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.
Preliminary Application Note

V850E/IF3, V850E/IG3
32-bit Single-Chip Microcontrollers
Sample Programs for Clock Generator

V850E/IF3:
  μPD70F3451
  μPD70F3452
V850E/IG3:
  μPD70F3453
  μPD70F3454
① VOLTAGE APPLICATION WAVEFORM AT INPUT PIN
Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between $V_{IL}$ (MAX) and $V_{IH}$ (MIN) due to noise, etc., the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between $V_{IL}$ (MAX) and $V_{IH}$ (MIN).

② HANDLING OF UNUSED INPUT PINS
Unconnected CMOS device inputs can be cause of malfunction. If an input pin is unconnected, it is possible that an internal input level may be generated due to noise, etc., causing malfunction. CMOS devices behave differently than Bipolar or NMOS devices. Input levels of CMOS devices must be fixed high or low by using pull-up or pull-down circuitry. Each unused pin should be connected to $V_{DD}$ or GND via a resistor if there is a possibility that it will be an output pin. All handling related to unused pins must be judged separately for each device and according to related specifications governing the device.

③ PRECAUTION AGAINST ESD
A strong electric field, when exposed to a MOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it when it has occurred. Environmental control must be adequate. When it is dry, a humidifier should be used. It is recommended to avoid using insulators that easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors should be grounded. The operator should be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions need to be taken for PW boards with mounted semiconductor devices.

④ STATUS BEFORE INITIALIZATION
Power-on does not necessarily define the initial status of a MOS device. Immediately after the power source is turned ON, devices with reset functions have not yet been initialized. Hence, power-on does not guarantee output pin levels, I/O settings or contents of registers. A device is not initialized until the reset signal is received. A reset operation must be executed immediately after power-on for devices with reset functions.

⑤ POWER ON/OFF SEQUENCE
In the case of a device that uses different power supplies for the internal operation and external interface, as a rule, switch on the external power supply after switching on the internal power supply. When switching the power supply off, as a rule, switch off the external power supply and then the internal power supply. Use of the reverse power on/off sequences may result in the application of an overvoltage to the internal elements of the device, causing malfunction and degradation of internal elements due to the passage of an abnormal current. The correct power on/off sequence must be judged separately for each device and according to related specifications governing the device.

⑥ INPUT OF SIGNAL DURING POWER OFF STATE
Do not input signals or an I/O pull-up power supply while the device is not powered. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Input of signals during the power off state must be judged separately for each device and according to related specifications governing the device.
Caution: This product uses SuperFlash® technology licensed from Silicon Storage Technology, Inc.

SuperFlash is a registered trademark of Silicon Storage Technology, Inc. in several countries including the United States and Japan.

- The information contained in this document is being issued in advance of the production cycle for the product. The parameters for the product may change before final production or NEC Electronics Corporation, at its own discretion, may withdraw the product prior to its production.
- No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Electronics. NEC Electronics assumes no responsibility for any errors that may appear in this document.
- NEC 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 NEC Electronics products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Electronics or others.
- Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of a customer's equipment shall be done under the full responsibility of the customer. NEC Electronics assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
- While NEC Electronics endeavors to enhance the quality, reliability and safety of NEC Electronics products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC Electronics products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment and anti-failure features.
- NEC Electronics products are classified into the following three quality grades: "Standard", "Special", and "Specific". The "Specific" quality grade applies only to NEC Electronics products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of an NEC Electronics product depend on its quality grade, as indicated below. Customers must check the quality grade of each NEC Electronics products before using it in a particular application.
  "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.
  "Special": 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, life support systems and medical equipment for life support, etc.

The quality grade of NEC Electronics products is "Standard" unless otherwise expressly specified in NEC Electronics data sheets or data books, etc. If customers wish to use NEC Electronics products in applications not intended by NEC Electronics, they must contact an NEC Electronics sales representative in advance to determine NEC Electronics' willingness to support a given application.

(Note)
(1) "NEC Electronics" as used in this statement means NEC Electronics Corporation and also includes its majority-owned subsidiaries.
(2) "NEC Electronics products" means any product developed or manufactured by or for NEC Electronics (as defined above).
INTRODUCTION

Cautions 1. This Application Note explains a case where the V850E/IG3 is used as a representative microcontroller. Use this Application Note for your reference when using the V850E/IF3.
3. The sample programs are provided for reference purposes only and operations are therefore not subject to guarantee by NEC Electronics Corporation. When using sample programs, customers are advised to sufficiently evaluate this product based on their systems, before use.
4. When using sample programs, reference the following startup routine and link directive file and adjust them if necessary.
   • Startup routine: ig3_start.s
   • Link directive file: ig3_link.dir

Target Readers
This Application Note is intended for users who understand the functions of the V850E/IF3 (μPD70F3451, 70F3452), and V850E/IG3 (μPD70F3453, 70F3454), and who design application systems that use these microcontrollers.

Purpose
This manual is intended to give users an understanding of the basic functions of the V850E/IF3 and V850E/IG3, using the application programs.

How to Use This Manual
It is assumed that the reader of this Application Note has general knowledge in the fields of electrical engineering, logic circuits, and microcontrollers.

For details of hardware functions (especially register functions, setting methods, etc.) and electrical specifications

For details of instruction functions
→ See the V850E1 Architecture User’s Manual.

Conventions
Data significance: Higher digits on the left and lower digits on the right
Active low representation: xxx (overscore over pin or signal name)
Memory map address: Higher addresses on the top and lower addresses on the bottom

Note: Footnote for item marked with Note in the text
Caution: Information requiring particular attention
Remark: Supplementary information
Numeric representation: Binary ... xxxx or xxxxB
Decimal ... xxxx
Hexadecimal ... xxxxH

Prefix indicating the power of 2 (address space, memory capacity):
K (kilo): \(2^{10} = 1,024\)
M (mega): \(2^{20} = 1,024^2\)
G (giga): \(2^{30} = 1,024^3\)
The function lists are structured as follows.

**Theme**

<table>
<thead>
<tr>
<th>[Function]</th>
<th>Function description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Function name]</td>
<td>Name of sample function</td>
</tr>
<tr>
<td>[Argument(s)]</td>
<td>Type and overview of argument(s)</td>
</tr>
<tr>
<td>[Processing content]</td>
<td>Processing content of sample function</td>
</tr>
<tr>
<td>[Starting method]</td>
<td>Conditions for calling a function</td>
</tr>
<tr>
<td>[SFR(s) used]</td>
<td>Register name and setting content</td>
</tr>
<tr>
<td>[call function(s)]</td>
<td>Name and function of call function(s)</td>
</tr>
<tr>
<td>[Variable(s)]</td>
<td>Type, name, and overview of variable(s) used in sample function</td>
</tr>
<tr>
<td>[Interrupt(s)]</td>
<td>Name of function</td>
</tr>
<tr>
<td>[Interrupt source(s)]</td>
<td>Name</td>
</tr>
<tr>
<td>[File name]</td>
<td>Name of corresponding sample program file</td>
</tr>
<tr>
<td>[Caution(s)]</td>
<td>Caution(s) upon function usage</td>
</tr>
</tbody>
</table>

**Product Differences**

The differences between the V850E/IG3 and the V850E/IF3 related to the clock generator are shown below.

<table>
<thead>
<tr>
<th>Item</th>
<th>V850E/IG3</th>
<th>V850E/IF3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLKOUT pin</td>
<td>Provided (μPD70F3454GC-8EA-A only)</td>
<td>None</td>
</tr>
</tbody>
</table>
The related documents indicated in this publication may include preliminary versions. However, preliminary versions are not marked as such.

### Documents related to V850E/IF3 and V850E/IG3

<table>
<thead>
<tr>
<th>Document Name</th>
<th>Document No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>V850E1 Architecture User's Manual</td>
<td>U14559E</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Serial Communication (UARTA)</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Serial Communication (UARTB)</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Serial Communication (CSIB)</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Serial Communication (I²C)</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for DMA Function Application Note</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Timer M Application Note</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Watchdog Timer Application Note</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Timer AA Application Note</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Timer AB Application Note</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Timer T Application Note</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Port Function Application Note</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Clock Generator Application Note</td>
<td>This manual</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Standby Function Application Note</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Interrupt Function Application Note</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for A/D Converters 0 and 1 Application Note</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for A/D Converter 2 Application Note</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 Sample Programs for Low-Voltage Detector (LVI) Function Application Note</td>
<td>To be prepared</td>
</tr>
<tr>
<td>V850E/IF3, V850E/IG3 6-Phase PWM Output Control by Timer AB, Timer Q Option, Timer AA, A/D Converters 0 and 1 Application Note</td>
<td>U18717E</td>
</tr>
</tbody>
</table>
CONTENTS

CHAPTER 1 PLL MODE ............................................................................................................................. 9

CHAPTER 2 CLOCK MONITOR MODE ................................................................................................. 13
### CHAPTER 1 PLL MODE

<table>
<thead>
<tr>
<th>Function</th>
<th>Sets the clock frequency by setting the CPU operation clock (PLL mode) and the PCC register which is a special register.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function name</td>
<td>pll_main</td>
</tr>
<tr>
<td>Argument</td>
<td>None</td>
</tr>
<tr>
<td>Processing content</td>
<td>Calls the PLL setting function by terminating all DMAs in use. When DMA is not used, the terminate processing of DMA is not needed.</td>
</tr>
<tr>
<td>Starting method</td>
<td>None</td>
</tr>
<tr>
<td>SFR used</td>
<td>None</td>
</tr>
<tr>
<td>call functions</td>
<td>clock_pll_mode, clock_pcc_mode</td>
</tr>
<tr>
<td>Variable</td>
<td>None</td>
</tr>
<tr>
<td>Interrupt</td>
<td>None</td>
</tr>
<tr>
<td>Interrupt source</td>
<td>None</td>
</tr>
<tr>
<td>File name</td>
<td>clock_generator1.c</td>
</tr>
<tr>
<td>Caution</td>
<td>Note that if the pll_main function is called the maskable interrupt request will not be enabled (EI).</td>
</tr>
</tbody>
</table>

<p>| Function name     | clock_pll_mode                                                                                   |
| Processing content| Sets PLL mode by the PLLCTL register.                                                             |
| SFR used          | PLLCTL: 0x03 (Sets to PLL mode.)                                                                  |
| call functions    | None                                                                                             |
| Variable          | None                                                                                             |
| File name         | clock_generator1.c                                                                                |
| Caution           | None                                                                                             |</p>
<table>
<thead>
<tr>
<th>Function name</th>
<th>clock_pcc_mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing content</td>
<td>Sets the PCC register by forcibly terminating DMA transfer.</td>
</tr>
<tr>
<td>SFRs used</td>
<td>DCHC0.TC0: DMA0 transfer status bit</td>
</tr>
<tr>
<td></td>
<td>DCHC0.E00: 1 (Enables DMA0 transfer.)</td>
</tr>
<tr>
<td></td>
<td>DCHC0.INIT0: 1 (Forcibly terminates DMA0 transfer.)</td>
</tr>
<tr>
<td></td>
<td>DCHC1.TC1 DMA1 transfer status bit</td>
</tr>
<tr>
<td></td>
<td>DCHC1.E11: 1 (Enables DMA1 transfer.)</td>
</tr>
<tr>
<td></td>
<td>DCHC1.INIT1: 1 (Forcibly terminates DMA1 transfer.)</td>
</tr>
<tr>
<td></td>
<td>DCHC2.TC2 DMA2 transfer status bit</td>
</tr>
<tr>
<td></td>
<td>DCHC2.E22: 1 (Enables DMA2 transfer.)</td>
</tr>
<tr>
<td></td>
<td>DCHC2.INIT2: 1 (Forcibly terminates DMA2 transfer.)</td>
</tr>
<tr>
<td></td>
<td>DCHC3.TC3 DMA3 transfer status bit</td>
</tr>
<tr>
<td></td>
<td>DCHC3.E33: 1 (Enables DMA3 transfer.)</td>
</tr>
<tr>
<td></td>
<td>DCHC3.INIT3: 1 (Forcibly terminates DMA3 transfer.)</td>
</tr>
<tr>
<td></td>
<td>PRCMD: 0x00 (Writes to command register</td>
</tr>
<tr>
<td></td>
<td>(used when writing to a special register).)</td>
</tr>
<tr>
<td></td>
<td>PCC: 0x00 (Selects clock as fXX.)</td>
</tr>
<tr>
<td>call functions</td>
<td>None</td>
</tr>
<tr>
<td>Variable</td>
<td>None</td>
</tr>
<tr>
<td>File name</td>
<td>clock_generator1.c</td>
</tr>
<tr>
<td>Cautions</td>
<td>• DMA transfer is forcibly terminated in this sample program, because all DMA transfers must be terminated before performing data setting to the special register. When DMA is not used, the terminate processing of DMA is not needed.</td>
</tr>
<tr>
<td></td>
<td>• Set the PCC register after switching to the PLL mode. The PCC register is a special register and can therefore only be written in a combination of specific sequences.</td>
</tr>
</tbody>
</table>
Figure 1-1. PLL mode (1/2)

- `pll_main`
- `DI` (Disables maskable interrupt request)
- `clock_pll_mode` (PLL mode setting function)
- `clock_pcc_mode` (PCC register setting function)
- `PRERR == 1` (Checks protection error flag)

Flowchart:

1. `pll_main`
2. `DI`
3. `clock_pll_mode`
4. `clock_pcc_mode`
5. `PRERR == 1`
   - No
   - Yes
6. `ret`
CHAPTER 1 PLL MODE

Figure 1-1. PLL mode (2/2)

Preliminary Application Note U18734EJ1V0AN
CHAPTER 2 CLOCK MONITOR MODE

<table>
<thead>
<tr>
<th>[Function]</th>
<th>Performs clock monitor operation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Function name]</td>
<td>clock_monitor_main</td>
</tr>
<tr>
<td>[Argument]</td>
<td>None</td>
</tr>
<tr>
<td>[Processing content]</td>
<td>Enables operation of the clock monitor mode by calling the clock monitor mode function.</td>
</tr>
<tr>
<td>[Starting method]</td>
<td>None</td>
</tr>
<tr>
<td>[SFR used]</td>
<td>None</td>
</tr>
<tr>
<td>[call functions]</td>
<td>clock_monitor_mode</td>
</tr>
<tr>
<td>[Variable]</td>
<td>None</td>
</tr>
<tr>
<td>[Interrupt]</td>
<td>None</td>
</tr>
<tr>
<td>[Interrupt source]</td>
<td>None</td>
</tr>
<tr>
<td>[File name]</td>
<td>clock_generator2.c</td>
</tr>
<tr>
<td>[Caution]</td>
<td>Note that if the clock_monitor_main function is called the maskable interrupt request will not be enabled (EI).</td>
</tr>
</tbody>
</table>
[Function name]  clock_monitor_mode

[Processing content] Sets the operation mode of the clock monitor via the CLM register, by forcibly terminating DMA transfer.

[SFRs used]  
- DCHC0.TC0  DMA0 transfer status bit
- DCHC0.E00: 1 (Enables DMA0 transfer.)
- DCHC0.INIT0: 1 (Forcibly terminates DMA0 transfer.)
- DCHC1.TC1  DMA1 transfer status bit
- DCHC1.E11: 1 (Enables DMA1 transfer.)
- DCHC1.INIT1: 1 (Forcibly terminates DMA1 transfer.)
- DCHC2.TC2  DMA2 transfer status bit
- DCHC2.E22: 1 (Enables DMA2 transfer.)
- DCHC2.INIT2: 1 (Forcibly terminates DMA2 transfer.)
- DCHC3.TC3  DMA3 transfer status bit
- DCHC3.E33: 1 (Enables DMA3 transfer.)
- DCHC3.INIT3: 1 (Forcibly terminates DMA3 transfer.)
- PRCMD: 0x01 (Writes to command register (used when writing to a special register).)
- CLM: 0x01 (Enables operation of clock monitor.)

[call functions]  None

[Variable]  None

[File name]  clock_generator2.c

[Cautions]  
- DMA transfer is forcibly terminated in this sample program, because all DMA transfers must be terminated before performing data setting to the special register. When DMA is not used, the terminate processing of DMA is not needed.
- The CLM register is a special register and can therefore only be written in a combination of specific sequences.
Figure 2-1. Clock Monitor Mode (1/2)

- **clock_monitor_main**
  - **DI** — Disables maskable interrupt request.
  - **clock_monitor_mode** — Clock monitor mode setting
  - **PRERR == 1**
    - **No**
    - **Yes** — Checks protection error flag.
  - **ret**
Figure 2-1. Clock Monitor Mode (2/2)

Clock monitor mode setting

clock_monitor_mode

TC0 == 0 && E00 == 1

No

Yes

INIT0 = 1

Checks DMA0 transfer.

Forcibly terminates DMA0.

TC1 == 0 && E11 == 1

No

Yes

INIT1 = 1

Checks DMA1 transfer.

Forcibly terminates DMA1.

TC2 == 0 && E22 == 1

No

Yes

INIT2 = 1

Checks DMA2 transfer.

Forcibly terminates DMA2.

TC3 == 0 && E33 == 1

No

Yes

INIT3 = 1

Checks DMA3 transfer.

Forcibly terminates DMA3.

PRCMD = 0x01

Writes to command register.

CLM = 0x01

Enables clock monitor operation.

NOP instruction × 5

Inserts five NOP instructions.

ret

Not needed when DMA is not used.
For further information, please contact:

NEC Electronics Corporation
1753, Shimonumabe, Nakahara-ku,
Kawasaki, Kanagawa 211-8668,
Japan
Tel: 044-435-5111
http://www.necel.com/

[America]
NEC Electronics America, Inc.
2880 Scott Blvd.
Santa Clara, CA 95050-2554, U.S.A.
Tel: 408-588-6000
800-366-9782
http://www.am.necel.com/

[Europe]
NEC Electronics (Europe) GmbH
Arcadiastrasse 10
40472 Düsseldorf, Germany
Tel: 0211-65030
http://www.eu.necel.com/

Hanover Office
Podbielskistrasse 166 B
30177 Hannover
Tel: 0 511 34 40 2-0

Munich Office
Werner-Eckert-Strasse 9
81829 München
Tel: 0 89 92 10 03-0

Stuttgart Office
Industriestrasse 3
70565 Stuttgart
Tel: 0 711 99 01 0-0

United Kingdom Branch
Cygnus House, Sunrise Parkway
Linford Wood, Milton Keynes
MK14 6NP, U.K.
Tel: 01908-691-133

Sucursale Française
9, rue Paul Dautier, B.P. 52
78142 Velizy-Villacoublay Cédex
France
Tel: 01-3067-5800

Sucursal en España
Juan Esplandiu, 15
28007 Madrid, Spain
Tel: 91-504-2787

Tyskland Filial
Täby Centrum
Entrance S (7th floor)
18322 Täby, Sweden
Tel: 08 638 72 00

Filiale Italiana
Via Fabio Filzi, 25/A
20124 Milano, Italy
Tel: 02-667541

Branch The Netherlands
Steijgerweg 6
5616 HS Eindhoven
The Netherlands
Tel: 040 265 40 10

[Asia & Oceania]
NEC Electronics (China) Co., Ltd
7th Floor, Quantum Plaza, No. 27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: 010-8235-1155
http://www.cn.necel.com/

Shanghai Branch
Room 2509-2510, Bank of China Tower,
200 Yincheng Road Central,
Pudong New Area, Shanghai, P.R.China P.C:200120
Tel:021-5888-5400
http://www.cn.necel.com/

Shenzhen Branch
Unit 01, 39/F, Excellence Times Square Building,
No. 4068 Yi Tian Road, Futian District, Shenzhen,
P.R.China P.C:518048
Tel:0755-8282-9800
http://www.cn.necel.com/

NEC Electronics Hong Kong Ltd.
Unit 1601-1613, 16/F, Tower 2, Grand Century Place,
193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: 2886-9318
http://www.hk.necel.com/

NEC Electronics Taiwan Ltd.
7F., No. 363 Fu Shing North Road
Taipei, Taiwan, R. O. C.
Tel: 02-8175-9600
http://www.tw.necel.com/

NEC Electronics Singapore Pte. Ltd.
238A Thomson Road,
#12-08 Novena Square,
Singapore 307684
Tel: 6253-8311
http://www.sg.necel.com/

NEC Electronics Korea Ltd.
11F., Samik Lavied’or Bldg., 720-2,
Yeoksam-Dong, Kangnam-Ku,
Seoul, 135-080, Korea
Tel: 02-558-3737
http://www.kr.necel.com/