

HD74LV2G74A

www.DataSheet4U.com

Single D-type Flip Flops with Preset and Clear

HITACHI

ADE-205-346C (Z)

Rev.3
July 2001

Description

The HD74LV2G74A has independent data, preset, clear, and clock inputs Q and $\bar{Q}$ outputs in a 8 pin package. The input data is transferred to the output at the rising edge of clock pulse CLK. Low voltage and high speed operation is suitable for the battery powered products (e.g., notebook computers), and the low power consumption extends the battery life.

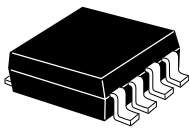
Features

- The basic gate function is lined up as hitachi uni logic series.
- Supplied on emboss taping for high speed automatic mounting.
- Electrical characteristics equivalent to the HD74LV74A
Supply voltage range : 1.65 to 5.5 V
Operating temperature range : -40 to +85°C
- All inputs V_{IH} (Max.) = 5.5 V (@ V_{CC} = 0 V to 5.5 V)
All outputs V_o (Max.) = 5.5 V (@ V_{CC} = 0 V)
- Output current ± 6 mA (@ V_{CC} = 3.0 V to 3.6 V), ± 12 mA (@ V_{CC} = 4.5 V to 5.5 V)
- All the logical input has hysteresis voltage for the slow transition.

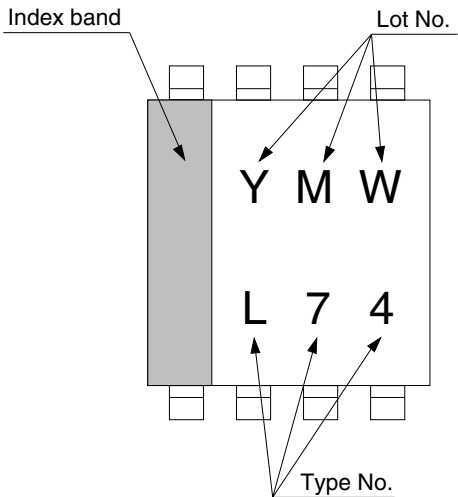
Outline and Article Indication

www.DataSheet4U.com

• HD74LV2G74A



SSOP-8



Y : Year code
(the last digit of year)
M : Month code
W : Week code

Function Table

Inputs				Outputs	
$\overline{PRE}$	$\overline{CLR}$	CLK	D	Q	$\overline{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H ^{**}	H ^{**}
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	↓	X	Q ₀	$\overline{Q}_0$

H : High level

L : Low level

X : Immaterial

↑ : Low to high transition

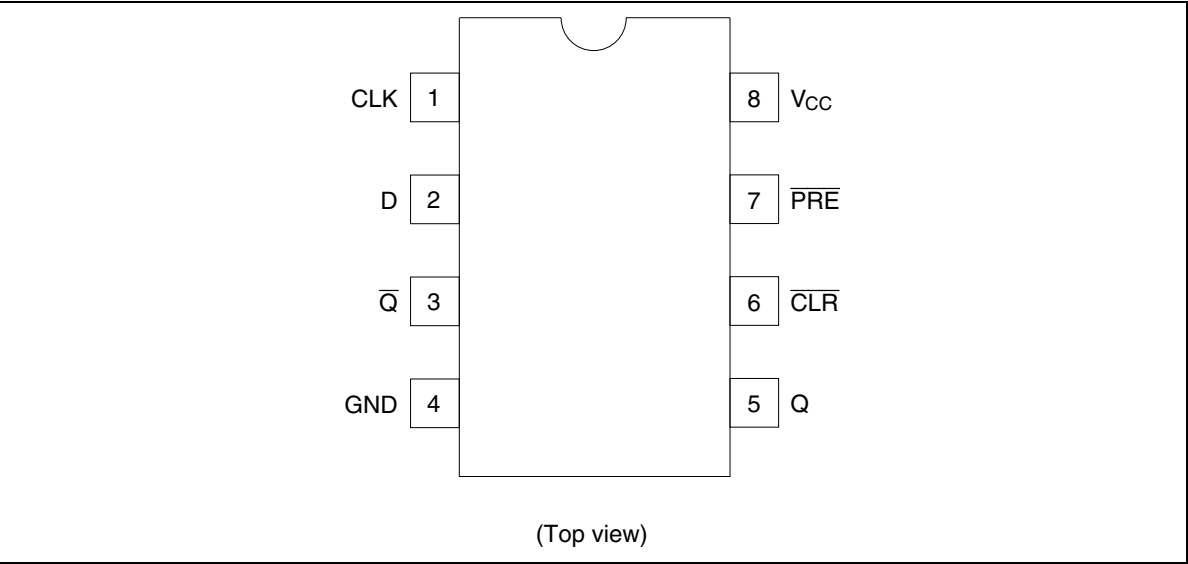
↓ : High to low transition

Q₀ : The level of Q immediately before the input conditions shown in the above table are determined.

Note : 1. Q and $\overline{Q}$ will remain high as long as preset and clear are low, but Q and $\overline{Q}$ are unpredictable, if preset and clear go high simultaneously.

Pin Arrangement

www.DataSheet4U.com



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage range	V_{CC}	−0.5 to 7.0	V	
Input voltage range ^{*1}	V_I	−0.5 to 7.0	V	
Output voltage range ^{*1,2}	V_O	−0.5 to $V_{CC} + 0.5$ −0.5 to 7.0	V	Output : H or L V_{CC} : OFF
Input clamp current	I_{IK}	−20	mA	$V_I < 0$
Output clamp current	I_{OK}	±50	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	I_O	±25	mA	$V_O = 0$ to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	±50	mA	
Maximum power dissipation at $T_a = 25^{\circ}\text{C}$ (in still air) ^{*3}	P_T	200	mW	
Storage temperature	T_{stg}	−65 to 150	°C	

- Notes: The absolute maximum ratings are values which must not individually be exceeded, and furthermore no two of which may be realized at the same time.
1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
 2. This value is limited to 5.5 V maximum.
 3. The maximum package power dissipation was calculated using a junction temperature of 150°C.

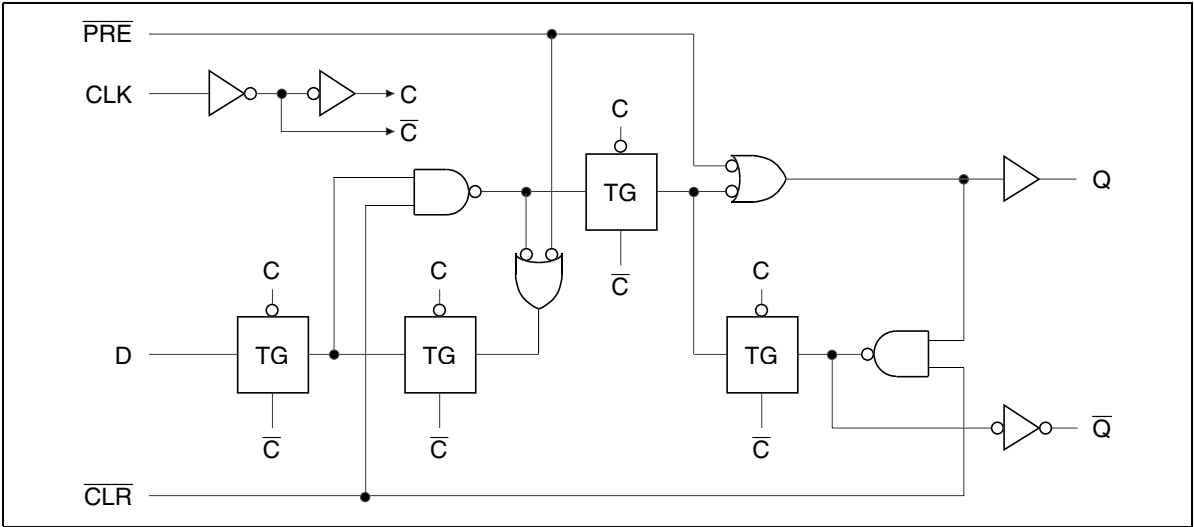
Recommended Operating Conditions

www.DataSheet4U.com

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V_{cc}	1.65	5.5	V	
Input voltage range	V_I	0	5.5	V	
Output voltage range	V_O	0	V_{cc}	V	
Output current	I_{OL}	—	1	mA	$V_{cc} = 1.65 \text{ to } 1.95 \text{ V}$
		—	2		$V_{cc} = 2.3 \text{ to } 2.7 \text{ V}$
		—	6		$V_{cc} = 3.0 \text{ to } 3.6 \text{ V}$
		—	12		$V_{cc} = 4.5 \text{ to } 5.5 \text{ V}$
	I_{OH}	—	−1		$V_{cc} = 1.65 \text{ to } 1.95 \text{ V}$
		—	−2		$V_{cc} = 2.3 \text{ to } 2.7 \text{ V}$
		—	−6		$V_{cc} = 3.0 \text{ to } 3.6 \text{ V}$
		—	−12		$V_{cc} = 4.5 \text{ to } 5.5 \text{ V}$
Input transition rise or fall rate	$\Delta t / \Delta v$	0	300	ns / V	$V_{cc} = 1.65 \text{ to } 1.95 \text{ V}$
		0	200		$V_{cc} = 2.3 \text{ to } 2.7 \text{ V}$
		0	100		$V_{cc} = 3.0 \text{ to } 3.6 \text{ V}$
		0	20		$V_{cc} = 4.5 \text{ to } 5.5 \text{ V}$
Operating free-air temperature	T_a	−40	85	°C	

Note: Unused or floating inputs must be held high or low.

Logic Diagram



Electrical Characteristic

www.DataSheet4U.com

- Ta = -40 to 85°C

Item	Symbol	V _{cc} (V) *	Min	Typ	Max	Unit	Test condition
Input voltage	V _{IH}	1.65 to 1.95	V _{cc} ×0.75	—	—	V	
		2.3 to 2.7	V _{cc} ×0.7	—	—		
		3.0 to 3.6	V _{cc} ×0.7	—	—		
		4.5 to 5.5	V _{cc} ×0.7	—	—		
	V _{IL}	1.65 to 1.95	—	—	V _{cc} ×0.25		
		2.3 to 2.7	—	—	V _{cc} ×0.3		
		3.0 to 3.6	—	—	V _{cc} ×0.3		
		4.5 to 5.5	—	—	V _{cc} ×0.3		
Hysteresis voltage	V _H	1.8	—	0.25	—	V	V _T ⁺ - V _T ⁻
		2.5	—	0.30	—		
		3.3	—	0.35	—		
		5.0	—	0.45	—		
Output voltage	V _{OH}	Min to Max	V _{cc} -0.1	—	—	V	I _{OH} = -50 μA
		1.65	1.4	—	—		I _{OH} = -1 mA
		2.3	2.0	—	—		I _{OH} = -2 mA
		3.0	2.48	—	—		I _{OH} = -6 mA
		4.5	3.8	—	—		I _{OH} = -12 mA
	V _{OL}	Min to Max	—	—	0.1		I _{OL} = 50 μA
		1.65	—	—	0.3		I _{OL} = 1 mA
		2.3	—	—	0.4		I _{OL} = 2 mA
		3.0	—	—	0.44		I _{OL} = 6 mA
		4.5	—	—	0.55		I _{OL} = 12 mA
Input current	I _{IN}	0 to 5.5	—	—	±1	μA	V _{IN} = 5.5 V or GND
Quiescent supply current	I _{CC}	5.5	—	—	10	μA	V _{IN} = V _{CC} or GND, I _O = 0
Output leakage current	I _{OFF}	0	—	—	5	μA	V _{IN} or V _O = 0 to 5.5 V
Input capacitance	C _{IN}	3.3	—	2.5	—	pF	V _{IN} = V _{CC} or GND

Note: For conditions shown as Min or Max, use the appropriate values under recommended operating conditions.

Switching Characteristics

www.DataSheet4U.com

- $V_{CC} = 1.8 \pm 0.15 \text{ V}$

Item	Symbol	$T_a = 25^{\circ}\text{C}$			$T_a = -40 \text{ to } 85^{\circ}\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Maximum clock frequency	f_{max}	30	60	—	20	—	MHz	$C_L = 15 \text{ pF}$		
		20	40	—	15	—		$C_L = 50 \text{ pF}$		
Propagation delay time	t_{PLH}	—	16.3	27.0	1.0	29.0	ns	$C_L = 15 \text{ pF}$	$\overline{\text{PRE}}/\overline{\text{CLR}}$	Q or $\overline{\text{Q}}$
		—	17.9	29.0	1.0	32.0			CLK	
	t_{PHL}	—	21.6	34.0	1.0	36.5		$C_L = 50 \text{ pF}$	$\overline{\text{PRE}}/\overline{\text{CLR}}$	Q or $\overline{\text{Q}}$
		—	24.5	39.5	1.0	42.5			CLK	
Setup time	t_{su}	13.0	—	—	14.0	—	ns		D	
		9.0	—	—	9.0	—			$\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ inactive	
Hold time	t_{h}	0.5	—	—	0.5	—	ns			
Pulse width	t_{w}	12.0	—	—	13.0	—	ns		$\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ “L”	
		12.0	—	—	13.0	—			CLK “H” or “L”	

- $V_{CC} = 2.5 \pm 0.2 \text{ V}$

Item	Symbol	$T_a = 25^{\circ}\text{C}$			$T_a = -40 \text{ to } 85^{\circ}\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Maximum clock frequency	f_{max}	50	100	—	40	—	MHz	$C_L = 15 \text{ pF}$		
		30	70	—	25	—		$C_L = 50 \text{ pF}$		
Propagation delay time	t_{PLH}	—	9.8	14.8	1.0	17.0	ns	$C_L = 15 \text{ pF}$	$\overline{\text{PRE}}/\overline{\text{CLR}}$	Q or $\overline{\text{Q}}$
		—	11.1	16.4	1.0	19.0			CLK	
	t_{PHL}	—	13.0	17.4	1.0	20.0		$C_L = 50 \text{ pF}$	$\overline{\text{PRE}}/\overline{\text{CLR}}$	Q or $\overline{\text{Q}}$
		—	14.2	20.0	1.0	23.0			CLK	
Setup time	t_{su}	8.0	—	—	9.0	—	ns		D	
		7.0	—	—	7.0	—			$\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ inactive	
Hold time	t_{h}	0.5	—	—	0.5	—	ns			
Pulse width	t_{w}	8.0	—	—	9.0	—	ns		$\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ “L”	
		8.0	—	—	9.0	—			CLK “H” or “L”	

Switching Characteristics (cont)

www.DataSheet4U.com

- V_{CC} = 3.3 ± 0.3 V

Item	Symbol	T _a = 25°C			T _a = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Maximum clock frequency	f _{max}	80	140	—	70	—	MHz	C _L = 15 pF		
		50	90	—	45	—		C _L = 50 pF		
Propagation delay time	t _{PLH}	—	6.9	12.3	1.0	14.5	ns	C _L = 15 pF	PRE/CLR	Q or Q̄
		—	7.9	11.9	1.0	14.0			CLK	
	t _{PHL}	—	9.2	15.8	1.0	18.0		C _L = 50 pF	PRE/CLR	Q or Q̄
		—	10.2	15.4	1.0	17.5			CLK	
Setup time	t _{su}	6.0	—	—	7.0	—	ns		D	
		5.0	—	—	5.0	—			PRE or CLR inactive	
Hold time	t _h	0.5	—	—	0.5	—	ns			
Pulse width	t _w	6.0	—	—	7.0	—	ns		PRE or CLR	“L”
		6.0	—	—	7.0	—			CLK	“H” or “L”

- V_{CC} = 5.0 ± 0.5 V

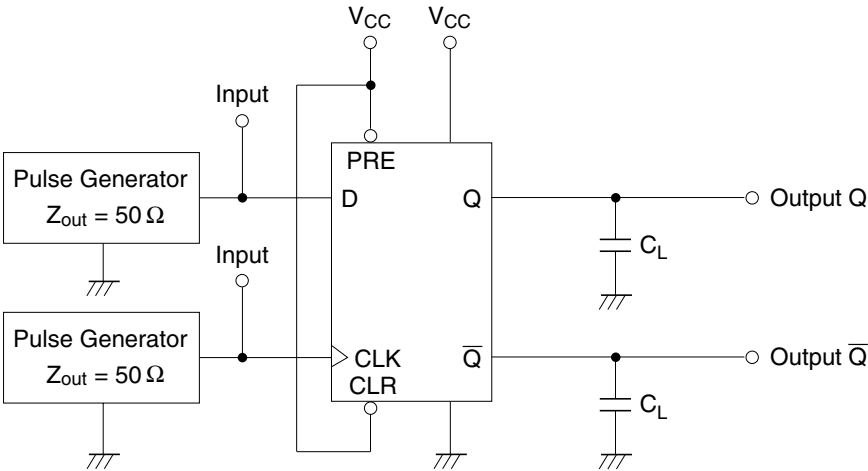
Item	Symbol	T _a = 25°C			T _a = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Maximum clock frequency	f _{max}	130	180	—	110	—	MHz	C _L = 15 pF		
		90	140	—	75	—		C _L = 50 pF		
Propagation delay time	t _{PLH}	—	5.0	7.7	1.0	9.0	ns	C _L = 15 pF	PRE/CLR	Q or Q̄
		—	5.6	7.3	1.0	8.5			CLK	
	t _{PHL}	—	6.6	9.7	1.0	11.0		C _L = 50 pF	PRE/CLR	Q or Q̄
		—	7.2	9.3	1.0	10.5			CLK	
Setup time	t _{su}	5.0	—	—	5.0	—	ns		D	
		3.0	—	—	3.0	—			PRE or CLR inactive	
Hold time	t _h	0.5	—	—	0.5	—	ns			
Pulse width	t _w	5.0	—	—	5.0	—	ns		PRE or CLR	“L”
		5.0	—	—	5.0	—			CLK	“H” or “L”

Operating Characteristics

- $C_L = 50\text{ pF}$

Item	Symbol	V_{cc} (V)	$T_a = 25^{\circ}\text{C}$			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C_{PD}	3.3	—	13.0	—	pF	$f = 10\text{ MHz}$
		5.0	—	14.0	—		

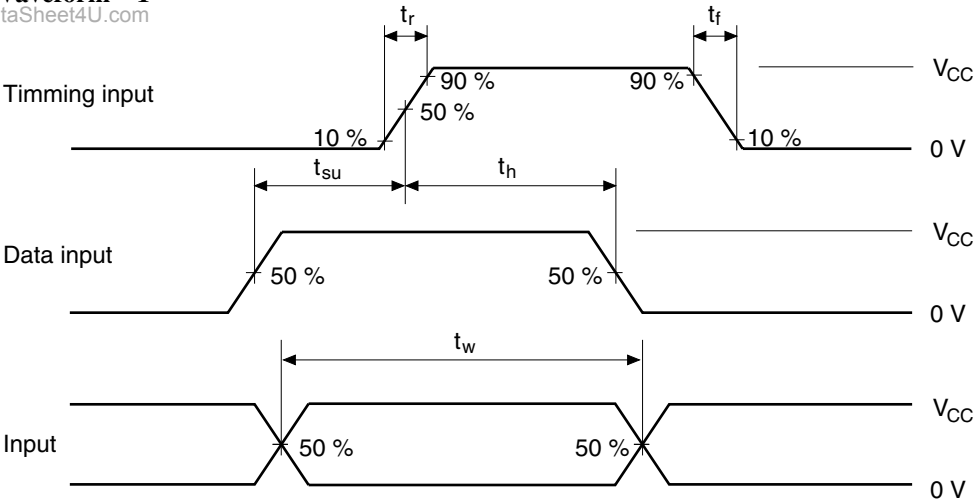
Test Circuit



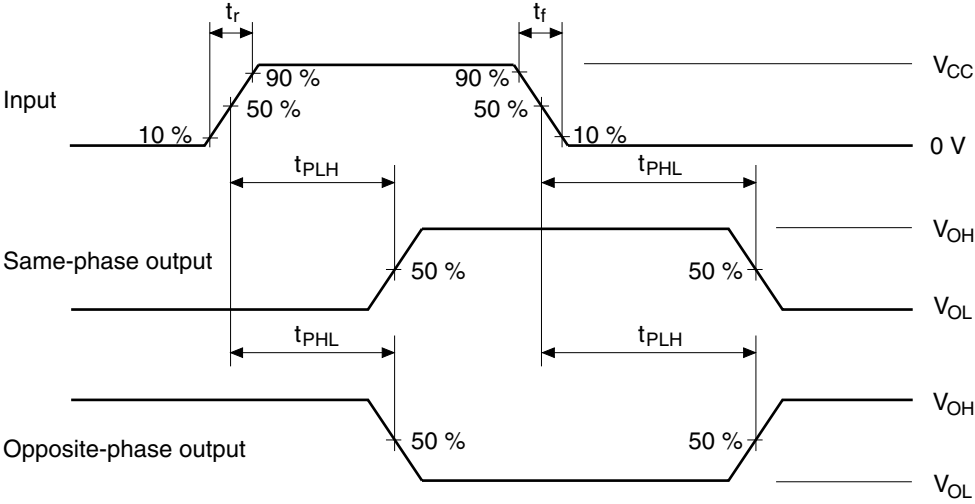
- Notes: 1. C_L includes probe and jig capacitance.
2. Test is put into the each flip flops.

• Waveform – 1

www.DataSheet4U.com



• Waveform – 2

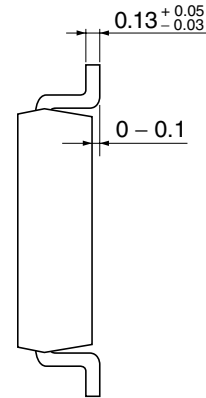
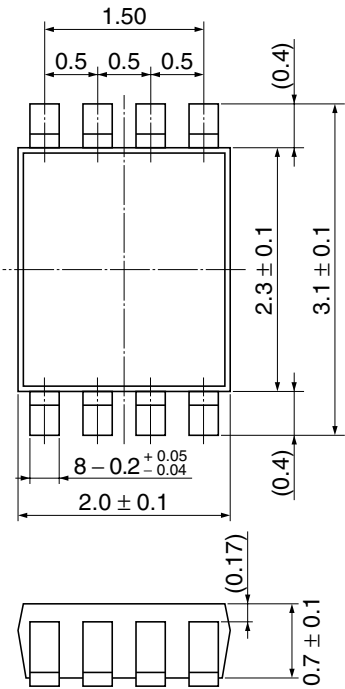


- Notes: 1. Input waveform : $PRR \leq 1 \text{ MHz}$, $Z_o = 50 \Omega$, $t_r \leq 3 \text{ ns}$, $t_f \leq 3 \text{ ns}$.
2. The output are measured one at a time with one transition per measurement.

Package Dimensions

www.DataSheet4U.com

As of January, 2001
Unit: mm



Hitachi Code	TTP-8DB
JEDEC	—
EIAJ	—
Mass (reference value)	0.25 g

Disclaimer

www.DataSheet4U.com

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.

Sales Offices

HITACHI

Hitachi, Ltd.

Semiconductor & Integrated Circuits
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: (03) 3270-2111 Fax: (03) 3270-5109

URL	NorthAmerica	: http://semiconductor.hitachi.com/
	Europe	: http://www.hitachi-eu.com/hel/ecg
	Asia	: http://sicapac.hitachi-asia.com
	Japan	: http://www.hitachi.co.jp/Sicd/indx.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 Ltd. Electronic Components Group Whitebrook Park Lower Cookham Road Maidenhead Berkshire SL6 8YA, United Kingdom Tel: <44> (1628) 585000 Fax: <44> (1628) 585200 Hitachi Europe GmbH Electronic Components Group Domacher StraÙe 3 D-85622 Feldkirchen, Munich Germany Tel: <49> (89) 9 9180-0 Fax: <49> (89) 9 29 30 00	Hitachi Asia Ltd. Hitachi Tower 16 Collyer Quay #20-00 Singapore 049318 Tel : <65>-538-6533/538-8577 Fax : <65>-538-6933/538-3877 URL : http://www.hitachi.com.sg Hitachi Asia Ltd. (Taipei Branch Office) 4/F, No. 167, Tun Hwa North Road Hung-Kuo Building Taipei (105), Taiwan Tel : <886>-(2)-2718-3666 Fax : <886>-(2)-2718-8180 Telex : 23222 HAS-TP URL : http://www.hitachi.com.tw	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 URL : http://semiconductor.hitachi.com.hk
---	---	--	---

Copyright © Hitachi, Ltd., 2001. All rights reserved. Printed in Japan.
Colophon 4.0