HD74ALVCHS162830

1-bit to 2-bit Address Driver with 3-state Outputs

HITACHI

ADE-205-221 (Z)
Preliminary
1st. Edition
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Description

This 1-bit to 2-bit address driver is designed for 2.3 V to 3.6 V V_{CC} operation. To ensure the high impedance state during power up or power down, $\overline{OE}$ should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current sinking capability of the driver. Active bus hold circuitry is provided to hold unused or floating inputs at a valid logic level. All outputs, which are designed to sink up to 12 mA, include equivalent 26 Ω resistors to reduce overshoot and undreshoot.

Diodes to V_{CC} have been added on the inputs to clamp overshoot.

Features

- V_{CC} = 2.3 V to 3.6 V
- Typical V_{OL} ground bounce < 0.8 V (@V_{CC} = 3.3 V, Ta = 25°C)
- Typical V_{OH} undershoot > 2.0 V (@V_{CC} = 3.3 V, Ta = 25°C)
- High output current ±12 mA (@V_{CC} = 3.0 V)
- Bus hold on data inputs eliminates the need for external pullup / pulldown resistors
- All outputs have equivalent 26 Ω series resistors, so no external resistors are required
- Diode on inputs clamp overshoot

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Function Table

Inputs			Outputs	
$\overline{OE1}$	$\overline{OE2}$	A	1Yn	2Yn
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

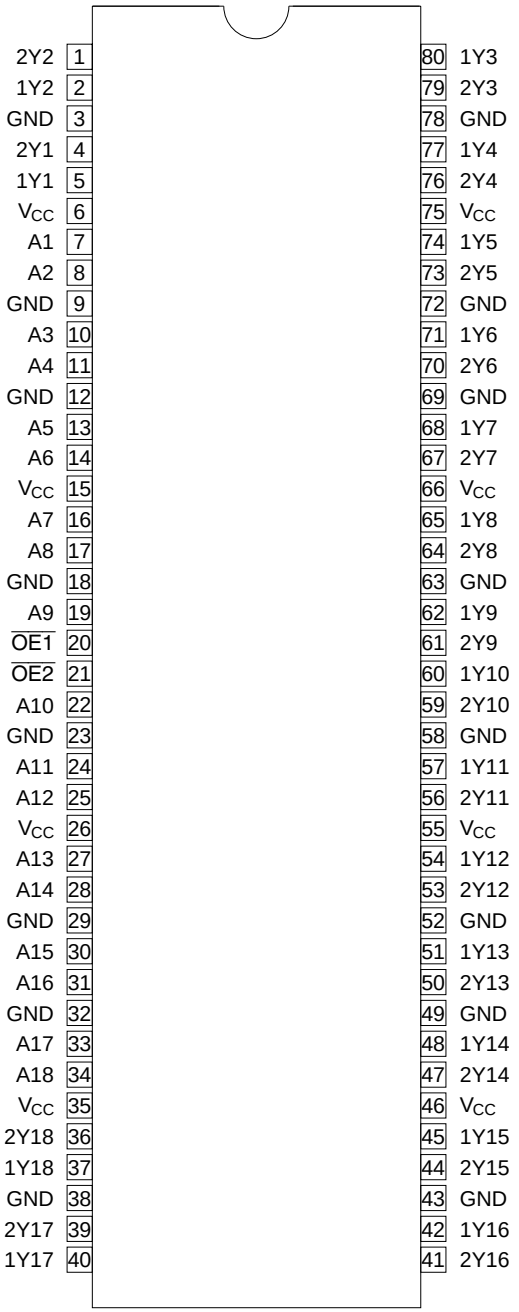
H : High level

L : Low level

X : Immaterial

Z : High impedance

Pin Arrangement



(Top view)

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V_{CC}	–0.5 to 4.6	V	
Input voltage [*1]	V_I	–0.5 to 4.6	V	
Output voltage [*1, 2]	V_O	–0.5 to V_{CC} +0.5	V	
Input clamp current	I_{IK}	–50	mA	$V_I < 0$
Output clamp current	I_{OK}	±50	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	I_O	±50	mA	V_O = 0 to V_{CC}
V_{CC}, GND current / pin	I_{CC} or I_{GND}	±100	mA	
Maximum power dissipation at Ta = 55°C (in still air) [*3]	P_T	1	W	TVSOP
Storage temperature	T_{stg}	–65 to 150	°C	

Notes: Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

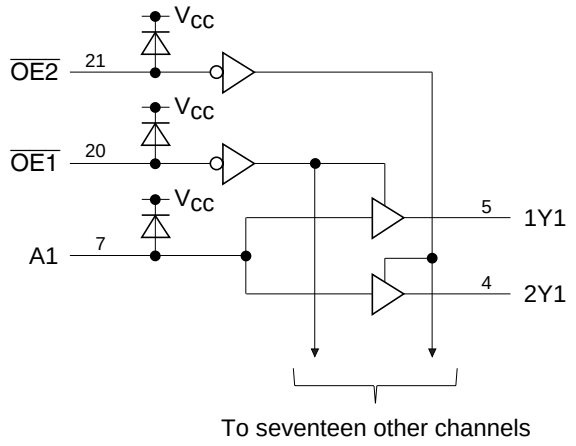
1. The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.
2. This value is limited to 4.6 V maximum.
3. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage	V_{CC}	2.3	3.6	V	
Input voltage	V_I	0	V_{CC}	V	
Output voltage	V_O	0	V_{CC}	V	
High level output current	I_{OH}	—	–6	mA	V_{CC} = 2.3 V
		—	–8		V_{CC} = 2.7 V
		—	–12		V_{CC} = 3.0 V
Low level output current	I_{OL}	—	6	mA	V_{CC} = 2.3 V
		—	8		V_{CC} = 2.7 V
		—	12		V_{CC} = 3.0 V
Input transition rise or fall rate	t / v	0	10	ns / V	
Operating temperature	T_a	–40	85	°C	

Note: Unused control inputs must be held high or low to prevent them from floating.

Logic Diagram



Electrical Characteristics (Ta = –40 to 85°C)

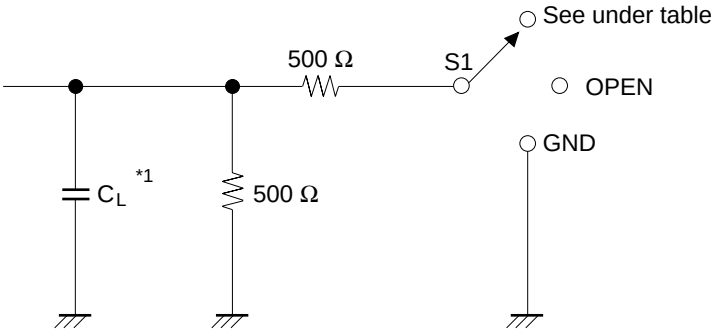
Item	Symbol	V_{CC} (V)	Min	Max	Unit	Test Conditions
Input voltage	V_{IH}	2.3 to 2.7	1.7	—	V	
		2.7 to 3.6	2.0	—		
	V_{IL}	2.3 to 2.7	—	0.7		
		2.7 to 3.6	—	0.8		
Input diode voltage	V_{IK}	2.3	—	–1.2	V	I_I = –18 mA
		2.3	—	V_{CC}+1.2		I_I = 18 mA
Output voltage	V_{OH}	2.3 to 3.6	V_{CC}–0.2	—	V	I_{OH} = –100 µA
		2.3	1.9	—		I_{OH} = –4 mA, V_{IH} = 1.7 V
		2.3	1.7	—		I_{OH} = –6 mA, V_{IH} = 1.7 V
		3.0	2.4	—		I_{OH} = –6 mA, V_{IH} = 2.0 V
		2.7	2.0	—		I_{OH} = –8 mA, V_{IH} = 2.0 V
		3.0	2.0	—		I_{OH} = –12 mA, V_{IH} = 2.0 V
	V_{OL}	2.3 to 3.6	—	0.2		I_{OL} = 100 µA
		2.3	—	0.4		I_{OL} = 4 mA, V_{IL} = 0.7 V
		2.3	—	0.55		I_{OL} = 6 mA, V_{IL} = 0.7 V
		3.0	—	0.55		I_{OL} = 6 mA, V_{IL} = 0.8 V
		2.7	—	0.6		I_{OL} = 8 mA, V_{IL} = 0.8 V
		3.0	—	0.8		I_{OL} = 12 mA, V_{IL} = 0.8 V
Input current	I_{IN}	3.6	—	±5	µA	V_{IN} = V_{CC} or GND
	$I_{IN (hold)}$	2.3	45	—		V_{IN} = 0.7 V
		2.3	–45	—		V_{IN} = 1.7 V
		3.0	75	—		V_{IN} = 0.8 V
		3.0	–75	—		V_{IN} = 2.0 V
		3.6	—	±500		V_{IN} = 0 to 3.6 V [*1]
Off state output current	I_{OZ}	3.6	—	±10	µA	V_{OUT} = V_{CC} or GND
Quiescent supply current	I_{CC}	3.6	—	40	µA	V_{IN} = V_{CC} or GND
	ΔI_{CC}	3.0 to 3.6	—	750	µA	V_{IN} = one input at (V_{CC}–0.6) V, other inputs at V_{CC} or GND

Note: 1. This is the bus hold maximum dynamic current required to switch the input from one state to another.

Switching Characteristics (Ta = –40 to 85°C)

Item	Symbol	V_{cc} (V)	Min	Typ	Max	Unit	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH}	2.5±0.2	1.2	—	3.8	ns	A	Y
	t_{PHL}	2.7	—	—	4.0			
		3.3±0.3	1.7	—	3.5			
Output enable time	t_{ZH}	2.5±0.2	1.0	—	5.7	ns	$\overline{OE}$	Y
	t_{ZL}	2.7	—	—	5.7			
		3.3±0.3	1.0	—	4.8			
Output disable time	t_{HZ}	2.5±0.2	1.0	—	4.9	ns	$\overline{OE}$	Y
	t_{LZ}	2.7	—	—	5.4			
		3.3±0.3	1.7	—	5.2			
Input capacitance	C_{IN}	3.3	—	4.5	—	pF	Control inputs	
		3.3	—	5.0	—		Data inputs	
Output capacitance	C_O	3.3	—	7.5	—	pF		

Test Circuit

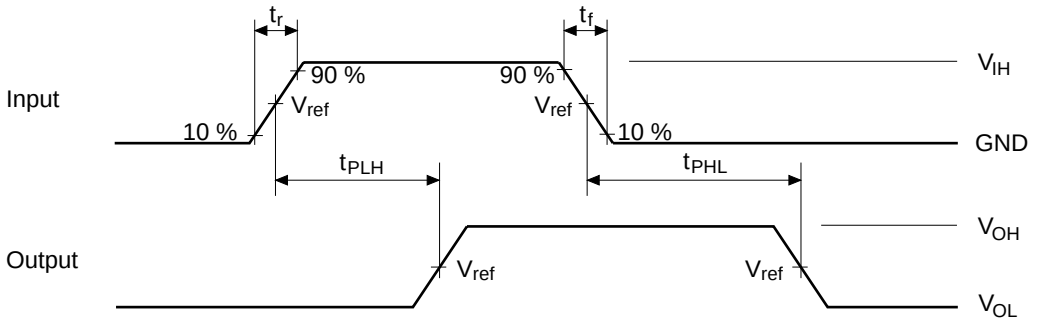


Load Circuit for Outputs

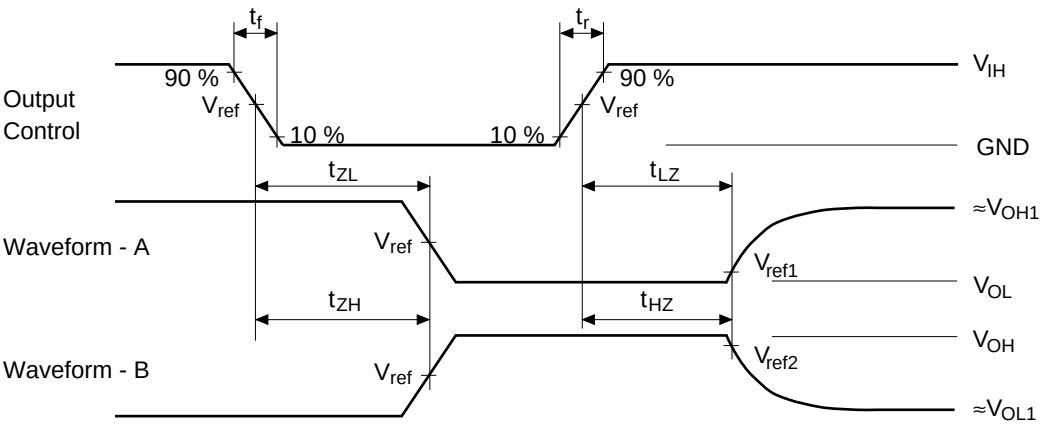
Symbol	Vcc=2.5±0.2V	Vcc=2.7V, 3.3±0.3V
t_{PLH} / t_{PHL}	OPEN	OPEN
t_{ZH} / t_{HZ}	GND	GND
t_{ZL} / t_{LZ}	$2 \times V_{CC}$	6.0 V
C_L	30 pF	50 pF

Note: 1. C_L includes probe and jig capacitance.

Waveforms – 1



Waveforms – 2

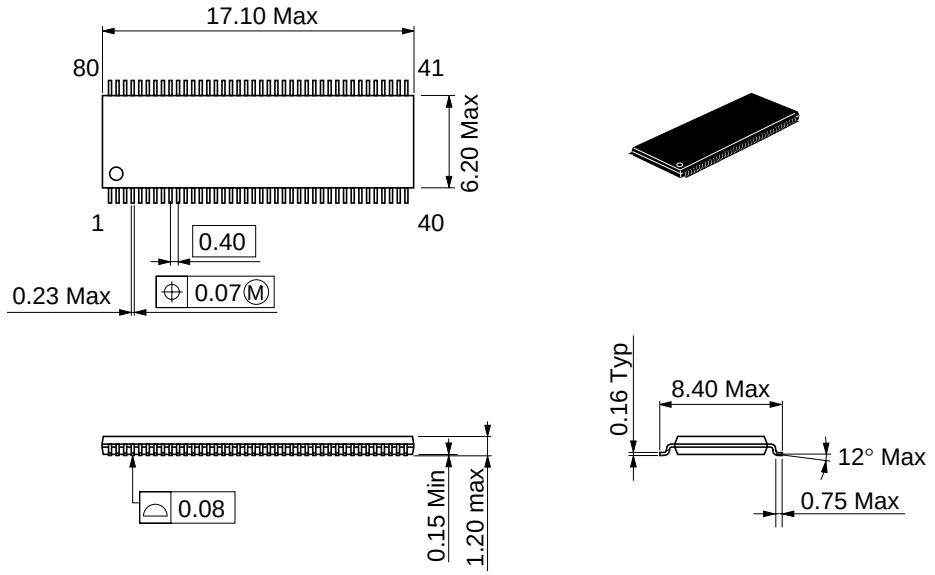


TEST	Vcc=2.5±0.2V	Vcc=2.7V, 3.3±0.3V
V_{IH}	V_{CC}	2.7 V
V_{ref}	1/2 V_{CC}	1.5 V
V_{ref1}	V_{OL} +0.15 V	V_{OL} +0.3 V
V_{ref2}	V_{OH}–0.15 V	V_{OH}–0.3 V
V_{OH1}	V_{CC}	3.0 V
V_{OL1}	GND	GND

Notes:
1. All input pulses are supplied by generators having the following characteristics :
   PRR 10 MHz, Zo = 50 Ω , t_r 2.0 ns, t_f 2.0 ns. (V_{CC} = 2.5±0.2 V)
   PRR 10 MHz, Zo = 50 Ω , t_r 2.5 ns, t_f 2.5 ns. (V_{CC} = 2.7 V, 3.3±0.3 V)
2. Waveform – A is for an output with internal conditions such that the output is low except when disabled by the output control.
3. Waveform – B is for an output with internal conditions such that the output is high except when disabled by the output control.
4. The output are measured one at a time with one transition per measurement.

Package Dimensions

Unit : mm



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