



3.3V CMOS HEX SCHMITT-TRIGGER INVERTER

IDT74ALVC14

FEATURES:

- 0.5 MICRON CMOS Technology
- 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 (0.4μW typ. static)
- Rail-to-Rail output swing for increased noise margin
- Available in SOIC, SSOP and TSSOP packages

Drive Features for ALVC14:

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

DESCRIPTION:

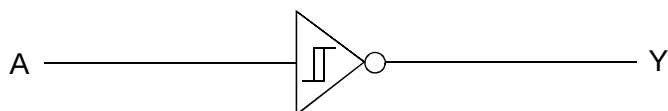
This hex Schmitt-trigger inverter is built using advanced dual metal CMOS technology. The ALVC14 contains six independent inverters, and performs the Boolean function $Y = \bar{A}$.

The ALVC14 has been designed with a $\pm 24mA$ output driver. This driver is capable of driving a moderate to heavy load while maintaining speed performance.

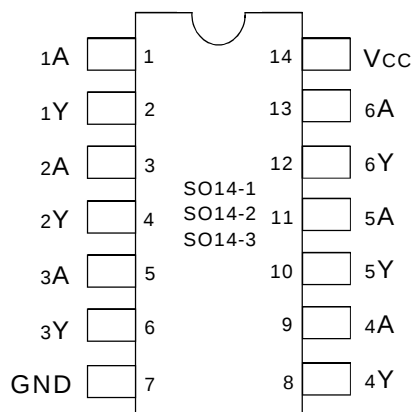
APPLICATIONS:

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

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



SOIC/ SSOP/ TSSOP
TOP VIEW

PIN DESCRIPTION

Pin Names	Description
xA	Data Inputs
xY	Data Outputs

FUNCTION TABLE (each gate) (1)

Input	Output
xA	xY
H	L
L	H

NOTE:

1. H = HIGH Voltage Level
L = LOW Voltage Level

ABSOLUTE MAXIMUM RATINGS⁽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	±100	mA
I _{SS}	V _{CC} or GND		

ALVC QUAD Link

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 (TA = +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

ALVC QUAD Link

NOTE:

- As applicable to the device type.

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
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	
V _{IK}	Clamp Diode Voltage	V _{CC} = 2.3V, I _{IN} = − 18mA		—	− 0.7	− 1.2	V
I _{CC} I _{CC} H	Quiescent Power Supply Current	V _{CC} = 3.6V V _{IN} = GND or V _{CC}		—	0.1	20	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:

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

OUTPUT DRIVE CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽⁴⁾		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	

ALVC QUAD Link

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 inverter	CL = 0pF, f = 10Mhz	27	31	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 xA to xY	1	6	1	5.5	1	4.5	ns
tPHL								

NOTE:

1. See test circuits and waveforms. TA = – 40°C to + 85°C.

HYSTERESIS CHARACTERISTICS

Parameter	Test Conditions	VCC	Min.	Typ.	Max.	Unit
VT+	Input Voltage, from VIL to VIH, in a linear ramp observing the output transition.	2.7V	0.8		2	V
Positive-going threshold		3V	0.8		2	
		3.6V	0.8		2	
VT–	Input Voltage, from VIH to VIL, in a linear ramp observing the output transition.	2.7V	0.4		1.4	V
Negative-going threshold		3V	0.6		1.5	
		3.6V	0.8		1.8	
ΔVT	$\Delta V_{T \min} = V_{T+ \min} - V_{T- \max} $ $\Delta V_{T \max} = V_{T+ \max} - V_{T- \min} $	2.7V	0.3		1.1	V
Hysteresis		3V	0.3		1.2	
(VT+ – VT–)		3.6V	0.3		1.2	

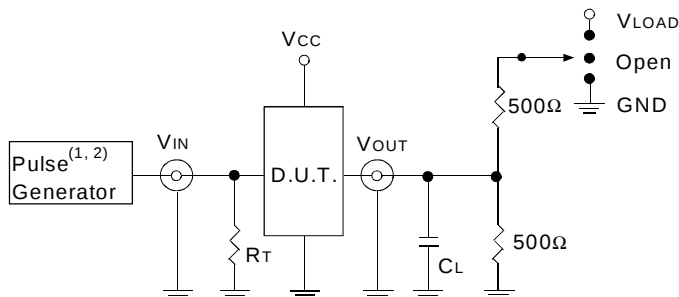
TEST CIRCUITS AND WAVEFORMS:

TEST CONDITIONS

Symbol	$V_{CC(1)} = 3.3V \pm 0.3V$	$V_{CC(1)} = 2.7V$	$V_{CC(2)} = 2.5V \pm 0.2V$	Unit
V_{LOAD}	6	6	$2 \times V_{CC}$	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

ALVC QUAD Link

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:

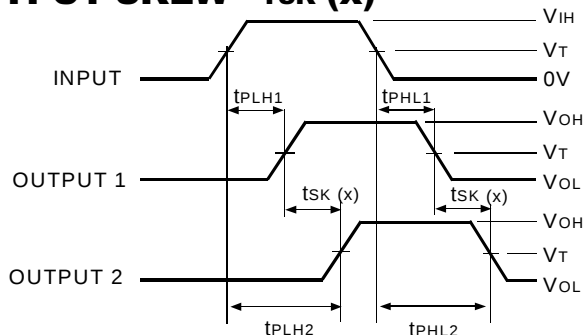
1. Pulse Generator for All Pulses: Rate $\leq 10\text{MHz}$; $t_F \leq 2.5\text{ns}$; $t_R \leq 2.5\text{ns}$.
2. Pulse Generator for All Pulses: Rate $\leq 10\text{MHz}$; $t_F \leq 2\text{ns}$; $t_R \leq 2\text{ns}$.

SWITCH POSITION

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

ALVC QUAD Link

OUTPUT SKEW - $\tau_{SK}(x)$



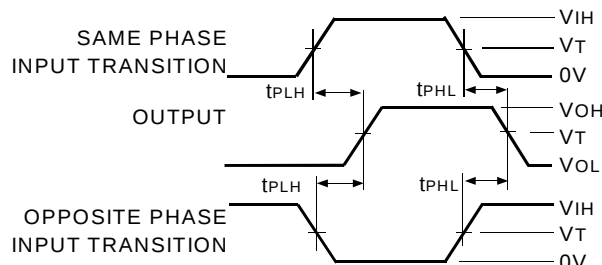
$$\tau_{SK}(x) = |t_{PLH2} - t_{PLH1}| \text{ or } |t_{PHL2} - t_{PHL1}|$$

NOTES:

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

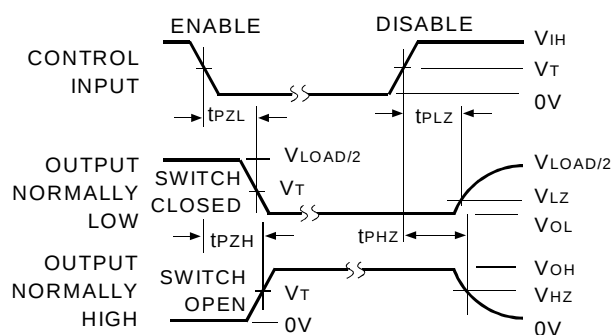
ALVC Link

PROPAGATION DELAY



ALVC Link

ENABLE AND DISABLE TIMES

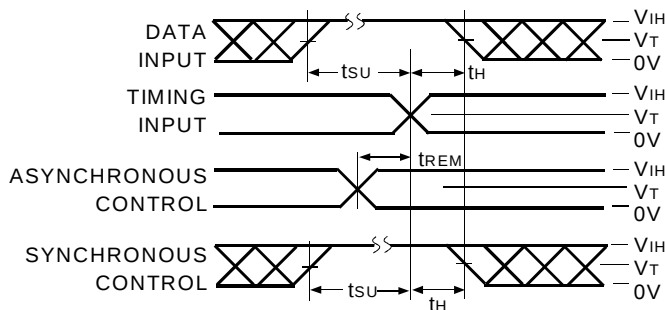


ALVC Link

NOTE:

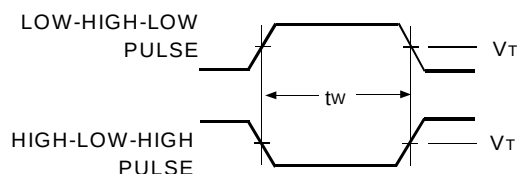
1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.

SET-UP, HOLD, AND RELEASE TIMES



ALVC Link

PULSE WIDTH



ALVC Link

ORDERING INFORMATION

IDT	XX	ALVC	XX	XX	
	Temp. Range		Device Type	Package	
				DC	Small Outline IC (SO14-1)
				PY	Shrink Small Outline Package (SO14-2)
				PG	Thin Shrink Small Outline Package (SO14-3)
				14	Hex Schmitt-Trigger Inverter, $\pm 24\text{mA}$
				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
fax: 408-492-8674
www.idt.com*

*To search for sales office near you, please click the sales button found on our home page or dial the 800# above and press 2.
The IDT logo is a registered trademark of Integrated Device Technology, Inc.