



3.3V CMOS 20-BIT BUFFER/DRIVER WITH 3-STATE OUTPUTS AND BUS-HOLD

IDT74ALVCH16827

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)
- 0.635mm pitch SSOP, 0.50mm pitch TSSOP,
and 0.40mm pitch TVSOP packages
- 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 ALVCH16827:

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

APPLICATIONS:

- 3.3V High Speed Systems
- 3.3V and lower voltage computing systems

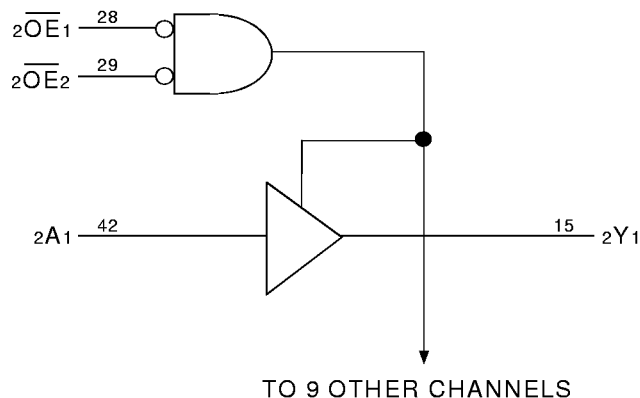
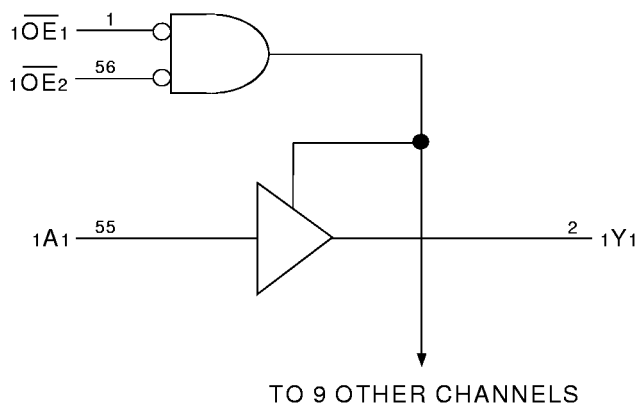
DESCRIPTION:

This 20-bit buffer/driver is built using advanced dual metal CMOS technology. The ALVCH16827 is composed of two 10-bit buffer sections with separate output-enable signals. For either 10-bit buffer section, the two output-enable ($1\overline{\text{OE}}1$ and $1\overline{\text{OE}}2$ or $2\overline{\text{OE}}1$ and $2\overline{\text{OE}}2$) inputs must both be low for the corresponding Y outputs to be active. If either output-enable input is high, the outputs of the 10-bit buffer section are in the high-impedance state.

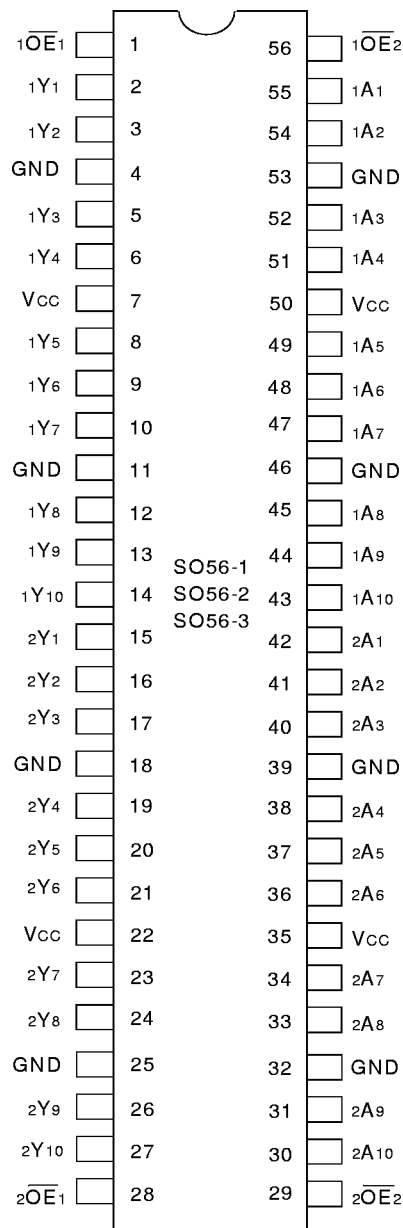
The ALVCH16827 has been designed with a $\pm 24\text{mA}$ output driver. This driver is capable of driving a moderate to heavy load while maintaining speed performance.

The ALVCH16827 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



SSOP/TSSOP/TVSOP
TOP VIEW

PIN DESCRIPTION

Pin Names	Description
xOEx	Output Enable Inputs (Active LOW)
xAx	Data Inputs ⁽¹⁾
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
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} I _{SS}	Continuous Current through each V _{CC} 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 ($T_A = +25^{\circ}\text{C}$, $f = 1.0\text{MHz}$)

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:

1. As applicable to the device type.

FUNCTION TABLE (each 10-bit section) ⁽¹⁾

Inputs		Outputs	
$\overline{xOE_1}$	$\overline{xOE_2}$	xAx	xYx
L	L	L	L
L	L	H	H
H	X	X	Z
X	H	X	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: $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$

Symbol	Parameter	Test Conditions		Min.	Typ. ⁽¹⁾	Max.	Unit
V_{IH}	Input HIGH Voltage Level	$V_{CC} = 2.3\text{V to } 2.7\text{V}$		1.7	—	—	V
		$V_{CC} = 2.7\text{V to } 3.6\text{V}$		2	—	—	
V_{IL}	Input LOW Voltage Level	$V_{CC} = 2.3\text{V to } 2.7\text{V}$		—	—	0.7	V
		$V_{CC} = 2.7\text{V to } 3.6\text{V}$		—	—	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	
I_{OZH}	High Impedance Output Current (3-State Output pins)	$V_{CC} = 3.6\text{V}$	$V_O = V_{CC}$	—	—	± 10	μA
I_{OLZ}			$V_O = \text{GND}$	—	—	± 10	μA
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_{OCL} I_{OCH} I_{OCC}	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.

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BUS-HOLD CHARACTERISTICS

Symbol	Parameter ⁽¹⁾	Test Conditions		Min.	Typ. ⁽²⁾	Max.	Unit
I_{BHH}	Bus-Hold Input Sustain Current	$V_{CC} = 3.0\text{V}$	$V_I = 2.0\text{V}$	-75	—	—	μA
I_{BHL}			$V_I = 0.8\text{V}$	75	—	—	
I_{BHH}	Bus-Hold Input Sustain Current	$V_{CC} = 2.3\text{V}$	$V_I = 1.7\text{V}$	-45	—	—	μA
I_{BHL}			$V_I = 0.7\text{V}$	45	—	—	
I_{BHNO} I_{BHLO}	Bus-Hold Input Overdrive Current	$V_{CC} = 3.6\text{V}$	$V_I = 0 \text{ to } 3.6\text{V}$	—	—	± 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.

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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 Outputs enabled	CL = 0pF, f = 10Mhz	16	18	pF
CPD	Power Dissipation Capacitance Outputs disabled		4	6	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	Propagation Delay	1	4.1	—	3.9	1	3.4	ns
tPHL	xAX to xYx							
tPZH	Output Enable Time	1	6	—	5.7	1	4.7	ns
tPZL	xOEx to xYx							
tPHZ	Output Disable Time	1.2	5.6	—	4.9	1.3	4.5	ns
tPLZ	xOEx to xYx							
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.

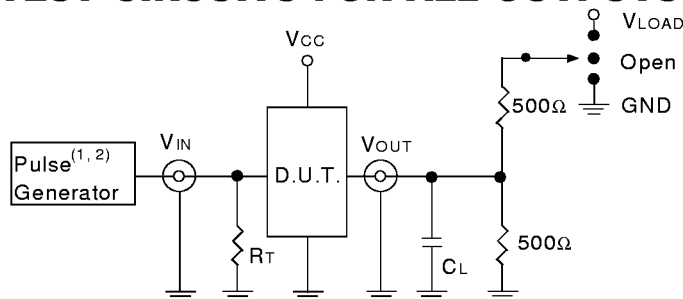
TEST CIRCUITS AND WAVEFORMS:

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

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TEST CIRCUITS FOR ALL OUTPUTS



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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:

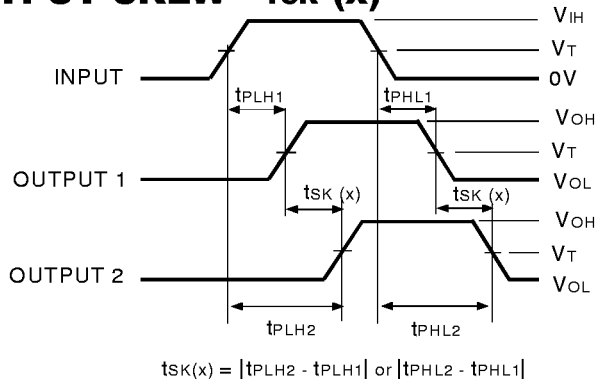
1. Pulse Generator for All Pulses: Rate ≤ 10MHz; t_F ≤ 2.5ns; t_R ≤ 2.5ns.
2. Pulse Generator for All Pulses: Rate ≤ 10MHz; t_F ≤ 2ns; t_R ≤ 2ns.

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)



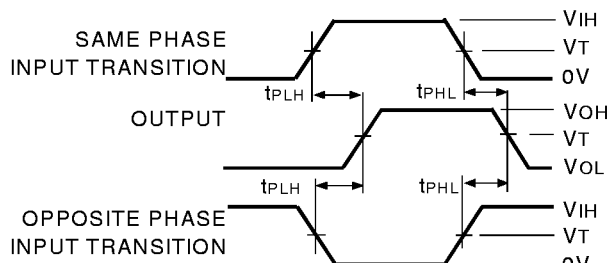
$$t_{SK}(x) = |t_{PLH2} - t_{PLH1}| \text{ or } |t_{PHL2} - t_{PHL1}|$$

ALVC Link

NOTES:

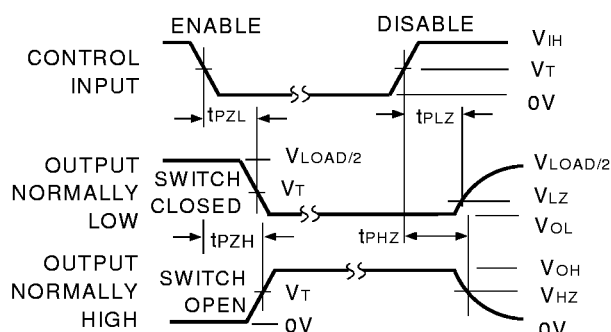
1. For t_{SK}(o) OUTPUT1 and OUTPUT2 are any two outputs.
2. For t_{SK}(b) OUTPUT1 and OUTPUT2 are in the same bank.

PROPAGATION DELAY



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ENABLE AND DISABLE TIMES

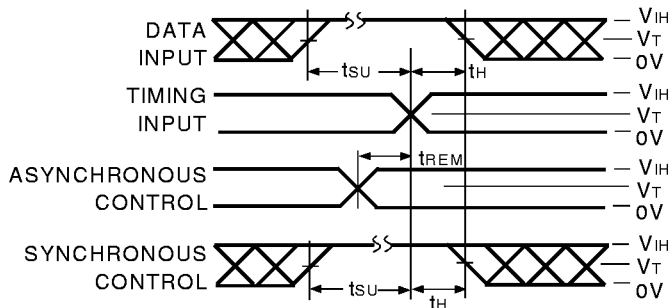


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NOTE:

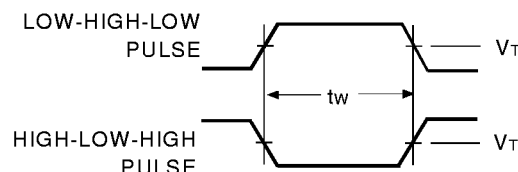
1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.

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	
						PV	Shrink Small Outline Package (SO56-1)
						PA	Thin Shrink Small Outline Package (SO56-2)
						PF	Thin Very Small Outline Package (SO56-3)
					827		20-Bit Buffer/Driver with 3-State Outputs
				16			Double-Density with Resistors, $\pm 24\text{mA}$
			H				Bus-Hold
						74	-40°C to $+85^{\circ}\text{C}$



CORPORATE HEADQUARTERS
 2975 Stender Way
 Santa Clara, CA 95054

for SALES:
 800-345-7015 or 408-727-6116
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