
HD74HC442/HD74HC443/HC74HC444

Quad. Tridirectional Bus Transceiver
(with noninverted 3-state outputs)

Quad. Tridirectional Bus Transceiver
(with inverted 3-state outputs)

Quad Tridirectional Bus Transceiver
(with noninverted/inverted 3-state outputs)

HITACHI

Description

These bus transceivers are designed for a synchronous three-way communication between four-line data buses. They give the designer a choice of selecting inverting, noninverting or a combination of inverting and noninverting data paths with 3-state outputs.

The S_0 and S_1 inputs select the bus from which data are to be transferred. The \overline{G} inputs enable the bus or buses to which data are to be transferred. The port for any bus selected for input and any other bus not enabled for output will be at high impedance.

Features

- High Speed Operation
- High Output Current: Fanout of 15 LSTTL Loads
- Wide Operating Voltage: $V_{CC} = 2$ to 6 V
- Low Input Current: 1 μA max
- Low Quiescent Supply Current: $I_{CC}(\text{static}) = 4 \mu A$ max ($T_a = 25^\circ C$)

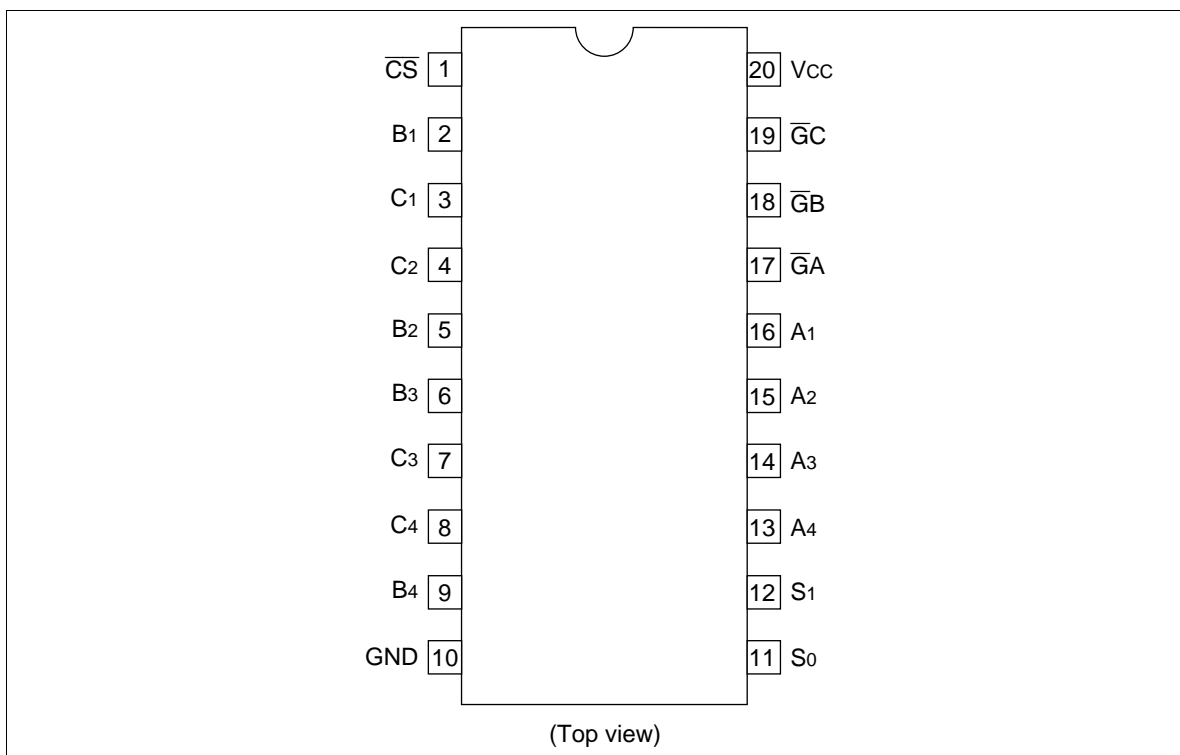
HD74HC442/HD74HC443HD74HC444

Function Table

Inputs			Transfers Between Buses					
CS	S ₁	S ₀	$\overline{\text{GA}}$	$\overline{\text{GB}}$	$\overline{\text{GC}}$	HD74HC442	HD74HC443	HD74HC444
H	X	X	X	X	X	None	None	None
X	H	H	X	X	X	None	None	None
X	X	X	H	H	H	None	None	None
X	L	L	X	H	H	None	None	None
X	L	H	H	X	H	None	None	None
X	H	L	H	H	X	None	None	None
L	L	L	X	L	L	$A \rightarrow B, A \rightarrow C$	$\overline{A} \rightarrow B, \overline{A} \rightarrow C$	$\overline{A} \rightarrow B, \overline{A} \rightarrow C$
L	L	H	L	X	L	$B \rightarrow C, B \rightarrow A$	$\overline{B} \rightarrow C, \overline{B} \rightarrow A$	$B \rightarrow C, \overline{B} \rightarrow A$
L	H	L	L	L	X	$C \rightarrow A, C \rightarrow B$	$\overline{C} \rightarrow A, \overline{C} \rightarrow B$	$\overline{C} \rightarrow A, C \rightarrow B$
L	L	L	X	L	H	$A \rightarrow B$	$\overline{A} \rightarrow B$	$\overline{A} \rightarrow B$
L	L	H	H	X	L	$B \rightarrow C$	$\overline{B} \rightarrow C$	$B \rightarrow C$
L	H	L	L	H	X	$C \rightarrow A$	$\overline{C} \rightarrow A$	$\overline{C} \rightarrow A$
L	L	L	X	H	L	$A \rightarrow C$	$\overline{A} \rightarrow C$	$\overline{A} \rightarrow C$
L	L	H	L	X	H	$B \rightarrow A$	$\overline{B} \rightarrow A$	$\overline{B} \rightarrow A$
L	H	L	H	L	X	$C \rightarrow B$	$\overline{C} \rightarrow B$	$C \rightarrow B$

HD74HC442/HD74HC443/HD74HC444

Pin Arrangement



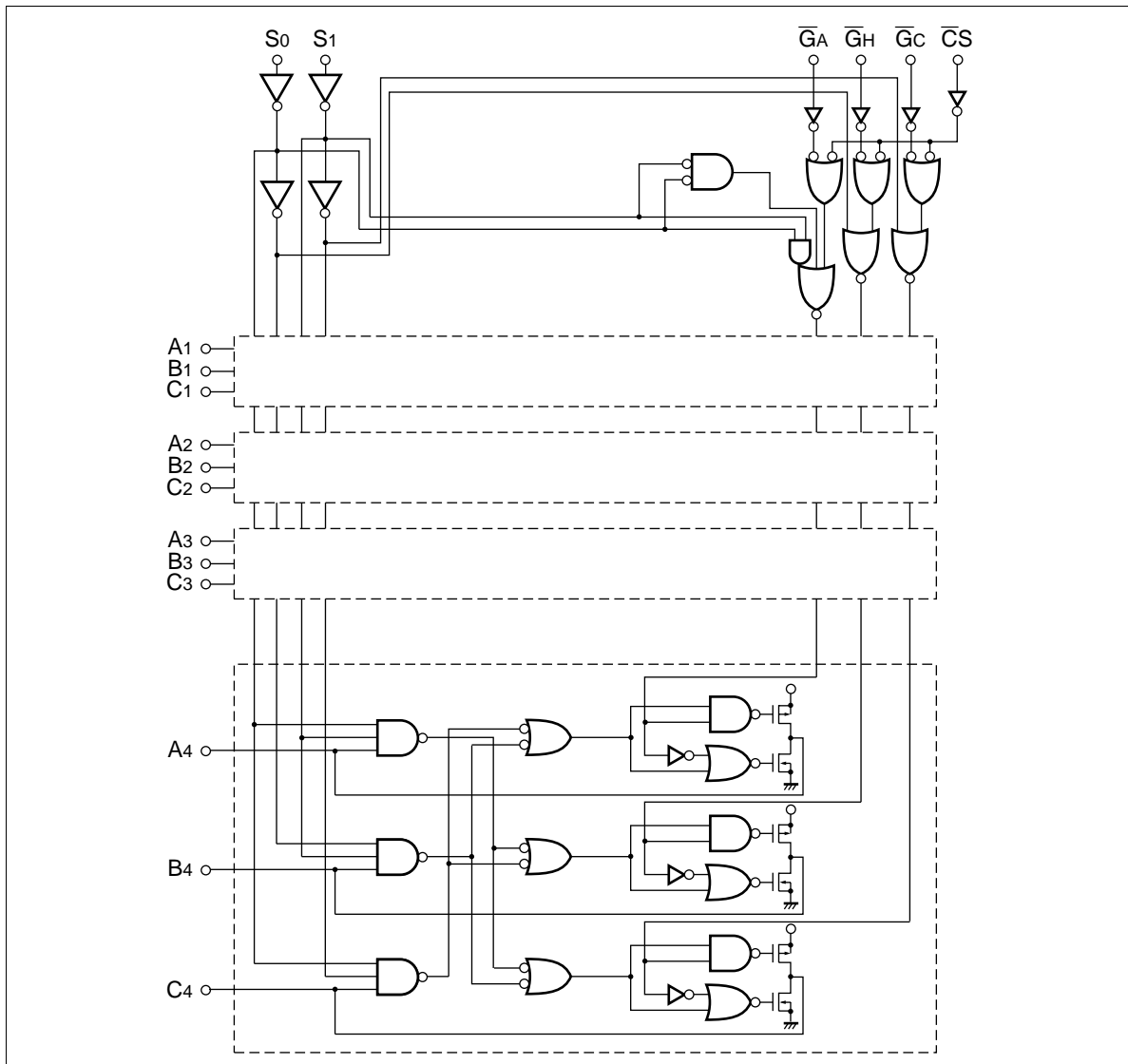
Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Supply voltage range	V_{CC}	-0.5 to +7.0	V
Input voltage	V_{IN}	-0.5 to $V_{CC} + 0.5$	V
Output voltage	V_{OUT}	-0.5 to $V_{CC} + 0.5$	V
Output current	I_{OUT}	± 35	mA
DC current drain per V_{CC} GND	I_{CC}, I_{GND}	± 75	mA
DC input diode current	I_{IK}	± 20	mA
DC output diode current	I_{OK}	± 20	mA
Power Dissipation per package	P_T	500	mW
Storage temperature	Tstg	-65 to +150	°C

HD74HC442/HD74HC443HD74HC444

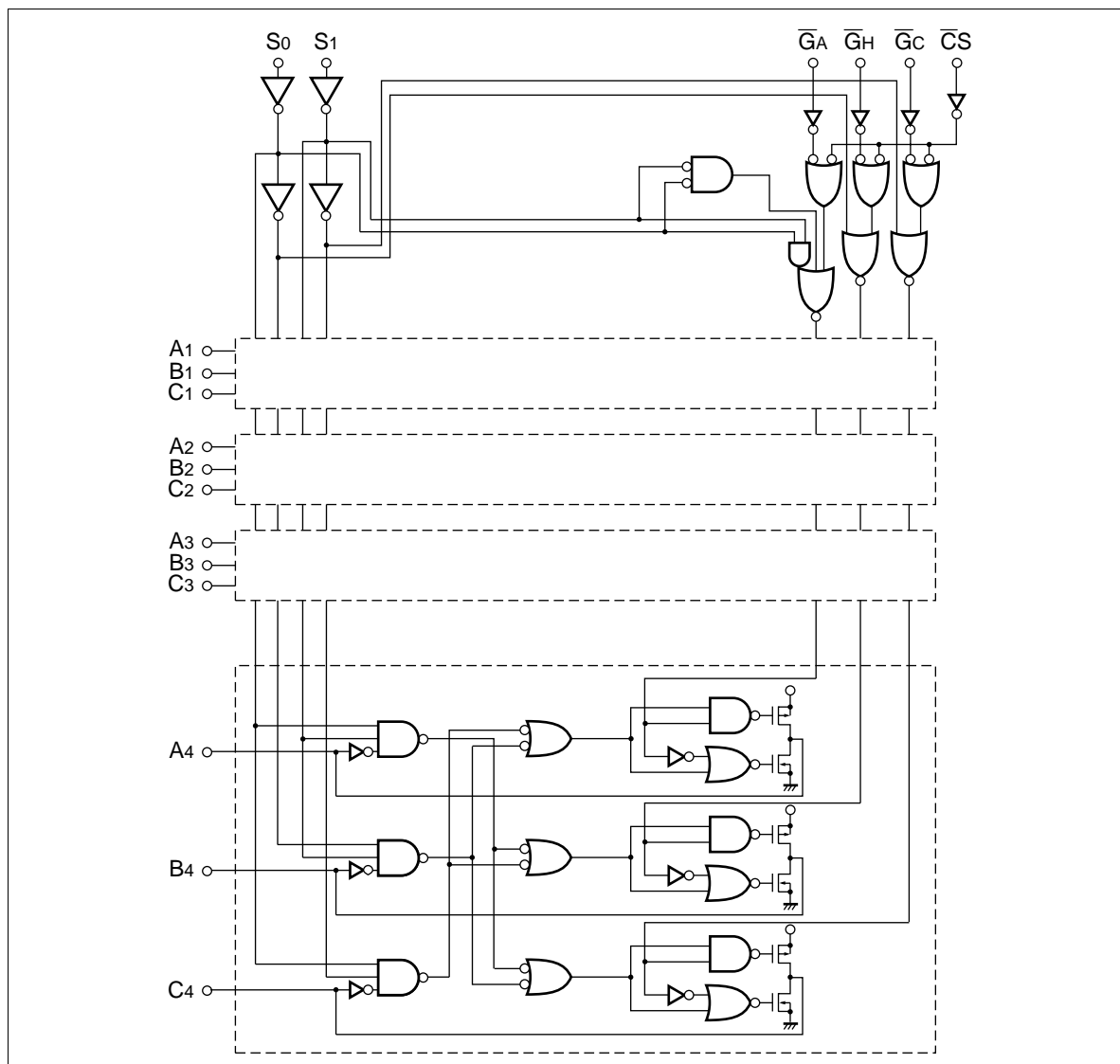
Logic Diagram

HD74HC442



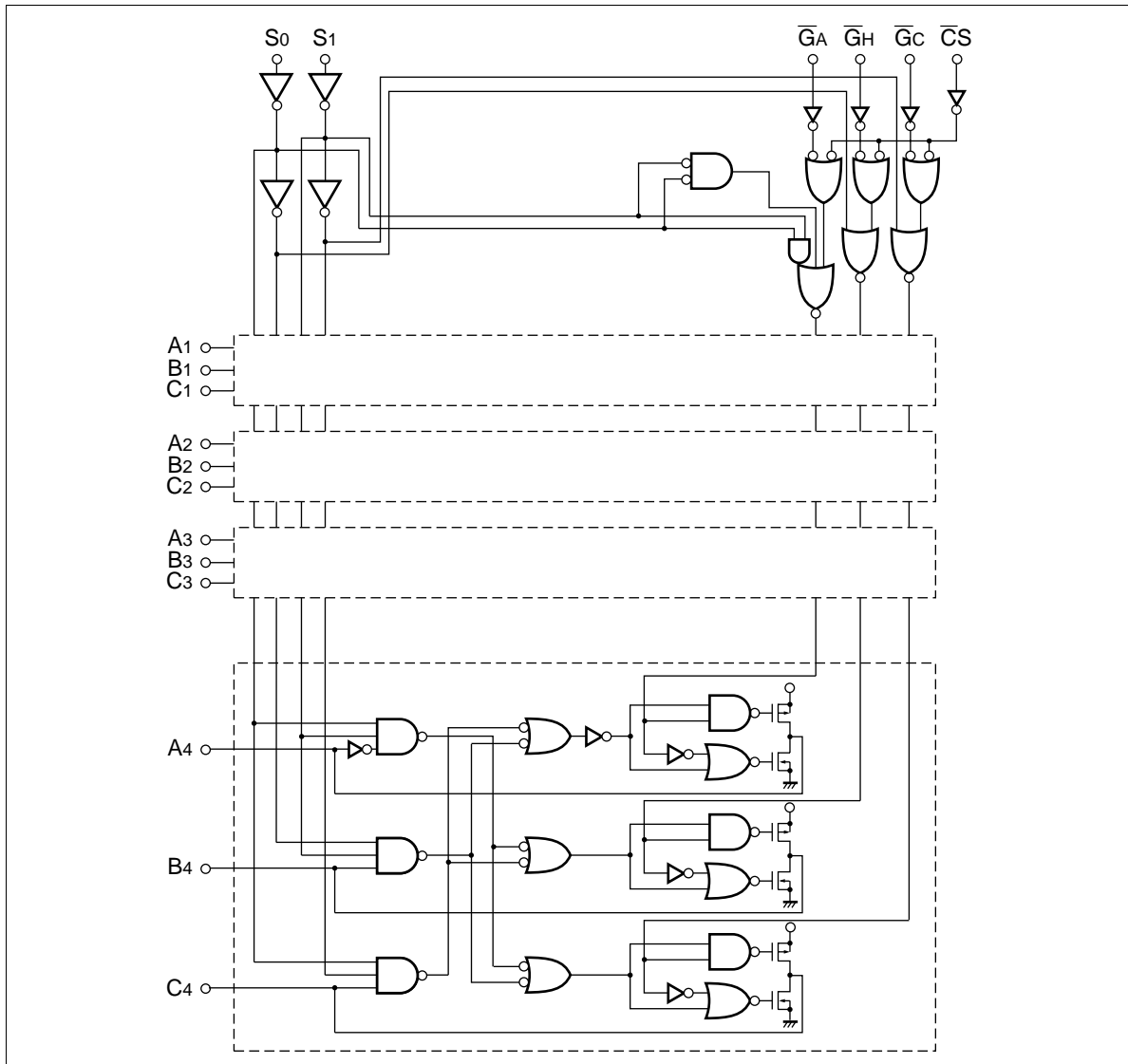
HD74HC442/HD74HC443/HD74HC444

HD74HC443



HD74HC442/HD74HC443HD74HC444

HD74HC444



HD74HC442/HD74HC443/HD74HC444

DC Characteristics

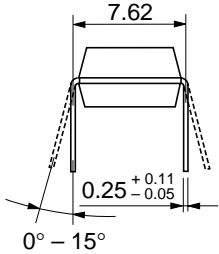
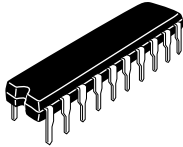
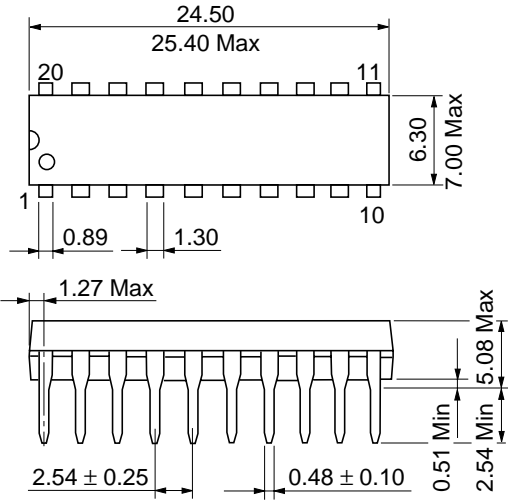
Item	Symbol	V _{CC} (V)	Ta = 25°C			Ta = −40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V _{IH}	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V _{IL}	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	V _{OH}	2.0	1.9	2.0	—	1.9	—	V	Vin = V _{IH} or V _{IL} I _{OH} = −20 μA	
		4.5	4.4	4.5	—	4.4	—			
		6.0	5.9	6.0	—	5.9	—			
		4.5	4.18	—	—	4.13	—			I _{OH} = −6 mA
		6.0	5.68	—	—	5.63	—			I _{OH} = −7.8 mA
	V _{OL}	2.0	—	0.0	0.1	—	0.1	V	Vin = V _{IH} or V _{IL} I _{OL} = 20 μA	
		4.5	—	0.0	0.1	—	0.1			
		6.0	—	0.0	0.1	—	0.1			
		4.5	—	—	0.26	—	0.33			I _{OL} = 6 mA
		6.0	—	—	0.26	—	0.33			I _{OL} = 7.8 mA
Off-state output current	I _{OZ}	6.0	—	—	±0.5	—	±5.0	μA	Vin = V _{IH} or V _{IL} , Vout = V _{CC} or GND	
Input current	I _{in}	6.0	—	—	±0.1	—	±1.0	μA	Vin = V _{CC} or GND	
Quiescent supply current	I _{CC}	6.0	—	—	4.0	—	40	μA	Vin = V _{CC} or GND, Iout = 0 μA	

HD74HC442/HD74HC443HD74HC444

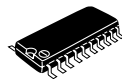
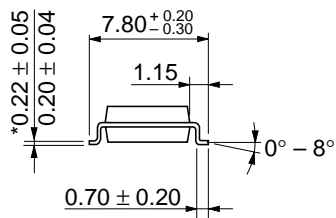
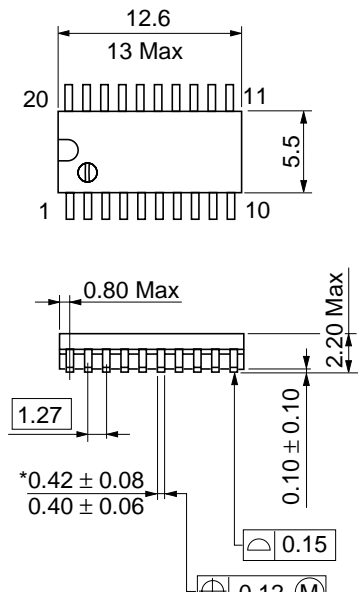
AC Characteristics ($C_L = 50 \text{ pF}$, Input $t_r = t_f = 6 \text{ ns}$)

Item	Symbol	$V_{CC} \text{ (V)}$	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } +85^\circ\text{C}$		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Propagation delay time	t_{PLH}	2.0	—	—	200	—	250	ns	
	t_{PHL}	4.5	—	—	40	—	50		
		6.0	—	—	34	—	43		
Output enable time	t_{ZH}	2.0	—	—	150	—	190	ns	
	t_{ZL}	4.5	—	—	30	—	38		
		6.0	—	—	26	—	33		
Output disable time	t_{HZ}	2.0	—	—	150	—	190	ns	
	t_{LZ}	4.5	—	—	30	—	38		
		6.0	—	—	26	—	33		
Output rise/fall time	t_{TLH}	2.0	—	—	60	—	75	ns	
	t_{THL}	4.5	—	—	12	—	15		
		6.0	—	—	10	—	13		
Input capacitance	C_{in}	—	—	5	10	—	10	pF	

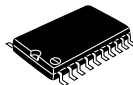
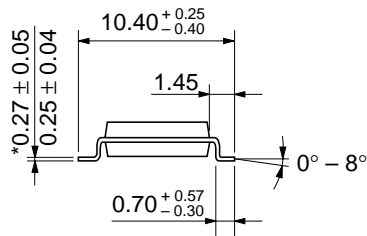
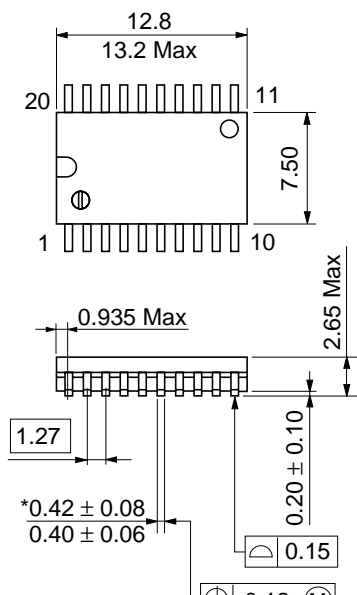
Unit: mm



Unit: mm



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

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/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 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 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