



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 $+85^{\circ}\text{C}$
- $V_{CC} = 3.3\text{V} \pm 0.3\text{V}$, Normal Range
- $V_{CC} = 2.7\text{V}$ to 3.6V , Extended Range
- $V_{CC} = 2.5\text{V} \pm 0.2\text{V}$
- CMOS power levels ($0.4\mu\text{W}$ typ. static)
- Rail-to-Rail output swing for increased noise margin

Drive Features for ALVCH16830:

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

DESCRIPTION:

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

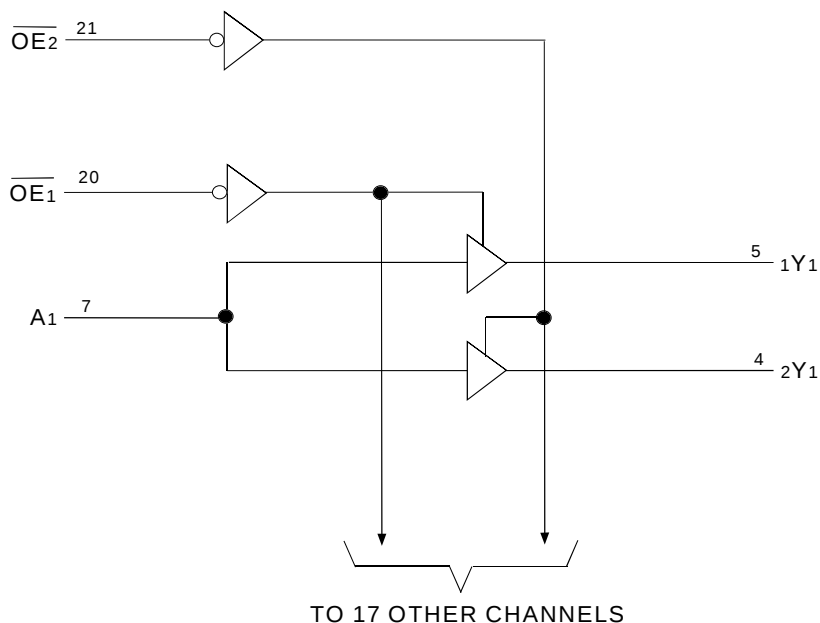
The ALVCH16830 has been designed with a $\pm 24\text{mA}$ output driver. This driver is capable of driving a moderate to heavy load while maintaining speed performance.

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.

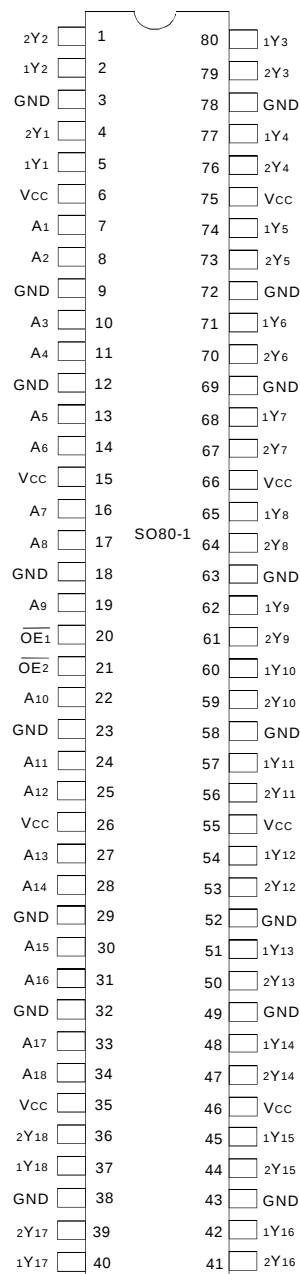
APPLICATIONS:

- 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 ⁽¹⁾
xYx	3-State Outputs

NOTE:

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

ABSOLUTE MAXIMUM RATING ⁽¹⁾

Symbol	Description	Max.	Unit
$V_{TERM}^{(2)}$	Terminal Voltage with Respect to GND	-0.5 to +4.6	V
$V_{TERM}^{(3)}$	Terminal Voltage with Respect to GND	-0.5 to $V_{CC} + 0.5$	V
T _{STG}	Storage Temperature	-65 to +150	°C
I _{OUT}	DC Output Current	-50 to +50	mA
I _{IK}	Continuous Clamp Current, $V_I < 0$ or $V_I > V_{CC}$	±50	mA
I _{OK}	Continuous Clamp Current, $V_O < 0$	-50	mA
I _{CC}	Continuous Current through each V _{CC} or GND	±100	mA

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NOTES:

- 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.
- V_{CC} terminals.
- All terminals except V_{CC}.

CAPACITANCE (T_A = +25°C, f = 1.0MHz)

Symbol	Parameter ⁽¹⁾	Conditions	Typ.	Max.	Unit
C _{IN}	Input Capacitance	V _{IN} = 0V	5	7	pF
C _{OUT}	Output Capacitance	V _{OUT} = 0V	7	9	pF
C _{I/O}	I/O Port Capacitance	V _{IN} = 0V	7	9	pF

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NOTE:

- 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:

- 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. ⁽¹⁾	Max.	Unit
V _{IH}	Input HIGH Voltage Level	V _{CC} = 2.3V to 2.7V		1.7	—	—	V
		V _{CC} = 2.7V to 3.6V		2	—	—	
V _{IL}	Input LOW Voltage Level	V _{CC} = 2.3V to 2.7V		—	—	0.7	V
		V _{CC} = 2.7V to 3.6V		—	—	0.8	
I _{IH}	Input HIGH Current	V _{CC} = 3.6V	V _I = V _{CC}	—	—	± 5	μA
I _{IL}	Input LOW Current	V _{CC} = 3.6V	V _I = GND	—	—	± 5	
I _{OZH}	High Impedance Output Current (3-State Output pins)	V _{CC} = 3.6V	V _O = V _{CC}	—	—	± 10	μA
I _{OZL}			V _O = GND	—	—	± 10	μA
V _{IK}	Clamp Diode Voltage	V _{CC} = 2.3V, I _{IN} = – 18mA		—	– 0.7	– 1.2	V
V _H	Input Hysteresis	V _{CC} = 3.3V		—	100	—	mV
I _{CCL} I _{CCH} I _{CCZ}	Quiescent Power Supply Current	V _{CC} = 3.6V V _{IN} = GND or V _{CC}		—	0.1	40	μA
ΔI _{CC}	Quiescent Power Supply Current Variation	One input at V _{CC} – 0.6V, other inputs at V _{CC} or GND		—	—	750	μA

NOTE:

1. Typical values are at V_{CC} = 3.3V, +25°C ambient.

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BUS-HOLD CHARACTERISTICS

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

NOTES:

1. Pins with Bus-hold are identified in the pin description.
2. Typical values are at V_{CC} = 3.3V, +25°C ambient.

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OUTPUT DRIVE CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾		Min.	Max.	Unit
VOH	Output HIGH Voltage	Vcc = 2.3V to 3.6V	IOH = – 0.1mA	Vcc – 0.2	—	V
		Vcc = 2.3V	IOH = – 6mA	2	—	
		Vcc = 2.3V	IOH = – 12mA	1.7	—	
		Vcc = 2.7V		2.2	—	
		Vcc = 3.0V		2.4	—	
		Vcc = 3.0V	IOH = – 24mA	2	—	
VOL	Output LOW Voltage	Vcc = 2.3V to 3.6V	IOL = 0.1mA	—	0.2	V
		Vcc = 2.3V	IOL = 6mA	—	0.4	
			IOL = 12mA	—	0.7	
		Vcc = 2.7V	IOL = 12mA	—	0.4	
		Vcc = 3.0V	IOL = 24mA	—	0.55	

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NOTE:

1. VIH and VIL must be within the min. or max. range shown in the DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE table for the appropriate Vcc range. TA = – 40°C to + 85°C.

OPERATING CHARACTERISTICS, TA = 25°C

Symbol	Parameter	Test Conditions	Vcc = 2.5V ± 0.2V	Vcc = 3.3V ± 0.3V	Unit
			Typical	Typical	
CPD	Power Dissipation Capacitance per driver Outputs enabled	CL = 0pF, f = 10Mhz	—	—	pF
CPD	Power Dissipation Capacitance per driver Outputs disabled		—	—	pF

SWITCHING CHARACTERISTICS ⁽¹⁾

Symbol	Parameter	Vcc = 2.5V ± 0.2V		Vcc = 2.7V		Vcc = 3.3V ± 0.3V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
tPLH tPHL	Propagation Delay Ax to xYx	1.2	3.4	—	3.5	1.5	3	ns
tpZH tpZL	Output Enable Time OEx to xYx	1	5.6	—	5.2	1	4	ns
tPHZ tPLZ	Output Disable Time OEx to xYx	1.2	5.7	—	5	1.5	4.6	ns
tsk(0)	Output Skew ⁽²⁾	—	—	—	—	—	500	ps

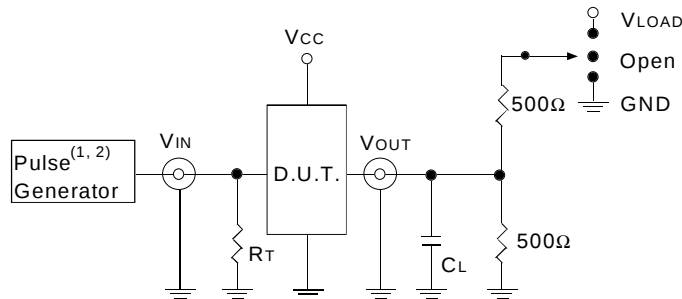
NOTES:

1. See test circuits and waveforms. TA = – 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 _{CC} (1)= 3.3V±0.3V	V _{CC} (1)= 2.7V	V _{CC} (2)= 2.5V±0.2V	Unit
V _{LOAD}	6	6	2 x V _{CC}	V
V _{IH}	2.7	2.7	V _{CC}	V
V _T	1.5	1.5	V _{CC} / 2	V
V _{LZ}	300	300	150	mV
V _{HZ}	300	300	150	mV
C _L	50	50	30	pF

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TEST CIRCUITS FOR ALL OUTPUTS

ALVC Link

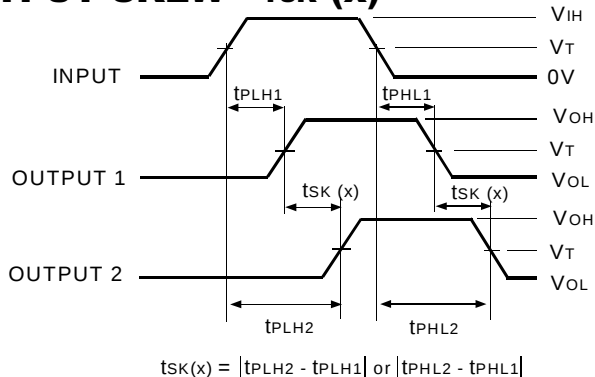
DEFINITIONS:C_L = Load capacitance: includes jig and probe capacitance.R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.**NOTES:**

1. Pulse Generator for All Pulses: Rate ≤ 10MHz; t_r ≤ 2.5ns; t_r ≤ 2.5ns.
2. Pulse Generator for All Pulses: Rate ≤ 10MHz; t_r ≤ 2ns; t_r ≤ 2ns.

SWITCH POSITION

Test	Switch
Open Drain Disable Low Enable Low	V _{LOAD}
Disable High Enable High	GND
All Other tests	Open

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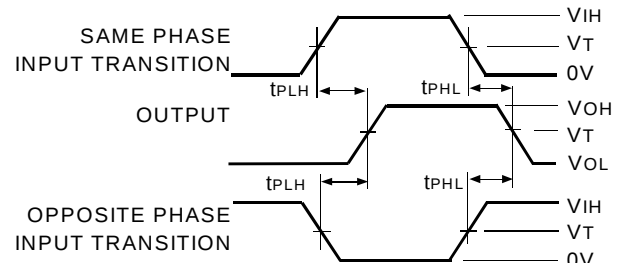
OUTPUT SKEW - t_{SK} (x)

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

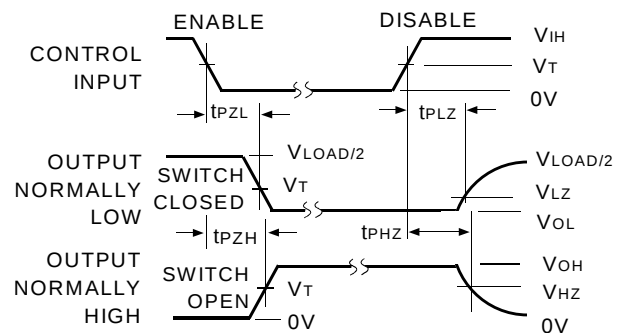
ALVC Link

NOTES:

1. For t_{SK}(o) OUTPUT1 and OUTPUT2 are any two outputs.
2. For t_{SK}(b) OUTPUT1 and OUTPUT2 are in the same bank.

PROPAGATION DELAY

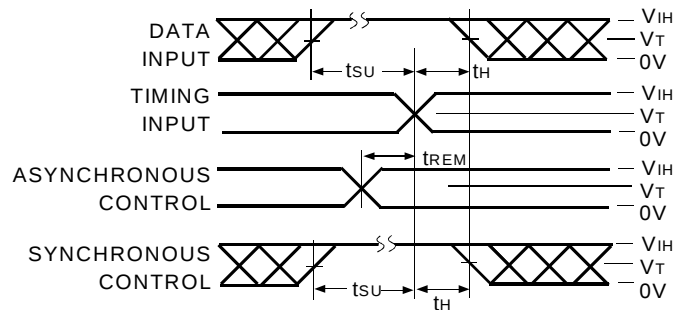
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ENABLE AND DISABLE TIMES

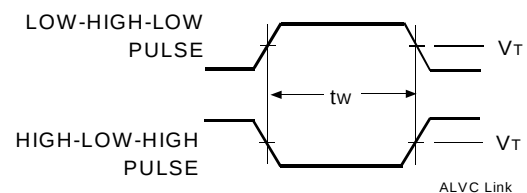
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NOTE:

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

IDT	XX	ALVC	X	XXX	XXX	XX	
Temp. Range			Bus-Hold	Family	Device Type	Package	
						DF	Thin Very Small Outline Package (SO80-1)
						830	1-Bit To 2-Bit Address Driver with 3-State Outputs
						16	Double-Density with Resistors, ±24mA
						H	Bus-Hold
						74	−40°C to +85°C



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