To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

Send any inquiries to http://www.renesas.com/inquiry.

Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
7. Renesas Electronics products are classified according to the following three quality grades: "Standard", "High Quality", and "Specific". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as "Specific" without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as "Specific" or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is "Standard" unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.

   "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots.

   "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; safety equipment; and medical equipment not specifically designed for life support.

   "Specific": Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
8. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
9. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
11. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

To all our customers

Regarding the change of names mentioned in the document, such as Hitachi Electric and Hitachi XX, to Renesas Technology Corp.

The semiconductor operations of Mitsubishi Electric and Hitachi were transferred to Renesas Technology Corporation on April 1st 2003. These operations include microcomputer, logic, analog and discrete devices, and memory chips other than DRAMs (flash memory, SRAMs etc.) Accordingly, although Hitachi, Hitachi, Ltd., Hitachi Semiconductors, and other Hitachi brand names are mentioned in the document, these names have in fact all been changed to Renesas Technology Corp. Thank you for your understanding. Except for our corporate trademark, logo and corporate statement, no changes whatsoever have been made to the contents of the document, and these changes do not constitute any alteration to the contents of the document itself.

Renesas Technology Home Page: http://www.renesas.com

Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

Cautions

Keep safety first in your circuit designs!

1. Renesas Technology Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.
   Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

1. These materials are intended as a reference to assist our customers in the selection of the Renesas Technology Corporation product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Renesas Technology Corporation or a third party.
2. Renesas Technology Corporation assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.
3. All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Renesas Technology Corporation without notice due to product improvements or other reasons. It is therefore recommended that customers contact Renesas Technology Corporation or an authorized Renesas Technology Corporation product distributor for the latest product information before purchasing a product listed herein.
   The information described here may contain technical inaccuracies or typographical errors.
   Renesas Technology Corporation assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors.
   Please also pay attention to information published by Renesas Technology Corporation by various means, including the Renesas Technology Corporation Semiconductor home page (http://www.renesas.com).
4. When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Renesas Technology Corporation assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.
5. Renesas Technology Corporation semiconductors are not designed or manufactured for use in a device or system that is used under circumstances in which human life is potentially at stake. Please contact Renesas Technology Corporation or an authorized Renesas Technology Corporation product distributor when considering the use of a product contained herein for any specific purposes, such as apparatus or systems for transportation, vehicular, medical, aerospace, nuclear, or undersea repeater use.
6. The prior written approval of Renesas Technology Corporation is necessary to reprint or reproduce in whole or in part these materials.
7. If these products or technologies are subject to the Japanese export control restrictions, they must be exported under a license from the Japanese government and cannot be imported into a country other than the approved destination.
   Any diversion or reexport contrary to the export control laws and regulations of Japan and/or the country of destination is prohibited.
8. Please contact Renesas Technology Corporation for further details on these materials or the products contained therein.

HM628512C Series

4 M SRAM (512-kword × 8-bit)

ADE-203-1212C (Z)
Rev. 3.0
Aug. 5, 2002

Description

The Hitachi HM628512C is a 4-Mbit static RAM organized 512-kword × 8-bit. It realizes higher density, higher performance and low power consumption by employing CMOS process technology (6-transistor memory cell). The device, packaged in a 525-mil SOP (foot print pitch width) or 400-mil TSOP TYPE II or 600-mil plastic DIP, is available for high density mounting. The HM628512C is suitable for battery backup system.

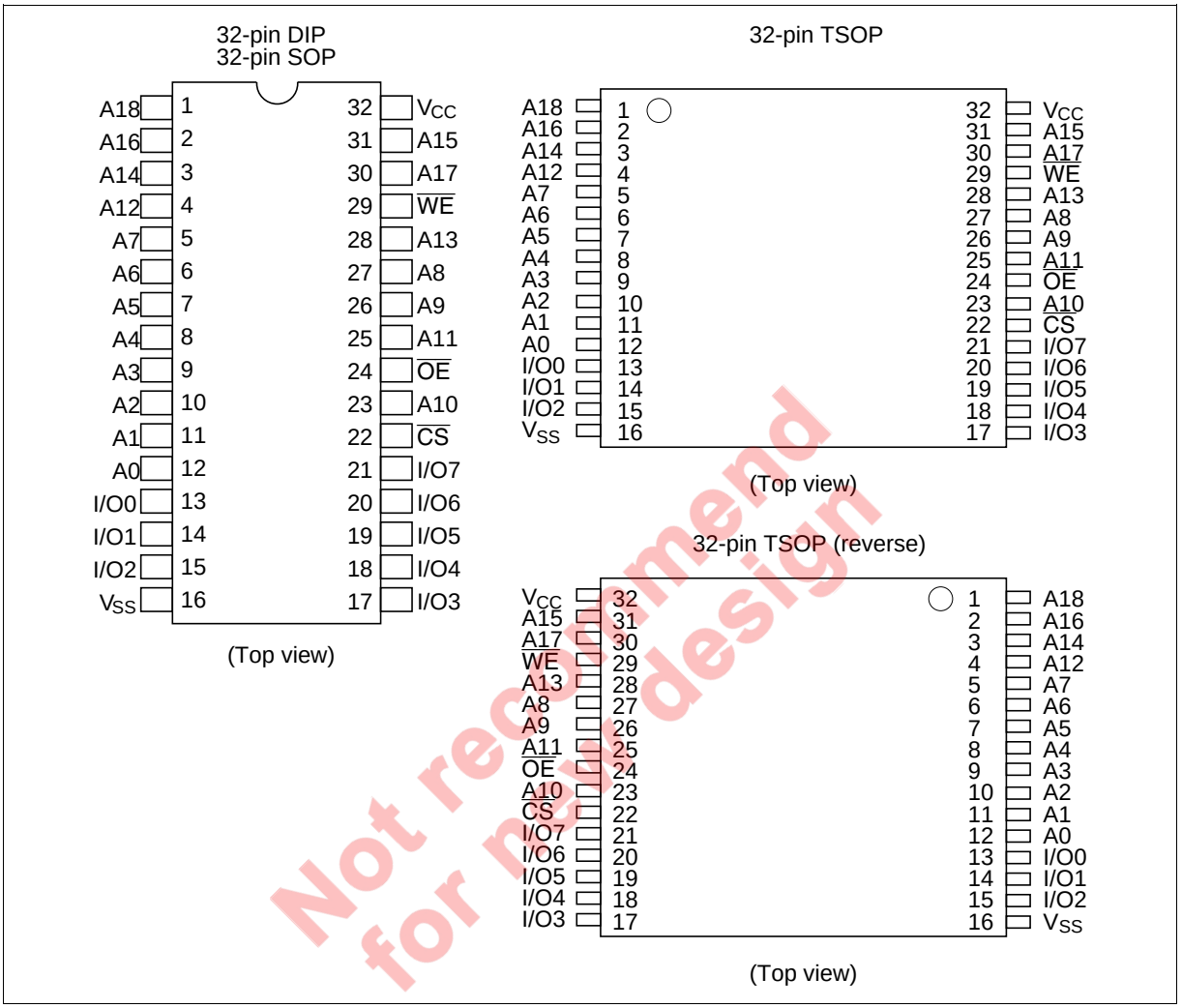
Features

- Single 5 V supply
- Access time: 55/70 ns (max)
- Power dissipation
  - Active: 10 mW/MHz (typ)
  - Standby: 4 µW (typ)
- Completely static memory. No clock or timing strobe required
- Equal access and cycle times
- Common data input and output: Three state output
- Directly TTL compatible: All inputs and outputs
- Battery backup operation

Ordering Information

Type No.	Access time	Package
HM628512CLP-7	70 ns	600-mil 32-pin plastic DIP (DP-32)
HM628512CLP-5SL	55 ns	
HM628512CLFP-7	70 ns	525-mil 32-pin plastic SOP (FP-32D)
HM628512CLFP-5SL	55 ns	
HM628512CLTT-7	70 ns	400-mil 32-pin plastic TSOP II (TTP-32D)
HM628512CLTT-5SL	55 ns	
HM628512CLRR-7	70 ns	400-mil 32-pin plastic TSOP II reverse (TTP-32DR)
HM628512CLRR-5SL	55 ns	

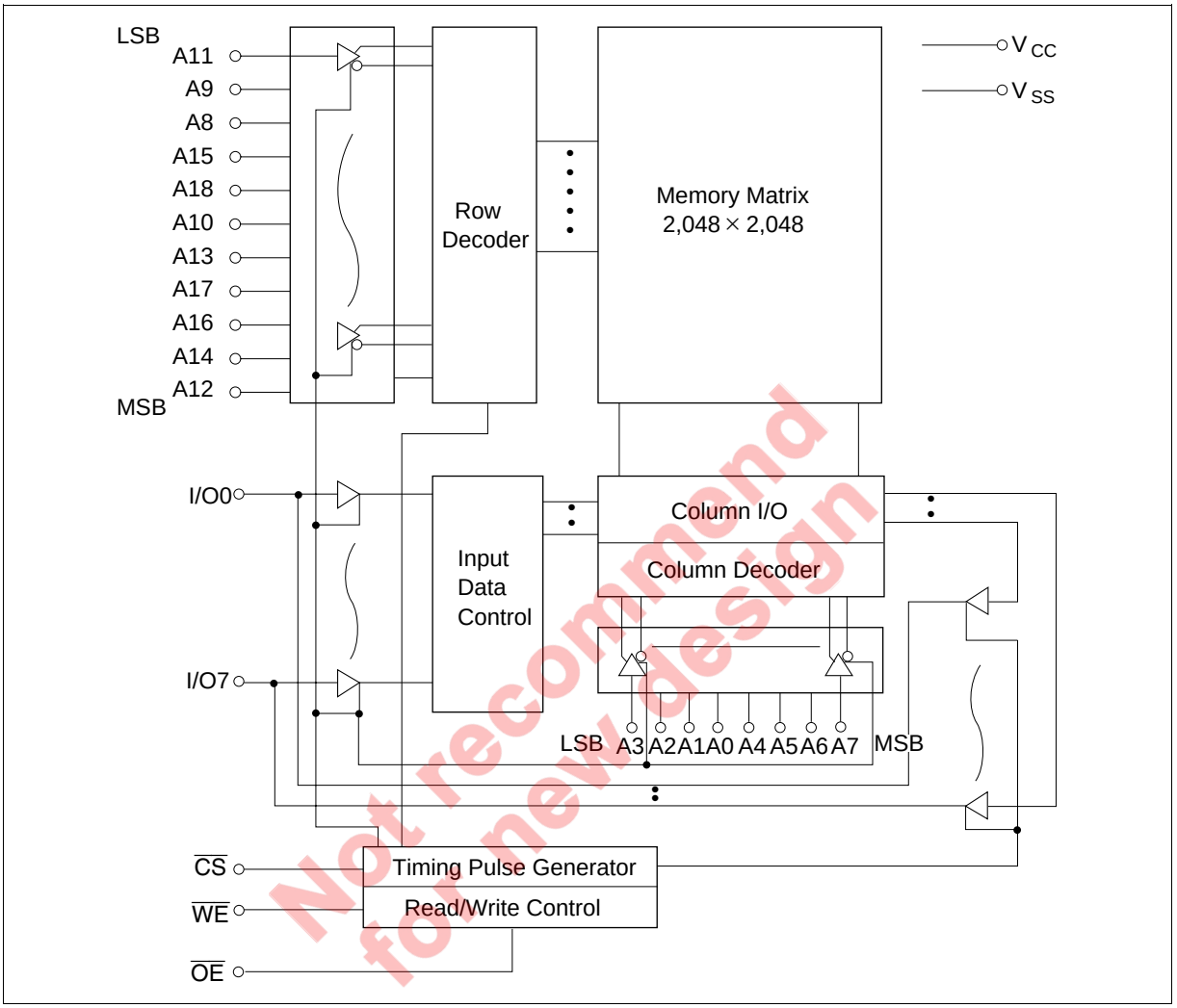
Pin Arrangement



Pin Description

Pin name	Function
A0 to A18	Address input
I/O0 to I/O7	Data input/output
$\overline{CS}$	Chip select
$\overline{OE}$	Output enable
$\overline{WE}$	Write enable
V_{CC}	Power supply
V_{SS}	Ground

Block Diagram



Function Table

$\overline{WE}$	$\overline{CS}$	$\overline{OE}$	Mode	V_{CC} current	Dout pin	Ref. cycle
×	H	×	Not selected	I_{SB}, I_{SB1}	High-Z	—
H	L	H	Output disable	I_{CC}	High-Z	—
H	L	L	Read	I_{CC}	Dout	Read cycle
L	L	H	Write	I_{CC}	Din	Write cycle (1)
L	L	L	Write	I_{CC}	Din	Write cycle (2)

Note: ×: H or L

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Power supply voltage	V_{CC}	–0.5 to +7.0	V
Voltage on any pin relative to V_{SS}	V_T	–0.5*[1] to V_{CC} + 0.3*[2]	V
Power dissipation	P_T	1.0	W
Operating temperature	Topr	–20 to +70	°C
Storage temperature	Tstg	–55 to +125	°C
Storage temperature under bias	Tbias	–20 to +85	°C

Notes: 1. V_T min: –3.0 V for pulse half-width ≤ 30 ns.
2. Maximum voltage is 7.0 V.

Recommended DC Operating Conditions (Ta = –20 to +70°C)

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	V_{CC}	4.5	5.0	5.5	V
	V_{SS}	0	0	0	V
Input high voltage	V_{IH}	2.2	—	V_{CC} + 0.3	V
Input low voltage	V_{IL}	–0.3*[1]	—	0.8	V

Note: 1. V_{IL} min: –3.0 V for pulse half-width ≤ 30 ns.

DC Characteristics

Parameter		Symbol	Min	Typ*[1]	Max	Unit	Test conditions
Input leakage current		$\|I_{LI}\|$	—	—	1	µA	Vin = V_{SS} to V_{CC}
Output leakage current		$\|I_{LO}\|$	—	—	1	µA	$\overline{CS}$ = V_{IH} or $\overline{OE}$ = V_{IH} or $\overline{WE}$ = V_{IL}, $V_{I/O}$ = V_{SS} to V_{CC}
Operating power supply current: DC		I_{CC}	—	1.5	3	mA	$\overline{CS}$ = V_{IL}, others = V_{IH}/V_{IL}, $I_{I/O}$ = 0 mA
Operating power supply current	HM628512C-5	I_{CC1}	—	8	25	mA	Min cycle, duty = 100% $\overline{CS}$ = V_{IL}, others = V_{IH}/V_{IL} $I_{I/O}$ = 0 mA
	HM628512C-7	I_{CC1}	—	7	25	mA	
Operating power supply current		I_{CC2}	—	2	5	mA	Cycle time = 1 µs, duty = 100% $I_{I/O}$ = 0 mA, $\overline{CS}$ ≤ 0.2 V V_{IH} ≥ V_{CC} – 0.2 V, V_{IL} ≤ 0.2 V
Standby power supply current: DC		I_{SB}	—	0.1	0.5	mA	$\overline{CS}$ = V_{IH}
Standby power supply current (1): DC		I_{SB1}	—	0.8*[2]	20*[2]	µA	Vin ≥ 0 V, $\overline{CS}$ ≥ V_{CC} – 0.2 V
			—	0.8*[3]	10*[3]	µA	
Output low voltage		V_{OL}	—	—	0.4	V	I_{OL} = 2.1 mA
Output high voltage		V_{OH}	2.4	—	—	V	I_{OH} = –1.0 mA

Notes: 1. Typical values are at V_{CC} = 5.0 V, Ta = +25°C and specified loading, and not guaranteed.
2. This characteristics is guaranteed only for L version.
3. This characteristics is guaranteed only for L-SL version.

Capacitance (Ta = +25°C, f = 1 MHz)

Parameter	Symbol	Typ	Max	Unit	Test conditions
Input capacitance*[1]	Cin	—	8	pF	Vin = 0 V
Input/output capacitance*[1]	$C_{I/O}$	—	10*[2]	pF	$V_{I/O}$ = 0 V

Notes: 1. This parameter is sampled and not 100% tested.
2. $C_{I/O}$ max = 12 pF only for HM628512CLP Series.

AC Characteristics (Ta = –20 to +70°C, V_{CC} = 5 V ± 10%, unless otherwise noted.)

Test Conditions

- Input pulse levels: 0.8 V to 2.4 V
- Input rise and fall time: 5 ns
- Input and output timing reference levels: 1.5 V
- Output load: 1 TTL Gate + C_L (100 pF) (HM628512C-7)
  1 TTL Gate + C_L (50 pF) (HM628512C-5)
  (Including scope & jig)

Read Cycle

		HM628512C					
		-5		-7			
Parameter	Symbol	Min	Max	Min	Max	Unit	Notes
Read cycle time	t_{RC}	55	—	70	—	ns	
Address access time	t_{AA}	—	55	—	70	ns	
Chip select access time	t_{CO}	—	55	—	70	ns	
Output enable to output valid	t_{OE}	—	25	—	35	ns	
Chip selection to output in low-Z	t_{LZ}	10	—	10	—	ns	2
Output enable to output in low-Z	t_{OLZ}	5	—	5	—	ns	2
Chip deselection to output in high-Z	t_{HZ}	0	20	0	25	ns	1, 2
Output disable to output in high-Z	t_{OHZ}	0	20	0	25	ns	1, 2
Output hold from address change	t_{OH}	10	—	10	—	ns	

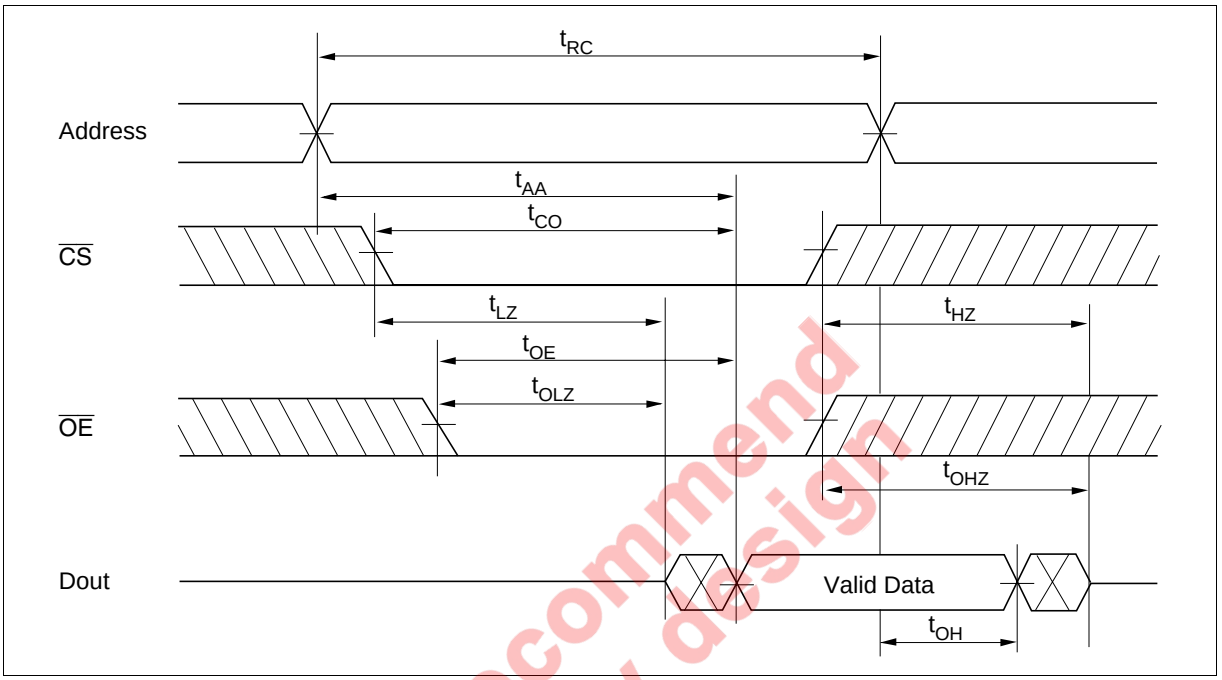
Write Cycle

		HM628512C					
		-5		-7			
Parameter	**Symbol**	**Min**	**Max**	**Min**	**Max**	**Unit**	**Notes**
Write cycle time	t_{WC}	55	—	70	—	ns	
Chip selection to end of write	t_{CW}	50	—	60	—	ns	4
Address setup time	t_{AS}	0	—	0	—	ns	5
Address valid to end of write	t_{AW}	50	—	60	—	ns	
Write pulse width	t_{WP}	40	—	50	—	ns	3, 12
Write recovery time	t_{WR}	0	—	0	—	ns	6
$\overline{WE}$ to output in high-Z	t_{WHZ}	0	20	0	25	ns	1, 2, 7
Data to write time overlap	t_{DW}	25	—	30	—	ns	
Data hold from write time	t_{DH}	0	—	0	—	ns	
Output active from output in high-Z	t_{OW}	5	—	5	—	ns	2
Output disable to output in high-Z	t_{OHZ}	0	20	0	25	ns	1, 2, 7

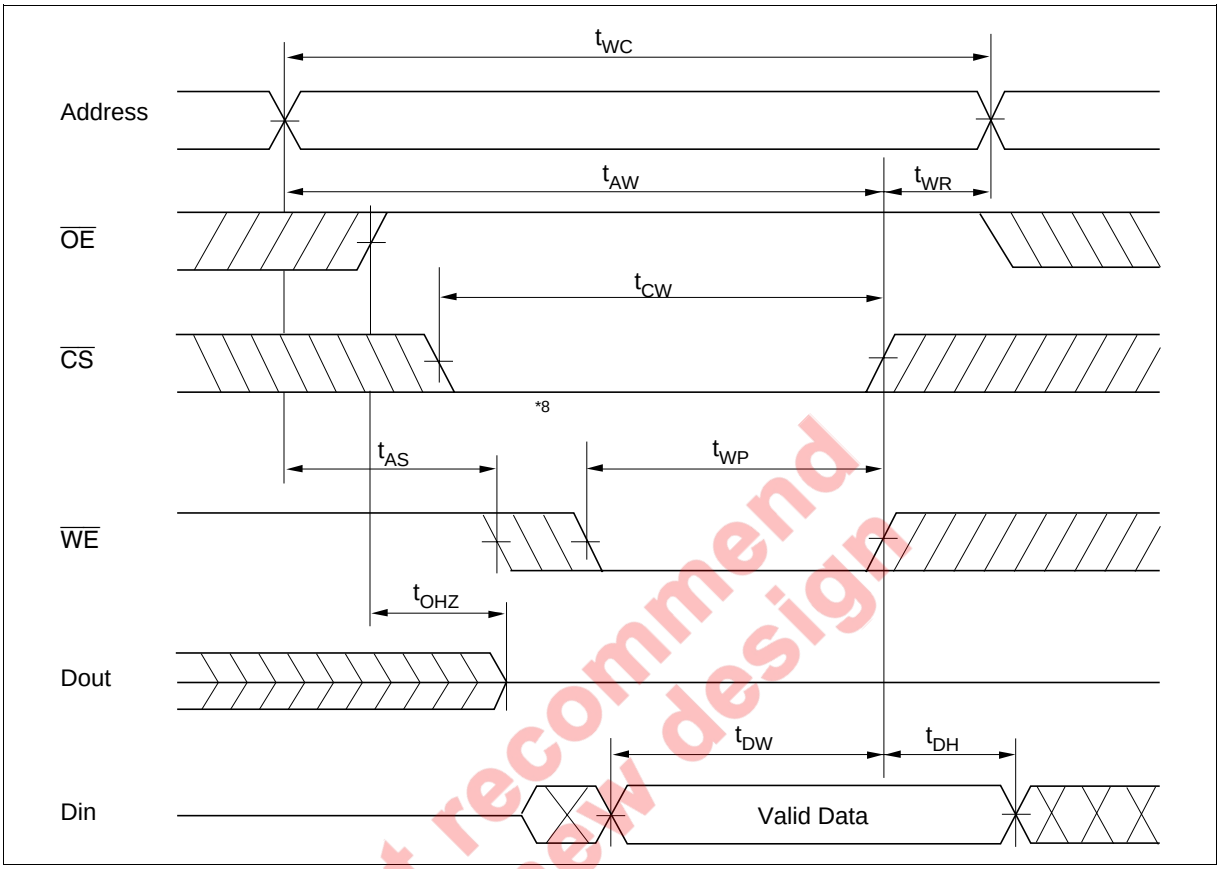
Notes:
1. t_{HZ}, t_{OHZ} and t_{WHZ} are defined as the time at which the outputs achieve the open circuit conditions and are not referred to output voltage levels.
2. This parameter is sampled and not 100% tested.
3. A write occurs during the overlap (t_{WP}) of a low $\overline{CS}$ and a low $\overline{WE}$. A write begins at the later transition of $\overline{CS}$ going low or $\overline{WE}$ going low. A write ends at the earlier transition of $\overline{CS}$ going high or $\overline{WE}$ going high. t_{WP} is measured from the beginning of write to the end of write.
4. t_{CW} is measured from $\overline{CS}$ going low to the end of write.
5. t_{AS} is measured from the address valid to the beginning of write.
6. t_{WR} is measured from the earlier of $\overline{WE}$ or $\overline{CS}$ going high to the end of write cycle.
7. During this period, I/O pins are in the output state so that the input signals of the opposite phase to the outputs must not be applied.
8. If the $\overline{CS}$ low transition occurs simultaneously with the $\overline{WE}$ low transition or after the $\overline{WE}$ transition, the output remain in a high impedance state.
9. Dout is the same phase of the write data of this write cycle.
10. Dout is the read data of next address.
11. If $\overline{CS}$ is low during this period, I/O pins are in the output state. Therefore, the input signals of the opposite phase to the outputs must not be applied to them.
12. In the write cycle with $\overline{OE}$ low fixed, t_{WP} must satisfy the following equation to avoid a problem of data bus contention. $t_{WP} \geq t_{DW}$ min + t_{WHZ} max

Timing Waveforms

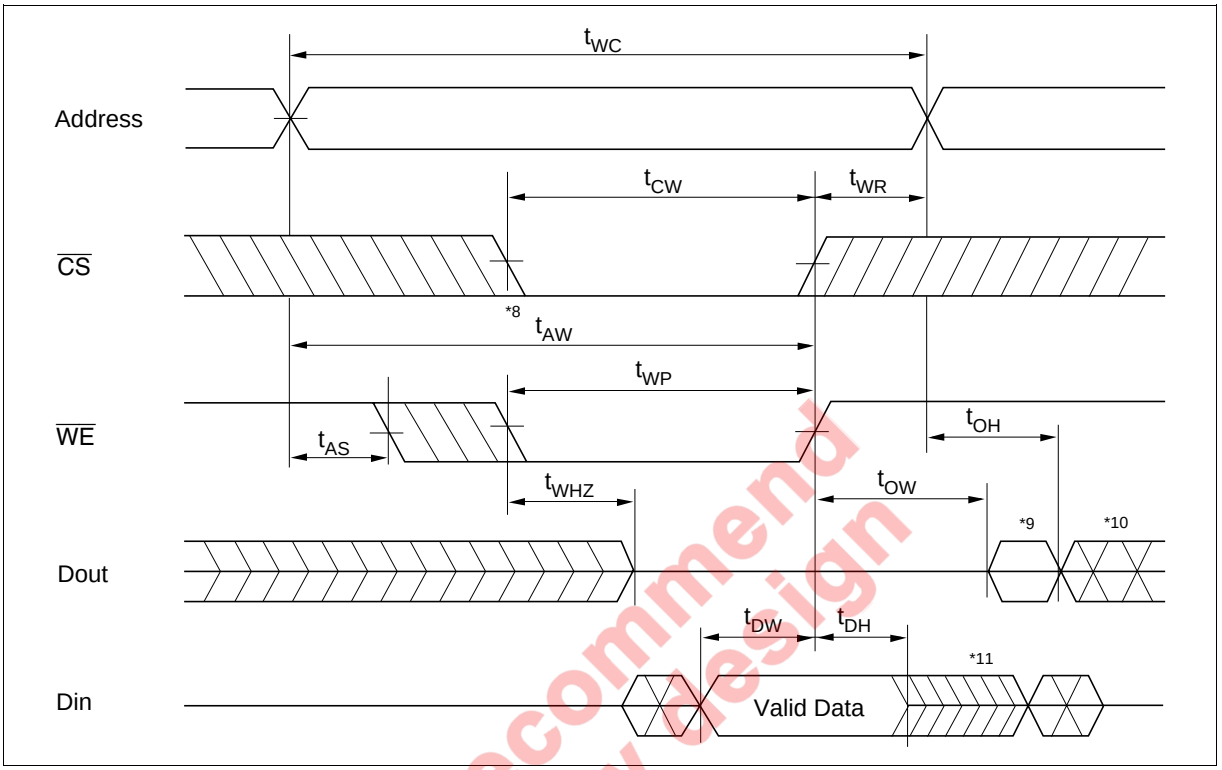
Read Timing Waveform ($\overline{WE}$ = V_{IH})



Write Timing Waveform (1) ($\overline{OE}$ Clock)



Write Timing Waveform (2) ($\overline{OE}$ Low Fixed)

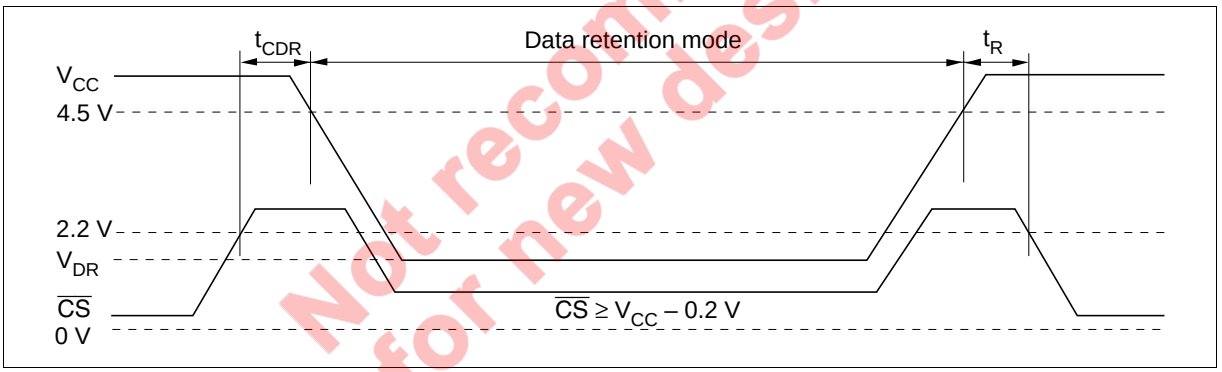


Low V_{CC} Data Retention Characteristics (Ta = –20 to +70°C)

Parameter	Symbol	Min	Typ	Max	Unit	Test conditions*[3]
V_{CC} for data retention	V_{DR}	2	—	—	V	$\overline{CS} \geq V_{CC} - 0.2$ V, Vin ≥ 0 V
Data retention current	I_{CCDR}	—	0.8*[4]	20*[1]	µA	V_{CC} = 3.0 V, Vin ≥ 0 V $\overline{CS} \geq V_{CC} - 0.2$ V
		—	0.8*[4]	10*[2]	µA	
Chip deselect to data retention time	t_{CDR}	0	—	—	ns	See retention waveform
Operation recovery time	t_R	t_{RC}*[5]	—	—	ns	

Notes:
1. For L-version and 10 µA (max.) at Ta = –20 to +40°C.
2. For L-SL-version and 3 µA (max.) at Ta = –20 to +40°C.
3. $\overline{CS}$ controls address buffer, $\overline{WE}$ buffer, $\overline{OE}$ buffer, and Din buffer. In data retention mode, Vin levels (address, $\overline{WE}$, $\overline{OE}$, I/O) can be in the high impedance state.
4. Typical values are at V_{CC} = 3.0 V, Ta = +25°C and specified loading, and not guaranteed.
5. t_{RC} = read cycle time.

Low V_{CC} Data Retention Timing Waveform ($\overline{CS}$ Controlled)

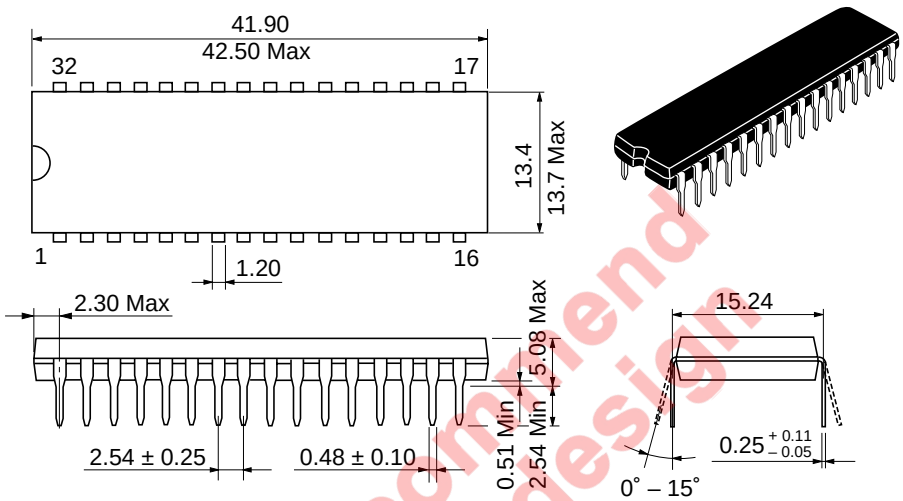


Package Dimensions

HM628512CLP Series (DP-32)

As of January, 2002

Unit: mm



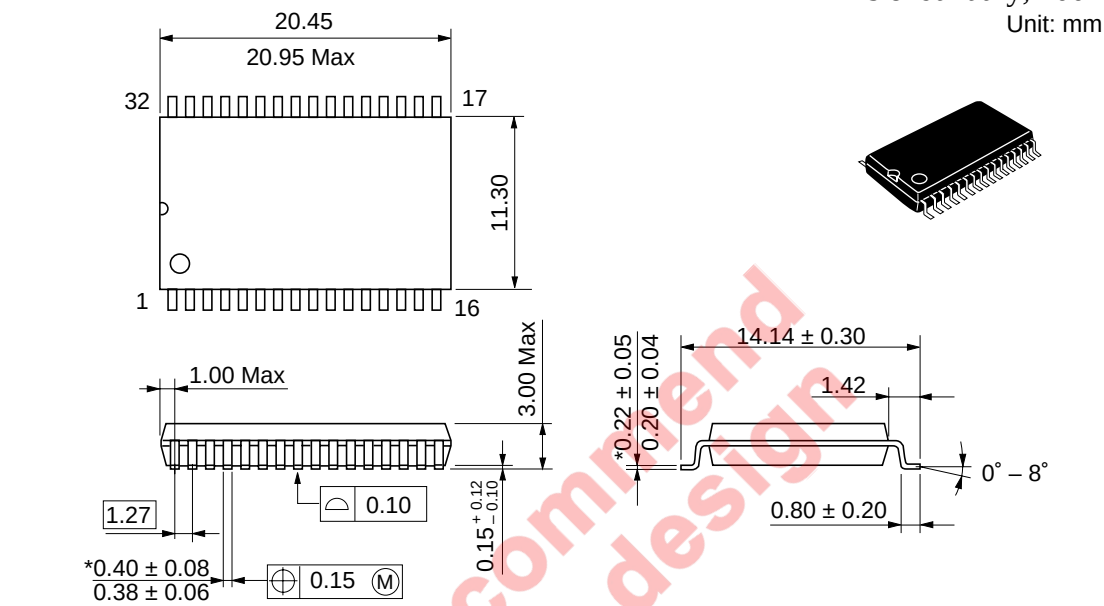
Hitachi Code	DP-32
JEDEC	—
JEITA	Conforms
Mass (reference value)	5.1 g

Package Dimensions (cont.)

HM628512CLFP Series (FP-32D)

As of January, 2002

Unit: mm



*Dimension including the plating thickness
Base material dimension

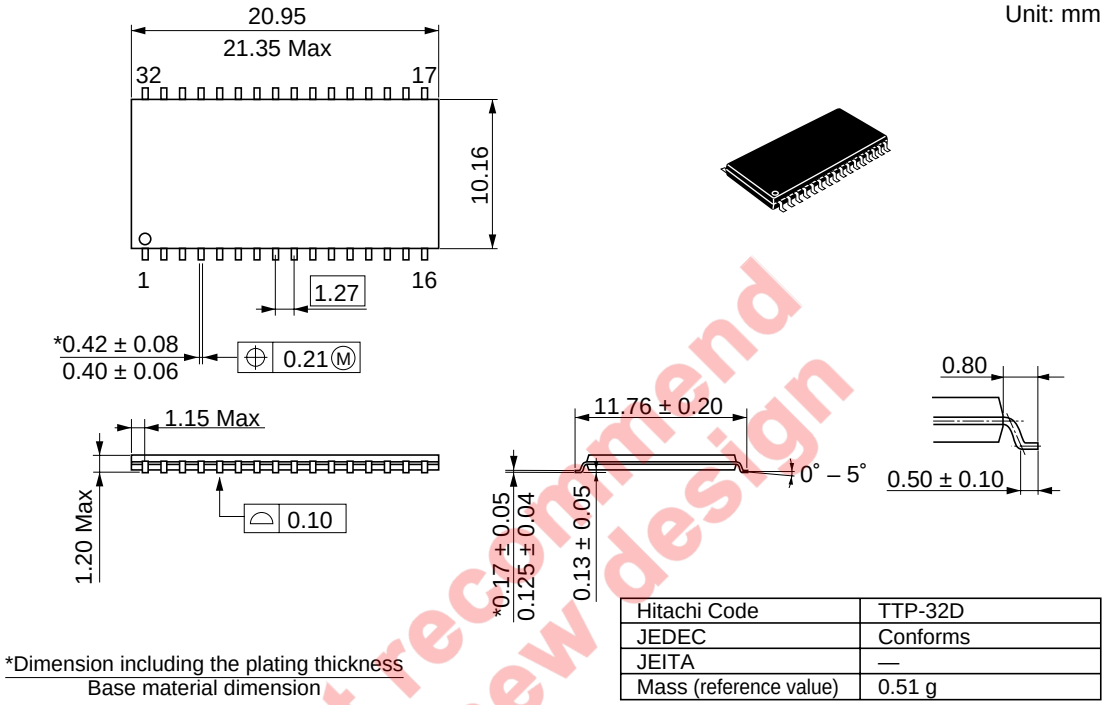
Hitachi Code	FP-32D
JEDEC	Conforms
JEITA	—
Mass (reference value)	1.3 g

Package Dimensions (cont.)

HM628512CLTT Series (TTP-32D)

As of January, 2002

Unit: mm



*Dimension including the plating thickness
Base material dimension

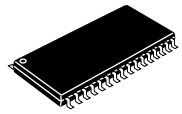
Hitachi Code	TTP-32D
JEDEC	Conforms
JEITA	—
Mass (reference value)	0.51 g

Package Dimensions (cont.)

HM628512CLRR Series (TTP-32DR)

As of January, 2002

Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	TTP-32DR
JEDEC	Conforms
JEITA	—
Mass (reference value)	0.51 g

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: (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>-6538-6533/6538-8577
Fax : <65>-6538-6933/6538-3877
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>-2735-9218
Fax : <852>-2730-0281
URL : http://semiconductor.hitachi.com.hk

Colophon 6.0