

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

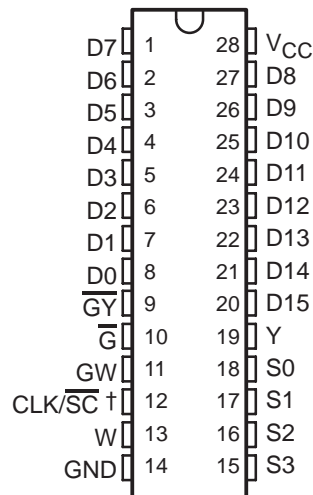
SDAS154A – D2822, DECEMBER 1983 – REVISED JANUARY 1990

- **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 ( $\overline{GY}$ , 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 ( $\overline{G}$ ,  $\overline{GY}$ , 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.

# SN74AS850A, SN74AS851B

## 1 OF 16 DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

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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

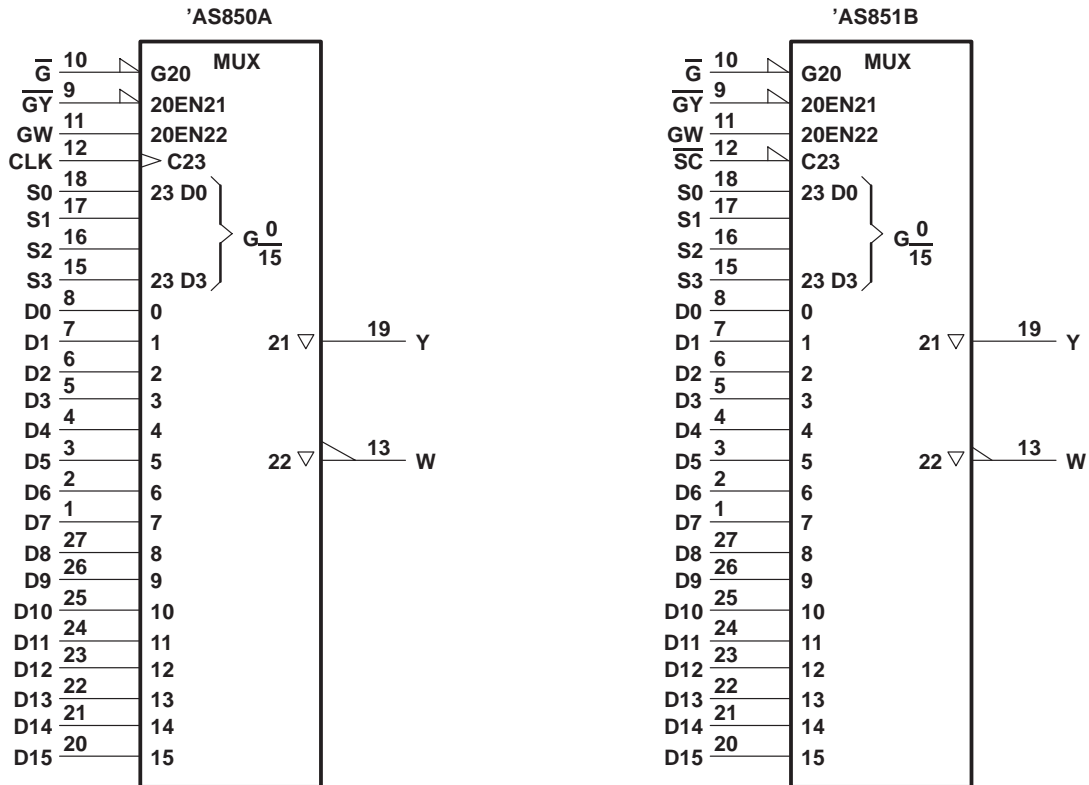
OUTPUT FUNCTION TABLE

$\overline{G}$	$\overline{GY}$	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

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

### logic symbols†

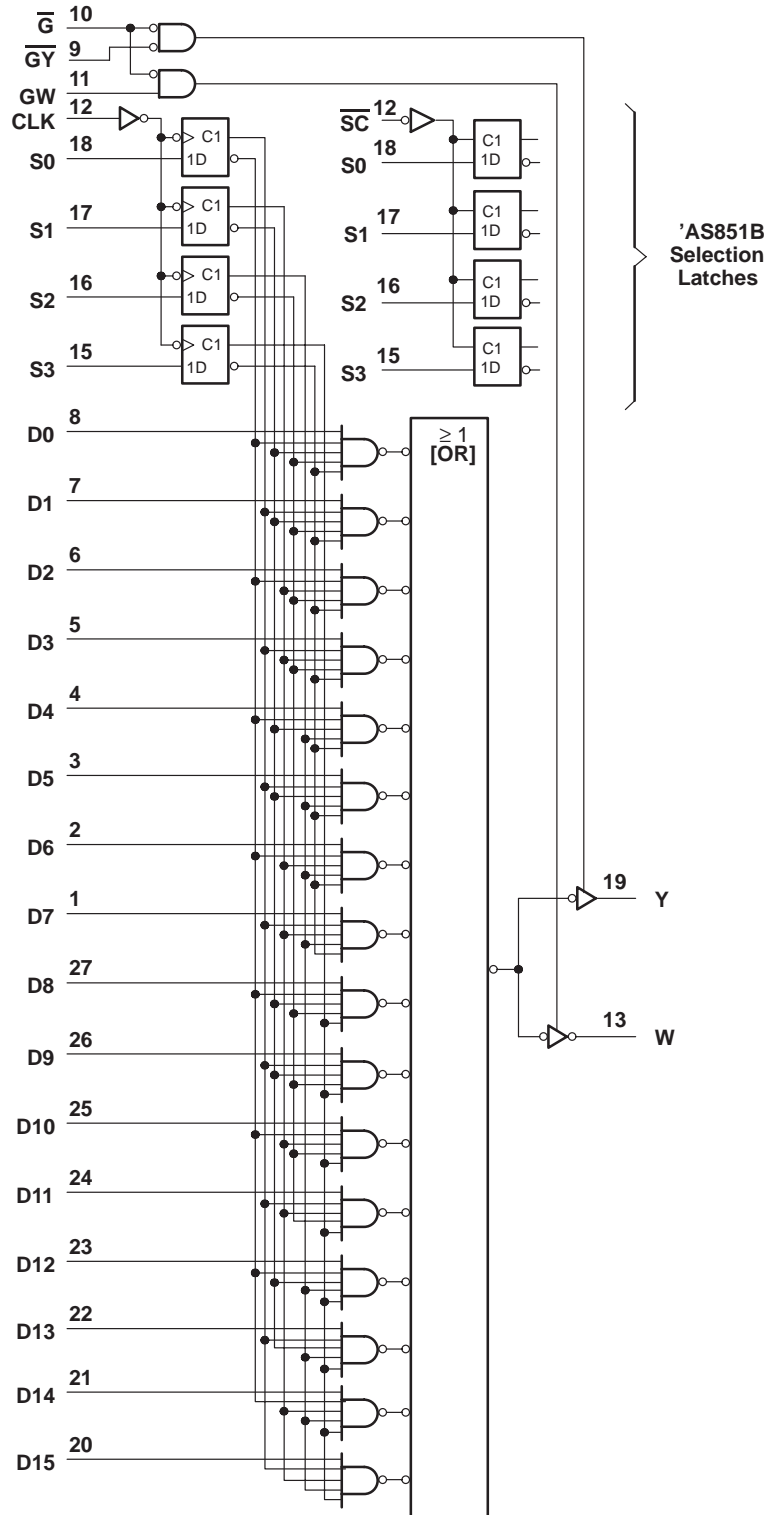


† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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



# SN74AS850A

## 1 OF 16 DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

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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 $\uparrow$	10			ns
$t_h$ Hold time, select inputs after CLK $\uparrow$	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 $\ddagger$	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	$\mu$ A
$I_{OZL}$	$V_{CC} = 4.5$ V, $V_O = 0.4$ V			-50	$\mu$ A
$I_I$	$V_{CC} = 5.5$ V, $V_I = 7$ V			0.1	mA
$I_{IH}$	$V_{CC} = 5.5$ V, $V_I = 2.7$ V			20	$\mu$ A
$I_{IL}$	$V_{CC} = 5.5$ V, $V_I = 0.4$ V			-1	mA
				-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			50	mA
				81	
				52	85

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

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



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

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**switching characteristics (see Note 1)**

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

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



# SN74AS851B

## 1 OF 16 DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

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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 $\overline{SC}\uparrow$	4.5			ns
$t_h$ Hold time, select inputs after $\overline{SC}\uparrow$	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 <sup>†</sup>	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, $\overline{G}$	$V_{CC} = 5.5\text{ V}$ , $V_I = 0.4\text{ V}$			-1	mA	
	All others				-0.5		
$I_{O\ddagger}$		$V_{CC} = 5.5\text{ V}$ , $V_O = 2.25\text{ V}$	-30		-112	mA	
$I_{CC}$		$V_{CC} = 5.5\text{ V}$	Outputs active		50	81	mA
			Outputs disabled		52	85	

<sup>†</sup> All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

<sup>‡</sup> 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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**WITH 3-STATE OUTPUTS**

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**switching characteristics (see Note 1)**

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

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



# SN74AS850A, SN74AS851B

## 1 OF 16 DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

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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.

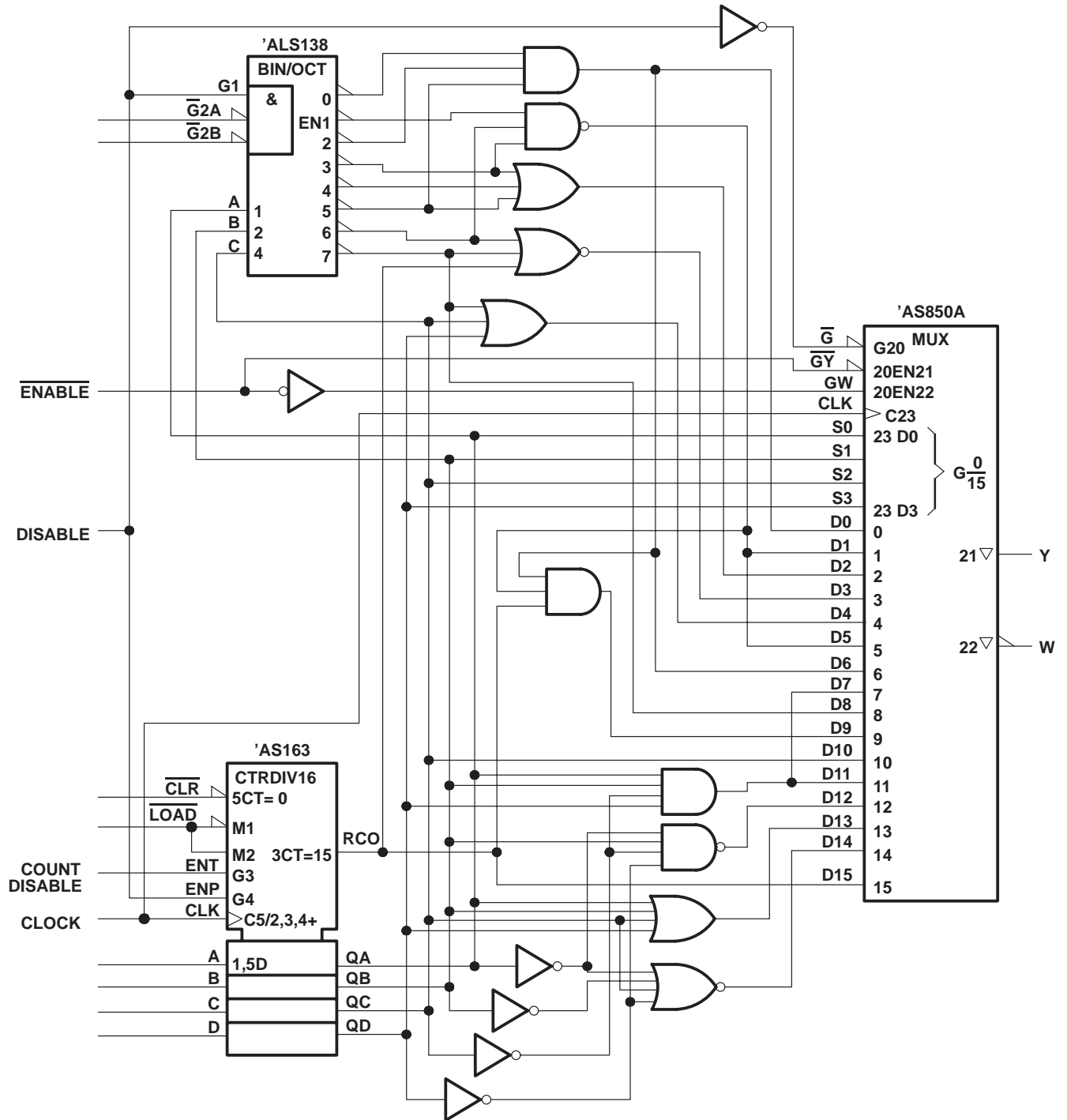


Figure 1. 1 - of - 16 Boolean Function Generator



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**TYPICAL APPLICATION DATA**

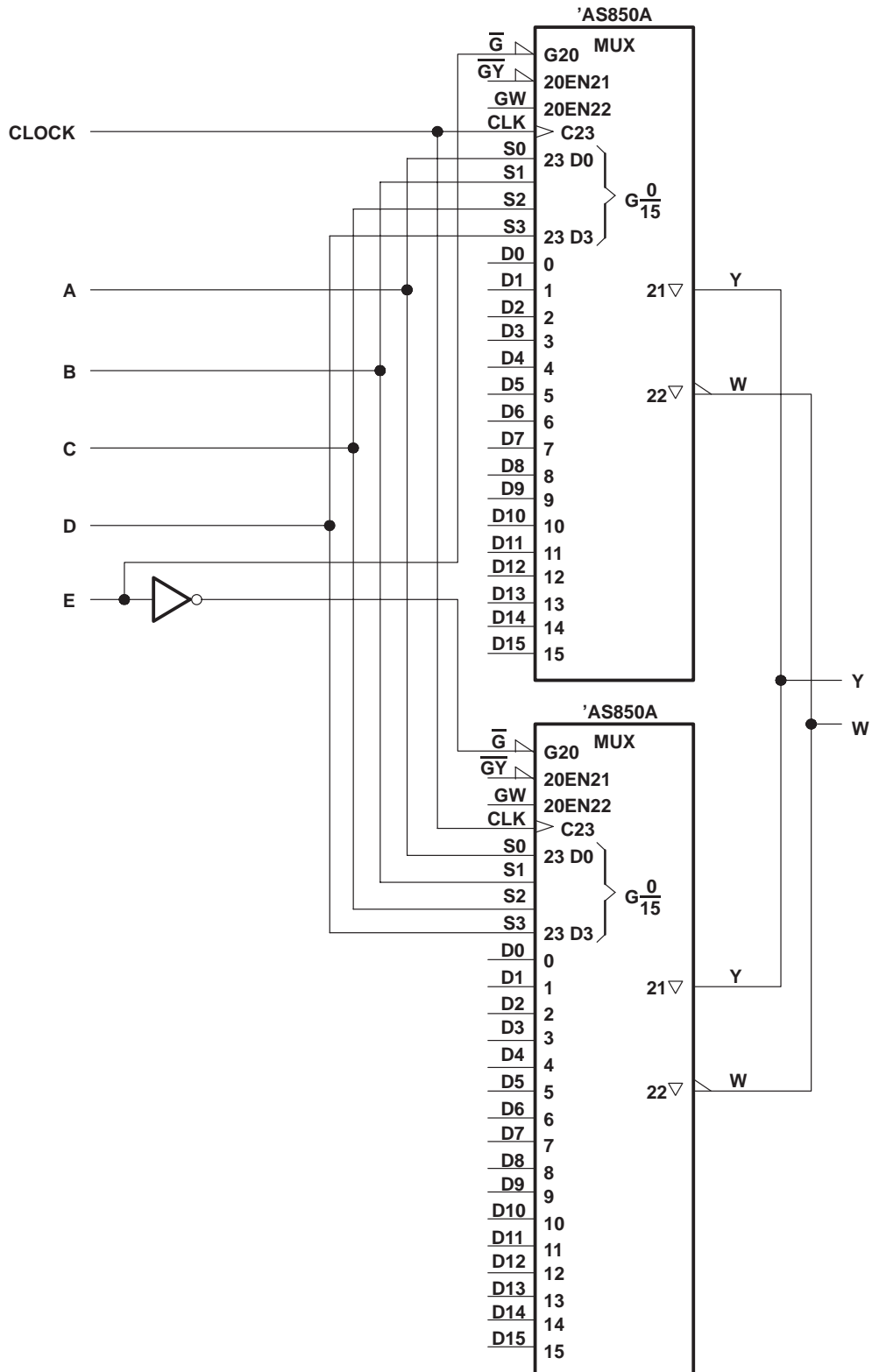


Figure 2. 1 - of - 32 Data/Selector/Multiplexer



# SN74AS850A

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### TYPICAL APPLICATION DATA

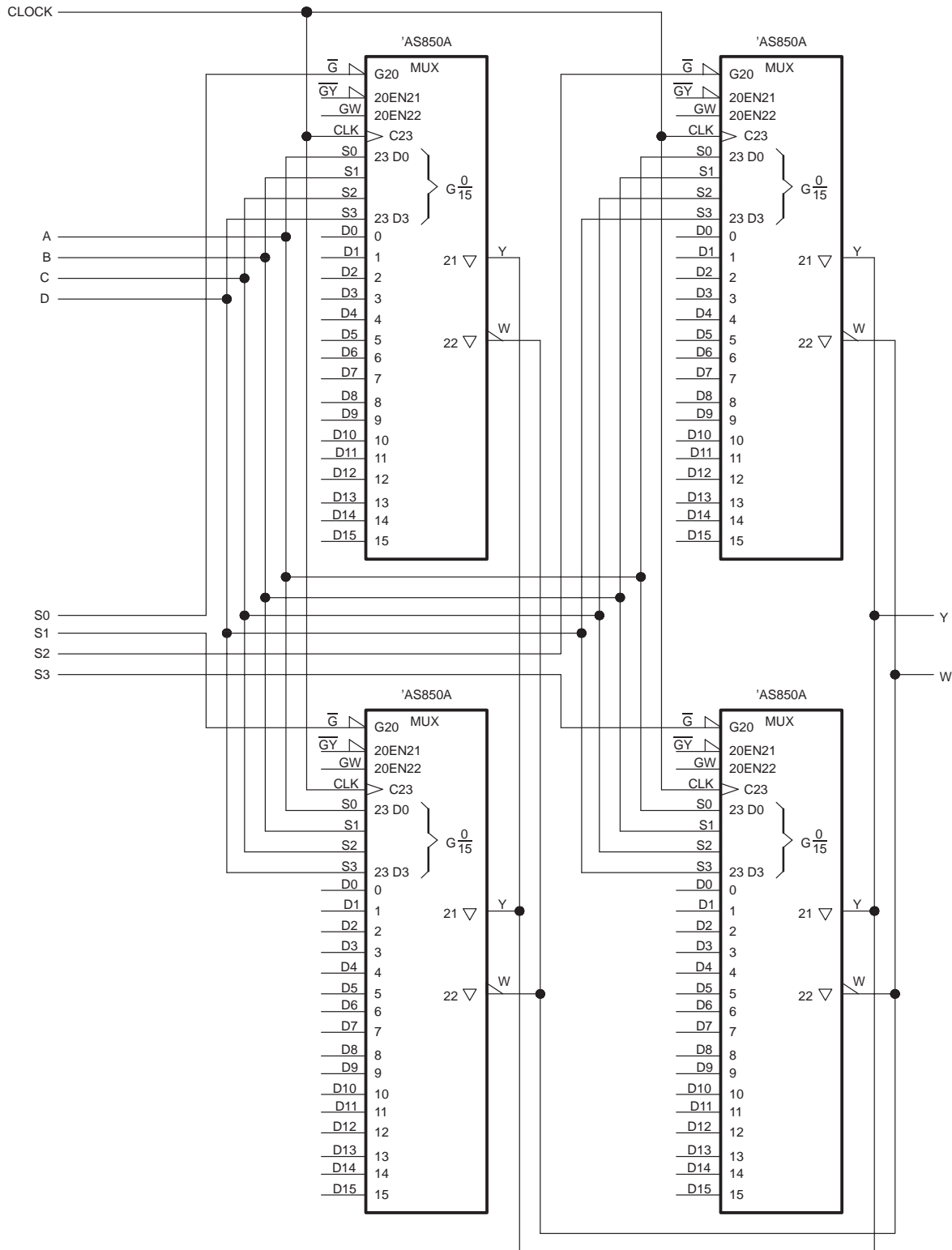


Figure 3. 1 - of - 64 Data Selector/Multiplexer



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