151NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS151	Samples
SN74AS151D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	AS151	Samples
SN74AS151N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74AS151N	Samples
SN74AS151NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	74AS151	Samples
SNJ54ALS151J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8414101EA SNJ54ALS151J	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.

⁽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.





17-Dec-2015

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.
- (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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OTHER QUALIFIED VERSIONS OF SN54ALS151, SN74ALS151:

Catalog: SN74ALS151

Military: SN54ALS151

NOTE: Qualified Version Definitions:

- Catalog TI's standard catalog product
- Military QML certified for Military and Defense Applications

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

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
SN74ALS151DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74ALS151NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74AS151NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1

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*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CN74ALC4E4DD	<u> </u>	D		2500	<u> </u>	245.0	<u> </u>
SN74ALS151DR	SOIC	U	16	2500	333.2	345.9	28.6
SN74ALS151NSR	SO	NS	16	2000	367.0	367.0	38.0
SN74AS151NSR	SO	NS	16	2000	367.0	367.0	38.0

14 LEADS SHOWN



- 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.

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.



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.



MECHANICAL DATA

NS (R-PDSO-G**)

14-PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



- 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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