



3.3V CMOS 1-BIT TO 4-BIT ADDRESS REGISTER/DRIVER WITH 3-STATE OUTPUTS AND BUS-HOLD

IDT74ALVCH16832

FEATURES:

- 0.5 MICRON CMOS Technology
- Typical $t_{sk(o)}$ (Output Skew) < 250ps
- ESD > 2000V per MIL-STD-883, Method 3015; > 200V using machine model (C = 200pF, R = 0)
- $V_{cc} = 3.3V \pm 0.3V$, Normal Range
- $V_{cc} = 2.7V$ to $3.6V$, Extended Range
- $V_{cc} = 2.5V \pm 0.2V$
- CMOS power levels ($0.4\mu W$ typ. static)
- Rail-to-Rail output swing for increased noise margin
- Available in TSSOP package

DRIVE FEATURES:

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

APPLICATIONS:

- Memory subsystems
- PC Motherboards and servers
- Workstations
- Telecommunications

DESCRIPTION:

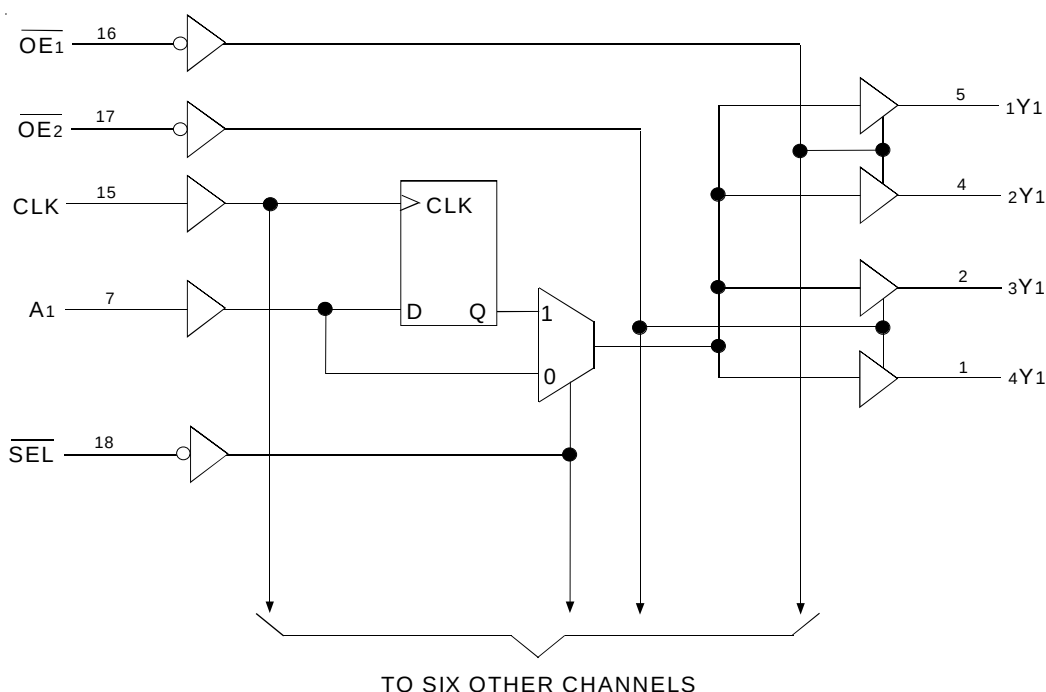
This 1-bit to 4-bit address register/driver is built using advanced dual metal CMOS technology. This device is ideal for use in applications in which a single address bus is driving four separate memory locations. The ALVCH16832 can be used as a buffer or a register, depending on the logic level of the select ($\overline{SEL}$) input.

When $\overline{SEL}$ is logic high, the device is in the buffer mode. The outputs follow the inputs and are controlled by the two output-enable ($\overline{OE}$) controls. Each $\overline{OE}$ controls two groups of seven outputs. When $\overline{SEL}$ is logic low, the device is in the register mode. The register is an edge-triggered D-type flip-flop. On the positive transition of the clock (CLK) input, data at the A inputs is stored in the internal registers. $\overline{OE}$ controls operate the same as in buffer mode.

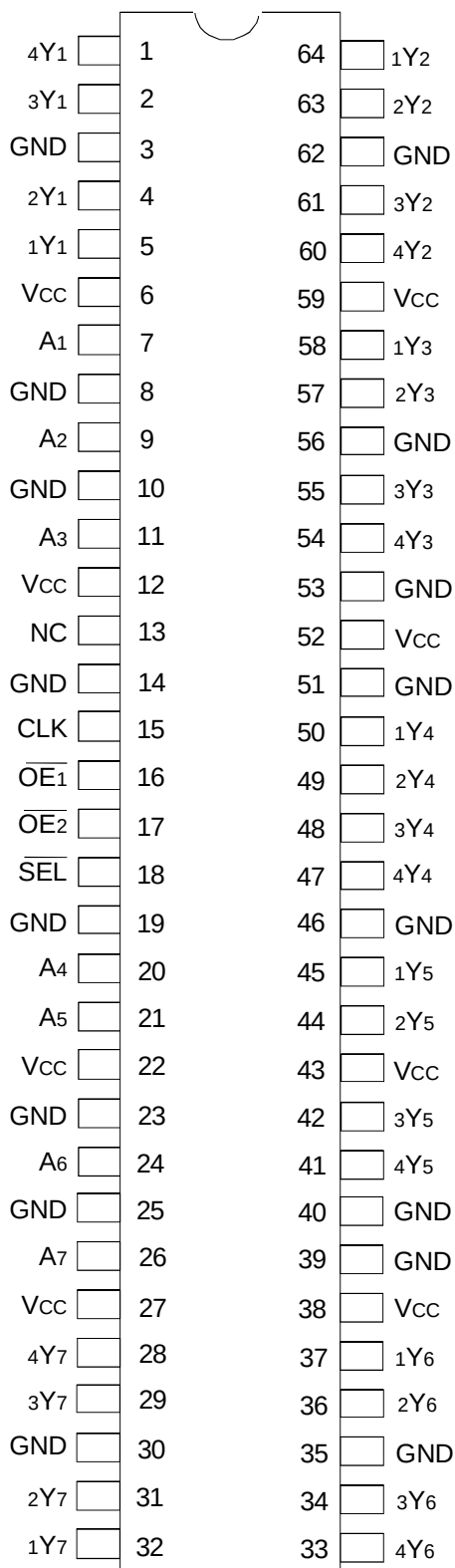
The ALVCH16832 has been designed with a $\pm 24mA$ output driver. This driver is capable of driving a moderate to heavy load while maintaining speed performance.

The ALVCH16832 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.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION

TSSOP
TOP VIEWABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Description	Max	Unit
VTERM ⁽²⁾	Terminal Voltage with Respect to GND	-0.5 to +4.6	V
VTERM ⁽³⁾	Terminal Voltage with Respect to GND	-0.5 to V _{CC} +0.5	V
TSTG	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} I _{SS}	Continuous Current through each V _{CC} or GND	±100	mA

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 _{OUT}	I/O Port Capacitance	V _{IN} = 0V	7	9	pF

NOTE:

- As applicable to the device type.

PIN DESCRIPTION

Pin Names	Description
$\overline{OE}x$	3-State Output Enable Inputs (Active LOW)
CLK	Register Input Clock
$\overline{SEL}$	Select Input (Active LOW)
A _x	Data Inputs ⁽¹⁾
xY _x	3-State Outputs
NC	No Internal Connection

NOTE:

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

FUNCTION TABLE⁽¹⁾

Inputs				Outputs
$\overline{OE}x$	$\overline{SEL}$	CLK	A _x	xY _x
H	X	X	X	Z
L	H	X	L	L
L	H	X	H	H
L	L	↑	L	L
L	L	↑	H	H

NOTE:

- H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care
Z = High Impedance
↑ = LOW-to-HIGH Transition

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Operating Condition: $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$

Symbol	Parameter	Test Conditions		Min.	Typ. ⁽¹⁾	Max.	Unit
V_{IH}	Input HIGH Voltage Level	$V_{CC} = 2.3\text{V}$ to 2.7V		1.7	—	—	V
		$V_{CC} = 2.7\text{V}$ to 3.6V		2	—	—	
V_{IL}	Input LOW Voltage Level	$V_{CC} = 2.3\text{V}$ to 2.7V		—	—	0.7	V
		$V_{CC} = 2.7\text{V}$ to 3.6V		—	—	0.8	
I_{IH}	Input HIGH Current	$V_{CC} = 3.6\text{V}$	$V_I = V_{CC}$	—	—	± 5	μA
I_{IL}	Input LOW Current	$V_{CC} = 3.6\text{V}$	$V_I = \text{GND}$	—	—	± 5	μA
I_{OZH}	High Impedance Output Current (3-State Output pins)	$V_{CC} = 3.6\text{V}$	$V_O = V_{CC}$	—	—	± 10	μA
I_{OZL}			$V_O = \text{GND}$	—	—	± 10	
V_{IK}	Clamp Diode Voltage	$V_{CC} = 2.3\text{V}$, $I_{IN} = -18\text{mA}$		—	-0.7	-1.2	V
V_H	Input Hysteresis	$V_{CC} = 3.3\text{V}$		—	100	—	mV
I_{CCL} I_{CCH} I_{CCZ}	Quiescent Power Supply Current	$V_{CC} = 3.6\text{V}$ $V_{IN} = \text{GND}$ or V_{CC}		—	0.1	40	μA
ΔI_{CC}	Quiescent Power Supply Current Variation	One input at $V_{CC} - 0.6\text{V}$, other inputs at V_{CC} or GND		—	—	750	μA

NOTE:

1. Typical values are at $V_{CC} = 3.3\text{V}$, $+25^{\circ}\text{C}$ ambient.

BUS-HOLD CHARACTERISTICS

Symbol	Parameter ⁽¹⁾	Test Conditions		Min.	Typ. ⁽²⁾	Max.	Unit
I_{BHH} I_{BHL}	Bus-Hold Input Sustain Current	$V_{CC} = 3\text{V}$	$V_I = 2\text{V}$	-75	—	—	μA
			$V_I = 0.8\text{V}$	75	—	—	
I_{BHH} I_{BHL}	Bus-Hold Input Sustain Current	$V_{CC} = 2.3\text{V}$	$V_I = 1.7\text{V}$	-45	—	—	μA
			$V_I = 0.7\text{V}$	45	—	—	
I_{BHHO} I_{BHL0}	Bus-Hold Input Overdrive Current	$V_{CC} = 3.6\text{V}$	$V_I = 0$ to 3.6V	—	—	± 500	μA

NOTES:

1. Pins with Bus-Hold are identified in the pin description.
2. Typical values are at $V_{CC} = 3.3\text{V}$, $+25^{\circ}\text{C}$ ambient.

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 = 3V		2.4	—	
		VCC = 3V	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 = 3V	IOL = 24mA	—	0.55	

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 Register/Driver Outputs enabled	CL = 0pF, f = 10Mhz	119	132	pF
CPD	Power Dissipation Capacitance per Register/Driver Outputs disabled		22	25	

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.	
fMAX		150	—	150	—	150	—	ns
tPLH tPHL	Propagation Delay Ax to xYx	1.2	4	—	4.1	1.6	3.6	ns
tPLH tPHL	Propagation Delay CLK to xYx	1.1	4.5	—	4.4	1.5	3.9	ns
tPLH tPHL	Propagation Delay SEL to xYx	1.3	5.2	—	5.2	1.7	4.4	ns
tPZH tPZL	Output Enable Time OEx to xYx	1.1	5.1	—	5	1.3	4.3	ns
tPHZ tPLZ	Output Disable Time OEx to xYx	1.4	5.5	—	4.7	1.6	4.5	ns
tSU	Set-up Time, Ax data before CLK↑	2	—	2	—	1.6	—	ns
tH	Hold Time, Ax data after CLK↑	0.7	—	0.5	—	1.1	—	ns
tW	Pulse Duration, CLK HIGH or LOW	3.3	—	3.3	—	3.3	—	ns
tsk(O)	Output Skew ⁽²⁾	—	—	—	—	—	500	ps

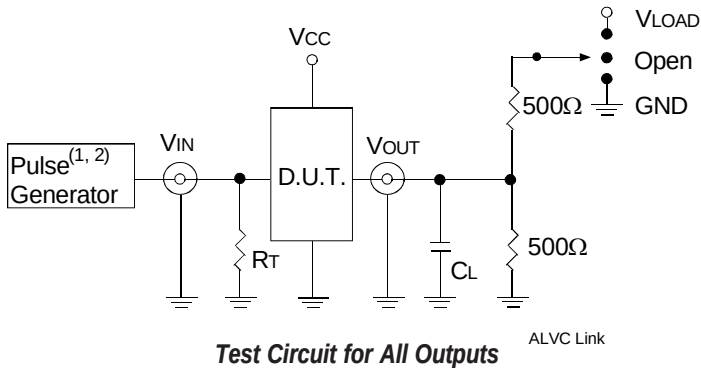
NOTES:

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



DEFINITIONS:

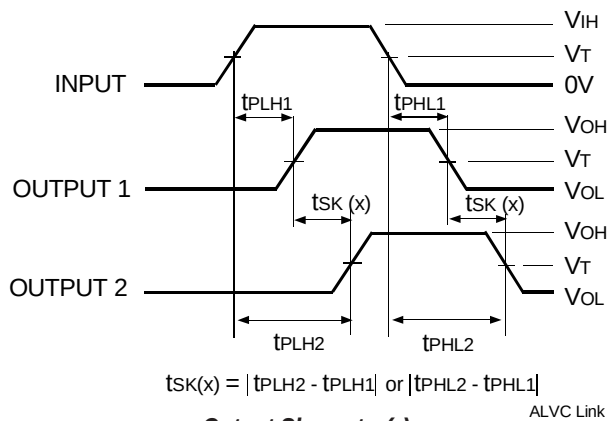
C_L = Load capacitance: includes jig and probe capacitance.R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.

NOTES:

1. Pulse Generator for All Pulses: Rate ≤ 1.0MHz; t_r ≤ 2.5ns; t_f ≤ 2.5ns.
2. Pulse Generator for All Pulses: Rate ≤ 1.0MHz; t_r ≤ 2ns; t_f ≤ 2ns.

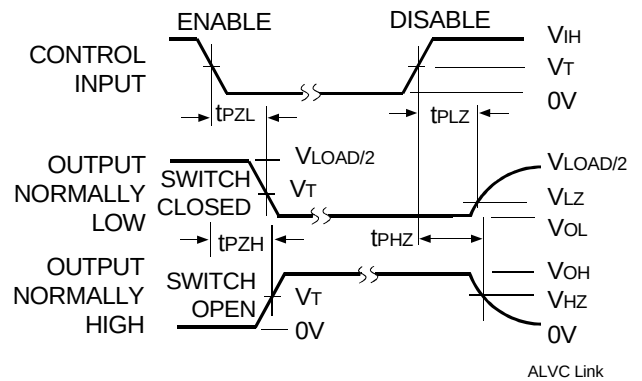
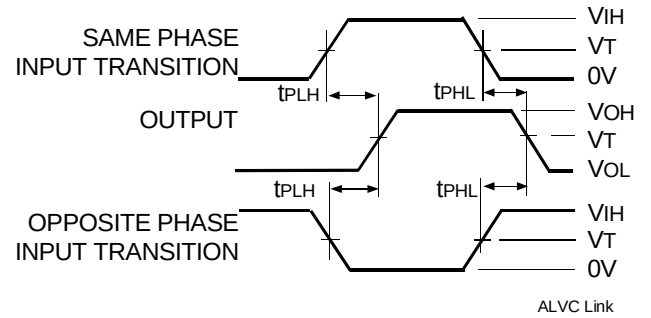
SWITCH POSITION

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



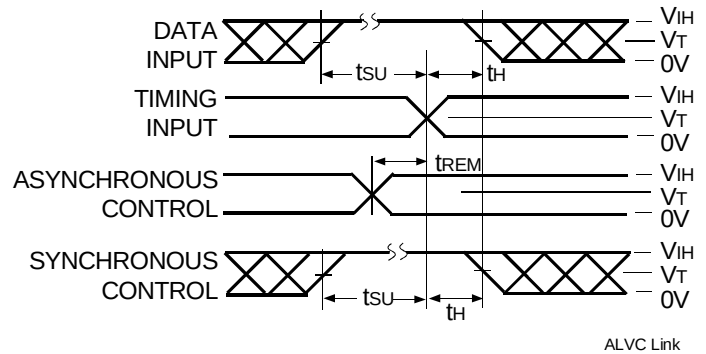
NOTES:

1. For t_{SK}(0) OUTPUT1 and OUTPUT2 are any two outputs.
2. For t_{SK}(b) OUTPUT1 and OUTPUT2 are in the same bank.

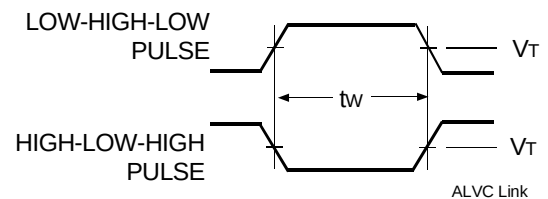


NOTE:

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



Set-up, Hold, and Release Times



Pulse Width

ORDERING INFORMATION

IDT	XX	ALVC	X	XXX	XXX	XX	
	Temp. Range		Bus-Hold	Family	Device Type	Package	
						PA	Thin Shrink Small Outline Package
						832	1-Bit to 4-Bit Address Register/Driver with 3-State Outputs
						16	Double-Density, $\pm 24\text{mA}$
						H	Bus Hold
						74	-40°C to $+85^{\circ}\text{C}$



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