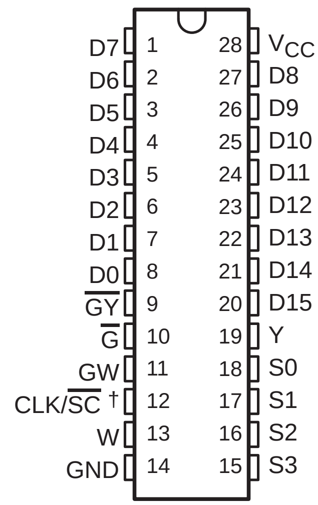
SDAS154A – D2822, DECEMBER 1983 – REVISED JANUARY 1990

- **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.

FUNCTION TABLE

INPUT SELECTION TABLE

SELECT INPUTS				’AS850A	’AS851B	INPUT SELECTED
S3	S2	S1	S0	CLK	$\overline{SC}$	
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 $\overline{SC}$.

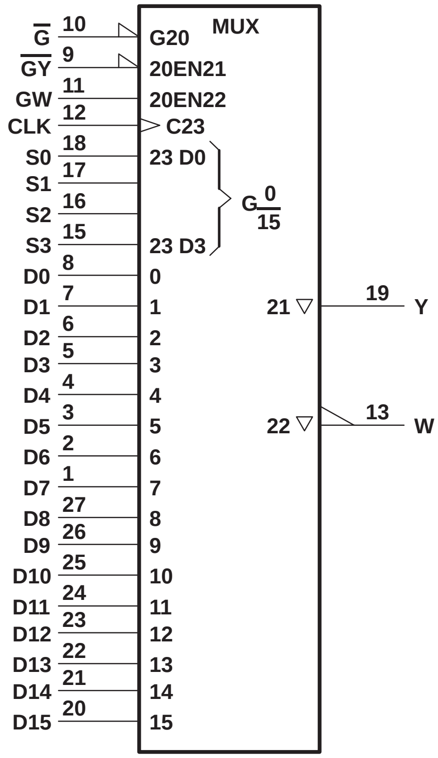
OUTPUT FUNCTION TABLE

$\overline{G}$	$\overline{GY}$	GW	OUTPUTS Y	OUTPUTS 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

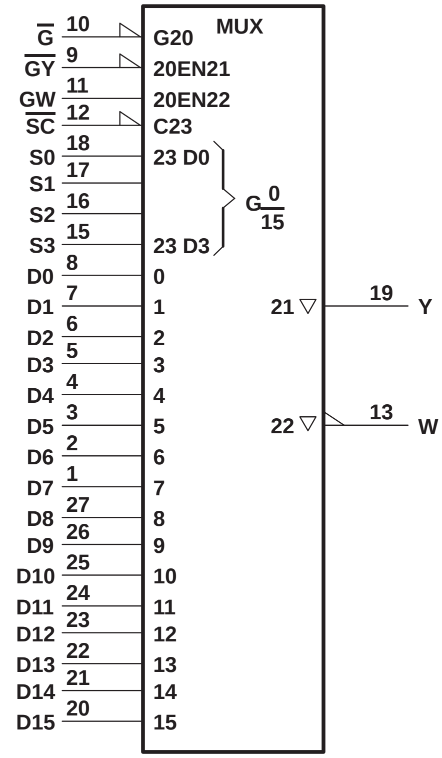
D = level of selected input D0 – D15

logic symbols†

’AS850A

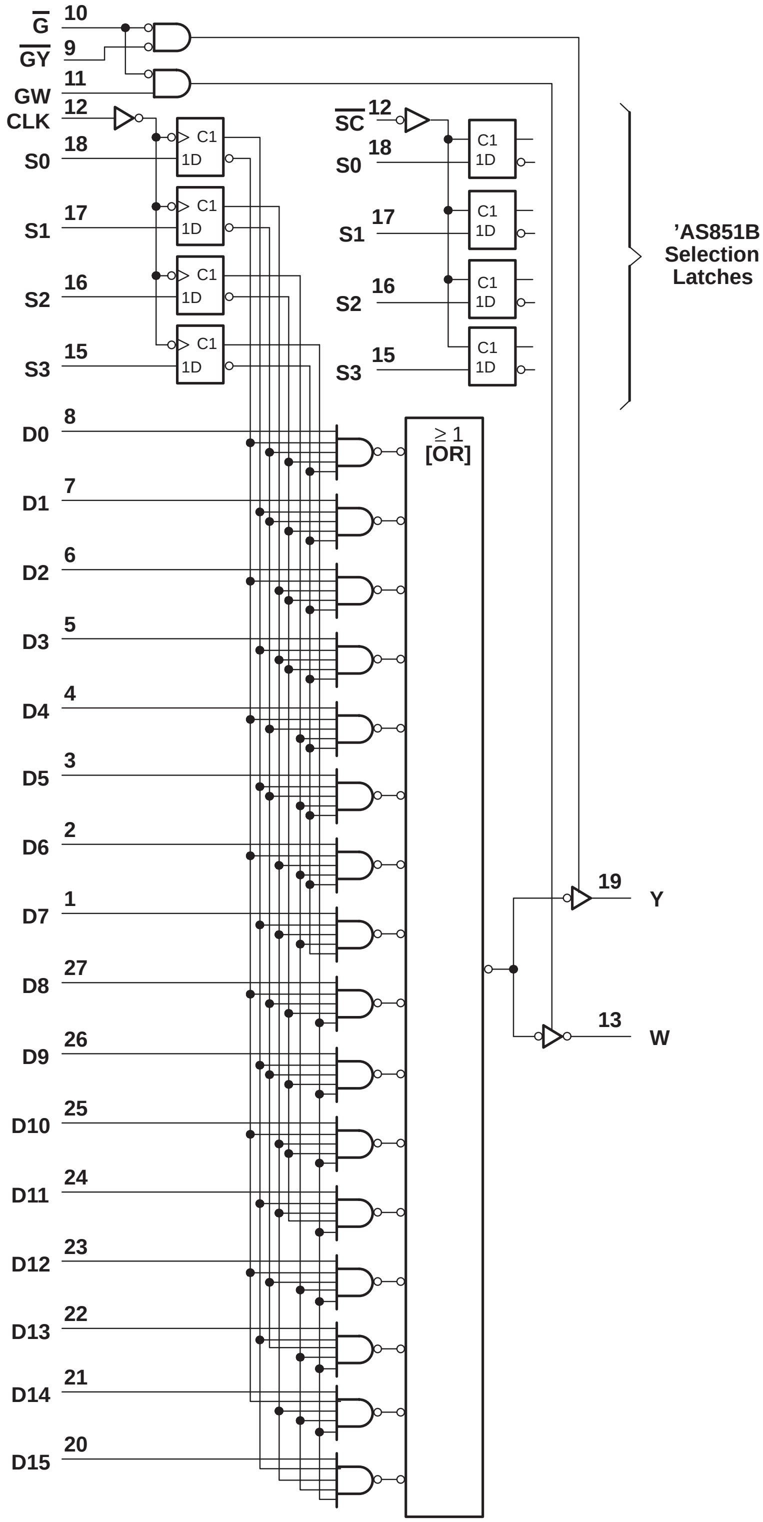


’AS851B



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

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



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	V_{CC} = 5.5 V,	V_I = 0 .4 V			–1	mA
	All others					–0.5	
I_O‡		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
			Outputs disabled		52	85	

† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ The output conditions have been chosen to produce a current that closely approximates one-half of the true short-circuit current, I_{OS}.

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 MIN	MAX	UNIT
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.

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, $\overline{SC}$ 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†	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} = 5.5 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, $\overline{G}$	V_{CC} = 5.5 V,	V_I = 0 .4 V			–1	mA
	All others					–0.5	
I_O‡		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
			Outputs disabled		52	85	

† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ The output conditions have been chosen to produce a current that closely approximates one-half of the true short-circuit current, I_{OS}.

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 MIN	MAX	UNIT
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}	$\overline{SC}$	Y	3	18	ns
t_{PHL}			3	20	
t_{PLH}	$\overline{SC}$	W	3	16	ns
t_{PHL}			3	15	
t_{PZH}	$\overline{G}$	Y	2	8	ns
t_{PZL}			3	11	
t_{PHZ}	$\overline{G}$	Y	1	6	ns
t_{PLZ}			2	8	
t_{PZH}	$\overline{G}$	W	2	8	ns
t_{PZL}			3	10	
t_{PHZ}	$\overline{G}$	W	1	6	ns
t_{PLZ}			2	8	
t_{PZH}	$\overline{GY}$	Y	2	8	ns
t_{PZL}			3	11	
t_{PHZ}	$\overline{GY}$	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.

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.

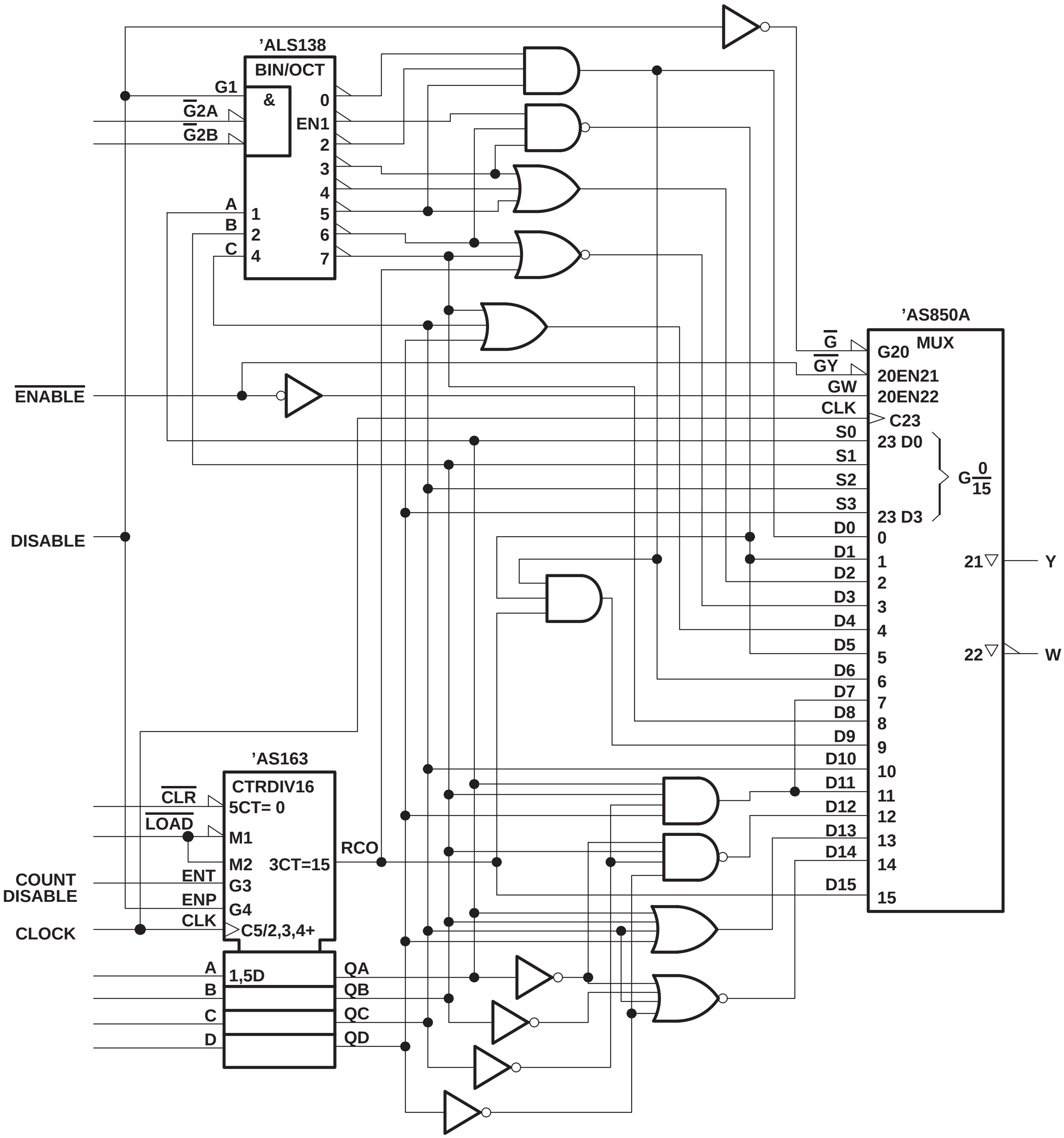


Figure 1. 1 - of - 16 Boolean Function Generator

TYPICAL APPLICATION DATA

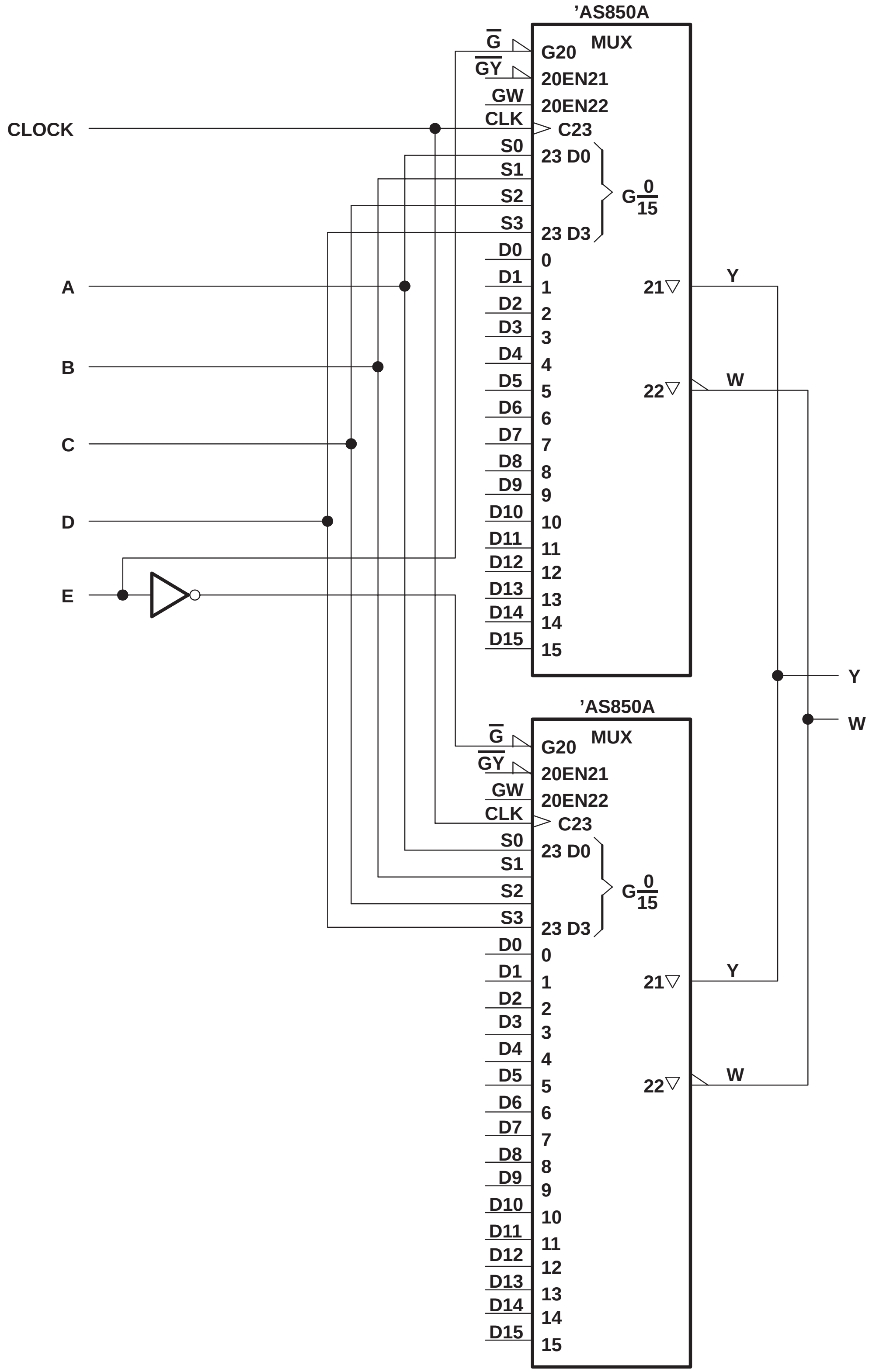


Figure 2. 1 - of - 32 Data/Selector/Multiplexer

TYPICAL APPLICATION DATA

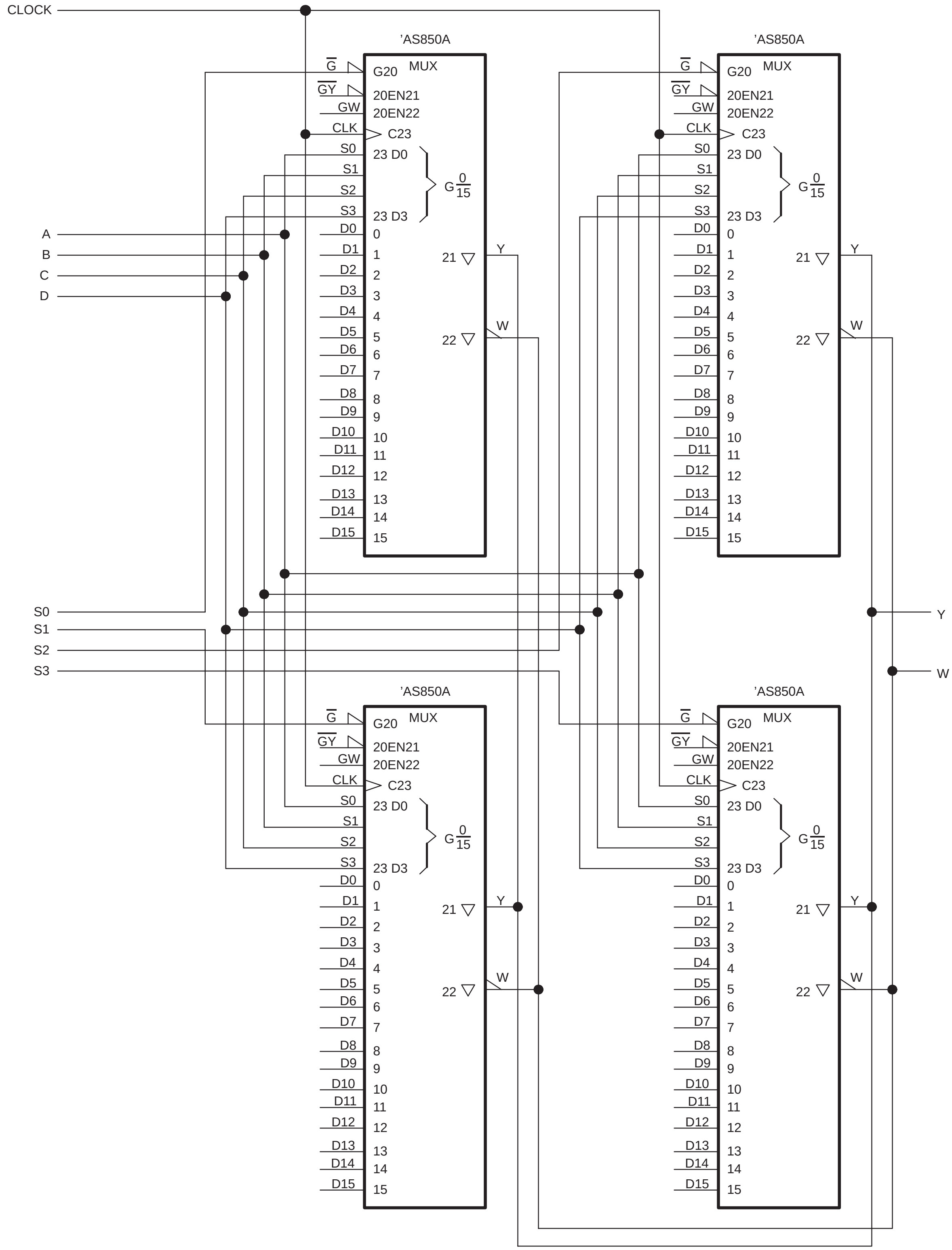


Figure 3. 1 - of - 64 Data Selector/Multiplexer

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.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		**Applications**	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Interface	interface.ti.com	Digital Control	www.ti.com/digitalcontrol
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
		Telephony	www.ti.com/telephony
		Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265