

SN74AS131A 3-LINE TO 8-LINE DECODER/DEMULTIPLEXER WITH ADDRESS REGISTERS

SDAS060C – APRIL 1982 – REVISED DECEMBER 1994

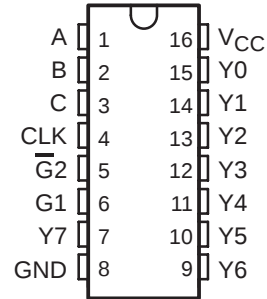
- Combines Decoder and 3-Bit Address Register
- Incorporates Two Enable Inputs to Simplify Cascading
- Package Options Include Plastic Small-Outline (D) Packages and Standard Plastic (N) 300-mil DIPs

description

The SN74AS131A is a 3-line to 8-line decoder/demultiplexer with registers on the three address inputs. When the clock (CLK) input goes from low to high, the device acts as a decoder/demultiplexer and the address present at the select (A, B, and C) inputs is stored in the registers. Further address changes are ignored until the next rising transition of CLK. The output-enable (G1, G2) inputs control the state of the outputs independently of the select or CLK inputs. All of the outputs are high unless G1 is high and G2 is low. This device is ideally suited for implementing glitch-free decoders in strobed (stored-address) applications in bus-oriented systems.

The SN74AS131A is characterized for operation from 0°C to 70°C.

D OR N PACKAGE
(TOP VIEW)



FUNCTION TABLE

INPUTS						OUTPUTS							
CLK	ENABLE		SELECT										
	G1	G2	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	X	H	X	X	X	H	H	H	H	H	H	H	H
X	L	X	X	X	X	H	H	H	H	H	H	H	H
↑	H	L	L	L	L	L	H	H	H	H	H	H	H
↑	H	L	L	L	H	H	L	H	H	H	H	H	H
↑	H	L	L	H	L	H	H	L	H	H	H	H	H
↑	H	L	L	H	H	H	H	H	L	H	H	H	H
↑	H	L	H	L	L	H	H	H	H	L	H	H	H
↑	H	L	H	L	H	H	H	H	H	L	H	H	H
↑	H	L	H	H	L	H	H	H	H	H	L	H	H
↑	H	L	H	H	H	H	H	H	H	H	H	L	H
L or H	H	L	X	X	X	Outputs corresponding to stored address = L; all others = H.							

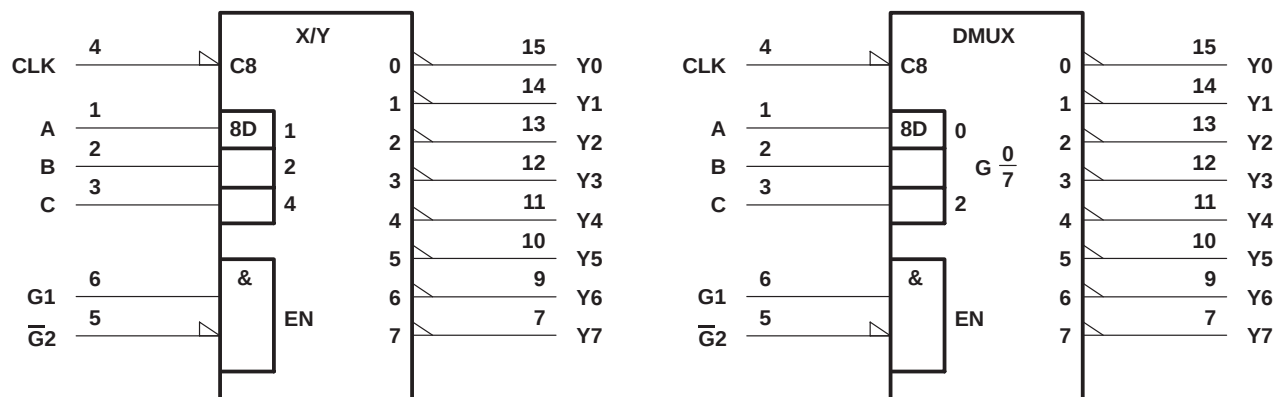
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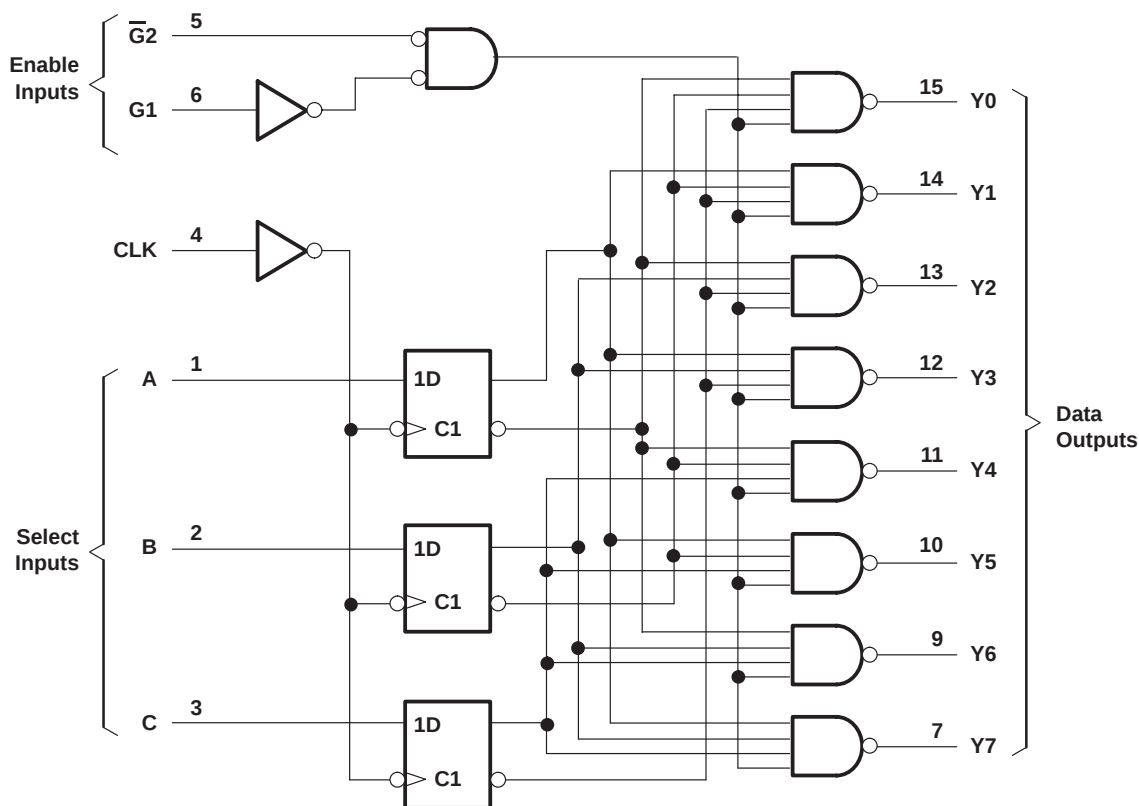
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logic symbols (alternatives)[†]



[†] These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



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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	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

	MIN	NOM	MAX	UNIT
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
f_{clock} Clock frequency	0		100	MHz
t_w Pulse duration	CLK high	5		ns
	CLK low	5		
t_{su} Setup time, A, B, and C before CLK $\uparrow$	3.5			ns
t_h Hold time, A, B, and C after CLK $\uparrow$	0			ns
T_A Operating free-air temperature	0		70	°C

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

PARAMETER	TEST CONDITIONS	MIN	TYP [‡]	MAX	UNIT
V_{IK}	$V_{CC} = 4.5$ V, $I_I = -18$ mA			–1.2	V
V_{OH}	$V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -2$ mA	$V_{CC} - 2$			V
V_{OL}	$V_{CC} = 4.5$ V, $I_{OL} = 20$ mA		0.35	0.5	V
I_I	$V_{CC} = 5.5$ V, $V_I = 7$ V			0.1	mA
I_{IH}	$V_{CC} = 5.5$ V, $V_I = 2.7$ V			20	μ A
I_{IL}	$V_{CC} = 5.5$ V, $V_I = 0.4$ V			–0.5	mA
$I_O^{\S}$	$V_{CC} = 5.5$ V, $V_O = 2.25$ V	–30		–112	mA
I_{CCH}	$V_{CC} = 5.5$ V		15	29	mA
I_{CCL}	$V_{CC} = 5.5$ V		16	30	mA

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



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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
			MIN	MAX	
f _{max}			100		MHz
t _{PLH}	CLK	Y	2	14.5	ns
t _{PHL}			2	9.5	
t _{PLH}	G1	Y	2	10	ns
t _{PHL}			2	9	
t _{PLH}	$\overline{G2}$	Y	2	7	ns
t _{PHL}			2	8.5	

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

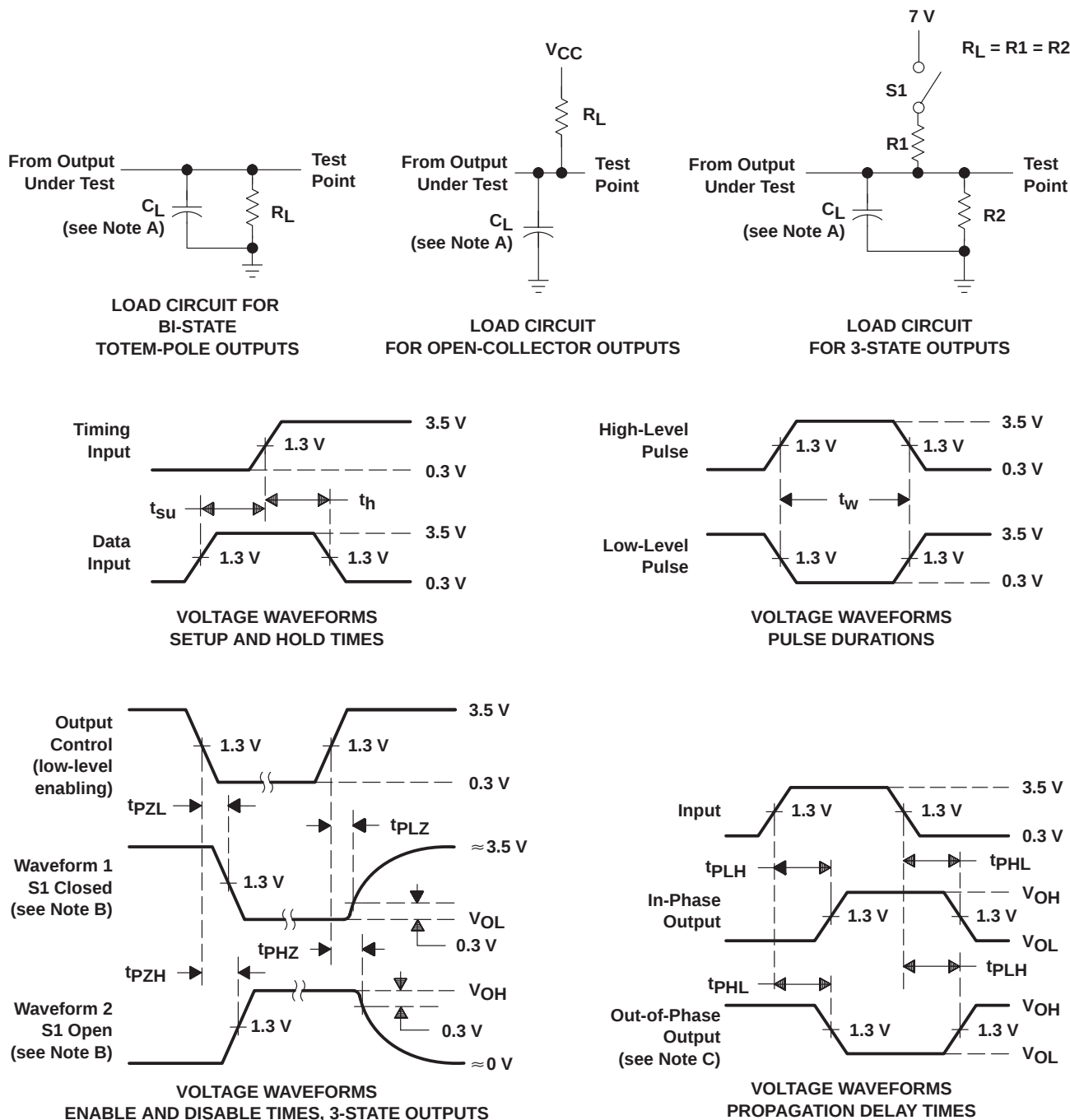


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PARAMETER MEASUREMENT INFORMATION SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



- 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⁾
SN74AS131AD	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI
SN74AS131ADR	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI
SN74AS131AN	OBSOLETE	PDIP	N	16		TBD	Call TI	Call TI

⁽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), 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.

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)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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