To our customers,

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April 1\textsuperscript{st}, 2010  
Renesas Electronics Corporation

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This manual explains the sample program functions of the port functions for the V850E/IA4 microcontroller. The explanations are based on usage with the V850E/IA4 microcontroller. Refer to this manual when using the V850E/IA3, V850ES/IK1, and V850ES/IE2 microcontrollers.

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NOTES FOR CMOS DEVICES

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 $V_{IL\,\text{MAX}}$ and $V_{IH\,\text{MIN}}$ 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 $V_{IL\,\text{MAX}}$ and
   $V_{IH\,\text{MIN}}$.

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.
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INTRODUCTION

Cautions 1. Download the program used in this manual from the NEC Electronics Website (http://www.necel.com/).
2. When using this sample program, reference the following startup file and link directive file and adjust them if as necessary.
   • Startup file: IA4_start.s
   • Link directive file: IA4_link.dir

Conventions The function lists are structured as follows.

Hardware name

<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]</td>
<td>Type and overview of argument</td>
</tr>
<tr>
<td>[Processing content]</td>
<td>Processing content of sample 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/IA4 and the V850E/IA3, V850ES/IK1, and V850ES/IE2 related to the port functions are shown below.

<table>
<thead>
<tr>
<th>Item</th>
<th>V850E/IA4</th>
<th>V850E/IA3</th>
<th>V850ES/IK1</th>
<th>V850ES/IE2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port 0</td>
<td>P00 to P07</td>
<td>P00, P02 to P07</td>
<td>P00 to P06</td>
<td></td>
</tr>
<tr>
<td>Port 1</td>
<td>P10 to P17</td>
<td>P10 to P17</td>
<td>P10 to P17 (P16 (CLMER))</td>
<td></td>
</tr>
<tr>
<td>Port 2</td>
<td>P20 to P27</td>
<td>Not provided</td>
<td>P20 to P27</td>
<td></td>
</tr>
<tr>
<td>Port 3</td>
<td>P30 to P37</td>
<td>P30 to P37</td>
<td>P30 to P33</td>
<td></td>
</tr>
<tr>
<td>Port 4</td>
<td>P40 to P44</td>
<td>P40 to P44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port 5</td>
<td>P50 to P52</td>
<td>Not provided</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port 7</td>
<td>P70 to P77</td>
<td>P70 to P75</td>
<td>Not provided</td>
<td></td>
</tr>
<tr>
<td>Port DL</td>
<td>PDL0 to PDL15</td>
<td>PDL0 to PDL15</td>
<td>PDL0 to PDL7</td>
<td></td>
</tr>
</tbody>
</table>
Related Documents
The related documents indicated in this publication may include preliminary versions. However, preliminary versions are not marked as such.

Documents related to V850E/IA3, V850E/IA4, V850ES/IK1, and V850ES/IE2

<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/IA3, V850E/IA4 Hardware User’s Manual</td>
<td>U16543E</td>
</tr>
<tr>
<td>V850ES Architecture User’s Manual</td>
<td>U15943E</td>
</tr>
<tr>
<td>V850ES/IK1 Hardware User’s Manual</td>
<td>U16910E</td>
</tr>
<tr>
<td>V850ES/IE2 Hardware User’s Manual</td>
<td>U17716E</td>
</tr>
<tr>
<td>Inverter Control by V850 Series Vector Control by Hole Sensor Application Note</td>
<td>U17338E</td>
</tr>
<tr>
<td>Inverter Control by V850 Series Vector Control by Encoder Application Note</td>
<td>U17324E</td>
</tr>
<tr>
<td>Inverter Control by V850 Series 120° Excitation Method Control by Zero-Cross Detection Application Note</td>
<td>U17209E</td>
</tr>
<tr>
<td>Manual for Using Sample Program Functions DMA Functions (V850E/IA3, V850E/IA4) Application Note</td>
<td>U18235E</td>
</tr>
<tr>
<td>Manual for Using Sample Program Functions Timer ENC (V850E/IA3, V850E/IA4) Application Note</td>
<td>U18240E</td>
</tr>
</tbody>
</table>
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  Alternate-function pins .............................................................................................. 20
Port functions
Port input

<table>
<thead>
<tr>
<th>[Function]</th>
<th>Sets all ports as input pins of port mode.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Function name]</td>
<td>port_input_main</td>
</tr>
<tr>
<td>[Argument]</td>
<td>None</td>
</tr>
<tr>
<td>[Processing content]</td>
<td>Calls setting function of each port and sets to input pin.</td>
</tr>
<tr>
<td>[SFR used]</td>
<td>None</td>
</tr>
<tr>
<td>[call functions]</td>
<td>port0_input, port1_input, port2_input, port3_input, port4_input, port5_input, port7_input, portDL_input</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>port_input.c</td>
</tr>
<tr>
<td>[Caution]</td>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>[Function name]</th>
<th>port0_input</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Processing content]</td>
<td>Sets P0 pin to input mode of I/O port.</td>
</tr>
<tr>
<td>[SFRs used]</td>
<td>PMC0: 0x00 (Sets to I/O port)</td>
</tr>
<tr>
<td></td>
<td>PU0: 0x00 (Sets on-chip pull-up resistor as unused)</td>
</tr>
<tr>
<td></td>
<td>PM0: 0xFF (Sets to input mode)</td>
</tr>
<tr>
<td>[call function]</td>
<td>None</td>
</tr>
<tr>
<td>[Variable]</td>
<td>None</td>
</tr>
<tr>
<td>[File name]</td>
<td>port_input.c</td>
</tr>
<tr>
<td>[Cautions]</td>
<td>The connection of the on-chip pull-up resistor becomes valid only when in input mode during port mode or in alternate-function mode.</td>
</tr>
<tr>
<td></td>
<td>The on-chip pull-up resistor is set as “Not connected” in this sample program.</td>
</tr>
</tbody>
</table>
[Function name]  port1_input

[Processing content]  Sets P1 pin to input mode of I/O port.

[SFRs used]  PMC1: 0x00 (Sets to I/O port)
PU1: 0x00 (Sets on-chip pull-up resistor as unused)
PM1: 0xFF (Sets to input mode)

[call function]  None

[Variable]  None

[File name]  port_input.c

[Cautions]  
- The connection of the on-chip pull-up resistor becomes valid only when in input mode during port mode, when the pins function as input pins in alternate-function mode, or when the TOQ0T1 to TOQ1T3, TOQ0B1 to TOQ0B3, and TOP21 pins which are output pins during alternate-function mode go into a high impedance state due to TOQ0OFF and TOP2OFF pins or software processing.
- The on-chip pull-up resistor is set as “Not connected” in this sample program.

---

[Function name]  port2_input

[Processing content]  Sets P2 pin to input mode of I/O port.

[SFRs used]  PMC2: 0x00 (Sets to I/O port)
PU2: 0x00 (Sets on-chip pull-up resistor as unused)
PM2: 0xFF (Sets to input mode)

[call function]  None

[Variable]  None

[File name]  port_input.c

[Cautions]  
- The connection of the on-chip pull-up resistor becomes valid only when in input mode during port mode, or when the TOQ1T1 to TOQ1T3, TOQ1B1 to TOQ1B3, and TOP31 pins which are output pins during alternate-function mode go into a high impedance state due to TOQ1OFF and TOP3OFF pins or software processing.
- The on-chip pull-up resistor is set as “Not connected” in this sample program.
<table>
<thead>
<tr>
<th>Function name</th>
<th>port3_input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing content</td>
<td>Sets P3 pin to input mode of I/O port.</td>
</tr>
</tbody>
</table>
| SFRs used | PMC3: 0x00 (Sets to I/O port)  
PU3: 0x00 (Sets on-chip pull-up resistor as unused)  
PM3: 0xFF (Sets to input mode) |
| call function | None |
| Variable | None |
| File name | port_input.c |
| Cautions | • The connection of the on-chip pull-up resistor becomes valid only when in input mode during port mode or when the pins function as input pins in the alternate-function mode.  
• The on-chip pull-up resistor is set as “Not connected” in this sample program. |

<table>
<thead>
<tr>
<th>Function name</th>
<th>port4_input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing content</td>
<td>Sets P4 pin to input mode of I/O port.</td>
</tr>
</tbody>
</table>
| SFRs used | PMC4: 0x00 (Sets to I/O port)  
PU4: 0x00 (Sets on-chip pull-up resistor as unused)  
PM4: 0xFF (Sets to input mode) |
| call function | None |
| Variable | None |
| File name | port_input.c |
| Cautions | • The connection of the on-chip pull-up resistor becomes valid only when in input mode during port mode or when the pins function as input pins in the alternate-function mode (including when the SCKB0 pin is in slave mode).  
• The on-chip pull-up resistor is set as “Not connected” in this sample program. |
### port5_input

**Function name**: port5_input  
**Processing content**: Sets P5 pin to input mode of I/O port.  
**SFRs used**:  
- PMC5: 0x00 (Sets to I/O port)  
- PU5: 0x00 (Sets on-chip pull-up resistor as unused)  
- PM5: 0xFF (Sets to input mode)  
**call function**: None  
**Variable**: None  
**File name**: port_input.c  
**Caution**:  
- The connection of the on-chip pull-up resistor becomes valid only when in input mode during port mode or when the pins function as input pins in the alternate-function mode.  
- The on-chip pull-up resistor is set as “Not connected” in this sample program.

### port7_input

**Function name**: port7_input  
**Processing content**: Sets P7 pin to input mode of input port.  
**SFR used**: PMC7: 0x00 (Sets to input port)  
**call function**: None  
**Variable**: None  
**File name**: port_input.c  
**Caution**: None

### portDL_input

**Function name**: portDL_input  
**Processing content**: Sets PDL pin to input mode of I/O port.  
**SFRs used**:  
- PUDL: 0x0000 (Sets on-chip pull-up resistor as unused)  
- PMDL: 0xFFFF (Sets to input mode)  
**call function**: None  
**Variable**: None  
**File name**: port_input.c  
**Caution**:  
- The connection of the on-chip pull-up resistor becomes valid only when in input mode during port mode.  
- The on-chip pull-up resistor is set as “Not connected” in this sample program.
Port functions
Port input (1/3)

- port_input_main
  - port0_input: Port 0 input setting function
  - port1_input: Port 1 input setting function
  - port2_input: Port 2 input setting function
  - port3_input: Port 3 input setting function
  - port4_input: Port 4 input setting function
  - port5_input: Port 5 input setting function
  - port7_input: Port 7 input setting function
  - portDL_input: Port DL input setting function
  - ret
Port functions
Port input (2/3)

Port 0 input setting function

port0_input

PM0 = 0xFF
Sets alternate-function pin to I/O port

PU0 = 0x00
Sets pull-up resistor as unused

PM0 = 0xFF
Sets I/O mode to input mode

ret

Port 1 input setting function

port1_input

PM1 = 0xFF
Sets alternate-function pin to I/O port

PU1 = 0x00
Sets pull-up resistor as unused

PM1 = 0xFF
Sets I/O mode to input mode

ret

Port 2 input setting function

port2_input

PM2 = 0xFF
Sets alternate-function pin to I/O port

PU2 = 0x00
Sets pull-up resistor as unused

PM2 = 0xFF
Sets I/O mode to input mode

ret

Port 3 input setting function

port3_input

PM3 = 0xFF
Sets alternate-function pin to I/O port

PU3 = 0x00
Sets pull-up resistor as unused

PM3 = 0xFF
Sets I/O mode to input mode

ret
Port functions
Port input (3/3)

**Port 4 input setting function**
- `port4_input`
- `PMC4 = 0x00` Sets alternate-function pin to I/O port
- `PU4 = 0x00` Sets pull-up resistor as unused
- `PM4 = 0xFF` Sets I/O mode to input mode
- `ret`

**Port 5 input setting function**
- `port5_input`
- `PMC5 = 0x00` Sets alternate-function pin to I/O port
- `PU5 = 0x00` Sets pull-up resistor as unused
- `PM5 = 0xFF` Sets I/O mode to input mode
- `ret`

**Port 7 input setting function**
- `port7_input`
- `PMC7 = 0x00` Sets alternate-function pin to input port
- `ret`

**Port DL input setting function**
- `portDL_input`
- `PUDL = 0x0000` Sets pull-up resistor as unused
- `PMDL = 0xFFFF` Sets I/O mode to input mode
- `ret`
Port functions
Port output

<table>
<thead>
<tr>
<th>[Function]</th>
<th>Sets all ports as output pins of port mode.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Function name]</td>
<td>port_output_main</td>
</tr>
<tr>
<td>[Argument]</td>
<td>None</td>
</tr>
<tr>
<td>[Processing content]</td>
<td>Calls setting function of each port and sets to output pin.</td>
</tr>
<tr>
<td>[SFR used]</td>
<td>None</td>
</tr>
<tr>
<td>[call functions]</td>
<td>port0_output, port1_output, port2_output, port3_output, port4_output, port5_output, portDL_output</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>port_output.c</td>
</tr>
<tr>
<td>[Caution]</td>
<td>None</td>
</tr>
</tbody>
</table>

| [Function name]  | port0_output                                       |
| [Processing content] | Sets P0 pin to output mode of I/O port.          |
| [SFR used]       | PMC0: 0x00 (Sets to I/O port)                     |
|                   | P0: 0x00 (Sets initial value to output data)      |
|                   | PM0: 0x00 (Sets to output mode)                   |
| [call function]  | None                                                |
| [Variable]       | None                                                |
| [File name]      | port_output.c                                       |
| [Caution]        | Set the initial value of the output data as desired according to specifications. |
[Function name] port1_output

[Processing content] Sets P1 pin to output mode of I/O port.

[SFRs used] PMC1: 0x00 (Sets to I/O port)
P1: 0x00 (Sets initial value to output data)
PM1: 0x00 (Sets to output mode)

[call function] None

[Variable] None

[File name] port_output.c

[Caution] Set the initial value of the output data as desired according to specifications.

---

[Function name] port2_output

[Processing content] Sets P2 pin to output mode of I/O port.

[SFRs used] PMC2: 0x00 (Sets to I/O port)
P2: 0x00 (Sets initial value to output data)
PM2: 0x00 (Sets to output mode)

[call function] None

[Variable] None

[File name] port_output.c

[Caution] Set the initial value of the output data as desired according to specifications.

---

[Function name] port3_output

[Processing content] Sets P3 pin to output mode of I/O port.

[SFRs used] PMC3: 0x00 (Sets to I/O port)
P3: 0x00 (Sets initial value to output data)
PM3: 0x00 (Sets to output mode)

[call function] None

[Variable] None

[File name] port_output.c

[Caution] Set the initial value of the output data as desired according to specifications.
[Function name]   port4_output

[Processing content]   Sets P4 pin to output mode of I/O port.

[SFRs used]   PMC4:  0x00 (Sets to I/O port)
P4:  0x00 (Sets initial value to output data)
PM4:  0xE0 (Sets to output mode)

call function]   None

[Variable]   None

[File name]   port_output.c

[Caution]   Set the initial value of the output data as desired according to specifications.

---

[Function name]   port5_output

[Processing content]   Sets P5 pin to output mode of I/O port.

[SFRs used]   PMC5:  0x00 (Sets to I/O port)
P5:  0x00 (Sets initial value to output data)
PM5:  0xF8 (Sets to output mode)

call function]   None

[Variable]   None

[File name]   port_output.c

[Caution]   Set the initial value of the output data as desired according to specifications.

---

[Function name]   portDL_output

[Processing content]   Sets PDL pin to output mode of I/O port.

[SFRs used]   PDL:  0x0000 (Sets initial value to output data)
PMDL:  0x0000 (Sets to output mode)

call function]   None

[Variable]   None

[File name]   port_output.c

[Caution]   Set the initial value of the output data as desired according to specifications.
Port functions
Port output (1/3)

- port_output_main
  - port0_output: Port 0 output setting function
  - port1_output: Port 1 output setting function
  - port2_output: Port 2 output setting function
  - port3_output: Port 3 output setting function
  - port4_output: Port 4 output setting function
  - port5_output: Port 5 output setting function
  - portDL_output: Port DL output setting function
  - ret
Port functions
Port output (2/3)

Port 0 output setting function

port0_output

PM0 = 0x00 Sets alternate-function pin to I/O port

P0 = 0x00 Sets initial value of port latch specification

PM0 = 0x00 Sets I/O mode to output mode

ret

Port 1 output setting function

port1_output

PM1 = 0x00 Sets alternate-function pin to I/O port

P1 = 0x00 Sets initial value of port latch specification

PM1 = 0x00 Sets I/O mode to output mode

ret

Port 2 output setting function

port2_output

PM2 = 0x00 Sets alternate-function pin to I/O port

P2 = 0x00 Sets initial value of port latch specification

PM2 = 0x00 Sets I/O mode to output mode

ret

Port 3 output setting function

port3_output

PM3 = 0x00 Sets alternate-function pin to I/O port

P3 = 0x00 Sets initial value of port latch specification

PM3 = 0x00 Sets I/O mode to output mode

ret
Port 4 output setting function

- **port4.output**
- PMC4 = 0x00
- P4 = 0x00
- PM4 = 0xE0
- Sets alternate-function pin to I/O port
- Sets initial value of port latch specification
- Sets I/O mode to output mode
- **ret**

Port 5 output setting function

- **port5.output**
- PMC5 = 0x00
- P5 = 0x00
- PM5 = 0xF8
- Sets alternate-function pin to I/O port
- Sets initial value of port latch specification
- Sets I/O mode to output mode
- **ret**

Port DL output setting function

- **portDL.output**
- PDL = 0x0000
- PMDL = 0x0000
- Sets initial value of port latch specification
- Sets I/O mode to output mode
- **ret**
Port functions
Alternate-function pins

<table>
<thead>
<tr>
<th>Function</th>
<th>Sets all ports as alternate-function pins of alternate-function mode.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function name</td>
<td>port_use_main</td>
</tr>
<tr>
<td>Argument</td>
<td>None</td>
</tr>
<tr>
<td>Processing content</td>
<td>Calls setting function of each port and sets to alternate-function pin.</td>
</tr>
<tr>
<td>SFRs used</td>
<td>None</td>
</tr>
<tr>
<td>call functions</td>
<td>port0_use, port1_use, port2_use, port3_use, port4_use, port5_use, port7_use</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>port_use.c</td>
</tr>
<tr>
<td>Caution</td>
<td>None</td>
</tr>
</tbody>
</table>

| Function name | port0_use |
| Processing content | Sets P0 pin as alternate-function pin. |
| SFRs used | PMC0: 0xFF (Sets to alternate-function pin) |
| | PU0: 0x00 (Sets on-chip pull-up resistor as unused) |
| | INTR0: 0x00 (Sets to falling edge) |
| | INTF0: 0xFF (Sets to falling edge) |
| call function | None |
| Variable | None |
| File name | port_use.c |
| Cautions | The connection of the on-chip pull-up resistor becomes valid only when in input mode during port mode or in alternate-function mode. |
| | The on-chip pull-up resistor is set as “Not connected” in this sample program. |
[Function name] port1_use

[Processing content] Sets P1 pin as alternate-function pin.

[SFRs used] PFC1: 0xFF (Sets to alternate-function pin)
PFCE1: 0x00 (Sets to alternate-function pin)
PMC1: 0xFF (Sets to alternate-function pin)
PU1: 0x00 (Sets on-chip pull-up resistor as unused)

[call function] None

[Variable] None

[File name] port_use.c

[Cautions] • The connection of the on-chip pull-up resistor becomes valid only when in input mode during port mode, when the pins function as input pins in alternate-function mode, or when the TOQ0T1 to TOQ0T3, TOQ0B1 to TOQ0B3, and TOP21 pins which are output pins during alternate-function mode go into a high impedance state due to TOQ0OFF and TOP2OFF pins or software processing.
• The on-chip pull-up resistor is set as “Not connected” in this sample program.

[Function name] port2_use

[Processing content] Sets P2 pin as alternate-function pin.

[SFRs used] PMC2: 0xFF (Sets to alternate-function pin)
PU2: 0x00 (Sets on-chip pull-up resistor as unused)

[call function] None

[Variable] None

[File name] port_use.c

[Cautions] • The connection of the on-chip pull-up resistor becomes valid only when in input mode during port mode, or when the TOQ1T1 to TOQ1T3, TOQ1B1 to TOQ1B3, and TOP31 pins which are output pins during alternate-function mode go into a high impedance state due to TOQ1OFF and TOP3OFF pins or software processing.
• The on-chip pull-up resistor is set as “Not connected” in this sample program.
<table>
<thead>
<tr>
<th>Function name</th>
<th>port3_use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing content</td>
<td>Sets P3 pin as alternate-function pin.</td>
</tr>
</tbody>
</table>
| SFRs used | PFC3: 0x2C (Sets to alternate-function pin)  
PMC3: 0xFFF (Sets to alternate-function pin)  
PU3: 0x00 (Sets on-chip pull-up resistor as unused) |
| call function | None |
| Variable | None |
| File name | port_use.c |
| Cautions |  
- The connection of the on-chip pull-up resistor becomes valid only when in input mode during port mode or when the pins function as input pins in the alternate-function mode.  
- The on-chip pull-up resistor is set as “Not connected” in this sample program. |

<table>
<thead>
<tr>
<th>Function name</th>
<th>port4_use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing content</td>
<td>Sets P4 pin as alternate-function pin.</td>
</tr>
</tbody>
</table>
| SFRs used | PFC4: 0x18 (Sets to alternate-function pin)  
PMC4: 0x1F (Sets to alternate-function pin)  
PU4: 0x00 (Sets on-chip pull-up resistor as unused) |
| call function | None |
| Variable | None |
| File name | port_use.c |
| Cautions |  
- The connection of the on-chip pull-up resistor becomes valid only when in input mode during port mode or when the pins function as input pins in the alternate-function mode (including when the SCKB0 pin is in slave mode).  
- The on-chip pull-up resistor is set as “Not connected” in this sample program. |
### port5_use

- **Function name**: port5_use
- **Processing content**: Sets P5 pin as alternate-function pin.
- **SFRs used**:
  - PFC5: 0x01 (Sets to alternate-function pin)
  - PMC5: 0x07 (Sets to alternate-function pin)
  - PU5: 0x00 (Sets on-chip pull-up resistor as unused)
- **Call function**: None
- **Variable**: None
- **File name**: port_use.c
- **Cautions**:
  - The connection of the on-chip pull-up resistor becomes valid only when in input mode during port mode or when the pins function as input pins in the alternate-function mode.
  - The on-chip pull-up resistor is set as “Not connected” in this sample program.

---

### port7_use

- **Function name**: port7_use
- **Processing content**: Sets P7 pin as alternate-function pin.
- **SFR used**:
  - PMC7: 0xFF (Sets to alternate-function pin)
- **Call function**: None
- **Variable**: None
- **File name**: port_use.c
- **Cautions**: None
Port functions
Alternate-function pin (1/3)

diagram:

- port_use_main
  - port0_use: Port 0 alternate-function pin setting function
  - port1_use: Port 1 alternate-function pin setting function
  - port2_use: Port 2 alternate-function pin setting function
  - port3_use: Port 3 alternate-function pin setting function
  - port4_use: Port 4 alternate-function pin setting function
  - port5_use: Port 5 alternate-function pin setting function
  - port7_use: Port 7 alternate-function pin setting function
  - ret
Port functions
Alternate-function pin (2/3)

Port 0 alternate-function pin setting function

- **port0_use**
- **PMC0 = 0xFF**
- **PU0 = 0x00**
- **INTR0 = 0x00**
- **INTF0 = 0xFF**
- **Sets alternate-function pin to INTP0 to INTP7 inputs**
- **Sets pull-up resistor as unused**
- **Sets to falling edge of external interrupt**
- **ret**

Port 1 alternate-function pin setting function

- **port1_use**
- **PFC1 = 0xFF**
- **PFCE1 = 0x00**
- **PMC1 = 0xFF**
- **PU1 = 0x00**
- **Sets to falling edge of external interrupt**
- **Sets pull-up resistor as unused**
- **ret**

Port 2 alternate-function pin setting function

- **port2_use**
- **PMC2 = 0xFF**
- **PU2 = 0x00**
- **Sets alternate-function pins to TOP31 output, TOQ10 output, TOQ1B3 output, TOQ1T3 output, TOQ1B2 output, TOQ1T2 output, TOQ1B1 output, TOQ1T1 output**
- **Sets pull-up resistor as unused**
- **ret**

Port 3 alternate-function pin setting function

- **port3_use**
- **PFC3 = 0x2C**
- **PMC3 = 0xFF**
- **PU3 = 0x00**
- **Sets alternate-function pins to TCLR10 input, TCUD10 input, TO10 output, SCKB1 I/O, TXDA1 output, RXDA1 input, TXDA0 output, RXDA0 input**
- **Sets pull-up resistor as unused**
- **ret**
Port functions
Alternate-function pin (3/3)

Port 4 alternate-function pin setting function

port4_use

PFC4 = 0x18

Sets alternate-function pins to TIP01 input, TIP00 input, SCKB0 i/O, SOB0 output, SIB0 input

PMC4 = 0x1F

PU4 = 0x00 Sets pull-up resistor as unused

ret

Port 5 alternate-function pin setting function

port5_use

PFC5 = 0x01

Sets alternate-function pin to TCLR11 input, TCUD11 input, TO11 output

PMC5 = 0x07

PU5 = 0x00 Sets pull-up resistor as unused

ret

Port 7 alternate-function pin setting function

port7_use

PMC7 = 0xFF

Sets alternate-function pin to ANI20 to ANI27 inputs

ret
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
800-368-9782
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 33 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
Cygns House, Sunrise Parkway
Linford Wood, Milton Keynes
MK14 6NP, U.K.
Tel: 01908-691-133

Succursale 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: 911-504-2787

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
Steigerweg 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/

NEC Electronics Shanghai Ltd.
Room 2511-2512, Bank of China Tower,
200 Yinchen Road Central,
Pudong New Area, Shanghai P.R. China P.C:200120
Tel: 021-5888-5400
http://www.cn.necel.com/

NEC Electronics Hong Kong Ltd.
12/F, Cityplaza 4,
12 Taikoo Wan Road, 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.
1F., Samik Lavied’or Bldg., 720-2,
Yeoksam-Dong, Kangnam-Ku,
Seoul, 135-080, Korea
Tel: 02-558-3737
http://www.kr.necel.com/