



# 3.3V CMOS 1-BIT TO 2-BIT ADDRESS DRIVER WITH 3-STATE OUTPUTS AND BUS-HOLD

IDT74ALVCH16830

## FEATURES:

- 0.5 MICRON CMOS Technology
- Typical  $t_{sk(0)}$  (Output Skew) < 250ps
- ESD > 2000V per MIL-STD-883, Method 3015;  
> 200V using machine model (C = 200pF, R = 0)
- 0.40mm pitch TVSOP package
- Extended commercial range of - 40°C to +85°C
- $V_{CC} = 3.3V \pm 0.3V$ , Normal Range
- $V_{CC} = 2.7V$  to  $3.6V$ , Extended Range
- $V_{CC} = 2.5V \pm 0.2V$
- CMOS power levels (0.4μW typ. static)
- Rail-to-Rail output swing for increased noise margin

## Drive Features for ALVCH16830:

- High Output Drivers:  $\pm 24mA$
- Suitable for heavy loads

## DESCRIPTION:

This 1-bit to 2-bit address driver is built using advanced dual metal CMOS technology.

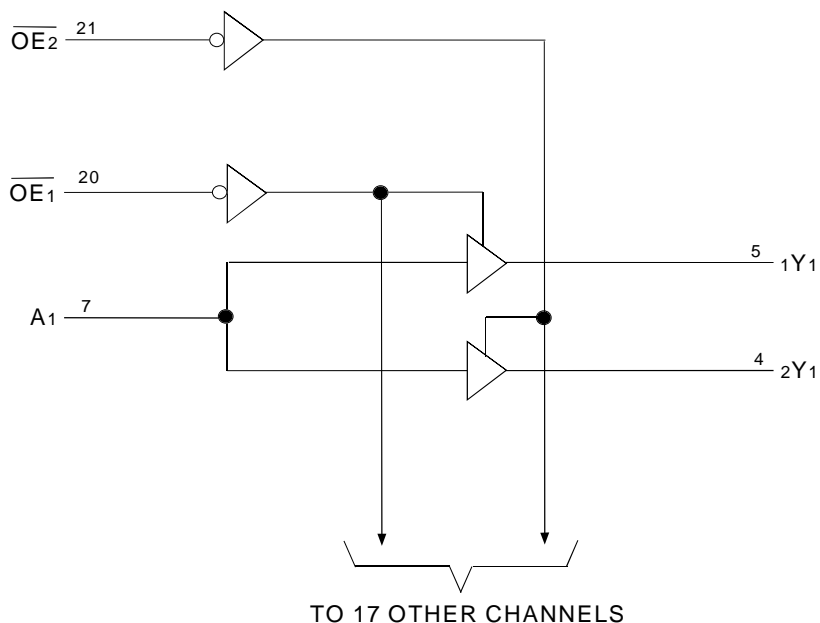
The ALVCH16830 has been designed with a  $\pm 24mA$  output driver. This driver is capable of driving a moderate to heavy load while maintaining speed performance.

The ALVCH16830 has "bus-hold" which retains the inputs' last state whenever the input bus goes to a high impedance. This prevents floating inputs and eliminates the need for pull-up/down resistors.

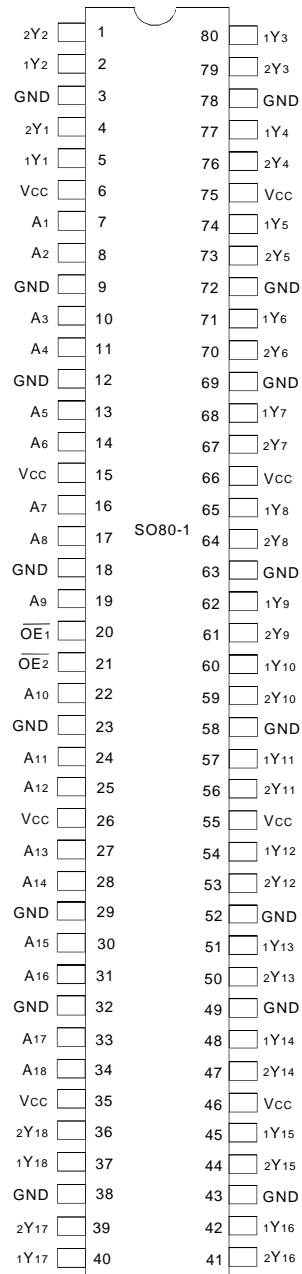
## APPLICATIONS:

- SDRAM Modules
- PC Motherboards
- Workstations

## FUNCTIONAL BLOCK DIAGRAM



**PIN CONFIGURATION**



TVSOP  
TOP VIEW

**PIN DESCRIPTION**

Pin Names	Description
$\overline{OE}x$	3-State Output Enable Inputs (Active LOW)
Ax	Data Inputs <sup>(1)</sup>
xYx	3-State Outputs

**NOTE:**

1. These pins have "Bus-Hold." All other pins are standard inputs, outputs, or I/Os.

**ABSOLUTE MAXIMUM RATING (1)**

Symbol	Description	Max.	Unit
VTERM <sup>(2)</sup>	Terminal Voltage with Respect to GND	- 0.5 to + 4.6	V
VTERM <sup>(3)</sup>	Terminal Voltage with Respect to GND	- 0.5 to VCC + 0.5	V
TSTG	Storage Temperature	- 65 to + 150	°C
IOUT	DC Output Current	- 50 to + 50	mA
I <sub>IK</sub>	Continuous Clamp Current, V <sub>I</sub> < 0 or V <sub>I</sub> > VCC	± 50	mA
I <sub>OK</sub>	Continuous Clamp Current, V <sub>O</sub> < 0	- 50	mA
I <sub>CC</sub>	Continuous Current through each VCC or GND	± 100	mA

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**NOTES:**

1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.
2. VCC terminals.
3. All terminals except Vcc.

**CAPACITANCE (T<sub>A</sub> = +25°C, f = 1.0MHz)**

Symbol	Parameter <sup>(1)</sup>	Conditions	Typ.	Max.	Unit
C <sub>IN</sub>	Input Capacitance	V <sub>IN</sub> = 0V	5	7	pF
C <sub>OUT</sub>	Output Capacitance	V <sub>OUT</sub> = 0V	7	9	pF
C <sub>I/O</sub>	I/O Port Capacitance	V <sub>IN</sub> = 0V	7	9	pF

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**NOTE:**

1. As applicable to the device type.

**FUNCTION TABLE (1)**

Inputs			Outputs	
$\overline{OE}1$	$\overline{OE}2$	Ax	1Yx	2Yx
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

**NOTE:**

1. H = HIGH Voltage Level  
L = LOW Voltage Level  
X = Don't Care  
Z = High-Impedance

## DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Operating Condition: TA = -40°C to +85°C

Symbol	Parameter	Test Conditions		Min.	Typ. <sup>(1)</sup>	Max.	Unit
V <sub>IH</sub>	Input HIGH Voltage Level	V <sub>CC</sub> = 2.3V to 2.7V		1.7	—	—	V
		V <sub>CC</sub> = 2.7V to 3.6V		2	—	—	
V <sub>IL</sub>	Input LOW Voltage Level	V <sub>CC</sub> = 2.3V to 2.7V		—	—	0.7	V
		V <sub>CC</sub> = 2.7V to 3.6V		—	—	0.8	
I <sub>IH</sub>	Input HIGH Current	V <sub>CC</sub> = 3.6V	V <sub>I</sub> = V <sub>CC</sub>	—	—	± 5	μA
I <sub>IL</sub>	Input LOW Current	V <sub>CC</sub> = 3.6V	V <sub>I</sub> = GND	—	—	± 5	
I <sub>OZH</sub>	High Impedance Output Current (3-State Output pins)	V <sub>CC</sub> = 3.6V	V <sub>O</sub> = V <sub>CC</sub>	—	—	± 10	μA
I <sub>OZL</sub>			V <sub>O</sub> = GND	—	—	± 10	μA
V <sub>IK</sub>	Clamp Diode Voltage	V <sub>CC</sub> = 2.3V, I <sub>IN</sub> = -18mA		—	-0.7	-1.2	V
V <sub>H</sub>	Input Hysteresis	V <sub>CC</sub> = 3.3V		—	100	—	mV
I <sub>CCL</sub>	Quiescent Power Supply Current	V <sub>CC</sub> = 3.6V		—	0.1	40	μA
I <sub>CCH</sub>		V <sub>IN</sub> = GND or V <sub>CC</sub>					
I <sub>CCZ</sub>							
ΔI <sub>CC</sub>	Quiescent Power Supply Current Variation	One input at V <sub>CC</sub> - 0.6V, other inputs at V <sub>CC</sub> or GND		—	—	750	μA

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### NOTE:

1. Typical values are at V<sub>CC</sub> = 3.3V, +25°C ambient.

## BUS-HOLD CHARACTERISTICS

Symbol	Parameter <sup>(1)</sup>	Test Conditions		Min.	Typ. <sup>(2)</sup>	Max.	Unit
I <sub>BHH</sub>	Bus-Hold Input Sustain Current	V <sub>CC</sub> = 3.0V	V <sub>I</sub> = 2.0V	-75	—	—	μA
			V <sub>I</sub> = 0.8V	75	—	—	
I <sub>BHL</sub>	Bus-Hold Input Sustain Current	V <sub>CC</sub> = 2.3V	V <sub>I</sub> = 1.7V	-45	—	—	μA
			V <sub>I</sub> = 0.7V	45	—	—	
I <sub>BHHO</sub>	Bus-Hold Input Overdrive Current	V <sub>CC</sub> = 3.6V	V <sub>I</sub> = 0 to 3.6V	—	—	± 500	μA
I <sub>BHLO</sub>							

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### NOTES:

1. Pins with Bus-hold are identified in the pin description.
2. Typical values are at V<sub>CC</sub> = 3.3V, +25°C ambient.

**OUTPUT DRIVE CHARACTERISTICS**

Symbol	Parameter	Test Conditions <sup>(1)</sup>		Min.	Max.	Unit
VOH	Output HIGH Voltage	V <sub>CC</sub> = 2.3V to 3.6V	I <sub>OH</sub> = - 0.1mA	V <sub>CC</sub> - 0.2	—	V
		V <sub>CC</sub> = 2.3V	I <sub>OH</sub> = - 6mA	2	—	
		V <sub>CC</sub> = 2.3V	I <sub>OH</sub> = - 12mA	1.7	—	
		V <sub>CC</sub> = 2.7V		2.2	—	
		V <sub>CC</sub> = 3.0V		2.4	—	
		V <sub>CC</sub> = 3.0V	I <sub>OH</sub> = - 24mA	2	—	
VOL	Output LOW Voltage	V <sub>CC</sub> = 2.3V to 3.6V	I <sub>OL</sub> = 0.1mA	—	0.2	V
		V <sub>CC</sub> = 2.3V	I <sub>OL</sub> = 6mA	—	0.4	
			I <sub>OL</sub> = 12mA	—	0.7	
		V <sub>CC</sub> = 2.7V	I <sub>OL</sub> = 12mA	—	0.4	
		V <sub>CC</sub> = 3.0V	I <sub>OL</sub> = 24mA	—	0.55	

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**NOTE:**

1. V<sub>IH</sub> and V<sub>IL</sub> must be within the min. or max. range shown in the DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE table for the appropriate V<sub>CC</sub> range. T<sub>A</sub> = - 40°C to + 85°C.

**OPERATING CHARACTERISTICS, T<sub>A</sub> = 25°C**

Symbol	Parameter	Test Conditions	V <sub>CC</sub> = 2.5V ± 0.2V	V <sub>CC</sub> = 3.3V ± 0.3V	Unit
			Typical	Typical	
CPD	Power Dissipation Capacitance per driver Outputs enabled	C <sub>L</sub> = 0pF, f = 10Mhz	—	—	pF
CPD	Power Dissipation Capacitance per driver Outputs disabled		—	—	pF

**SWITCHING CHARACTERISTICS <sup>(1)</sup>**

Symbol	Parameter	V <sub>CC</sub> = 2.5V ± 0.2V		V <sub>CC</sub> = 2.7V		V <sub>CC</sub> = 3.3V ± 0.3V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay A <sub>x</sub> to xY <sub>x</sub>	1.2	3.4	—	3.5	1.5	3	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time OEx to xY <sub>x</sub>	1	5.6	—	5.2	1	4	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time OEx to xY <sub>x</sub>	1.2	5.7	—	5	1.5	4.6	ns
t <sub>SK(0)</sub>	Output Skew <sup>(2)</sup>	—	—	—	—	—	500	ps

**NOTES:**

1. See test circuits and waveforms. T<sub>A</sub> = - 40°C to + 85°C.
2. Skew between any two outputs of the same package and switching in the same direction.

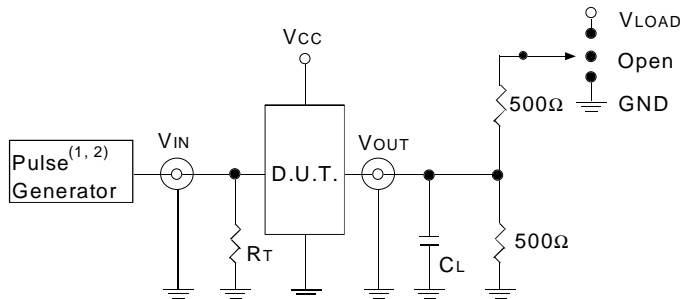
## TEST CIRCUITS AND WAVEFORMS:

### TEST CONDITIONS

Symbol	V <sub>CC</sub> (1)= 3.3V±0.3V	V <sub>CC</sub> (1)= 2.7V	V <sub>CC</sub> (2)= 2.5V±0.2V	Unit
V <sub>LOAD</sub>	6	6	2 x V <sub>CC</sub>	V
V <sub>IH</sub>	2.7	2.7	V <sub>CC</sub>	V
V <sub>T</sub>	1.5	1.5	V <sub>CC</sub> / 2	V
V <sub>LZ</sub>	300	300	150	mV
V <sub>HZ</sub>	300	300	150	mV
C <sub>L</sub>	50	50	30	pF

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### TEST CIRCUITS FOR ALL OUTPUTS



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#### DEFINITIONS:

C<sub>L</sub>= Load capacitance: includes jig and probe capacitance.

R<sub>T</sub>= Termination resistance: should be equal to Z<sub>OUT</sub> of the Pulse Generator.

#### NOTES:

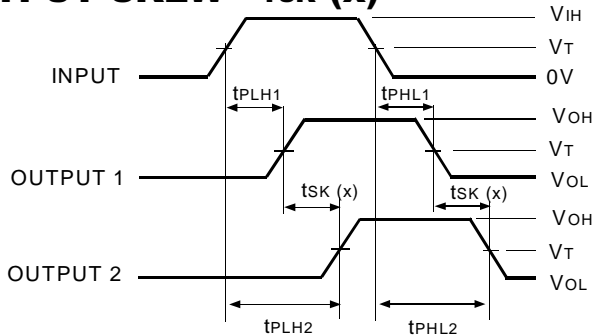
1. Pulse Generator for All Pulses: Rate ≤ 10MHz; t<sub>r</sub> ≤ 2.5ns; t<sub>r</sub> ≤ 2.5ns.
2. Pulse Generator for All Pulses: Rate ≤ 10MHz; t<sub>r</sub> ≤ 2ns; t<sub>r</sub> ≤ 2ns.

### SWITCH POSITION

Test	Switch
Open Drain Disable Low Enable Low	V <sub>LOAD</sub>
Disable High Enable High	GND
All Other tests	Open

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### OUTPUT SKEW - T<sub>SK</sub> (x)



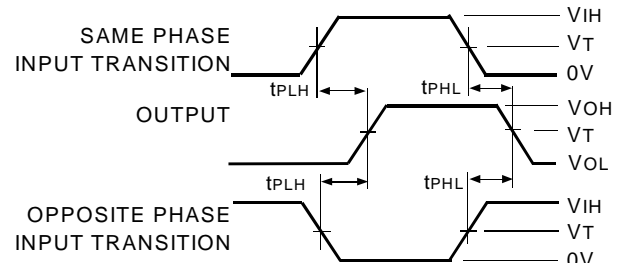
$$t_{SK}(x) = |t_{PLH2} - t_{PLH1}| \text{ or } |t_{PHL2} - t_{PHL1}|$$

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#### NOTES:

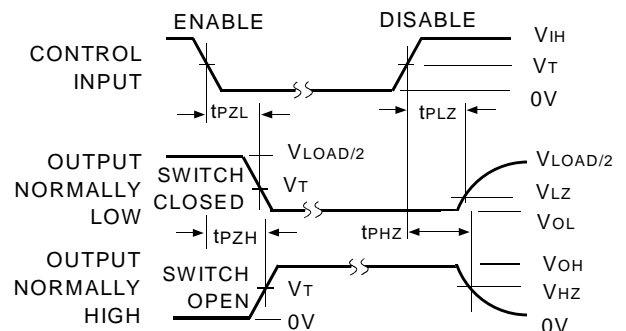
1. For t<sub>sk(o)</sub> OUTPUT1 and OUTPUT2 are any two outputs.
2. For t<sub>sk(b)</sub> OUTPUT1 and OUTPUT2 are in the same bank.

### PROPAGATION DELAY



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### ENABLE AND DISABLE TIMES

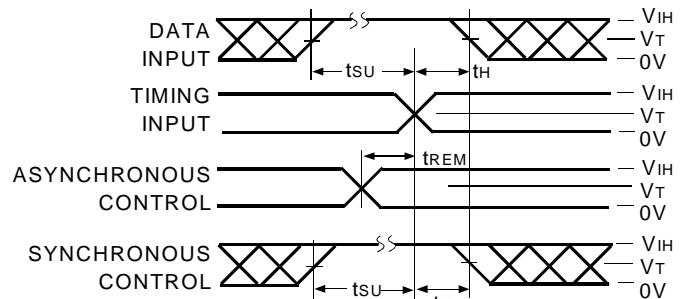


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#### NOTE:

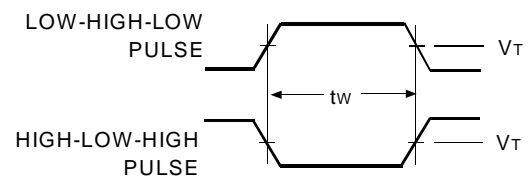
1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.

### SET-UP, HOLD, AND RELEASE TIMES



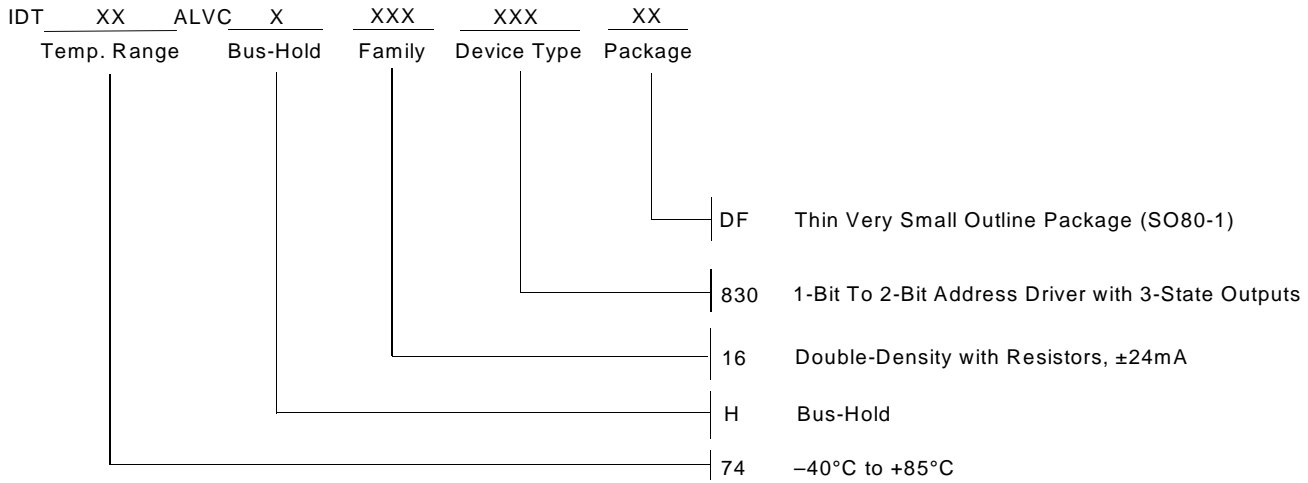
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### PULSE WIDTH



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### ORDERING INFORMATION



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