

HD74ALVCH16830

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

HITACHI

ADE-205-196 (Z)
1st. Edition
February 2000

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, the output enable (OE) input 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.

Features

- $V_{CC} = 2.3$ V to 3.6 V
- Typical V_{OL} ground bounce < 0.8 V (@ $V_{CC} = 3.3$ V, $T_a = 25^\circ C$)
- Typical V_{OH} undershoot > 2.0 V (@ $V_{CC} = 3.3$ V, $T_a = 25^\circ C$)
- High output current ± 24 mA (@ $V_{CC} = 3.0$ V)
- Bus hold on data inputs eliminates the need for external pullup / pulldown resistors

HD74ALVCH16830

Function Table

Inputs			Outputs	
OE1	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

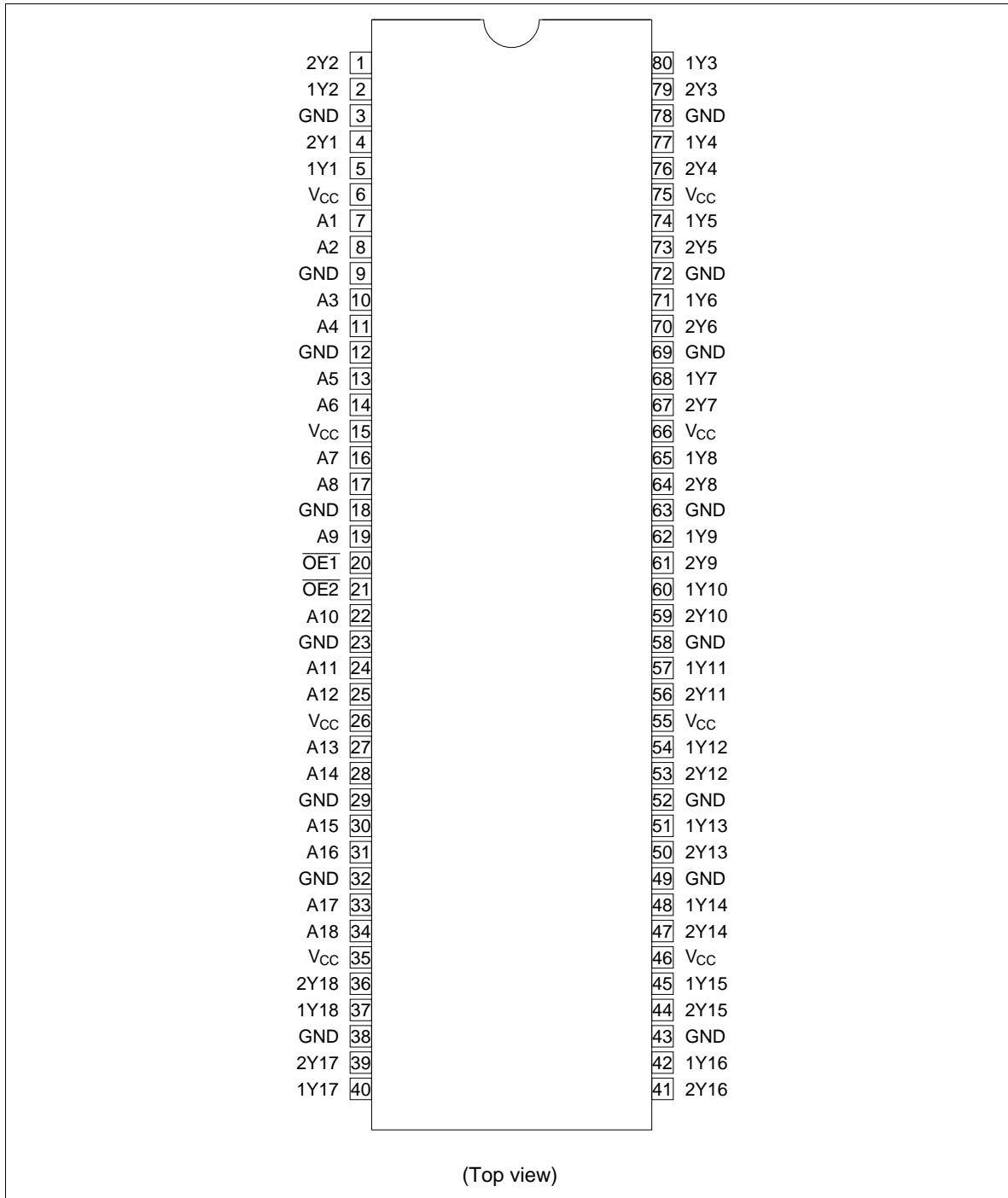
L : Low level

X : Immaterial

Z : High impedance

HD74ALVCH16830

Pin Arrangement



HD74ALVCH16830

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 $T_a = 55^\circ C$ (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.

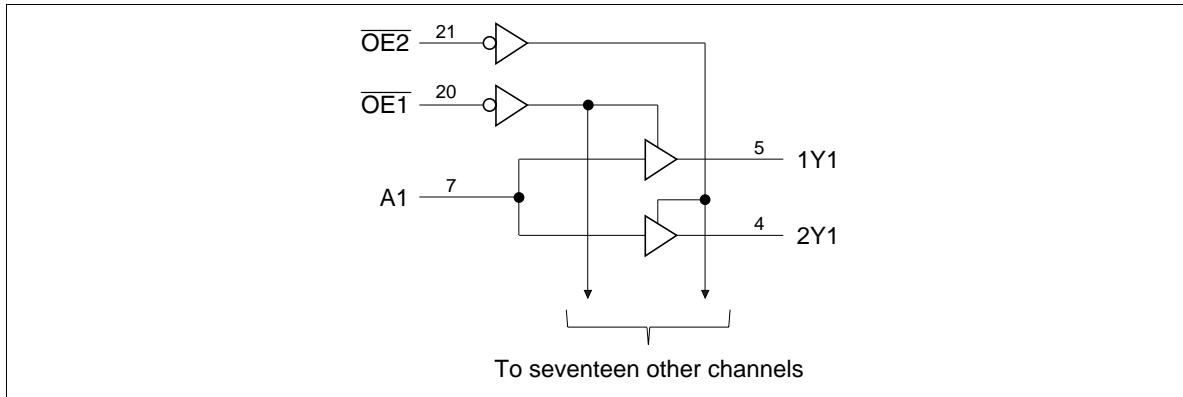
Recommended Operating Conditions

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}	—	−12	mA	$V_{CC} = 2.3$ V
		—	−12		$V_{CC} = 2.7$ V
		—	−24		$V_{CC} = 3.0$ V
Low level output current	I_{OL}	—	12	mA	$V_{CC} = 2.3$ V
		—	12		$V_{CC} = 2.7$ V
		—	24		$V_{CC} = 3.0$ V
Input transition rise or fall rate	$\Delta t / \Delta v$	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.

HD74ALVCH16830

Logic Diagram



HD74ALVCH16830

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		
Output voltage	V _{OH}	2.3 to 3.6	V _{cc} - 0.2	—	V	I _{OH} = -100 μA
		2.3	2.0	—		I _{OH} = -6 mA, V _{IH} = 1.7 V
		2.3	1.7	—		I _{OH} = -12 mA, V _{IH} = 1.7 V
		2.7	2.2	—		I _{OH} = -12 mA, V _{IH} = 2.0 V
		3.0	2.4	—		I _{OH} = -12 mA, V _{IH} = 2.0 V
		3.0	2.0	—		I _{OH} = -24 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} = 6 mA, V _{IL} = 0.7 V
		2.3	—	0.7		I _{OL} = 12 mA, V _{IL} = 0.7 V
		2.7	—	0.4		I _{OL} = 12 mA, V _{IL} = 0.8 V
		3.0	—	0.55		I _{OL} = 24 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}
	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.

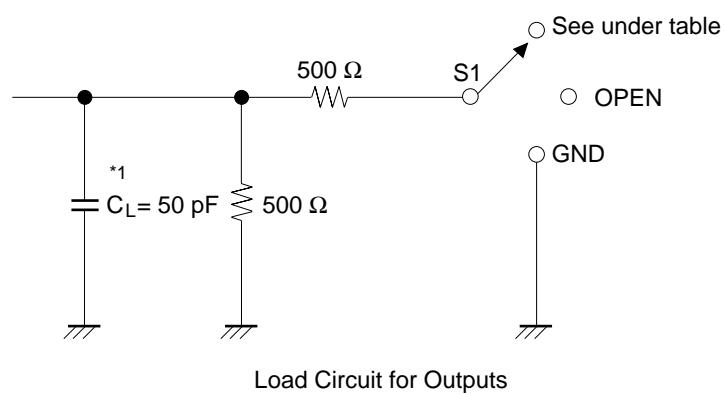
HD74ALVCH16830

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	1.0	—	3.8	ns	A	Y
	t_{PHL}	2.7	—	—	3.8			
		3.3±0.3	1.0	—	3.0			
Output enable time	t_{ZH}	2.5±0.2	1.0	—	5.4	ns	\overline{OE}	Y
	t_{ZL}	2.7	—	—	5.4			
		3.3±0.3	1.0	—	4.4			
Output disable time	t_{HZ}	2.5±0.2	1.0	—	5.4	ns	\overline{OE}	Y
	t_{LZ}	2.7	—	—	4.6			
		3.3±0.3	1.0	—	4.1			
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		

HD74ALVCH16830

Test Circuit

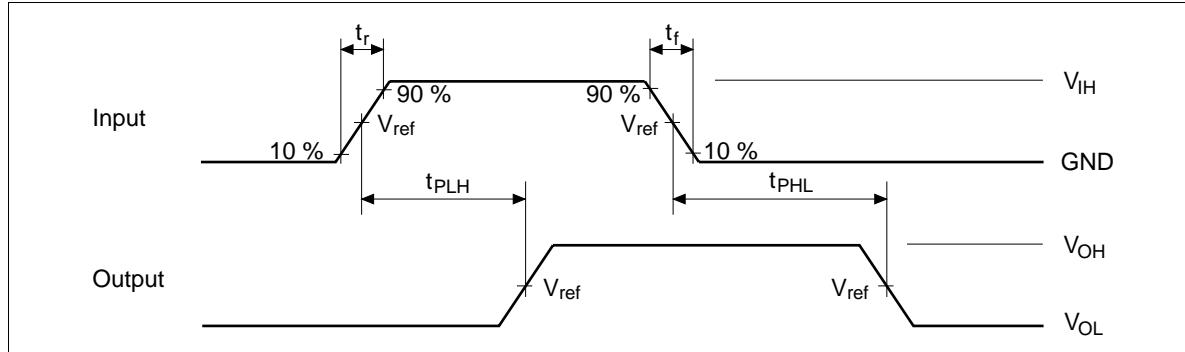


Symbol	$V_{CC}=2.5 \pm 0.2V$	$V_{CC}=2.7V, 3.3 \pm 0.3V$
t_{PLH}/t_{PHL}	OPEN	OPEN
t_{ZH}/t_{HZ}	GND	GND
t_{ZL}/t_{LZ}	$2 \times V_{CC}$	6.0 V
C_L	30 pF	50 pF

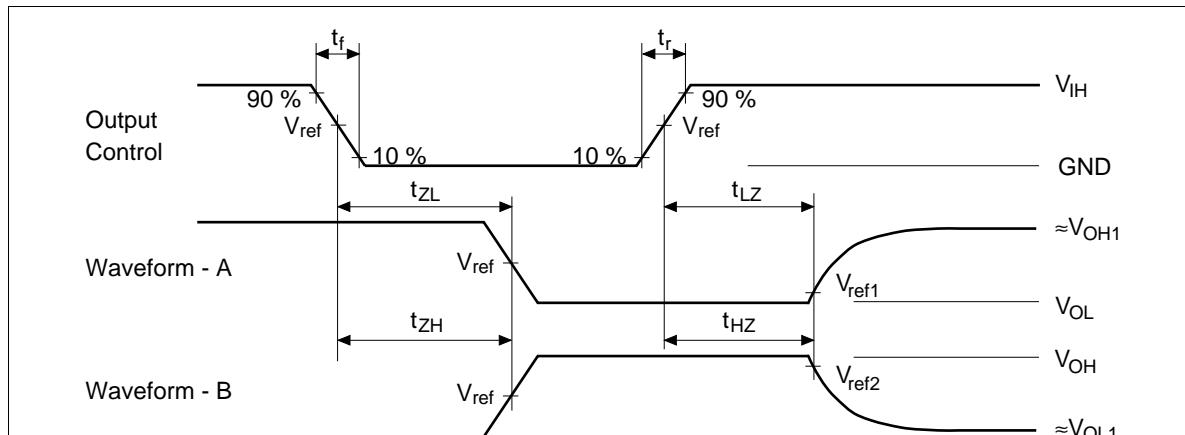
Note: 1. C_L includes probe and jig capacitance.

HD74ALVCH16830

Waveforms – 1



Waveforms – 2



TEST	$V_{CC} = 2.5 \pm 0.2 V$	$V_{CC} = 2.7 V, 3.3 \pm 0.3 V$
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

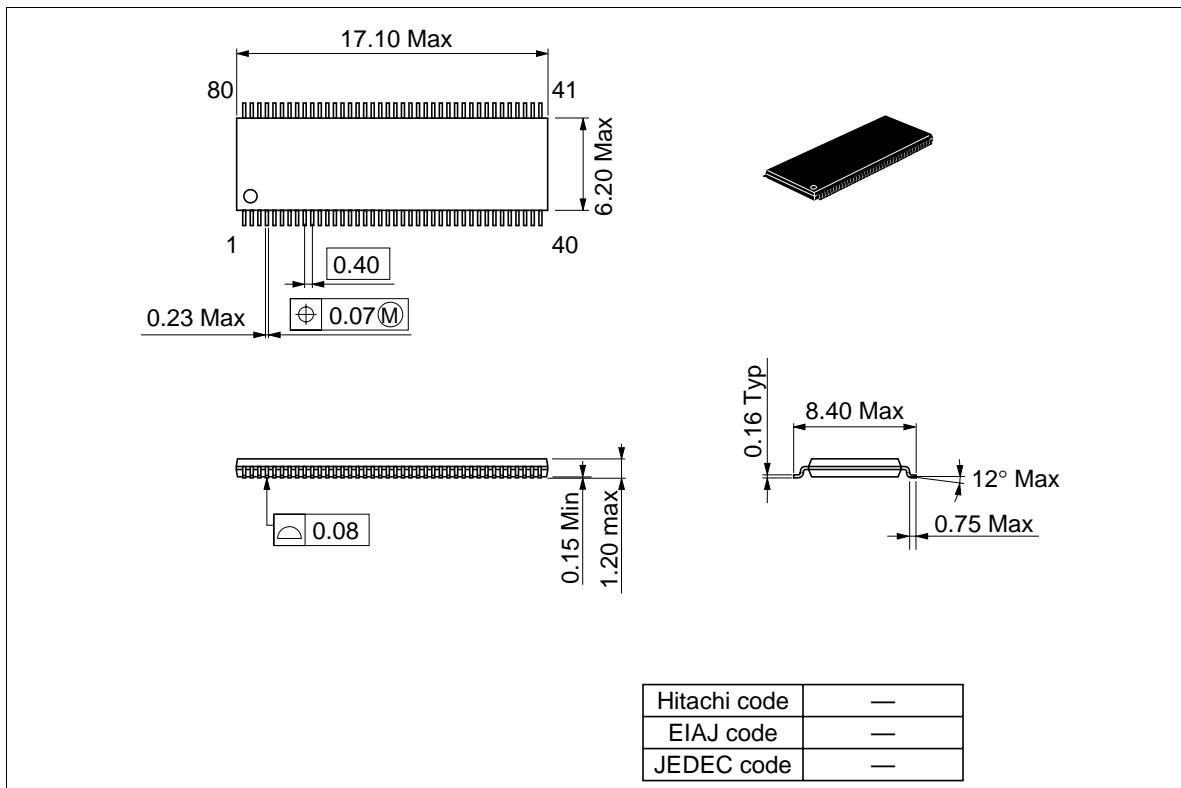
Notes:

1. All input pulses are supplied by generators having the following characteristics :
 $PRR \leq 10 \text{ MHz}$, $Z_o = 50 \Omega$, $t_r \leq 2.0 \text{ ns}$, $t_f \leq 2.0 \text{ ns}$. ($V_{CC} = 2.5 \pm 0.2 \text{ V}$)
 $PRR \leq 10 \text{ MHz}$, $Z_o = 50 \Omega$, $t_r \leq 2.5 \text{ ns}$, $t_f \leq 2.5 \text{ ns}$. ($V_{CC} = 2.7 \text{ V}, 3.3 \pm 0.3 \text{ V}$)
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.

HD74ALVCH16830

Package Dimensions

Unit : mm



Cautions

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
5. This product is not designed to be radiation resistant.
6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

**Hitachi, Ltd.**

Semiconductor & Integrated Circuits.

Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL	NorthAmerica	: http://semiconductor.hitachi.com/
	Europe	: http://www.hitachi-eu.com/hel/ecg
	Asia (Singapore)	: http://www.has.hitachi.com.sg/grp3/sicd/index.htm
	Asia (Taiwan)	: http://www.hitachi.com.tw/E/Product/SICD_Frame.htm
	Asia (HongKong)	: http://www.hitachi.com.hk/eng/bo/grp3/index.htm
	Japan	: http://www.hitachi.co.jp/Sicd/index.htm

For further information write to:

Hitachi Semiconductor (America) Inc. 179 East Tasman Drive, San Jose, CA 95134 Tel: <1> (408) 433-1990 Fax: <1>(408) 433-0223	Hitachi Europe GmbH Electronic components Group Dornacher Straße 3 D-85622 Feldkirchen, Munich Germany Tel: <49> (89) 9 9180-0 Fax: <49> (89) 9 29 30 00 Hitachi Europe Ltd. Electronic Components Group. Whitebrook Park Lower Cookham Road Maidenhead Berkshire SL6 8YA, United Kingdom Tel: <44> (1628) 585000 Fax: <44> (1628) 778322	Hitachi Asia Pte. Ltd. 16 Collyer Quay #20-00 Hitachi Tower Singapore 049318 Tel: 535-2100 Fax: 535-1533 Hitachi Asia Ltd. Taipei Branch Office 3F, Hung Kuo Building, No.167, Tun-Hwa North Road, Taipei (105) Tel: <886> (2) 2718-3666 Fax: <886> (2) 2718-8180	Hitachi Asia (Hong Kong) Ltd. Group III (Electronic Components) 7/F., North Tower, World Finance Centre, Harbour City, Canton Road, Tsim Sha Tsui, Kowloon, Hong Kong Tel: <852> (2) 735 9218 Fax: <852> (2) 730 0281 Telex: 40815 HITEC HX
--	---	--	--