- **Member of the Texas Instruments Widebus™ Family**
- **Output Ports Have Series Damping Resistors, So No External Resistors Are Required**
- **Diodes on Inputs Clamp Overshoot**
- **Bus Hold on Data Inputs Eliminates the Need for External Pullup/Pulldown Resistors**
- **Latch-Up Performance Exceeds 250 mA Per JESD 17**
- **ESD Protection Exceeds JESD 22**
  - **2000-V Human-Body Model (A114-A)**
  - **200-V Machine Model (A115-A)**

description/ordering information

This 1-bit to 2-bit address driver is designed for 2.3-V to 3.6-V V_{CC} operation.

Diodes to V_{CC} have been added on the inputs to clamp overshoot.

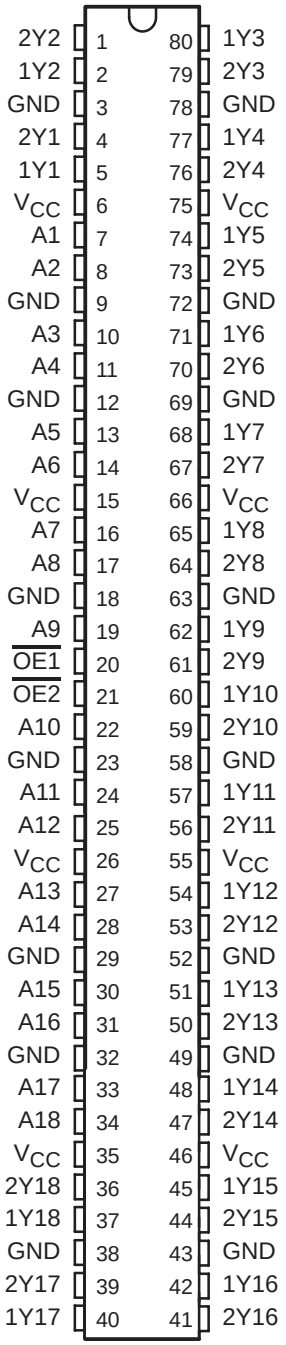
Active bus-hold circuitry holds unused or undriven inputs at a valid logic state. Use of pullup or pulldown resistors with the bus-hold circuitry is not recommended.

The outputs, which are designed to sink up to 12 mA, include series damping resistors to reduce overshoot and undershoot.

The ALVCHS162830A is an improved version of the LVCHS162830 (non-A version) and has been optimized for lower power consumption and higher AC drive. Higher AC drive provides capability to drive loads with a faster edge rate.

To ensure the high-impedance state during power up or power down, the output-enable ($\overline{OE}$) input should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

DBB PACKAGE
(TOP VIEW)



description/ordering information

ORDERING INFORMATION

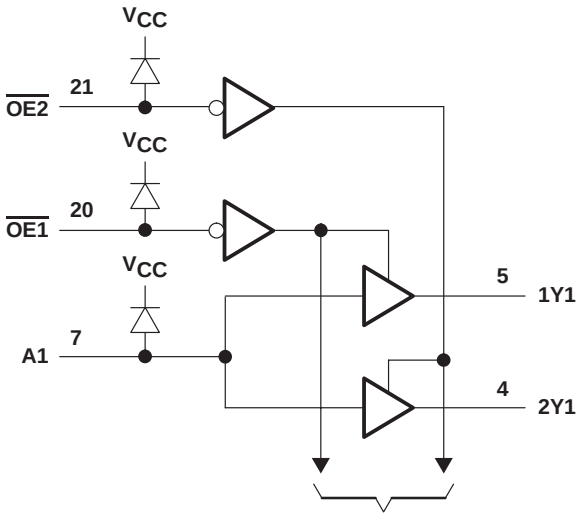
T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
−40°C to 85°C	TVSOP − DBB	Tape and reel	74ALVCHS162830AGR	ALVCHS162830A

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE

INPUTS			OUTPUTS	
$\overline{OE1}$	$\overline{OE2}$	A	1Yn	2Yn
L	H	H	H	Z
L	H	L	L	Z
H	L	H	Z	H
H	L	L	Z	L
L	L	H	H	H
L	L	L	L	L
H	H	X	Z	Z

logic diagram (positive logic)



To 17 Other Channels

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

Supply voltage range, V_{CC} . . . . . −0.5 V to 4.6 V
Input voltage range, V_I (see Note 1) . . . . . −0.5 V to V_{CC} + 0.5 V
Output voltage range, V_O (see Notes 1 and 2) . . . . . −0.5 V to V_{CC} + 0.5 V
Input clamp current, I_{IK} (V_I < 0, V_I > V_{CC}) . . . . . ±50 mA
Output clamp current, I_{OK} (V_O < 0) . . . . . −50 mA
Continuous output current, I_O . . . . . ±50 mA
Continuous current through each V_{CC} or GND . . . . . ±100 mA
Package thermal impedance, θ_{JA} (see Note 3) . . . . . 64°C/W
Storage temperature range, T_{stg} . . . . . −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.

NOTES: 1. The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. This value is limited to 4.6 V maximum.
3. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 4)

			MIN	MAX	UNIT
V_{CC}	Supply voltage		2.3	3.6	V
V_{IH}	High-level input voltage	V_{CC} = 2.3 V to 2.7 V	1.7		V
		V_{CC} = 2.7 V to 3.6 V	2		
V_{IL}	Low-level input voltage	V_{CC} = 2.3 V to 2.7 V		0.7	V
		V_{CC} = 2.7 V to 3.6 V		0.8	
V_I	Input voltage		0	V_{CC}	V
V_O	Output voltage		0	V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 2.3 V		−6	mA
		V_{CC} = 2.7 V		−8	
		V_{CC} = 3 V		−12	
I_{OL}	Low-level output current	V_{CC} = 2.3 V		6	mA
		V_{CC} = 2.7 V		8	
		V_{CC} = 3 V		12	
$\Delta t/\Delta v$	Input transition rise or fall rate			10	ns/V
T_A	Operating free-air temperature		−40	85	°C

NOTE 4: All unused control inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

PARAMETER		TEST CONDITIONS		V_{CC}	MIN	TYP†	MAX	UNIT
V_{IK}		I_I = −18 mA		2.3 V			−1.2	V
		I_I = 18 mA		2.3 V			V_{CC} + 1.2	
V_{OH}		I_{OH} = −100 μA		2.3 V to 3.6 V	V_{CC} − 0.2			V
		I_{OH} = −4 mA,	V_{IH} = 1.7 V	2.3 V	1.9			
		I_{OH} = −6 mA	V_{IH} = 1.7 V	2.3 V	1.7			
			V_{IH} = 2 V	3 V	2.4			
		I_{OH} = −8 mA,	V_{IH} = 2 V	2.7 V	2			
		I_{OH} = −12 mA,	V_{IH} = 2 V	3 V	2			
V_{OL}		I_{OL} = 100 μA		2.3 V to 3.6 V			0.2	V
		I_{OL} = 4 mA,	V_{IL} = 0.7 V	2.3 V			0.4	
		I_{OL} = 6 mA	V_{IL} = 0.7 V	2.3 V			0.55	
			V_{IL} = 0.8 V	3 V			0.55	
		I_{OL} = 8 mA,	V_{IL} = 0.8 V	2.7 V			0.6	
		I_{OL} = 12 mA,	V_{IL} = 0.8 V	3 V			0.8	
I_I		V_I = V_{CC} or GND		3.6 V			±5	μA
$I_{I(hold)}$		V_I = 0.7 V		2.3 V	45			μA
		V_I = 1.7 V		2.3 V	−45			
		V_I = 0.8 V		3 V	75			
		V_I = 2 V		3 V	−75			
		V_I = 0 to 3.6 V‡		3.6 V			±500	
I_{OZ}		V_O = V_{CC} or GND		3.6 V			±10	μA
I_{CC}		V_I = V_{CC} or GND,	I_O = 0	3.6 V			20	μA
ΔI_{CC}		One input at V_{CC} − 0.6 V,	Other inputs at V_{CC} or GND	3 V to 3.6 V			500	μA
C_i	Control inputs	V_I = V_{CC} or GND		3.3 V		3.5		pF
	Data inputs					4.5		
C_o	Outputs	V_O = V_{CC} or GND		3.3 V		4.5		pF

† All typical values are at V_{CC} = 3.3 V, T_A = 25°C.
‡ This is the bus-hold maximum dynamic current. It is the minimum overdrive current required to switch the input from one state to another.

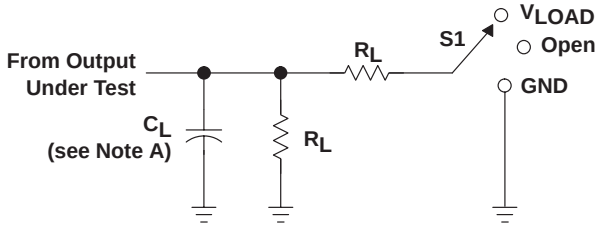
switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 2.5 V ± 0.2 V		V_{CC} = 2.7 V		V_{CC} = 3.3 V ± 0.3 V		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A	Y	1.2	3.8		4	1.7	3.5	ns
t_{en}	$\overline{OE}$	Y	1	5.7		5.7	1	4.8	ns
t_{dis}	$\overline{OE}$	Y	1	4.9		5.4	1.7	5.2	ns

operating characteristics, T_A = 25°C

PARAMETER			TEST CONDITIONS	V_{CC} = 2.5 V	V_{CC} = 3.3 V	UNIT
				TYP	TYP	
C_{pd}	Power dissipation capacitance per bit (one output switching)	One $\overline{OE}$ enabled	C_L = 0, f = 10 MHz	17	17.5	pF
		All outputs disabled		0.4	0.5	

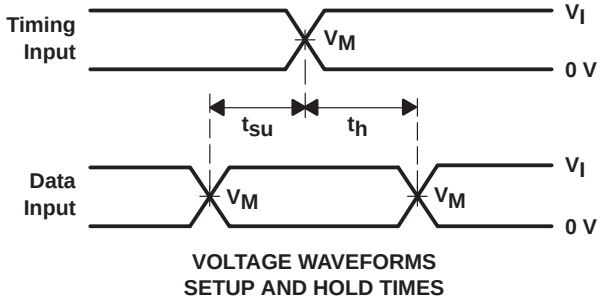
PARAMETER MEASUREMENT INFORMATION



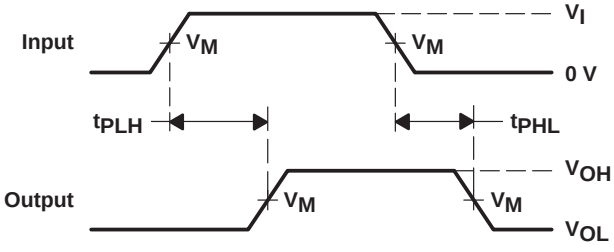
LOAD CIRCUIT

TEST	S1
t_{pd} t_{PLZ}/t_{PZL} t_{PHZ}/t_{PZH}	Open V_{LOAD} GND

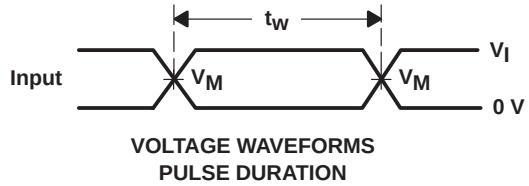
V_{CC}	INPUT		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_I	t_r/t_f					
2.5 V ± 0.2 V	V_{CC}	≤2 ns	$V_{CC}/2$	2 × V_{CC}	30 pF	500 Ω	0.15 V
2.7 V	2.7 V	≤2.5 ns	1.5 V	6 V	50 pF	500 Ω	0.3 V
3.3 V ± 0.3 V	2.7 V	≤2.5 ns	1.5 V	6 V	50 pF	500 Ω	0.3 V



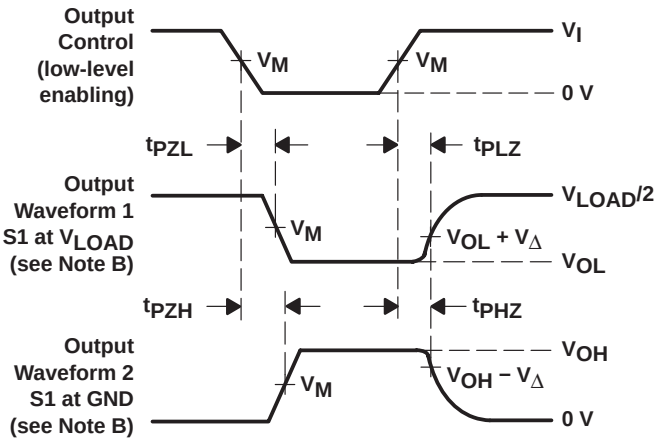
VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES

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. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω.
D. The outputs are measured one at a time, with one transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
F. t_{PZL} and t_{PZH} are the same as t_{en}.
G. t_{PLH} and t_{PHL} are the same as t_{pd}.
H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit 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)
74ALVCHS162830AGR	ACTIVE	TSSOP	DBB	80	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
ALVCHS162830AGRE4	ACTIVE	TSSOP	DBB	80	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
ALVCHS162830AGRG4	ACTIVE	TSSOP	DBB	80	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

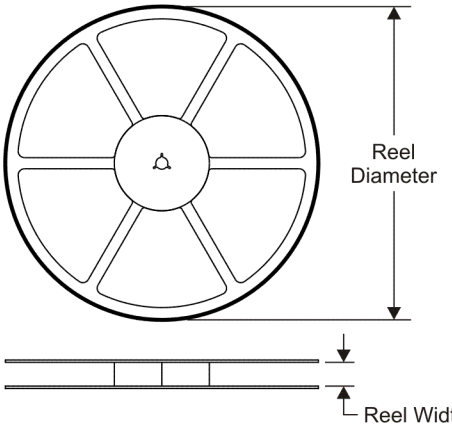
(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, 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)

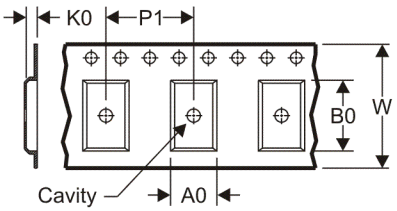
(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

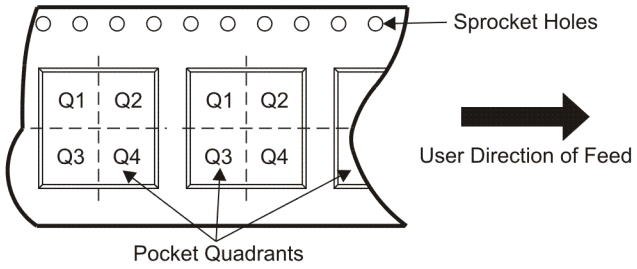


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	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

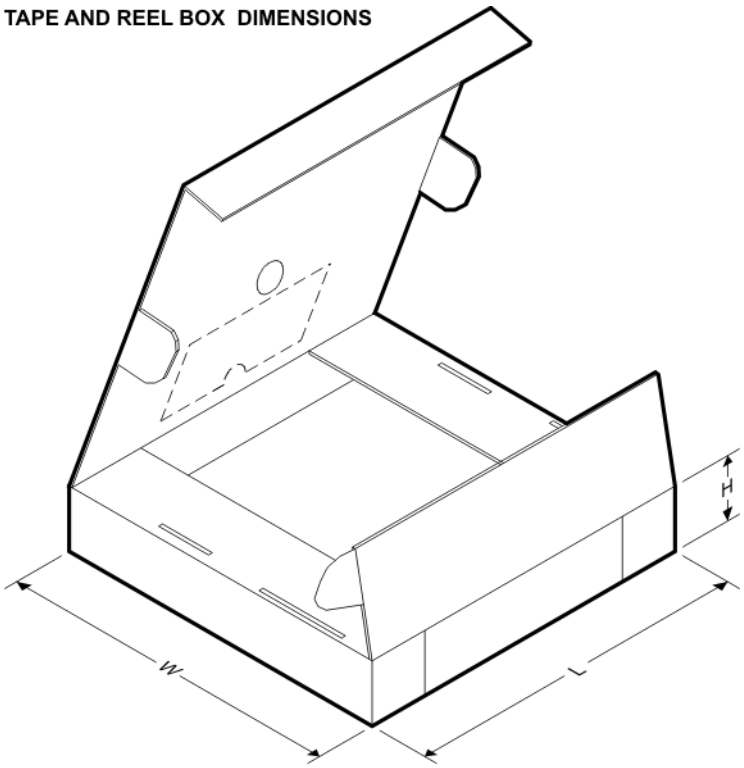
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
74ALVCHS162830AGR	TSSOP	DBB	80	2000	330.0	24.4	8.4	17.3	1.7	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
74ALVCHS162830AGR	TSSOP	DBB	80	2000	346.0	346.0	41.0

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