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)

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date: 2003/03/25

HITACHI SEMICONDUCTOR TECHNICAL UPDATE

<table>
<tr><td>Classification of Production</td><td colspan="3">MCU</td><td>No</td><td>TN-SH7-469A/E</td><td>Rev</td><td>1</td></tr>
<tr><td>THEME</td><td colspan="2">Flash Memory Programming and Erasing Precautions of SH7046 Series , SH7047 Series and SH7144 Series</td><td>Classification of Information</td><td colspan="4">1. Spec change
2. Supplement of Documents
③ Limitation of Use
4. Change of Mask
5. Change of Production Line</td></tr>
<tr><td rowspan="2">PRODUCT NAME</td><td rowspan="2">SH7046 Series
HD64F7046
SH7047 Series
HD64F7047
SH7144 Series
HD64F7144,HD64F7145</td><td>Lot No.</td><td rowspan="2">Reference Documents</td><td rowspan="2" colspan="3">SH7046/47 Series Hardware Manual
Rev.2.0 (ADE-602-237A)

SH7144 Series Hardware Manual
Rev.2.0 (ADE-602-254A)</td><td>Effective Date</td></tr>
<tr><td>ALL Lots</td><td>Permanent</td></tr>
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Flash memory programming and erasing precautions have been revised(for SH7046 series, SH7047 series, and SH7144 series).

Notes:

Flash Memory Programming and Erasing Precautions

Precautions concerning the use of on-board programming mode, the RAM emulation function, and programmer mode are summarized below.

Use the specified voltages and timing for programming and erasing: Applied voltages in excess of the rating can permanently damage the device. Use a PROM programmer that supports the Hitachi 256-kbyte flash memory on-chip microcomputer device type.

Only use the specified socket adapter. Failure to observe these points may result in damage to the device.

Powering on and off (see figures 1 to 3): Do not apply a low level to the FWP pin until V_{CC} has stabilized. Also, drive the FWP pin high before turning off V_{CC}.

When applying or disconnecting V_{CC} power, fix the FWP pin high and place the flash memory in the hardware protection state.

The power-on and power-off timing requirements should also be satisfied in the event of a power failure and subsequent recovery.

FWP application/disconnection (see figures 1 to 3): FWP application should be carried out when MCU operation is in a stable condition. If MCU operation is not stable, fix the FWP pin high and set the protection state.

The following points must be observed concerning FWP application and disconnection to prevent unintentional programming or erasing of flash memory:

- Apply FWP when the V_{CC} voltage has stabilized within its rated voltage range.
- In boot mode, apply and disconnect FWP during a reset.
- In user program mode, FWP can be switched between high and low level regardless of the reset state. FWP input can also be switched during execution of a program in flash memory.
- Do not apply FWP if program runaway has occurred.

- Disconnect FWP only when the SWE, ESU, PSU, EV, PV, P, and E bits in FLMCR1 are cleared.

  Make sure that the SWE, ESU, PSU, EV, PV, P, and E bits are not set by mistake when applying or disconnecting FWP.

Do not apply a constant low level to the FWP pin: Apply a low level to the FWP pin only when programming or erasing flash memory. A system configuration in which a low level is constantly applied to the FWP pin should be avoided. Also, while a low level is applied to the FWP pin, the watchdog timer should be activated to prevent overprogramming or overerasing due to program runaway, etc.

Use the recommended algorithm when programming and erasing flash memory: The recommended algorithm enables programming and erasing to be carried out without subjecting the device to voltage stress or sacrificing program data reliability. When setting the P or E bit in FLMCR1, the watchdog timer should be set beforehand as a precaution against program runaway, etc.

Do not set or clear the SWE bit during execution of a program in flash memory: Wait for at least 100 μs after clearing the SWE bit before executing a program or reading data in flash memory.
When the SWE bit is set, data in flash memory can be rewritten. Access flash memory only for verify operations (verification during programming/erasing). Also, do not clear the SWE bit during programming, erasing, or verifying. Similarly, when using the RAM emulation function while a low level is being input to the FWP pin, the SWE bit must be cleared before executing a program or reading data in flash memory.
However, the RAM area overlapping flash memory space can be read and written to regardless of whether the SWE bit is set or cleared.

Do not use interrupts while flash memory is being programmed or erased: All interrupt requests, including NMI, should be disabled during FWP application to give priority to program/erase operations.

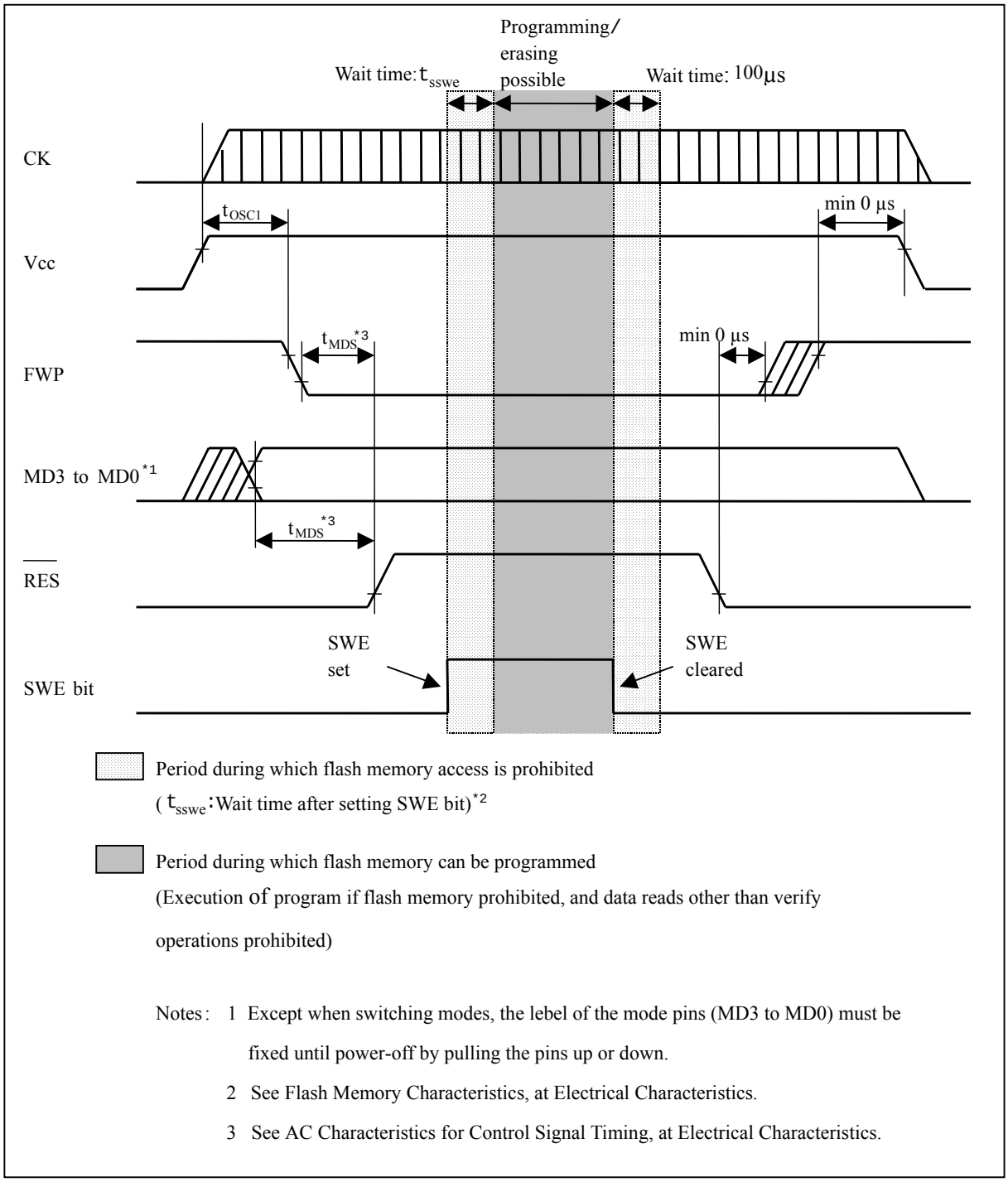
Do not perform additional programming. Erase the memory before reprogramming: In on-board programming, perform only one programming operation on a 128-byte programming unit block. In programmer mode, too, perform only one programming operation on a 128-byte programming unit block. Programming should be carried out with the entire programming unit block erased.

Before programming, check that the chip is correctly mounted in the PROM programmer: Overcurrent damage to the device can result if the index marks on the PROM programmer socket, socket adapter, and chip are not correctly aligned.

Do not touch the socket adapter or chip during programming: Touching either of these can cause contact faults and write errors.

Reset the flash memory before turning on the power: To reset the flash memory during oscillation

Apply the reset signal while SWE is low to reset the flash memory during its operation: The reset signal is applied at least 100 μs after the SWE bit has been cleard.

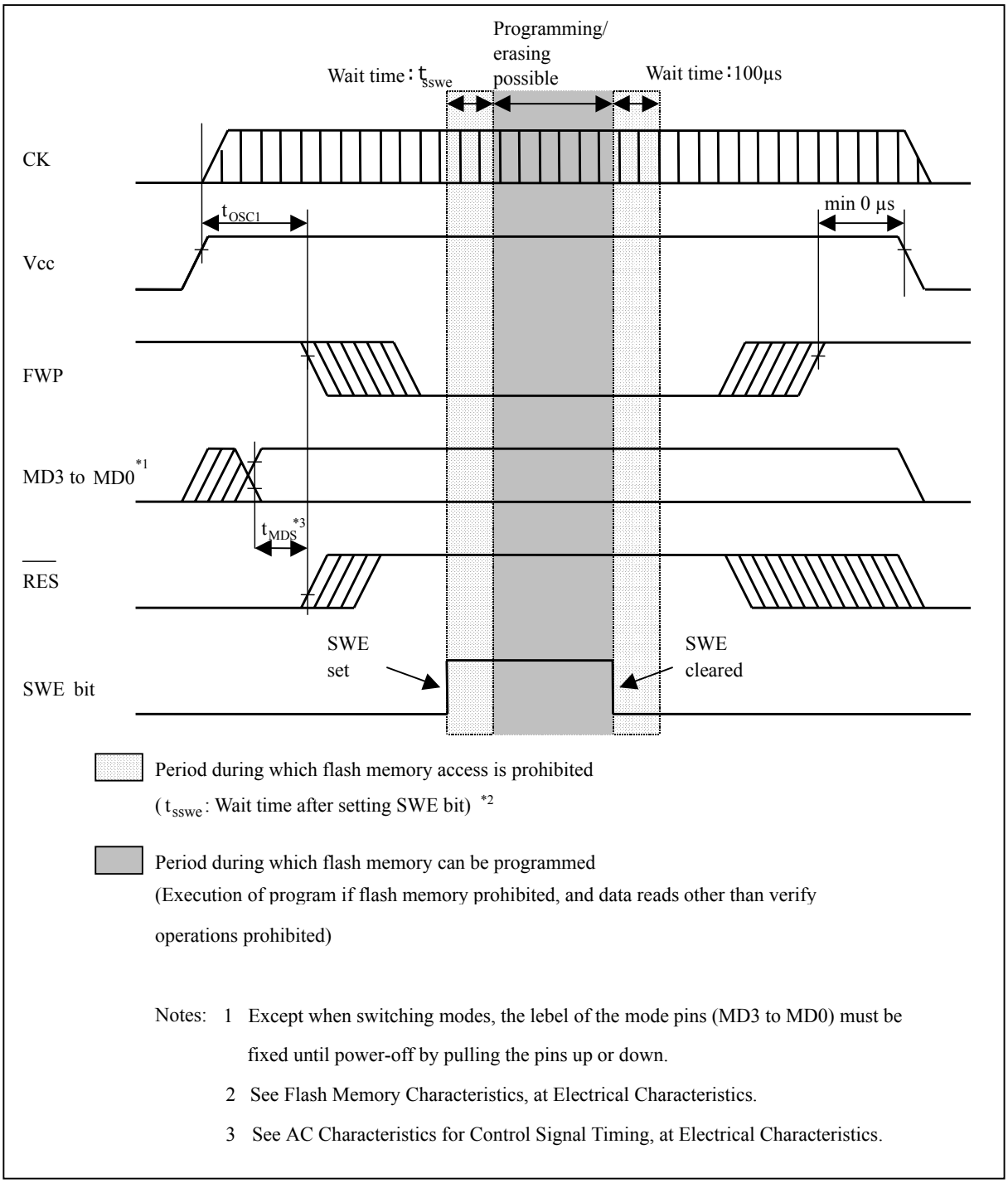


Notes: 1 Except when switching modes, the lebel of the mode pins (MD3 to MD0) must be fixed until power-off by pulling the pins up or down.

2 See Flash Memory Characteristics, at Electrical Characteristics.

3 See AC Characteristics for Control Signal Timing, at Electrical Characteristics.

Figure 1 Power-On/Off Timing (Boot Mode)



Notes: 1 Except when switching modes, the lebel of the mode pins (MD3 to MD0) must be fixed until power-off by pulling the pins up or down.

2 See Flash Memory Characteristics, at Electrical Characteristics.

3 See AC Characteristics for Control Signal Timing, at Electrical Characteristics.

Figure 2 Power-On/Off Timing (User Program Mode)

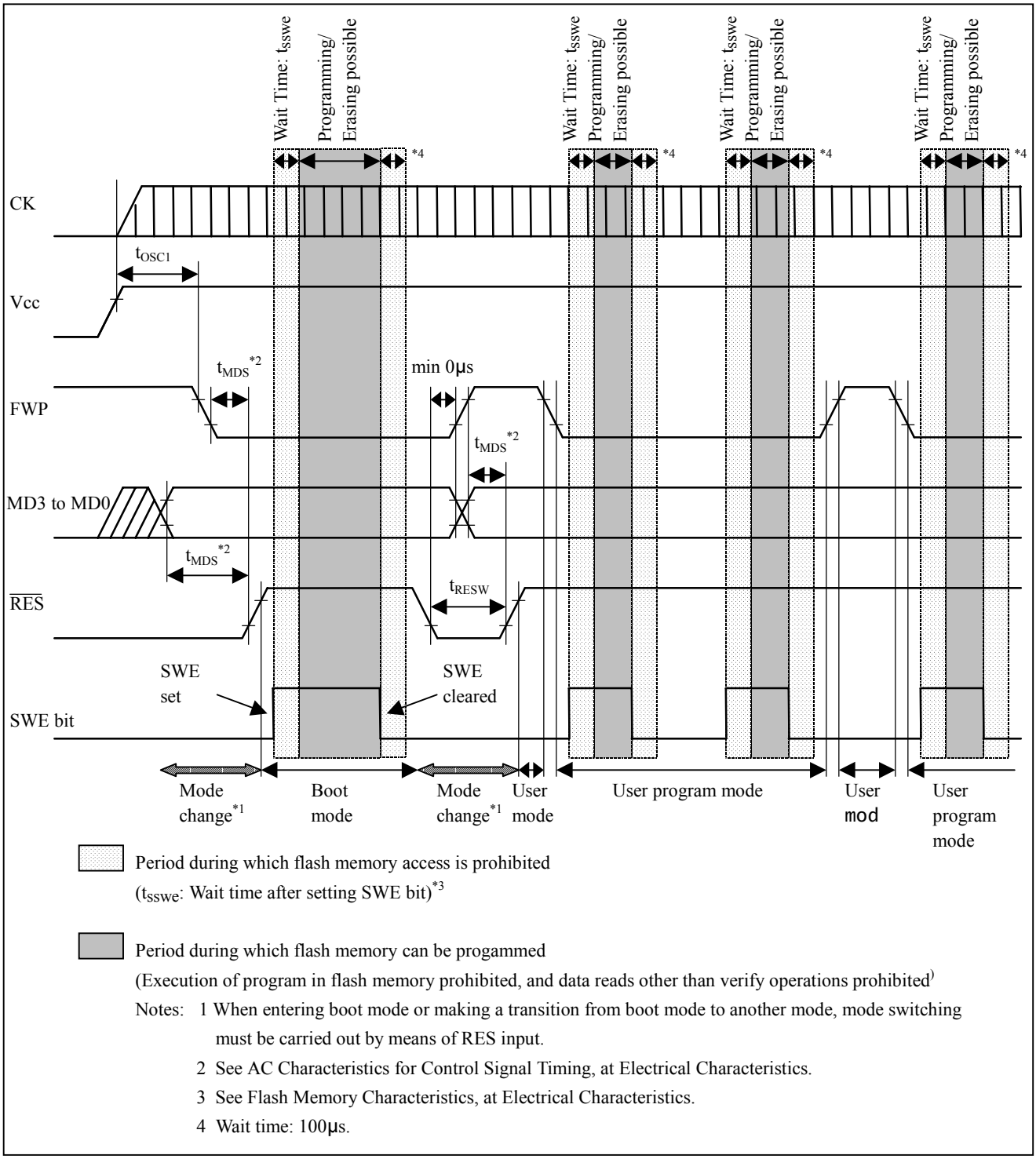


Figure 3 Mode Transition Timing
(Example: Boot Mode → User Mode ↔ User Program Mode)