

SN74AS850A, SN74AS851B 1 OF 16 DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

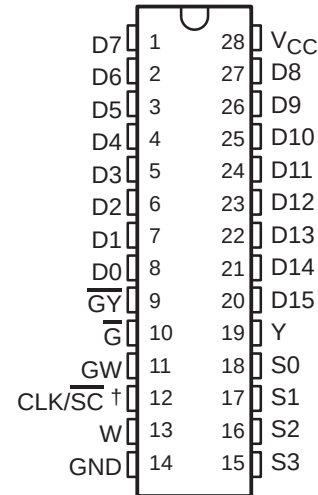
SDAS154A – D2822, DECEMBER 1983 – REVISED JANUARY 1990

- 4-Line to 1-Line Data Selectors/Multiplexers That Can Select 1 of 16 Data Inputs Typical Applications:

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

- Cascadable to n-Bits
- 3-State Bus Driver Outputs
- 'AS850A Offers Clocked Selects; 'AS851B Offers Enable-Controlled Selects
- Has a Master Output Control ($\overline{G}$) for Cascading and individual Output Controls ($\overline{GY}$, $\overline{GW}$) for Each Output
- Package Option Includes 600-mil Standard Plastic DIPs
- Dependable Texas Instruments Quality and Reliability

SN74AS850A, SN74AS851B . . . N PACKAGE
(TOP VIEW)



† CLK for 'AS850A or $\overline{SC}$ for 'AS851B

description

These four-line to one-line data selectors/multiplexers provide full binary decoding to select one-of-sixteen data sources with complementary Y and W outputs. The 'AS850A has a clock-controlled select register allowing for a symmetrical presentation of the select inputs to the decoder while the 'AS851B has an enable-controlled select register allowing the user to select and hold one particular data line.

A buffered group of output controls ($\overline{G}$, $\overline{GY}$, $\overline{GW}$) can be used to place the two outputs in either a normal logic (high or low logic level) or a high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance third state and increased drive provide the capability to drive the bus lines in a bus-organized system without the need for interface or pullup components.

The output controls do not affect the internal operations of the data selector/multiplexer. New data can be setup while the outputs are in the high-impedance state.

The SN74AS850A and SN74AS851B are characterized for operation from 0°C to 70°C.

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FUNCTION TABLE

INPUT SELECTION TABLE

SELECT INPUTS				'AS850A	'AS851B	INPUT SELECTED
S3	S2	S1	S0	CLK	SC	
L	L	L	L	↑	L	D0
L	L	L	H	↑	L	D1
L	L	H	L	↑	L	D2
L	L	H	H	↑	L	D3
L	H	L	L	↑	L	D4
L	H	L	H	↑	L	D5
L	H	H	L	↑	L	D6
L	H	H	H	↑	L	D7
H	L	L	L	↑	L	D8
H	L	L	H	↑	L	D9
H	L	H	L	↑	L	D10
H	L	H	H	↑	L	D11
H	H	L	L	↑	L	D12
H	H	L	H	↑	L	D13
H	H	H	L	↑	L	D14
H	H	H	H	↑	L	D15
X	X	X	X	H or L	H	Dn

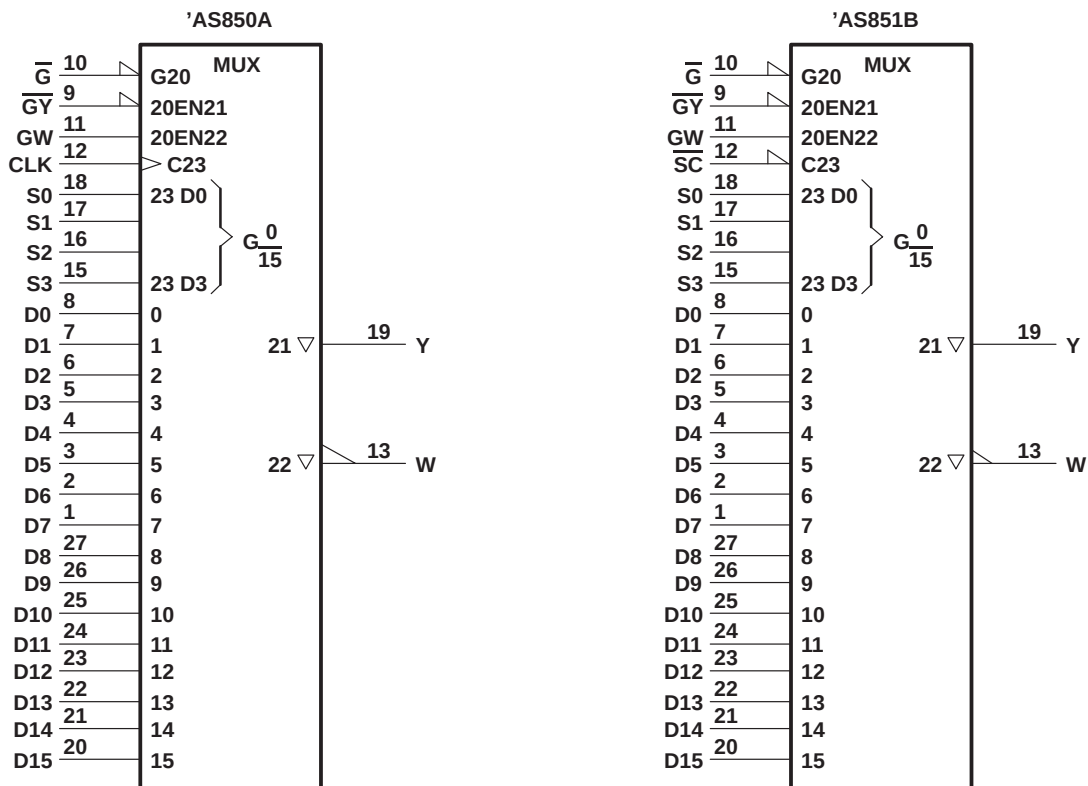
D = the input selected before the most-recent low-to-high transition of CLK or SC.

OUTPUT FUNCTION TABLE

$\overline{G}$	$\overline{GY}$	GW	OUTPUTS	
			Y	W
H	X	X	Z	Z
L	H	L	Z	Z
L	L	L	D	Z
L	H	H	Z	D
L	L	H	D	D

D = level of selected input D0 – D15

logic symbols†

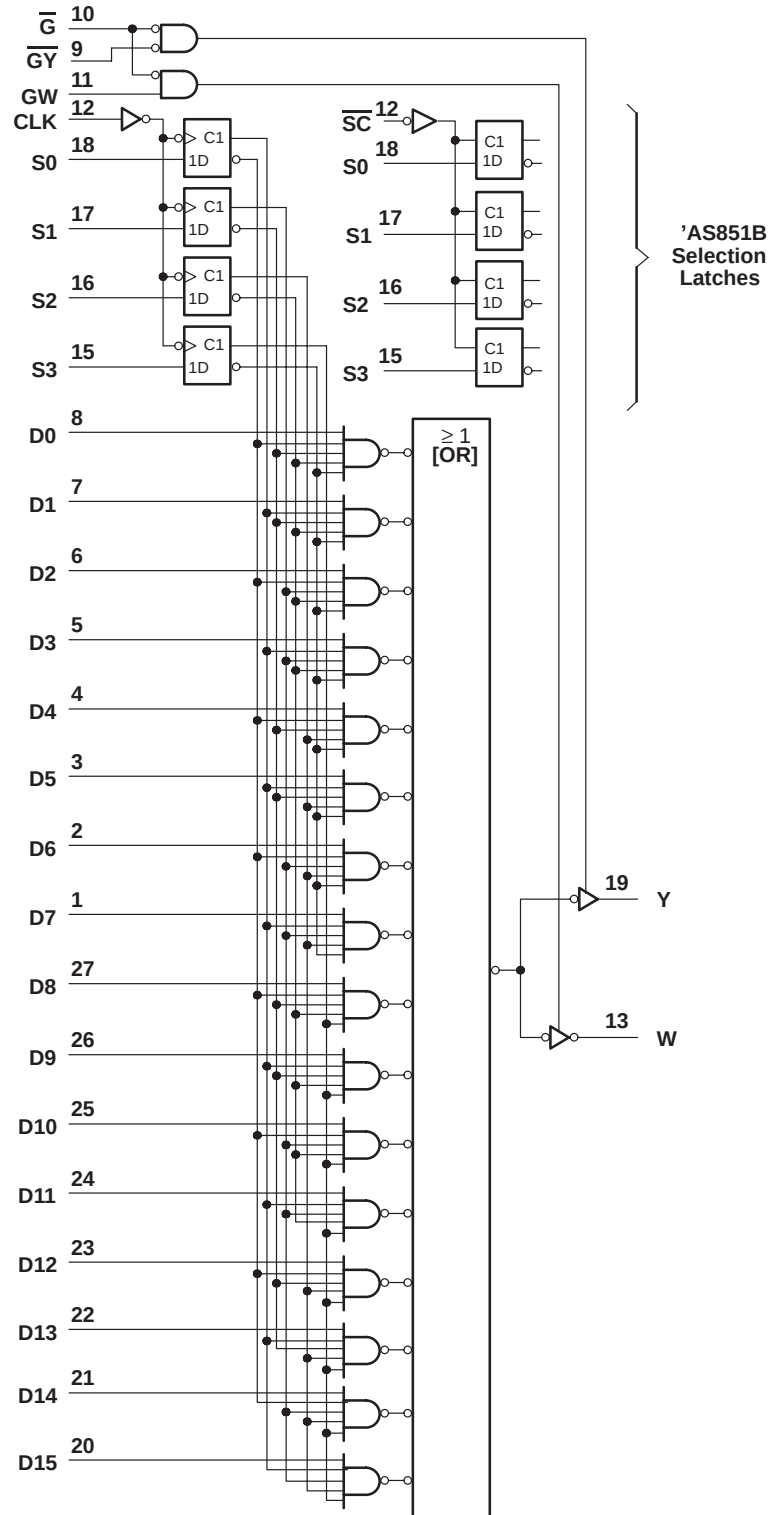


† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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'AS850A logic diagram (positive logic) (see inset for 'AS851B)



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

Supply voltage, V_{CC}	7 V
Input voltage	7 V
Operating free-air temperature range:	0°C to 70°C
Storage temperature range	–65°C to 150°C

SN74AS850A 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				−15	mA
I _{OL}	Low-level output current				48	mA
f _{clock}	Clock frequency		0		60	MHz
t _w	Pulse duration	CLK high	8			ns
		CLK low	8			
t _{su}	Setup time, select inputs before CLK↑		10			ns
t _h	Hold time, select inputs after CLK↑		0			ns
T _A	Operating free-air temperature		0		70	°C

SN74AS850A 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, $I_{OH} = -2$ mA	2.5			V
	$V_{CC} = 4.5$ V, $I_{OH} = -15$ mA	2	3.3		
V_{OL}	$V_{CC} = 4.5$ V, $I_{OL} = 48$ mA	0.35	0.5		V
I_{OZH}	$V_{CC} = 5.5$ V, $V_O = 2.7$ V			50	μA
I_{OZL}	$V_{CC} = 4.5$ V, $V_O = 0.4$ V			–50	μA
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	μA
I_{IL}	D, G			–1	mA
	All others			–0.5	
$I_O^{\ddagger}$	$V_{CC} = 5.5$ V, $V_O = 2.25$ V	–30		–112	mA
I_{CC}	$V_{CC} = 5.5$ V, Outputs active		50	81	mA
	$V_{CC} = 5.5$ V, Outputs disabled		52	85	

[†] All typical values are at $V_{CC} = 5$ 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 current, I_{OS} .

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switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T _A = 0°C to 70°C		UNIT
			MIN	MAX	
f _{max}			60		MHz
t _{PLH}	Any D	Y	3	10.5	ns
t _{PHL}			3	11	
t _{PLH}	Any D	W	3	8.5	ns
t _{PHL}			1	8.5	
t _{PLH}	CLK	Y	3	14.5	ns
t _{PHL}			3	17.5	
t _{PLH}	CLK	W	3	15	ns
t _{PHL}			3.5	13	
t _{PZH}	$\overline{G}$	Y	2	9.5	ns
t _{PZL}			3	11	
t _{PHZ}	$\overline{G}$	Y	1	6	ns
t _{PLZ}			2	8	
t _{PZH}	$\overline{G}$	W	2	9	ns
t _{PZL}			3	10	
t _{PHZ}	$\overline{G}$	W	1	6	ns
t _{PLZ}			2	9	
t _{PZH}	$\overline{GY}$	Y	2	9	ns
t _{PZL}			3	11.5	
t _{PHZ}	$\overline{GY}$	Y	1	6	ns
t _{PLZ}			2	9	
t _{PZH}	GW	W	2	10	ns
t _{PZL}			3	12	
t _{PHZ}	GW	W	1	6	ns
t _{PLZ}			2	11	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of *ALS/AS Logic Data Book*, 1986.

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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			–15	mA
I_{OL} Low-level output current			48	mA
t_w Pulse duration, SC low	10			ns
t_{su} Setup time, select inputs before $SC\uparrow$	4.5			ns
t_h Hold time, select inputs after $SC\uparrow$	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}	$V_{CC} = 4.5\text{ V}$, $I_I = -18\text{ mA}$			–1.2	V
V_{OH}	$V_{CC} = 4.5\text{ V}$, $I_{OH} = -2\text{ mA}$	2.5			V
	$V_{CC} = 4.5\text{ V}$, $I_{OH} = -15\text{ mA}$	2	3.3		
V_{OL}	$V_{CC} = 4.5\text{ V}$, $I_{OL} = 48\text{ mA}$	0.35	0.5		V
I_{OZH}	$V_{CC} = 5.5\text{ V}$, $V_O = 2.7\text{ V}$			50	μA
I_{OZL}	$V_{CC} = 5.5\text{ V}$, $V_O = 0.4\text{ V}$			–50	μA
I_I	$V_{CC} = 5.5\text{ V}$, $V_I = 7\text{ V}$			0.1	mA
I_{IH}	$V_{CC} = 5.5\text{ V}$, $V_I = 2.7\text{ V}$			20	μA
I_{IL}	D, G			–1	mA
	All others			–0.5	
$I_O^{\ddagger}$	$V_{CC} = 5.5\text{ V}$, $V_O = 2.25\text{ V}$	–30		–112	mA
I_{CC}	$V_{CC} = 5.5\text{ V}$				mA
	Outputs active		50	81	
	Outputs disabled		52	85	

[†] 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 current, I_{OS} .

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switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T _A = MIN to MAX		UNIT
			MIN	MAX	
t _{PLH}	Any D	Y	3	10.5	ns
t _{PHL}			3	11	
t _{PLH}	Any D	W	3	8	ns
t _{PHL}			1	8	
t _{PLH}	S0, S1, S2, S3	Y	3	18	ns
t _{PHL}			3	19	
t _{PLH}	S0, S1, S2, S3	W	3	16	ns
t _{PHL}			3	15	
t _{PLH}	$\overline{\text{SC}}$	Y	3	18	ns
t _{PHL}			3	20	
t _{PLH}	$\overline{\text{SC}}$	W	3	16	ns
t _{PHL}			3	15	
t _{PZH}	$\overline{\text{G}}$	Y	2	8	ns
t _{PZL}			3	11	
t _{PHZ}	$\overline{\text{G}}$	Y	1	6	ns
t _{PLZ}			2	8	
t _{PZH}	$\overline{\text{G}}$	W	2	8	ns
t _{PZL}			3	10	
t _{PHZ}	$\overline{\text{G}}$	W	1	6	ns
t _{PLZ}			2	8	
t _{PZH}	$\overline{\text{GY}}$	Y	2	8	ns
t _{PZL}			3	11	
t _{PHZ}	$\overline{\text{GY}}$	Y	1	6	ns
t _{PLZ}			2	8	
t _{PZH}	GW	W	2	10	ns
t _{PZL}			3	12	
t _{PHZ}	GW	W	1	6.5	ns
t _{PLZ}			2	11	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of *ALS/AS Logic Data Book*, 1986.

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TYPICAL APPLICATION DATA

The 'AS850A or 'AS851B can be used as a 1-of-16 Boolean function generator. Figure 1 shows the 'AS850A in one example.

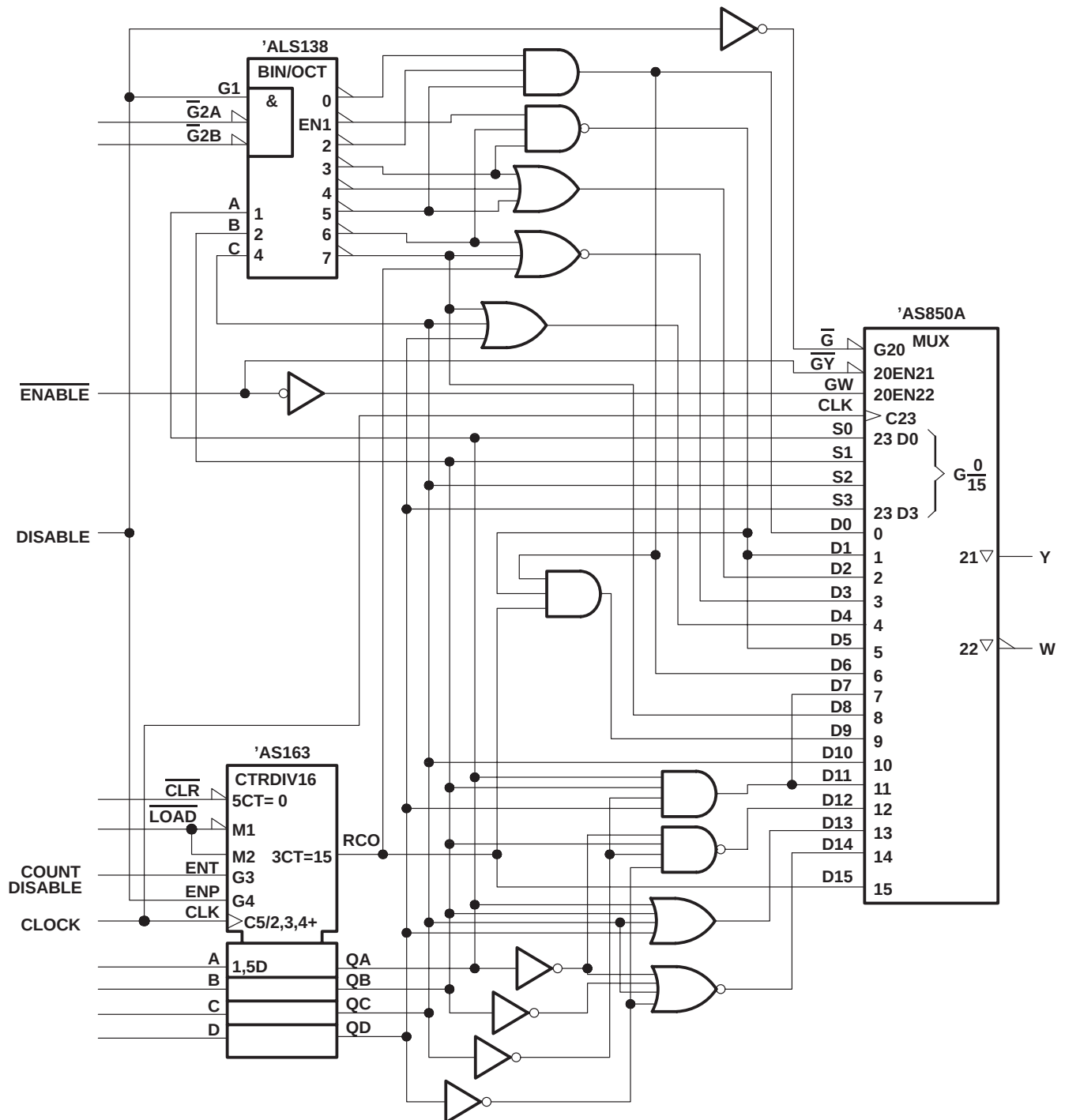


Figure 1. 1 - of - 16 Boolean Function Generator

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TYPICAL APPLICATION DATA

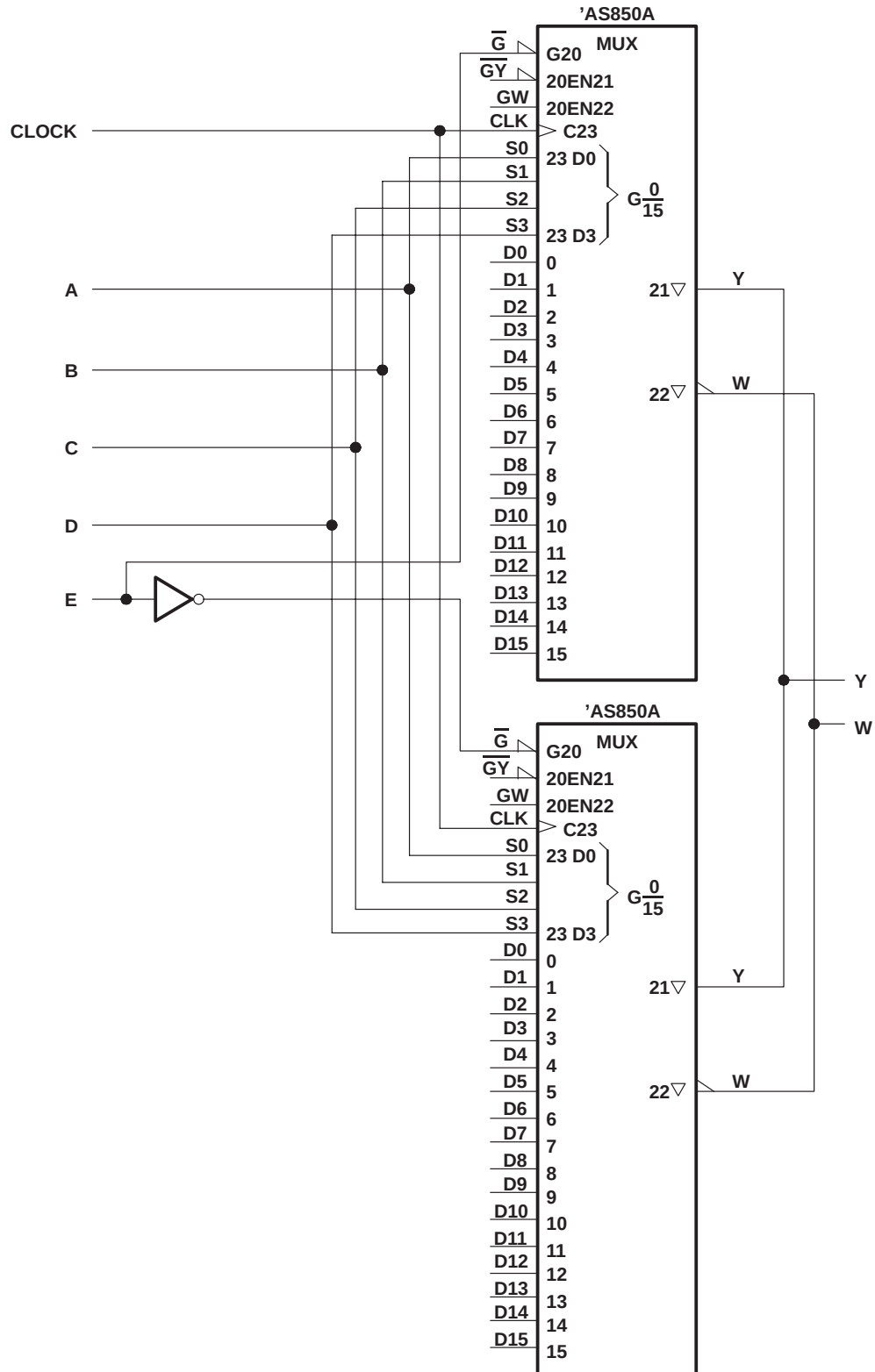


Figure 2. 1 - of - 32 Data/Selector/Multiplexer

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TYPICAL APPLICATION DATA

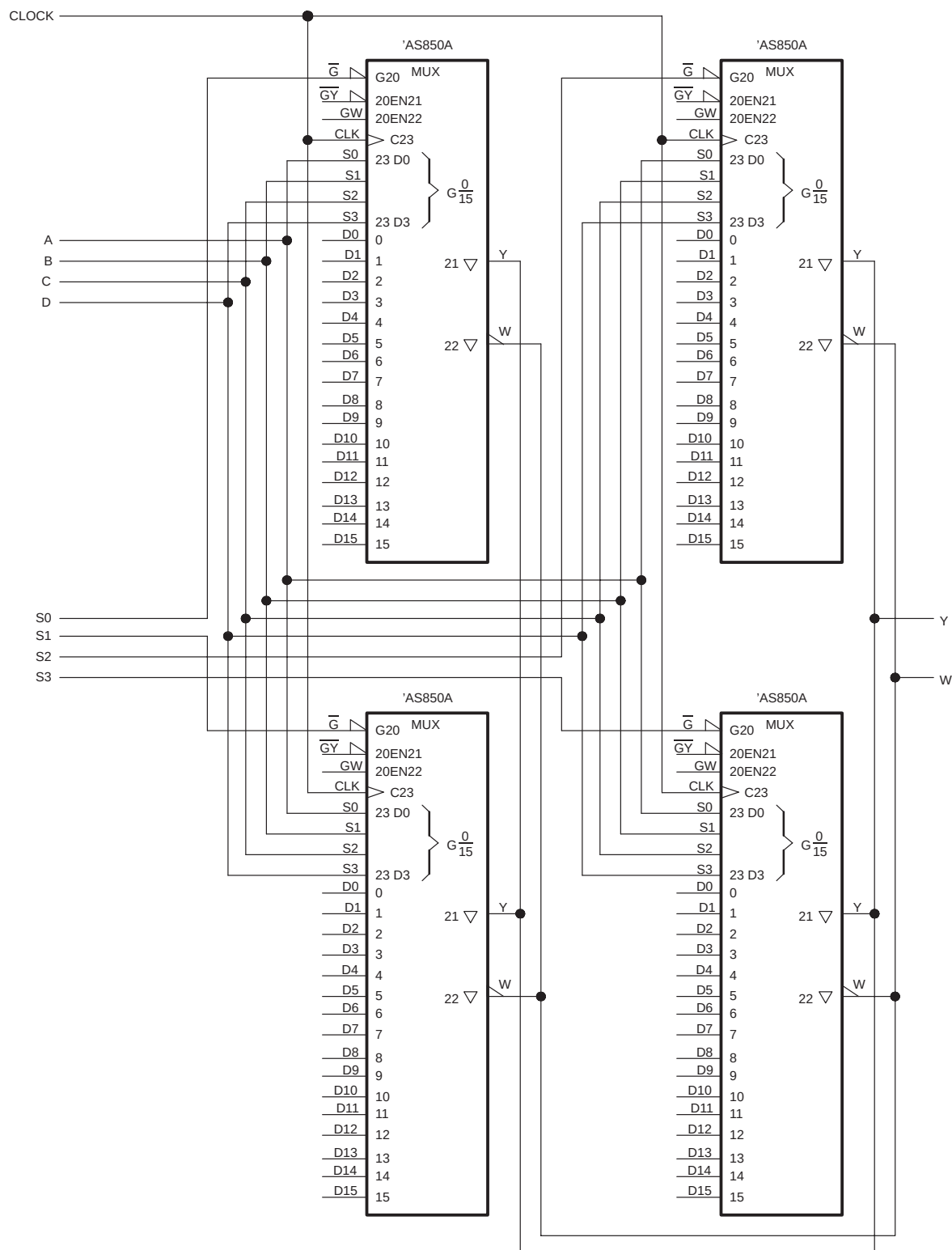


Figure 3. 1 - of - 64 Data Selector/Multiplexer

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN74AS850AFN	OBSOLETE	PLCC	FN	28		TBD	Call TI	Call TI
SN74AS850AN	OBSOLETE	PDIP	N	28		TBD	Call TI	Call TI
SN74AS851BN	OBSOLETE	PDIP	N	28		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) 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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