HD74CBT3257

4-bit 1-of-2 FET Multiplexer / Demultiplexer

HITACHI

ADE-205-624B (Z)

Rev. 2
Nov. 2001

Description

The HD74CBT3257 is a 4-bit 1-of-2 high-speed TTL-compatible FET multiplexer / demultiplexer. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

Output enable ($\overline{OE}$) and select control (S) inputs select the appropriate B1 and B2 outputs for the A-input data.

Features

- Minimal propagation delay through the switch.
- 5 Ω switch connection between two ports.
- TTL-compatible input levels.
- Ultra low quiescent power.
  -Ideally suited for notebook applications.
- Package type
  Product code example: HD74CBT3257TELL

Package type	Package code	Package suffix	Taping code
TSSOP-16pin	TTP-16DA	T	ELL(2000pcs / Reel)

Notes: 1. As for the Pb-free package is attached the “V” to the end of package code.
2. As for the Pb-free product is attached the “–E” to the end of product code.

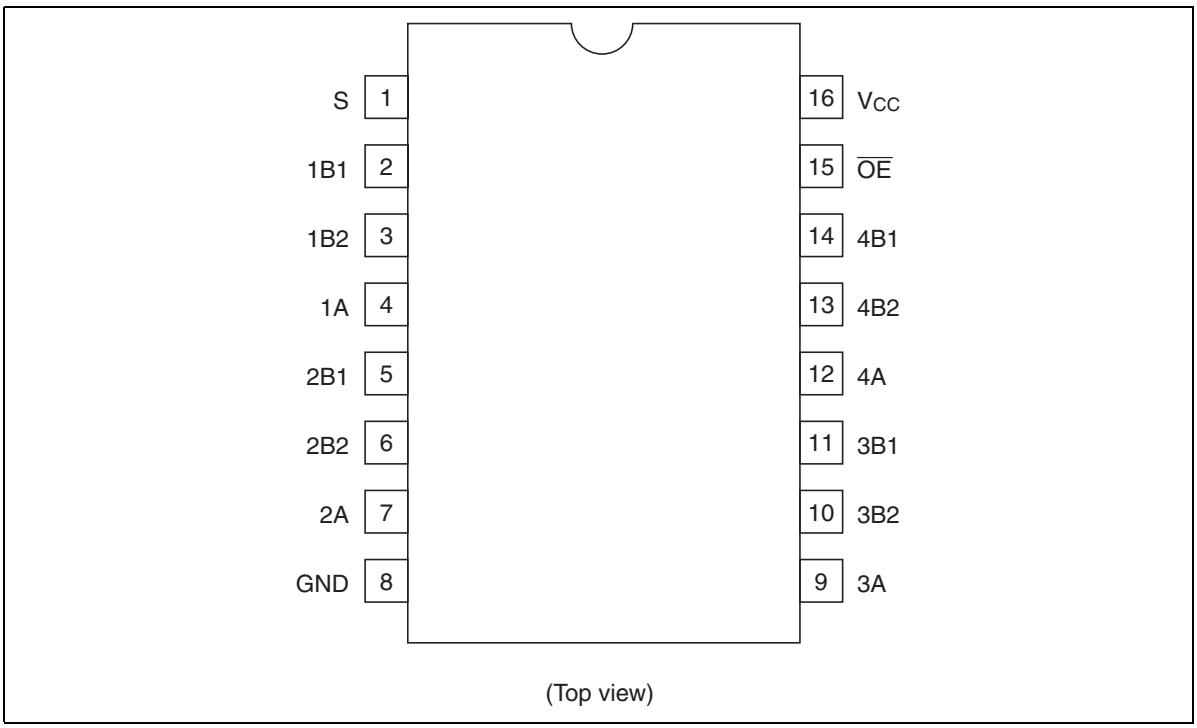
Hitachi semiconductor

Function Table

Inputs		
$\overline{OE}$	S	Function
L	L	A port = B1 port
L	H	A port = B2 port
H	X	Disconnect

H: High level
L: Low level
X: Immaterial

Pin Arrangement



(Top view)

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage range	V_{CC}	–0.5 to 7.0	V	
Input voltage range [*1]	V_I	–0.5 to 7.0	V	
Input clamp current	I_{IK}	–50	mA	$V_I < 0$
Continuous output current	I_O	128	mA	V_O = 0 to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	±100	mA	
Maximum power dissipation at Ta = 25°C (in still air) [*2]	P_T	500	mW	TSSOP
Storage temperature	Tstg	–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.

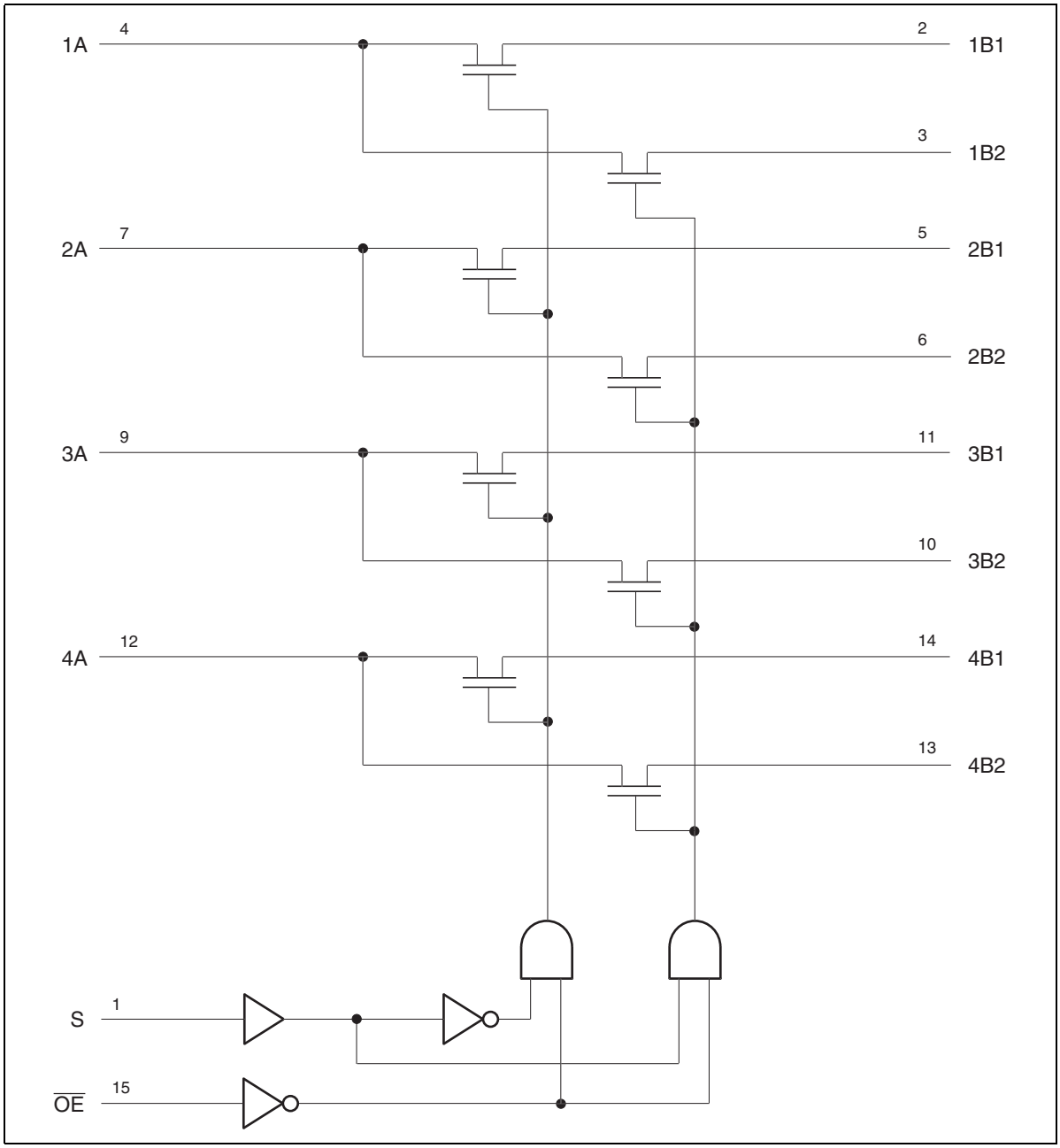
1. The input and output voltage ratings may be exceeded even if the input and output clamp-current ratings are observed.
2. The maximum package power dissipation was calculated using a junction temperature of 150°C.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V_{CC}	4.0	5.5	V	
Input voltage range	V_I	0	5.5	V	
Output voltage range	$V_{I/O}$	0	5.5	V	
Input transition rise or fall rate	$\Delta t / \Delta v$	0	5	ns / V	V_{CC} = 4.5 to 5.5 V
Operating free-air temperature	Ta	–40	85	°C	

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

Block Diagram



DC Electrical Characteristics

(Ta = −40 to 85°C)

Item	Symbol	V_{CC} (V)	Min	Typ [*1]	Max	Unit	Test conditions
Clamp diode voltage	V_{IK}	4.5	—	—	−1.2	V	I_{IN} = −18 mA
Input voltage	V_{IH}	4.0 to 5.5	2.0	—	—	V	
	V_{IL}	4.0 to 5.5	—	—	0.8		
On-state switch resistance [*2]	R_{ON}	4.0	—	14	20	Ω	V_{IN} = 2.4 V, I_{IN} = 15 mA Typ at V_{CC} = 4.0 V
		4.5	—	5	7		V_{IN} = 0 V, I_{IN} = 64 mA
		4.5	—	5	7		V_{IN} = 0 V, I_{IN} = 30 mA
		4.5	—	10	15		V_{IN} = 2.4 V, I_{IN} = 15 mA
Input current	I_{IN}	0 to 5.5	—	—	±1.0	µA	V_{IN} = 5.5 V or GND
Off-state leakage current	I_{OZ}	5.5	—	—	±1.0	µA	0 ≤ A, B ≤ V_{CC}
Quiescent supply current	I_{CC}	5.5	—	—	3	µA	V_{IN} = V_{CC} or GND, I_O = 0 mA
Increase in I_{CC} per input [*3]	ΔI_{CC}	5.5	—	—	2.5	mA	One input at 3.4 V, other inputs at V_{CC} or GND

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

1. All typical values are at V_{CC} = 5 V (unless otherwise noted), Ta = 25°C.
2. Measured by the voltage drop between the A and B terminals at the indicated current through the switch. On-state resistance is determined by the lower voltage of the two (A or B) terminals.
3. This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND.

Capacitance

(Ta = 25°C)

Item		Symbol	V_{CC} (V)	Min	Typ	Max	Unit	Test conditions
Control input capacitance		C_{IN}	5.0	—	3.5	—	pF	V_{IN} = 0 or 3 V
Input / output	A port	$C_{I/O (OFF)}$	5.0	—	9	—	pF	V_O = 0 or 3 V
capacitance	B port		5.0	—	5	—		$\overline{OE}$ = V_{CC}

Note: This parameter is determined by device characterization is not production tested.

Switching Characteristics

(Ta = −40 to 85°C)

- V_{CC} = 4.0 V

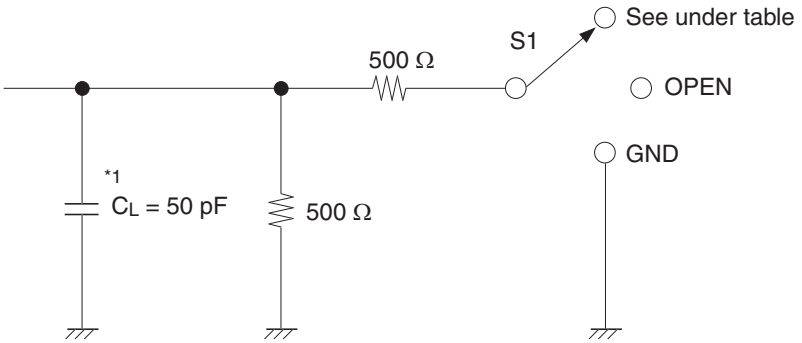
Item	Symbol	Min	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time [*1]	t_{PLH} t_{PHL}	—	0.35	ns	C_L = 50 pF R_L = 500 Ω	A or B	B or A
Propagation delay time	t_{PLH} t_{PHL}	—	5.5	ns	C_L = 50 pF R_L = 500 Ω	S	A
Enable time	t_{ZH} t_{ZL}	—	5.7	ns	C_L = 50 pF R_L = 500 Ω	S	B
		—	5.6			$\overline{OE}$	A or B
Disable time	t_{HZ}	—	5.2	ns	C_L = 50 pF R_L = 500 Ω	S	B
		—	5.5			$\overline{OE}$	A or B
	t_{LZ}	—	5.2			S	B
		—	6.4			$\overline{OE}$	A or B

- V_{CC} = 5.0±0.5 V

Item	Symbol	Min	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time [*1]	t_{PLH} t_{PHL}	—	0.25	ns	C_L = 50 pF R_L = 500 Ω	A or B	B or A
Propagation delay time	t_{PLH} t_{PHL}	1.6	5.0	ns	C_L = 50 pF R_L = 500 Ω	S	A
Enable time	t_{ZH} t_{ZL}	1.6	5.2	ns	C_L = 50 pF R_L = 500 Ω	S	B
		1.8	5.1			$\overline{OE}$	A or B
Disable time	t_{HZ}	1.0	5.0	ns	C_L = 50 pF R_L = 500 Ω	S	B
		2.2	5.5			$\overline{OE}$	A or B
	t_{LZ}	1.0	5.0			S	B
		2.2	6.8			$\overline{OE}$	A or B

Note: 1. The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

Test Circuit

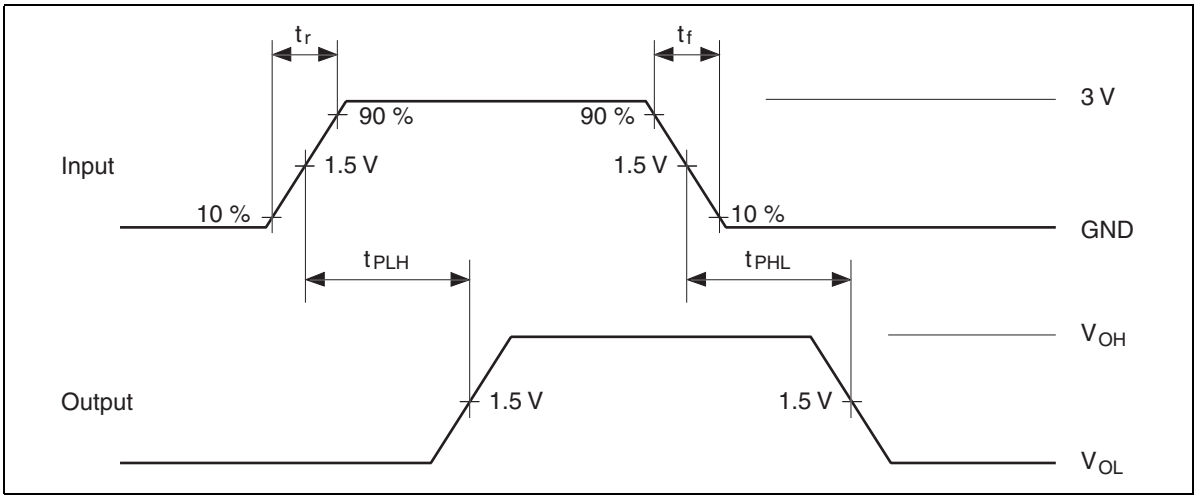


Load circuit for outputs

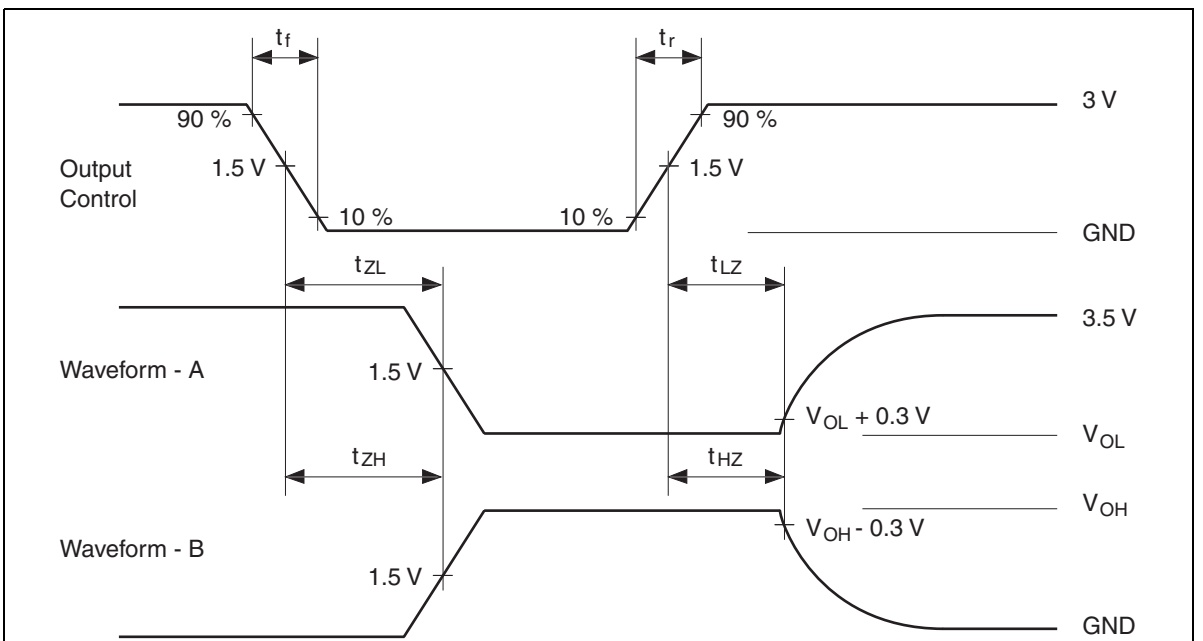
Symbol	S1
t_{PLH}/ t_{PHL}	OPEN
t_{ZH} / t_{HZ}	OPEN
t_{ZL} / t_{LZ}	7 V

Note: 1. C_L includes probe and jig capacitance.

Waveforms – 1



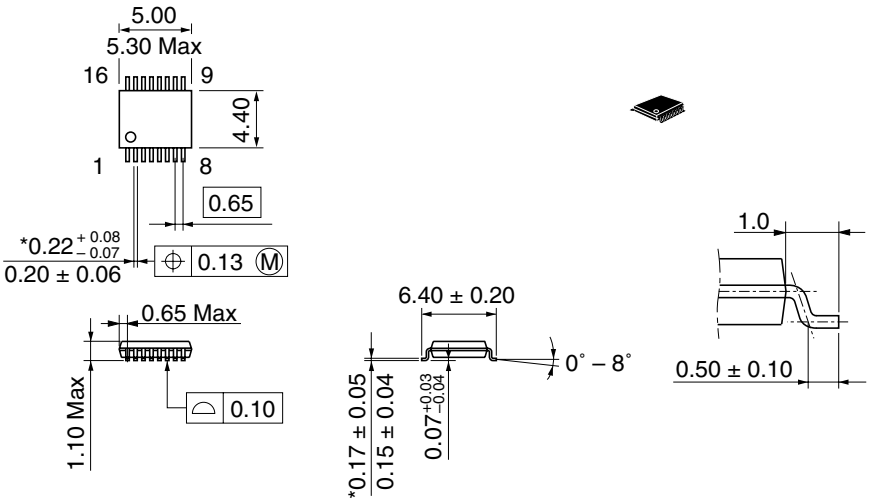
Waveforms – 2



Notes: 1. All input pulses are supplied by generators having the following characteristics : PRR ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 ns.
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

As of July, 2001
Unit: mm

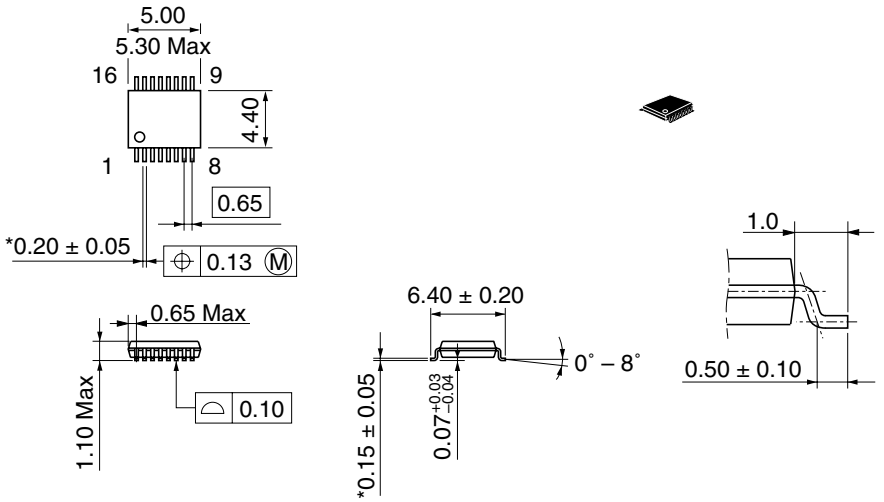


*Dimension including the plating thickness
Base material dimension

Hitachi Code	TTP-16DA
JEDEC	—
JEITA	—
Mass (reference value)	0.05 g

As of July, 2001

Unit: mm



Hitachi Code	TTP-16DAV
JEDEC	—
JEITA	—
Mass (reference value)	0.05 g

*Pd plating

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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 http://www.hitachisemiconductor.com/

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
Dornacher Straße 3
D-85622 Feldkirchen
Postfach 201, D-85619 Feldkirchen
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://semiconductor.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
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