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### What is "[Embedded - Microcontrollers](#)"?

"[Embedded - Microcontrollers](#)" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

### Applications of "[Embedded - Microcontrollers](#)"

#### Details

|                            |                                                                                                                                                                               |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Status             | Active                                                                                                                                                                        |
| Core Processor             | RL78                                                                                                                                                                          |
| Core Size                  | 16-Bit                                                                                                                                                                        |
| Speed                      | 32MHz                                                                                                                                                                         |
| Connectivity               | CSI, I <sup>2</sup> C, LINbus, UART/USART                                                                                                                                     |
| Peripherals                | DMA, LVD, POR, PWM, WDT                                                                                                                                                       |
| Number of I/O              | 26                                                                                                                                                                            |
| Program Memory Size        | 16KB (16K x 8)                                                                                                                                                                |
| Program Memory Type        | FLASH                                                                                                                                                                         |
| EEPROM Size                | 4K x 8                                                                                                                                                                        |
| RAM Size                   | 2K x 8                                                                                                                                                                        |
| Voltage - Supply (Vcc/Vdd) | 1.6V ~ 5.5V                                                                                                                                                                   |
| Data Converters            | A/D 8x8/10b                                                                                                                                                                   |
| Oscillator Type            | Internal                                                                                                                                                                      |
| Operating Temperature      | -40°C ~ 85°C (TA)                                                                                                                                                             |
| Mounting Type              | Surface Mount                                                                                                                                                                 |
| Package / Case             | 36-WFLGA                                                                                                                                                                      |
| Supplier Device Package    | 36-WFLGA (4x4)                                                                                                                                                                |
| Purchase URL               | <a href="https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f100caala-w0">https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f100caala-w0</a> |

## ○ ROM, RAM capacities

| Flash ROM | Data flash | RAM          | RL78/G13 |          |          |          |          |          |
|-----------|------------|--------------|----------|----------|----------|----------|----------|----------|
|           |            |              | 20 pins  | 24 pins  | 25 pins  | 30 pins  | 32 pins  | 36 pins  |
| 128 KB    | 8 KB       | 12 KB        | —        | —        | —        | R5F100AG | R5F100BG | R5F100CG |
|           | —          |              | —        | —        | —        | R5F101AG | R5F101BG | R5F101CG |
| 96 KB     | 8 KB       | 8 KB         | —        | —        | —        | R5F100AF | R5F100BF | R5F100CF |
|           | —          |              | —        | —        | —        | R5F101AF | R5F101BF | R5F101CF |
| 64 KB     | 4 KB       | 4 KB<br>Note | R5F1006E | R5F1007E | R5F1008E | R5F100AE | R5F100BE | R5F100CE |
|           | —          |              | R5F1016E | R5F1017E | R5F1018E | R5F101AE | R5F101BE | R5F101CE |
| 48 KB     | 4 KB       | 3 KB<br>Note | R5F1006D | R5F1007D | R5F1008D | R5F100AD | R5F100BD | R5F100CD |
|           | —          |              | R5F1016D | R5F1017D | R5F1018D | R5F101AD | R5F101BD | R5F101CD |
| 32 KB     | 4 KB       | 2 KB         | R5F1006C | R5F1007C | R5F1008C | R5F100AC | R5F100BC | R5F100CC |
|           | —          |              | R5F1016C | R5F1017C | R5F1018C | R5F101AC | R5F101BC | R5F101CC |
| 16 KB     | 4 KB       | 2 KB         | R5F1006A | R5F1007A | R5F1008A | R5F100AA | R5F100BA | R5F100CA |
|           | —          |              | R5F1016A | R5F1017A | R5F1018A | R5F101AA | R5F101BA | R5F101CA |

| Flash ROM | Data flash | RAM           | RL78/G13 |          |          |          |          |          |          |          |
|-----------|------------|---------------|----------|----------|----------|----------|----------|----------|----------|----------|
|           |            |               | 40 pins  | 44 pins  | 48 pins  | 52 pins  | 64 pins  | 80 pins  | 100 pins | 128 pins |
| 512 KB    | 8 KB       | 32 KB<br>Note | —        | R5F100FL | R5F100GL | R5F100JL | R5F100LL | R5F100ML | R5F100PL | R5F100SL |
|           | —          |               | —        | R5F101FL | R5F101GL | R5F101JL | R5F101LL | R5F101ML | R5F101PL | R5F101SL |
| 384 KB    | 8 KB       | 24 KB         | —        | R5F100FK | R5F100GK | R5F100JK | R5F100LK | R5F100MK | R5F100PK | R5F100SK |
|           | —          |               | —        | R5F101FK | R5F101GK | R5F101JK | R5F101LK | R5F101MK | R5F101PK | R5F101SK |
| 256 KB    | 8 KB       | 20 KB<br>Note | —        | R5F100FJ | R5F100GJ | R5F100JJ | R5F100LJ | R5F100MJ | R5F100PJ | R5F100SJ |
|           | —          |               | —        | R5F101FJ | R5F101GJ | R5F101JJ | R5F101LJ | R5F101MJ | R5F101PJ | R5F101SJ |
| 192 KB    | 8 KB       | 16 KB         | R5F100EH | R5F100FH | R5F100GH | R5F100JH | R5F100LH | R5F100MH | R5F100PH | R5F100SH |
|           | —          |               | R5F101EH | R5F101FH | R5F101GH | R5F101JH | R5F101LH | R5F101MH | R5F101PH | R5F101SH |
| 128 KB    | 8 KB       | 12 KB         | R5F100EG | R5F100FG | R5F100GG | R5F100JG | R5F100LG | R5F100MG | R5F100PG | —        |
|           | —          |               | R5F101EG | R5F101FG | R5F101GG | R5F101JG | R5F101LG | R5F101MG | R5F101PG | —        |
| 96 KB     | 8 KB       | 8 KB          | R5F100EF | R5F100FF | R5F100GF | R5F100JF | R5F100LF | R5F100MF | R5F100PF | —        |
|           | —          |               | R5F101EF | R5F101FF | R5F101GF | R5F101JF | R5F101LF | R5F101MF | R5F101PF | —        |
| 64 KB     | 4 KB       | 4 KB<br>Note  | R5F100EE | R5F100FE | R5F100GE | R5F100JE | R5F100LE | —        | —        | —        |
|           | —          |               | R5F101EE | R5F101FE | R5F101GE | R5F101JE | R5F101LE | —        | —        | —        |
| 48 KB     | 4 KB       | 3 KB<br>Note  | R5F100ED | R5F100FD | R5F100GD | R5F100JD | R5F100LD | —        | —        | —        |
|           | —          |               | R5F101ED | R5F101FD | R5F101GD | R5F101JD | R5F101LD | —        | —        | —        |
| 32 KB     | 4 KB       | 2 KB          | R5F100EC | R5F100FC | R5F100GC | R5F100JC | R5F100LC | —        | —        | —        |
|           | —          |               | R5F101EC | R5F101FC | R5F101GC | R5F101JC | R5F101LC | —        | —        | —        |
| 16 KB     | 4 KB       | 2 KB          | R5F100EA | R5F100FA | R5F100GA | —        | —        | —        | —        | —        |
|           | —          |               | R5F101EA | R5F101FA | R5F101GA | —        | —        | —        | —        | —        |

**Note** The flash library uses RAM in self-programming and rewriting of the data flash memory.

The target products and start address of the RAM areas used by the flash library are shown below.

R5F100xD, R5F101xD (x = 6 to 8, A to C, E to G, J, L): Start address FF300H

R5F100xE, R5F101xE (x = 6 to 8, A to C, E to G, J, L): Start address FEF00H

R5F100xJ, R5F101xJ (x = F, G, J, L, M, P): Start address FAF00H

R5F100xL, R5F101xL (x = F, G, J, L, M, P, S): Start address F7F00H

For the RAM areas used by the flash library, see **Self RAM list of Flash Self-Programming Library for RL78 Family (R20UT2944)**.

Table 1-1. List of Ordering Part Numbers

(3/12)

| Pin count | Package                                          | Data flash  | Fields of Application<br>Note | Ordering Part Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------|--------------------------------------------------|-------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 36 pins   | 36-pin plastic WFLGA<br>(4 × 4 mm, 0.5 mm pitch) | Mounted     | A                             | R5F100CAALA#U0, R5F100CCALA#U0, R5F100CDALA#U0,<br>R5F100CEALA#U0, R5F100CFALA#U0, R5F100CGALA#U0<br>R5F100CAALA#W0, R5F100CCALA#W0, R5F100CDALA#W0,<br>R5F100CEALA#W0, R5F100CFALA#W0, R5F100CGALA#W0<br>R5F100CAGLA#U0, R5F100CCGLA#U0, R5F100CDGLA#U0,<br>R5F100CEGLA#U0, R5F100CFGLA#U0, R5F100CGGLA#U0<br>R5F100CAGLA#W0, R5F100CCGLA#W0, R5F100CDGLA#W0,<br>R5F100CEGLA#W0, R5F100CFGLA#W0, R5F100CGGLA#W0                                                                                                                                                                                                                                                                                                                             |
|           |                                                  | Not mounted | A                             | R5F101CAALA#U0, R5F101CCALA#U0, R5F101CDALA#U0,<br>R5F101CEALA#U0, R5F101CFALA#U0, R5F101CGALA#U0<br>R5F101CAALA#W0, R5F101CCALA#W0, R5F101CDALA#W0,<br>R5F101CEALA#W0, R5F101CFALA#W0, R5F101CGALA#W0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 40 pins   | 40-pin plastic HWQFN<br>(6 × 6 mm, 0.5 mm pitch) | Mounted     | A                             | R5F100EAANA#U0, R5F100ECANA#U0, R5F100EDANA#U0,<br>R5F100EEANA#U0, R5F100EFANA#U0, R5F100EGANA#U0,<br>R5F100EHANA#U0<br>R5F100EAANA#W0, R5F100ECANA#W0, R5F100EDANA#W0,<br>R5F100EEANA#W0, R5F100EFANA#W0, R5F100EGANA#W0,<br>R5F100EHANA#W0<br>R5F100EADNA#U0, R5F100ECDNA#U0, R5F100EDDNA#U0,<br>R5F100EEDNA#U0, R5F100EFDNA#U0, R5F100EGDNA#U0,<br>R5F100EHDNA#U0<br>R5F100EADNA#W0, R5F100ECDNA#W0,<br>R5F100EDDNA#W0, R5F100EEDNA#W0, R5F100EFDNA#W0,<br>R5F100EGDNA#W0, R5F100EHDNA#W0<br>R5F100EAGNA#U0, R5F100ECGNA#U0, R5F100EDGNA#U0,<br>R5F100EEGNA#U0, R5F100EFGNA#U0, R5F100EGGNA#U0,<br>R5F100EHGNA#U0<br>R5F100EAGNA#W0, R5F100ECGNA#W0,<br>R5F100EDGNA#W0, R5F100EEGNA#W0,<br>R5F100EFGNA#W0, R5F100EGGNA#W0, R5F100EHGNA#W0 |
|           |                                                  | Not mounted | A                             | R5F101EAANA#U0, R5F101ECANA#U0, R5F101EDANA#U0,<br>R5F101EEANA#U0, R5F101EFANA#U0, R5F101EGANA#U0,<br>R5F101EHANA#U0<br>R5F101EAANA#W0, R5F101ECANA#W0, R5F101EDANA#W0,<br>R5F101EEANA#W0, R5F101EFANA#W0, R5F101EGANA#W0,<br>R5F101EHANA#W0<br>R5F101EADNA#U0, R5F101ECDNA#U0, R5F101EDDNA#U0,<br>R5F101EEDNA#U0, R5F101EFDNA#U0, R5F101EGDNA#U0,<br>R5F101EHDNA#U0<br>R5F101EADNA#W0, R5F101ECDNA#W0,<br>R5F101EDDNA#W0, R5F101EEDNA#W0, R5F101EFDNA#W0,<br>R5F101EGDNA#W0, R5F101EHDNA#W0                                                                                                                                                                                                                                                 |

**Note** For the fields of application, refer to **Figure 1-1 Part Number, Memory Size, and Package of RL78/G13**.

**Caution** The ordering part numbers represent the numbers at the time of publication. For the latest ordering part numbers, refer to the target product page of the Renesas Electronics website.

Table 1-1. List of Ordering Part Numbers

(4/12)

| Pin count | Package                                           | Data flash  | Fields of Application<br>Note | Ordering Part Number                                                                                                                                                                                                                                                                                                             |
|-----------|---------------------------------------------------|-------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 44 pins   | 44-pin plastic LQFP<br>(10 × 10 mm, 0.8 mm pitch) | Mounted     | A                             | R5F100FAAFP#V0, R5F100FCAFP#V0, R5F100FDAFP#V0, R5F100FEAFP#V0, R5F100FFAFP#V0, R5F100FGAFP#V0, R5F100FHAFP#V0, R5F100FJAFP#V0, R5F100FKAFP#V0, R5F100FLAFP#V0<br>R5F100FAAFP#X0, R5F100FCAFP#X0, R5F100FDAFP#X0, R5F100FEAFP#X0, R5F100FFAFP#X0, R5F100FGAFP#X0, R5F100FHAFP#X0, R5F100FJAFP#X0, R5F100FKAFP#X0, R5F100FLAFP#X0 |
|           |                                                   |             | D                             | R5F100FADFP#V0, R5F100FCDFP#V0, R5F100FDDFP#V0, R5F100FEDFP#V0, R5F100FFDFP#V0, R5F100FGDFP#V0, R5F100FHDFP#V0, R5F100FJDFP#V0, R5F100FKDFP#V0, R5F100FLDFP#V0<br>R5F100FADFP#X0, R5F100FCDFP#X0, R5F100FDDFP#X0, R5F100FEDFP#X0, R5F100FFDFP#X0, R5F100FGDFP#X0, R5F100FHDFP#X0, R5F100FJDFP#X0, R5F100FKDFP#X0, R5F100FLDFP#X0 |
|           |                                                   |             | G                             | R5F100FAGFP#V0, R5F100FCGFP#V0, R5F100FDGFP#V0, R5F100FEGFP#V0, R5F100FFGFP#V0, R5F100FGGFP#V0, R5F100FHGFP#V0, R5F100FJGFP#V0<br>R5F100FAGFP#X0, R5F100FCGFP#X0, R5F100FDGFP#X0, R5F100FEGFP#X0, R5F100FFGFP#X0, R5F100FGGFP#X0, R5F100FHGFP#X0, R5F100FJGFP#X0                                                                 |
|           |                                                   | Not mounted | A                             | R5F101FAAFP#V0, R5F101FCAFP#V0, R5F101FDAFP#V0, R5F101FEAFP#V0, R5F101FFAFP#V0, R5F101FGAFP#V0, R5F101FHAFP#V0, R5F101FJAFP#V0, R5F101FKAFP#V0, R5F101FLAFP#V0<br>R5F101FAAFP#X0, R5F101FCAFP#X0, R5F101FDAFP#X0, R5F101FEAFP#X0, R5F101FFAFP#X0, R5F101FGAFP#X0, R5F101FHAFP#X0, R5F101FJAFP#X0, R5F101FKAFP#X0, R5F101FLAFP#X0 |
|           |                                                   |             | D                             | R5F101FADFP#V0, R5F101FCDFP#V0, R5F101FDDFP#V0, R5F101FEDFP#V0, R5F101FFDFP#V0, R5F101FGDFP#V0, R5F101FHDFP#V0, R5F101FJDFP#V0, R5F101FKDFP#V0, R5F101FLDFP#V0<br>R5F101FADFP#X0, R5F101FCDFP#X0, R5F101FDDFP#X0, R5F101FEDFP#X0, R5F101FFDFP#X0, R5F101FGDFP#X0, R5F101FHDFP#X0, R5F101FJDFP#X0, R5F101FKDFP#X0, R5F101FLDFP#X0 |

**Note** For the fields of application, refer to **Figure 1-1 Part Number, Memory Size, and Package of RL78/G13**.

**Caution** The ordering part numbers represent the numbers at the time of publication. For the latest ordering part numbers, refer to the target product page of the Renesas Electronics website.

Table 1-1. List of Ordering Part Numbers

(11/12)

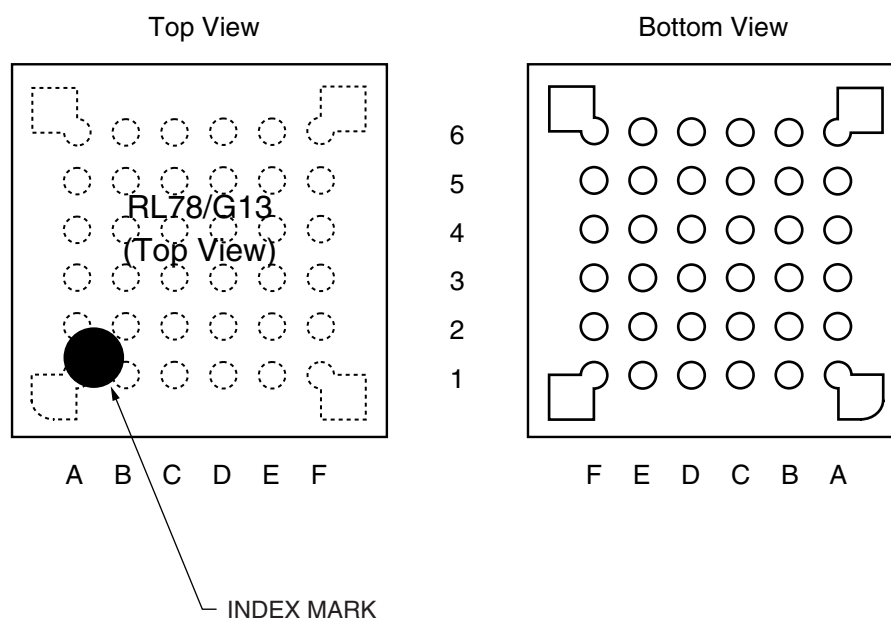
| Pin count | Package                                             | Data flash  | Fields of Application<br>Note | Ordering Part Number                                                                                                                                                                                   |
|-----------|-----------------------------------------------------|-------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 100 pins  | 100-pin plastic<br>LFQFP (14 × 14 mm, 0.5 mm pitch) | Mounted     | A                             | R5F100PFAFB#V0, R5F100PGAFA#V0, R5F100PHAFA#V0,<br>R5F100PJAFB#V0, R5F100PKAFB#V0, R5F100PLAFB#V0<br>R5F100PFAFB#X0, R5F100PGAFA#X0, R5F100PHAFA#X0,<br>R5F100PJAFB#X0, R5F100PKAFB#X0, R5F100PLAFB#X0 |
|           |                                                     |             | D                             | R5F100PFDFB#V0, R5F100PGDFB#V0, R5F100PHDFB#V0,<br>R5F100PJDFB#V0, R5F100PKDFB#V0, R5F100PLDFB#V0<br>R5F100PFDFB#X0, R5F100PGDFB#X0, R5F100PHDFB#X0,<br>R5F100PJDFB#X0, R5F100PKDFB#X0, R5F100PLDFB#X0 |
|           |                                                     |             | G                             | R5F100PFGFB#V0, R5F100PGGFB#V0, R5F100PHGFB#V0,<br>R5F100PJGFB#V0<br>R5F100PFGFB#X0, R5F100PGGFB#X0, R5F100PHGFB#X0,<br>R5F100PJGFB#X0                                                                 |
|           |                                                     | Not mounted | A                             | R5F101PFAFB#V0, R5F101PGAFA#V0, R5F101PHAFA#V0,<br>R5F101PJAFB#V0, R5F101PKAFB#V0, R5F101PLAFB#V0<br>R5F101PFAFB#X0, R5F101PGAFA#X0, R5F101PHAFA#X0,<br>R5F101PJAFB#X0, R5F101PKAFB#X0, R5F101PLAFB#X0 |
|           | 100-pin plastic<br>LQFP (14 × 20 mm, 0.65 mm pitch) | Mounted     | A                             | R5F100PFAFA#V0, R5F100PGAFA#V0, R5F100PHAFA#V0,<br>R5F100PJAFB#V0, R5F100PKAFA#V0, R5F100PLAFA#V0<br>R5F100PFAFA#X0, R5F100PGAFA#X0, R5F100PHAFA#X0,<br>R5F100PJAFB#X0, R5F100PKAFA#X0, R5F100PLAFA#X0 |
|           |                                                     |             | D                             | R5F100PFDA#V0, R5F100PGDA#V0, R5F100PHDA#V0,<br>R5F100PJDA#V0, R5F100PKDA#V0, R5F100PLDA#V0<br>R5F100PFDA#X0, R5F100PGDA#X0, R5F100PHDA#X0,<br>R5F100PJDA#X0, R5F100PKDA#X0, R5F100PLDA#X0             |
|           |                                                     |             | G                             | R5F100PFGFA#V0, R5F100PGGFA#V0, R5F100PHGFA#V0,<br>R5F100PJGFA#V0<br>R5F100PFGFA#X0, R5F100PGGFA#X0, R5F100PHGFA#X0,<br>R5F100PJGFA#X0                                                                 |
|           |                                                     | Not mounted | A                             | R5F101PFAFA#V0, R5F101PGAFA#V0, R5F101PHAFA#V0,<br>R5F101PJAFB#V0, R5F101PKAFA#V0, R5F101PLAFA#V0<br>R5F101PFAFA#X0, R5F101PGAFA#X0, R5F101PHAFA#X0,<br>R5F101PJAFB#X0, R5F101PKAFA#X0, R5F101PLAFA#X0 |
|           |                                                     |             | D                             | R5F101PFDA#V0, R5F101PGDA#V0, R5F101PHDA#V0,<br>R5F101PJDA#V0, R5F101PKDA#V0, R5F101PLDA#V0<br>R5F101PFDA#X0, R5F101PGDA#X0, R5F101PHDA#X0,<br>R5F101PJDA#X0, R5F101PKDA#X0, R5F101PLDA#X0             |

**Note** For the fields of application, refer to **Figure 1-1 Part Number, Memory Size, and Package of RL78/G13**.

**Caution** The ordering part numbers represent the numbers at the time of publication. For the latest ordering part numbers, refer to the target product page of the Renesas Electronics website.

## 1.3.6 36-pin products

- 36-pin plastic WFLGA (4 × 4 mm, 0.5 mm pitch)



|   | A                         | B                              | C                                                 | D                                                     | E                               | F                               |   |
|---|---------------------------|--------------------------------|---------------------------------------------------|-------------------------------------------------------|---------------------------------|---------------------------------|---|
| 6 | P60/SCLA0                 | V <sub>DD</sub>                | P121/X1                                           | P122/X2/EXCLK                                         | P137/INTP0                      | P40/TOOL0                       | 6 |
| 5 | P62                       | P61/SDAA0                      | V <sub>SS</sub>                                   | REGC                                                  | RESET                           | P120/ANI19                      | 5 |
| 4 | P72/SO21                  | P71/SI21/<br>SDA21             | P14/RxD2/SI20/<br>SDA20/(SCLA0)<br>/(TI03)/(TO03) | P31/TI03/TO03/<br>INTP4/<br>PCLBUZ0                   | P00/TI00/TxD1                   | P01/TO00/RxD1                   | 4 |
| 3 | P50/INTP1/<br>SI11/SDA11  | P70/SCK21/<br>SCL21            | P15/PCLBUZ1/<br>SCK20/SCL20/<br>(TI02)/(TO02)     | P22/ANI2                                              | P20/ANI0/<br>AV <sub>REFP</sub> | P21/ANI1/<br>AV <sub>REFM</sub> | 3 |
| 2 | P30/INTP3/<br>SCK11/SCL11 | P16/TI01/TO01/<br>INTP5/(RxD0) | P12/SO00/<br>TxD0/TOOLTxD<br>/(TI05)/(TO05)       | P11/SI00/RxD0/<br>TOOLRxD/<br>SDA00/(TI06)/<br>(TO06) | P24/ANI4                        | P23/ANI3                        | 2 |
| 1 | P51/INTP2/<br>SO11        | P17/TI02/TO02/<br>(TxD0)       | P13/TxD2/<br>SO20/(SDAA0)/<br>(TI04)/(TO04)       | P10/SCK00/<br>SCL00/(TI07)/<br>(TO07)                 | P147/ANI18                      | P25/ANI5                        | 1 |
|   | A                         | B                              | C                                                 | D                                                     | E                               | F                               |   |

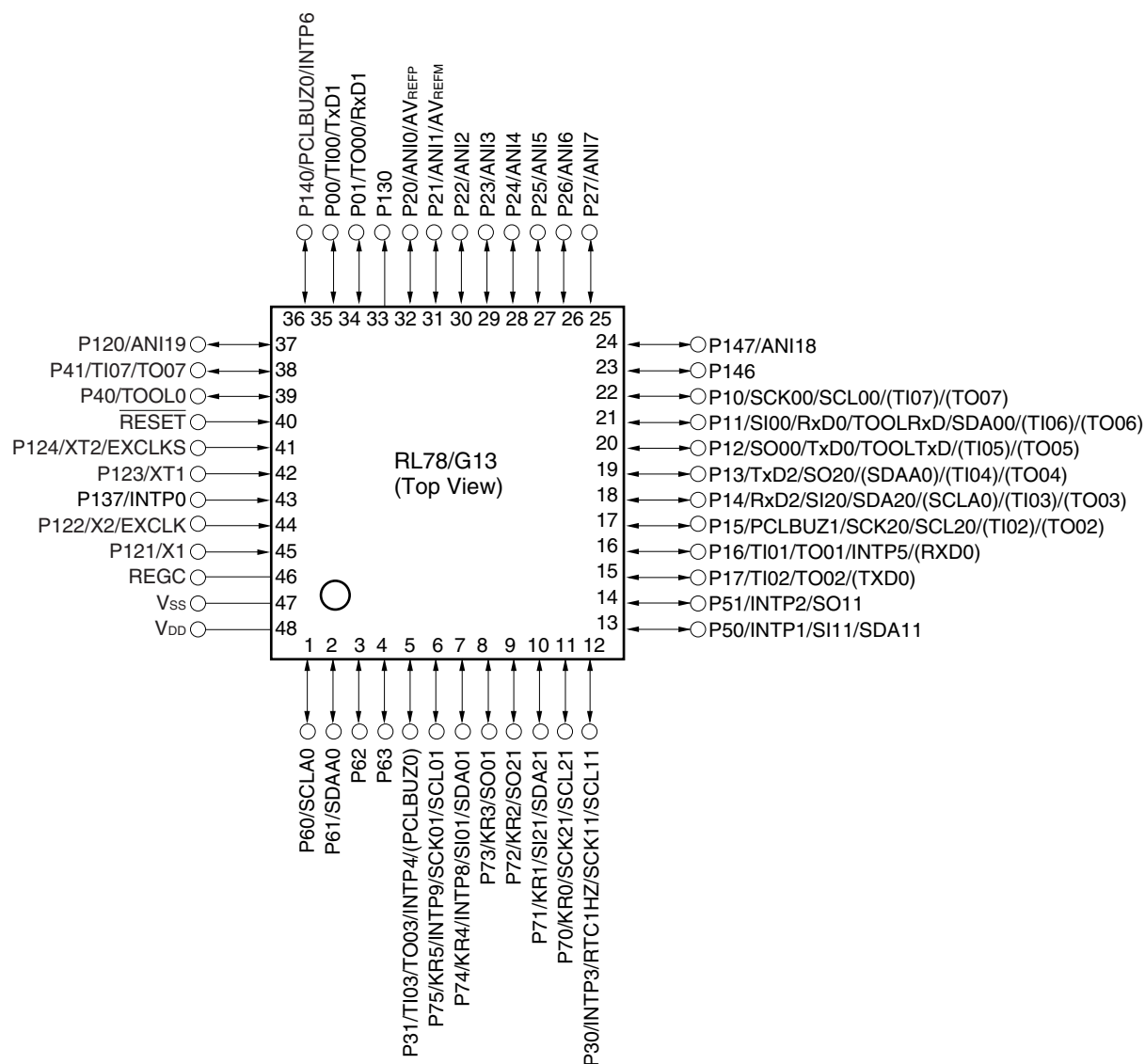
**Caution** Connect the REGC pin to V<sub>SS</sub> via a capacitor (0.47 to 1 μF).

**Remarks 1.** For pin identification, see 1.4 Pin Identification.

- Functions in parentheses in the above figure can be assigned via settings in the peripheral I/O redirection register (PIOR). Refer to **Figure 4-8 Format of Peripheral I/O Redirection Register (PIOR)** in the RL78/G13 User's Manual.

## 1.3.9 48-pin products

- 48-pin plastic LQFP (7 × 7 mm, 0.5 mm pitch)

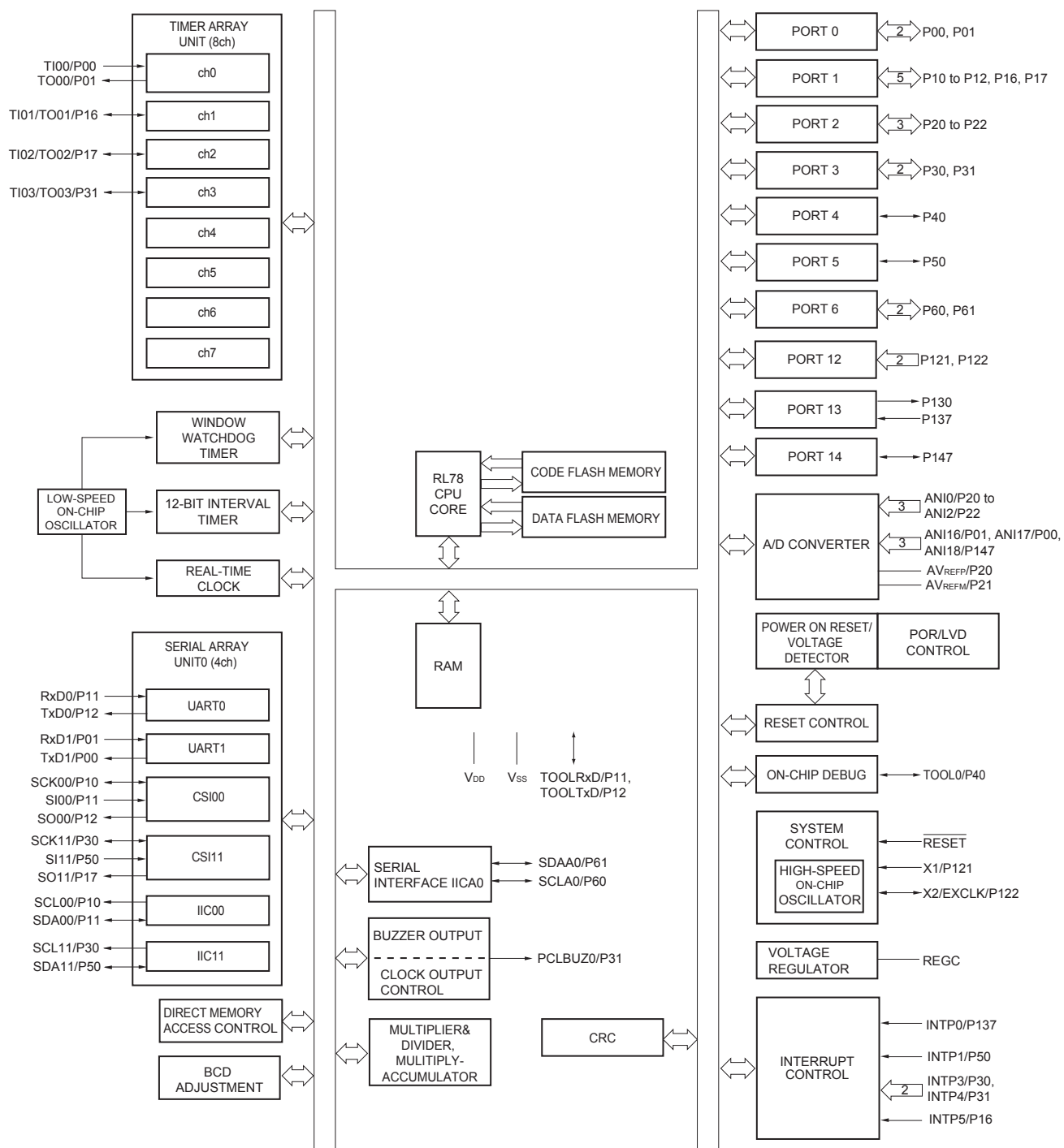


**Caution** Connect the REGC pin to Vss via a capacitor (0.47 to 1  $\mu$ F).

**Remarks 1.** For pin identification, see 1.4 Pin Identification.

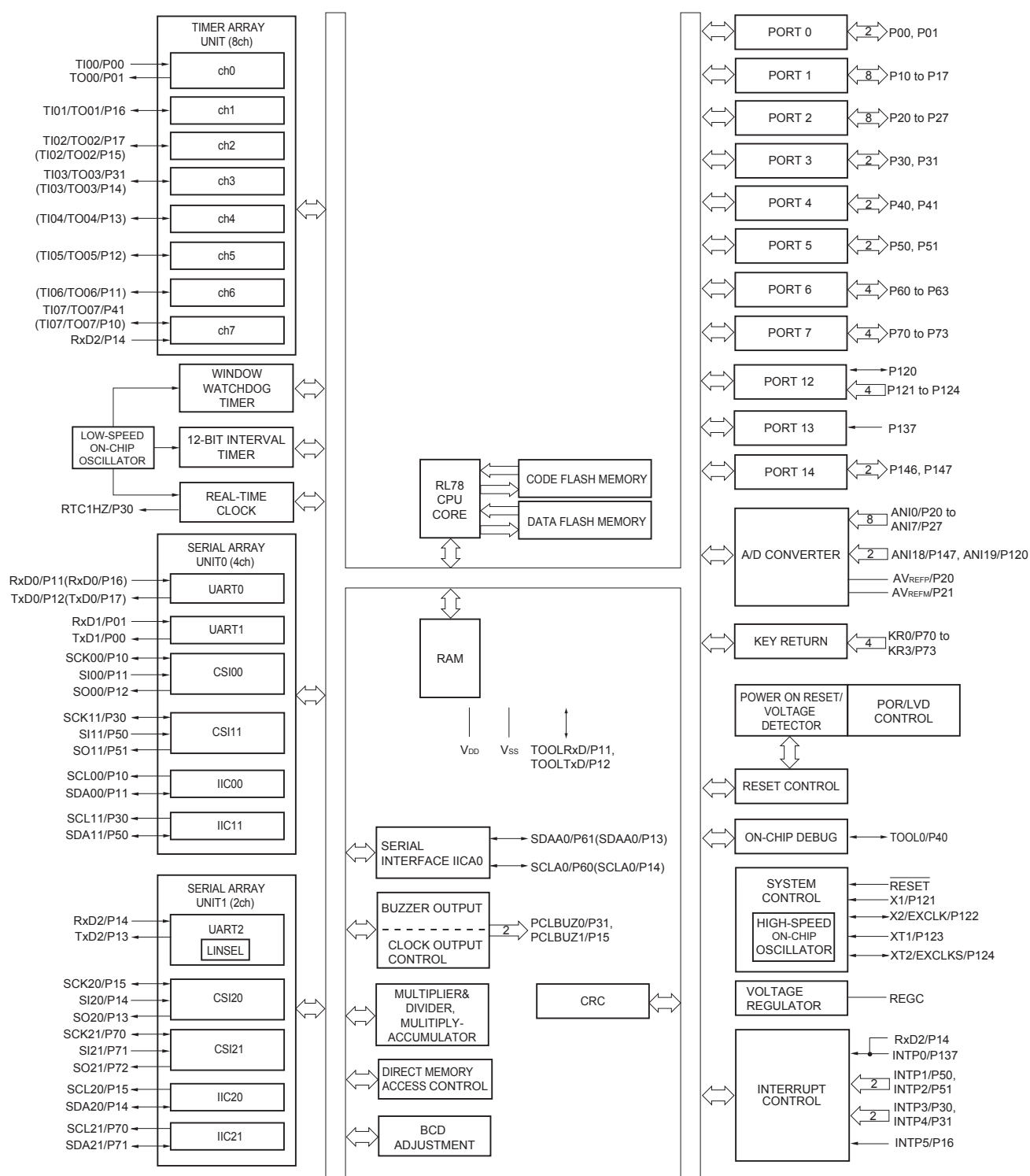
- Functions in parentheses in the above figure can be assigned via settings in the peripheral I/O redirection register (PIOR). Refer to **Figure 4-8 Format of Peripheral I/O Redirection Register (PIOR)** in the RL78/G13 User's Manual.

## 1.5.3 25-pin products



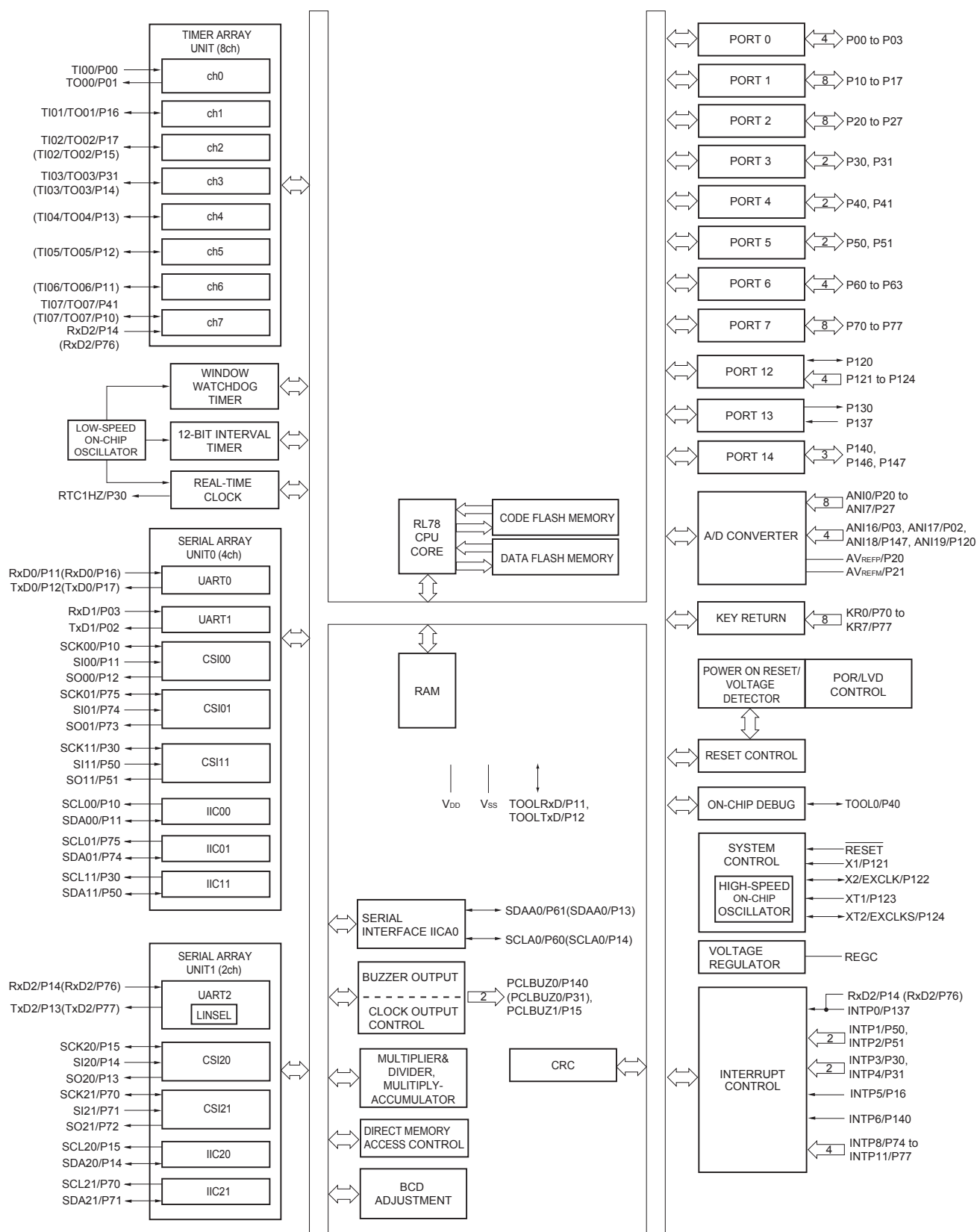


## 1.5.8 44-pin products



**Remark** Functions in parentheses in the above figure can be assigned via settings in the peripheral I/O redirection register (PIOR). Refer to **Figure 4-8 Format of Peripheral I/O Redirection Register (PIOR)** in the RL78/G13 User's Manual.

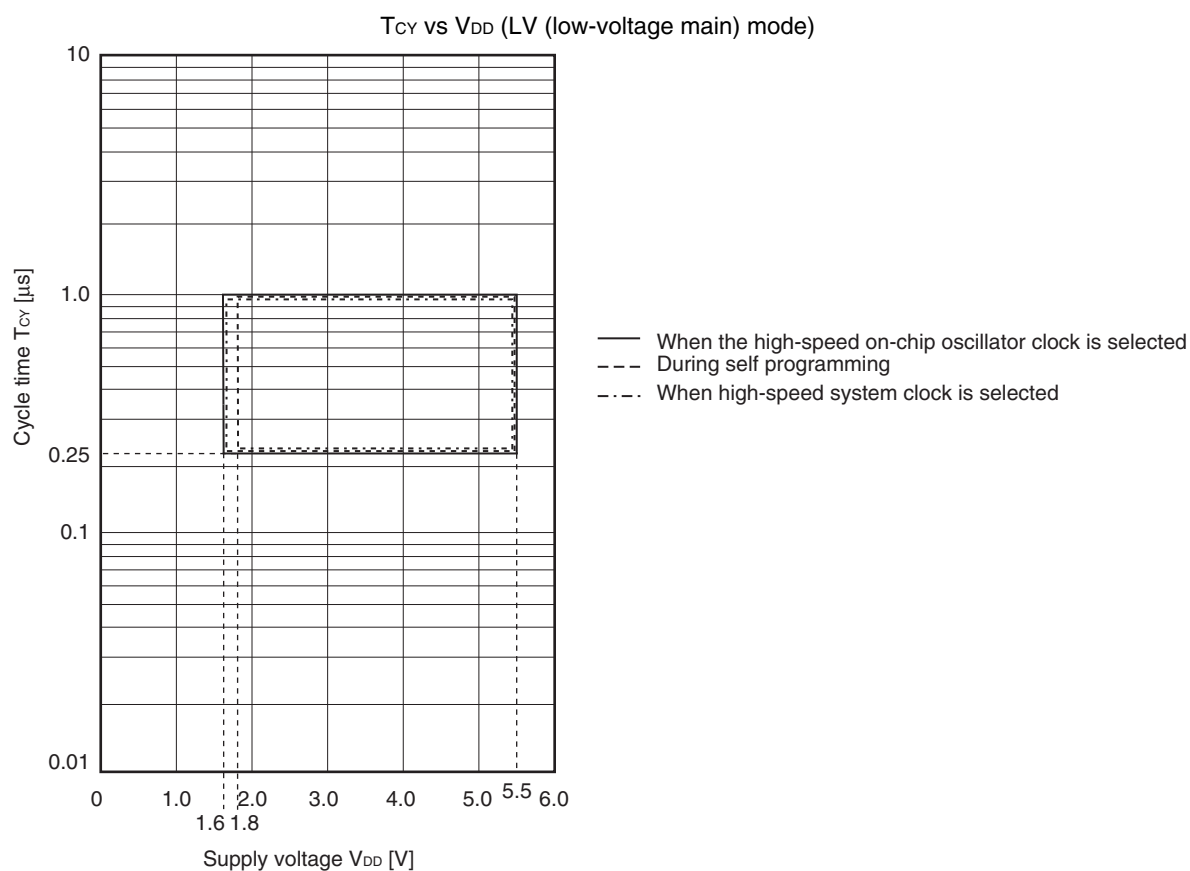
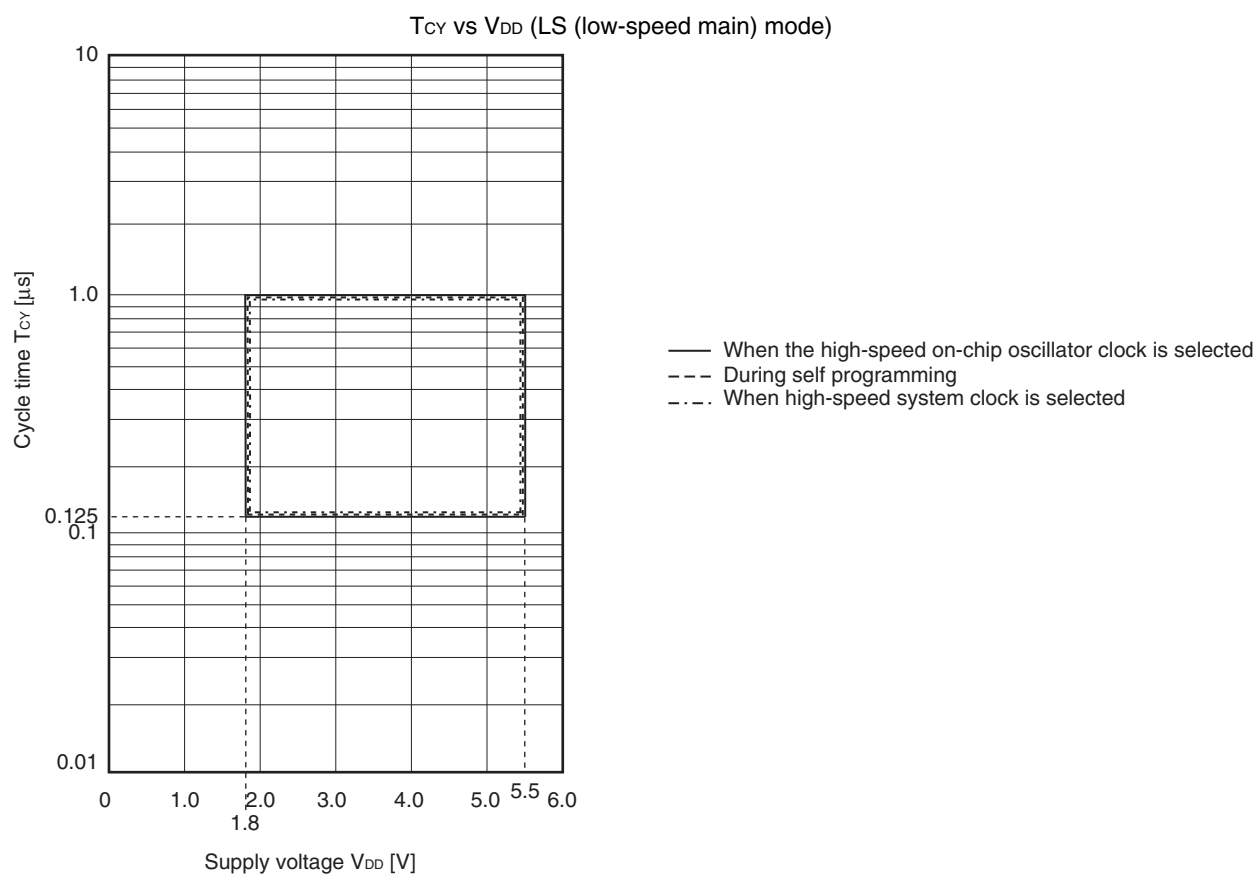
## 1.5.10 52-pin products

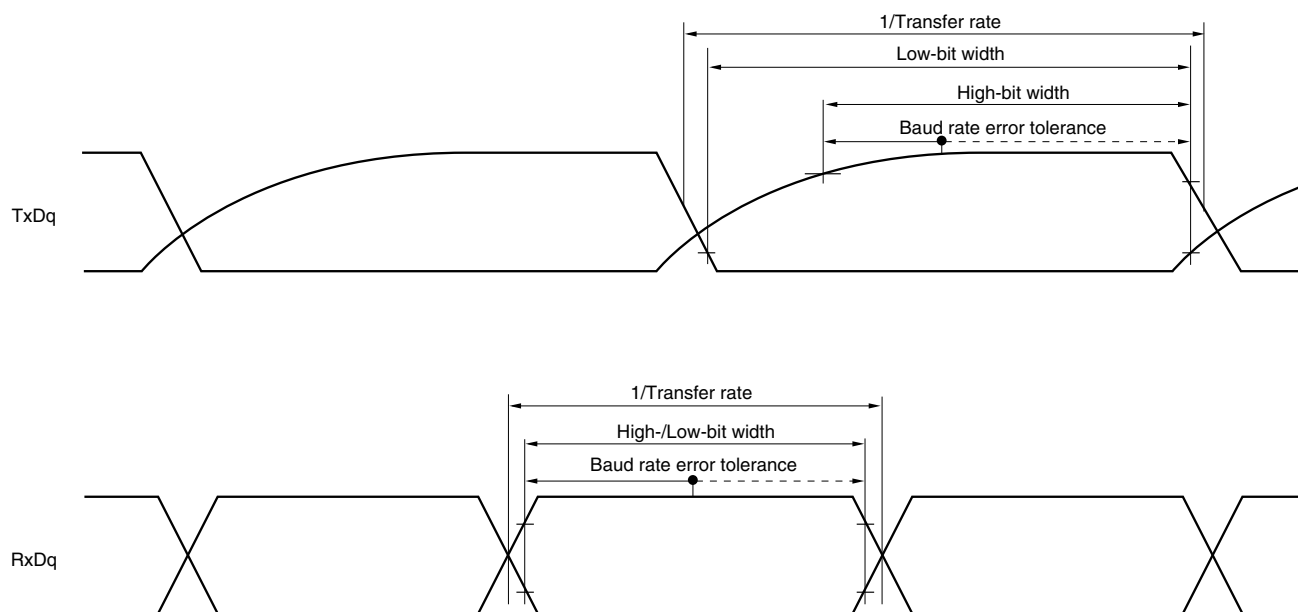


**Remark** Functions in parentheses in the above figure can be assigned via settings in the peripheral I/O redirection register (PIOR). Refer to **Figure 4-8 Format of Peripheral I/O Redirection Register (PIOR)** in the RL78/G13 User's Manual.

- Notes**
1. Total current flowing into V<sub>DD</sub>, EV<sub>DD0</sub>, and EV<sub>DD1</sub>, including the input leakage current flowing when the level of the input pin is fixed to V<sub>DD</sub>, EV<sub>DD0</sub>, and EV<sub>DD1</sub>, or V<sub>SS</sub>, EV<sub>SS0</sub>, and EV<sub>SS1</sub>. The values below the MAX. column include the peripheral operation current. However, not including the current flowing into the A/D converter, LVD circuit, I/O port, and on-chip pull-up/pull-down resistors and the current flowing during data flash rewrite.
  2. When high-speed on-chip oscillator and subsystem clock are stopped.
  3. When high-speed system clock and subsystem clock are stopped.
  4. When high-speed on-chip oscillator and high-speed system clock are stopped. When AMPHS1 = 1 (Ultra-low power consumption oscillation). However, not including the current flowing into the 12-bit interval timer and watchdog timer.
  5. Relationship between operation voltage width, operation frequency of CPU and operation mode is as below.
    - HS (high-speed main) mode:  $2.7\text{ V} \leq V_{DD} \leq 5.5\text{ V}$  @ 1 MHz to 32 MHz
    - $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}$  @ 1 MHz to 16 MHz
    - LS (low-speed main) mode:  $1.8\text{ V} \leq V_{DD} \leq 5.5\text{ V}$  @ 1 MHz to 8 MHz
    - LV (low-voltage main) mode:  $1.6\text{ V} \leq V_{DD} \leq 5.5\text{ V}$  @ 1 MHz to 4 MHz

- Remarks**
1. f<sub>MX</sub>: High-speed system clock frequency (X1 clock oscillation frequency or external main system clock frequency)
  2. f<sub>IH</sub>: High-speed on-chip oscillator clock frequency
  3. f<sub>SUB</sub>: Subsystem clock frequency (XT1 clock oscillation frequency)
  4. Except subsystem clock operation, temperature condition of the TYP. value is T<sub>A</sub> = 25°C



**UART mode bit width (during communication at different potential) (reference)**

- Remarks**
1.  $R_b[\Omega]$ : Communication line (TxDq) pull-up resistance,  
 $C_b[\text{F}]$ : Communication line (TxDq) load capacitance,  $V_b[\text{V}]$ : Communication line voltage
  2. q: UART number (q = 0 to 3), g: PIM and POM number (g = 0, 1, 8, 14)
  3.  $f_{\text{MCK}}$ : Serial array unit operation clock frequency  
 (Operation clock to be set by the CKSmn bit of serial mode register mn (SMRmn).  
 m: Unit number, n: Channel number (mn = 00 to 03, 10 to 13))
  4. UART2 cannot communicate at different potential when bit 1 (PIOR1) of peripheral I/O redirection register (PIOR) is 1.

**( $T_A = -40$  to  $+105^\circ\text{C}$ ,  $2.4\text{ V} \leq \text{EV}_{\text{DD0}} = \text{EV}_{\text{DD1}} \leq \text{V}_{\text{DD}} \leq 5.5\text{ V}$ ,  $\text{V}_{\text{SS}} = \text{EV}_{\text{SS0}} = \text{EV}_{\text{SS1}} = 0\text{ V}$ ) (2/5)**

| Items                                                       | Symbol                  | Conditions                                                                                                                                                                                                | MIN.                                                         | TYP. | MAX.                   | Unit |
|-------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|------|------------------------|------|
| Output current,<br>$\text{I}_{\text{OL}}$ <sup>Note 1</sup> | $\text{I}_{\text{OL1}}$ | Per pin for P00 to P07, P10 to P17,<br>P30 to P37, P40 to P47, P50 to P57,<br>P64 to P67, P70 to P77, P80 to P87,<br>P90 to P97, P100 to P106,<br>P110 to P117, P120, P125 to P127,<br>P130, P140 to P147 |                                                              |      | 8.5 <sup>Note 2</sup>  | mA   |
|                                                             |                         | Per pin for P60 to P63                                                                                                                                                                                    |                                                              |      | 15.0 <sup>Note 2</sup> | mA   |
|                                                             |                         | Total of P00 to P04, P07, P32 to<br>P37,<br>P40 to P47, P102 to P106, P120,<br>P125 to P127, P130, P140 to P145<br>(When duty $\leq 70\%$ <sup>Note 3</sup> )                                             | $4.0\text{ V} \leq \text{EV}_{\text{DD0}} \leq 5.5\text{ V}$ |      | 40.0                   | mA   |
|                                                             |                         |                                                                                                                                                                                                           | $2.7\text{ V} \leq \text{EV}_{\text{DD0}} < 4.0\text{ V}$    |      | 15.0                   | mA   |
|                                                             |                         |                                                                                                                                                                                                           | $2.4\text{ V} \leq \text{EV}_{\text{DD0}} < 2.7\text{ V}$    |      | 9.0                    | mA   |
|                                                             |                         | Total of P05, P06, P10 to P17, P30,<br>P31, P50 to P57, P60 to P67,<br>P70 to P77, P80 to P87, P90 to P97,<br>P100, P101, P110 to P117, P146,<br>P147<br>(When duty $\leq 70\%$ <sup>Note 3</sup> )       | $4.0\text{ V} \leq \text{EV}_{\text{DD0}} \leq 5.5\text{ V}$ |      | 40.0                   | mA   |
|                                                             |                         |                                                                                                                                                                                                           | $2.7\text{ V} \leq \text{EV}_{\text{DD0}} < 4.0\text{ V}$    |      | 35.0                   | mA   |
|                                                             |                         |                                                                                                                                                                                                           | $2.4\text{ V} \leq \text{EV}_{\text{DD0}} < 2.7\text{ V}$    |      | 20.0                   | mA   |
|                                                             |                         | Total of all pins<br>(When duty $\leq 70\%$ <sup>Note 3</sup> )                                                                                                                                           |                                                              |      | 80.0                   | mA   |
|                                                             | $\text{I}_{\text{OL2}}$ | Per pin for P20 to P27, P150 to P156                                                                                                                                                                      |                                                              |      | 0.4 <sup>Note 2</sup>  | mA   |
|                                                             |                         | Total of all pins<br>(When duty $\leq 70\%$ <sup>Note 3</sup> )                                                                                                                                           | $2.4\text{ V} \leq \text{V}_{\text{DD}} \leq 5.5\text{ V}$   |      | 5.0                    | mA   |

**Notes** 1. Value of current at which the device operation is guaranteed even if the current flows from an output pin to the  $\text{EV}_{\text{SS0}}$ ,  $\text{EV}_{\text{SS1}}$  and  $\text{V}_{\text{SS}}$  pin.

2. Do not exceed the total current value.

3. Specification under conditions where the duty factor  $\leq 70\%$ .

The output current value that has changed to the duty factor  $> 70\%$  the duty ratio can be calculated with the following expression (when changing the duty factor from 70% to  $n\%$ ).

- Total output current of pins =  $(\text{I}_{\text{OL}} \times 0.7)/(n \times 0.01)$

<Example> Where  $n = 80\%$  and  $\text{I}_{\text{OL}} = 10.0\text{ mA}$

$$\text{Total output current of pins} = (10.0 \times 0.7)/(80 \times 0.01) \cong 8.7\text{ mA}$$

However, the current that is allowed to flow into one pin does not vary depending on the duty factor.

A current higher than the absolute maximum rating must not flow into one pin.

**Remark** Unless specified otherwise, the characteristics of alternate-function pins are the same as those of the port pins.

## (5) Communication at different potential (1.8 V, 2.5 V, 3 V) (UART mode) (2/2)

(T<sub>A</sub> = -40 to +105°C, 2.4 V ≤ EV<sub>DD0</sub> = EV<sub>DD1</sub> ≤ V<sub>DD</sub> ≤ 5.5 V, V<sub>SS</sub> = EV<sub>SS0</sub> = EV<sub>SS1</sub> = 0 V)

| Parameter     | Symbol | Conditions   | HS (high-speed main) Mode                                                                                                 |                       | Unit                   |
|---------------|--------|--------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------|
|               |        |              | MIN.                                                                                                                      | MAX.                  |                        |
| Transfer rate |        | Transmission | 4.0 V ≤ EV <sub>DD0</sub> ≤ 5.5 V,<br>2.7 V ≤ V <sub>b</sub> ≤ 4.0 V                                                      |                       |                        |
|               |        |              | Theoretical value of the maximum transfer rate<br>C <sub>b</sub> = 50 pF, R <sub>b</sub> = 1.4 kΩ, V <sub>b</sub> = 2.7 V |                       |                        |
|               |        |              |                                                                                                                           | <b>Note 1</b>         | bps                    |
|               |        |              |                                                                                                                           | 2.6 <sup>Note 2</sup> | Mbps                   |
|               |        |              | 2.7 V ≤ EV <sub>DD0</sub> < 4.0 V,<br>2.3 V ≤ V <sub>b</sub> ≤ 2.7 V                                                      |                       |                        |
|               |        |              | Theoretical value of the maximum transfer rate<br>C <sub>b</sub> = 50 pF, R <sub>b</sub> = 2.7 kΩ, V <sub>b</sub> = 2.3 V |                       |                        |
|               |        |              |                                                                                                                           |                       | <b>Note 3</b>          |
|               |        |              |                                                                                                                           |                       | 1.2 <sup>Note 4</sup>  |
|               |        |              |                                                                                                                           |                       | Mbps                   |
|               |        |              | 2.4 V ≤ EV <sub>DD0</sub> < 3.3 V,<br>1.6 V ≤ V <sub>b</sub> ≤ 2.0 V                                                      |                       |                        |
|               |        |              | Theoretical value of the maximum transfer rate<br>C <sub>b</sub> = 50 pF, R <sub>b</sub> = 5.5 kΩ, V <sub>b</sub> = 1.6 V |                       |                        |
|               |        |              |                                                                                                                           |                       | <b>Note 5</b>          |
|               |        |              |                                                                                                                           |                       | 0.43 <sup>Note 6</sup> |
|               |        |              |                                                                                                                           |                       | Mbps                   |

**Notes 1.** The smaller maximum transfer rate derived by using f<sub>MCK</sub>/12 or the following expression is the valid maximum transfer rate.

Expression for calculating the transfer rate when 4.0 V ≤ EV<sub>DD0</sub> ≤ 5.5 V and 2.7 V ≤ V<sub>b</sub> ≤ 4.0 V

$$\text{Maximum transfer rate} = \frac{1}{\{-C_b \times R_b \times \ln(1 - \frac{2.2}{V_b})\} \times 3} \text{ [bps]}$$

$$\text{Baud rate error (theoretical value)} = \frac{\frac{1}{\text{Transfer rate} \times 2} - \{-C_b \times R_b \times \ln(1 - \frac{2.2}{V_b})\}}{(\frac{1}{\text{Transfer rate}}) \times \text{Number of transferred bits}} \times 100 \text{ [%]}$$

\* This value is the theoretical value of the relative difference between the transmission and reception sides.

- This value as an example is calculated when the conditions described in the “Conditions” column are met. Refer to Note 1 above to calculate the maximum transfer rate under conditions of the customer.
- The smaller maximum transfer rate derived by using f<sub>MCK</sub>/12 or the following expression is the valid maximum transfer rate.

Expression for calculating the transfer rate when 2.7 V ≤ EV<sub>DD0</sub> < 4.0 V and 2.4 V ≤ V<sub>b</sub> ≤ 2.7 V

$$\text{Maximum transfer rate} = \frac{1}{\{-C_b \times R_b \times \ln(1 - \frac{2.0}{V_b})\} \times 3} \text{ [bps]}$$

$$\text{Baud rate error (theoretical value)} = \frac{\frac{1}{\text{Transfer rate} \times 2} - \{-C_b \times R_b \times \ln(1 - \frac{2.0}{V_b})\}}{(\frac{1}{\text{Transfer rate}}) \times \text{Number of transferred bits}} \times 100 \text{ [%]}$$

\* This value is the theoretical value of the relative difference between the transmission and reception sides.

- This value as an example is calculated when the conditions described in the “Conditions” column are met. Refer to Note 3 above to calculate the maximum transfer rate under conditions of the customer.

5. The smaller maximum transfer rate derived by using  $f_{MCK}/12$  or the following expression is the valid maximum transfer rate.

Expression for calculating the transfer rate when  $2.4\text{ V} \leq E_{VDD0} < 3.3\text{ V}$  and  $1.6\text{ V} \leq V_b \leq 2.0\text{ V}$

$$\text{Maximum transfer rate} = \frac{1}{\{-C_b \times R_b \times \ln(1 - \frac{1.5}{V_b})\} \times 3} \text{ [bps]}$$

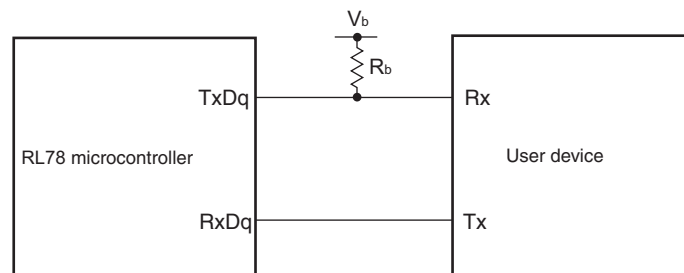
$$\text{Baud rate error (theoretical value)} = \frac{\frac{1}{\text{Transfer rate} \times 2} - \{-C_b \times R_b \times \ln(1 - \frac{1.5}{V_b})\}}{(\frac{1}{\text{Transfer rate}}) \times \text{Number of transferred bits}} \times 100 \text{ [%]}$$

\* This value is the theoretical value of the relative difference between the transmission and reception sides.

6. This value as an example is calculated when the conditions described in the “Conditions” column are met. Refer to Note 5 above to calculate the maximum transfer rate under conditions of the customer.

**Caution** Select the TTL input buffer for the RxDq pin and the N-ch open drain output ( $V_{DD}$  tolerance (for the 20- to 52-pin products)/ $E_{VDD}$  tolerance (for the 64- to 100-pin products)) mode for the TxDq pin by using port input mode register g (PIMg) and port output mode register g (POMg). For  $V_{IH}$  and  $V_{IL}$ , see the DC characteristics with TTL input buffer selected.

UART mode connection diagram (during communication at different potential)





(3) When reference voltage (+) =  $V_{DD}$  (ADREFP1 = 0, ADREFP0 = 0), reference voltage (–) =  $V_{SS}$  (ADREFM = 0), target pin : ANI0 to ANI14, ANI16 to ANI26, internal reference voltage, and temperature sensor output voltage

( $T_A = -40$  to  $+105^\circ\text{C}$ ,  $2.4\text{ V} \leq EV_{DD0} = EV_{DD1} \leq V_{DD} \leq 5.5\text{ V}$ ,  $V_{SS} = EV_{SS0} = EV_{SS1} = 0\text{ V}$ , Reference voltage (+) =  $V_{DD}$ , Reference voltage (–) =  $V_{SS}$ )

| Parameter                                      | Symbol          | Conditions                                                                                                                              |                                              | MIN.                           | TYP. | MAX.       | Unit          |
|------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------|------|------------|---------------|
| Resolution                                     | RES             |                                                                                                                                         |                                              | 8                              |      | 10         | bit           |
| Overall error <sup>Note 1</sup>                | AINL            | 10-bit resolution                                                                                                                       | $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ |                                | 1.2  | $\pm 7.0$  | LSB           |
| Conversion time                                | $t_{CONV}$      | 10-bit resolution<br>Target pin: ANI0 to ANI14,<br>ANI16 to ANI26                                                                       | $3.6\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ | 2.125                          |      | 39         | $\mu\text{s}$ |
|                                                |                 |                                                                                                                                         | $2.7\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ | 3.1875                         |      | 39         | $\mu\text{s}$ |
|                                                |                 |                                                                                                                                         | $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ | 17                             |      | 39         | $\mu\text{s}$ |
|                                                |                 | 10-bit resolution<br>Target pin: Internal reference<br>voltage, and temperature<br>sensor output voltage (HS<br>(high-speed main) mode) | $3.6\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ | 2.375                          |      | 39         | $\mu\text{s}$ |
|                                                |                 |                                                                                                                                         | $2.7\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ | 3.5625                         |      | 39         | $\mu\text{s}$ |
|                                                |                 |                                                                                                                                         | $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ | 17                             |      | 39         | $\mu\text{s}$ |
| Zero-scale error <sup>Notes 1, 2</sup>         | E <sub>ZS</sub> | 10-bit resolution                                                                                                                       | $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ |                                |      | $\pm 0.60$ | %FSR          |
| Full-scale error <sup>Notes 1, 2</sup>         | E <sub>FS</sub> | 10-bit resolution                                                                                                                       | $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ |                                |      | $\pm 0.60$ | %FSR          |
| Integral linearity error <sup>Note 1</sup>     | ILE             | 10-bit resolution                                                                                                                       | $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ |                                |      | $\pm 4.0$  | LSB           |
| Differential linearity error <sup>Note 1</sup> | DLE             | 10-bit resolution                                                                                                                       | $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ |                                |      | $\pm 2.0$  | LSB           |
| Analog input voltage                           | $V_{AIN}$       | ANI0 to ANI14                                                                                                                           |                                              | 0                              |      | $V_{DD}$   | V             |
|                                                |                 | ANI16 to ANI26                                                                                                                          |                                              | 0                              |      | $EV_{DD0}$ | V             |
|                                                |                 | Internal reference voltage output<br>( $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ , HS (high-speed main) mode)                        |                                              | $V_{BGR}$ <sup>Note 3</sup>    |      |            | V             |
|                                                |                 | Temperature sensor output voltage<br>( $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ , HS (high-speed main) mode)                        |                                              | $V_{TMPS25}$ <sup>Note 3</sup> |      |            | V             |

**Notes** 1. Excludes quantization error ( $\pm 1/2$  LSB).

2. This value is indicated as a ratio (%FSR) to the full-scale value.

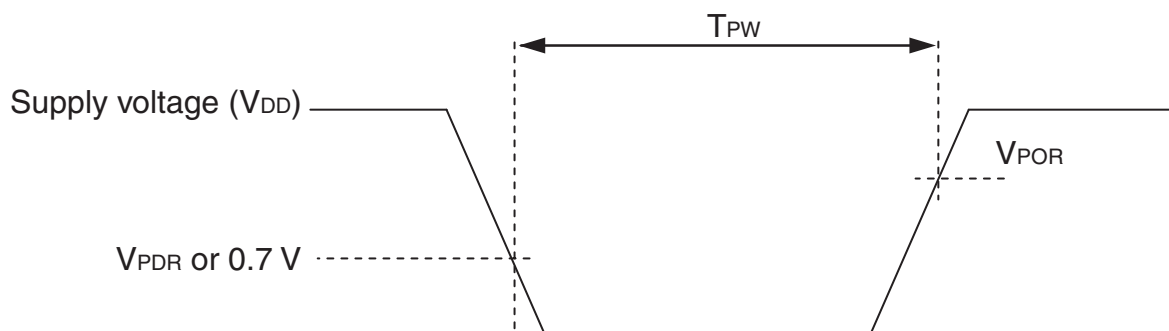
3. Refer to **3.6.2 Temperature sensor/internal reference voltage characteristics**.

## 3.6.3 POR circuit characteristics

 $(T_A = -40$  to  $+105^\circ\text{C}$ ,  $V_{SS} = 0$  V)

| Parameter           | Symbol    | Conditions             | MIN. | TYP. | MAX. | Unit          |
|---------------------|-----------|------------------------|------|------|------|---------------|
| Detection voltage   | $V_{POR}$ | Power supply rise time | 1.45 | 1.51 | 1.57 | V             |
|                     | $V_{PDR}$ | Power supply fall time | 1.44 | 1.50 | 1.56 | V             |
| Minimum pulse width | $T_{PW}$  |                        | 300  |      |      | $\mu\text{s}$ |

**Note** Minimum time required for a POR reset when  $V_{DD}$  exceeds below  $V_{PDR}$ . This is also the minimum time required for a POR reset from when  $V_{DD}$  exceeds below 0.7 V to when  $V_{DD}$  exceeds  $V_{POR}$  while STOP mode is entered or the main system clock is stopped through setting bit 0 (HIOSSTOP) and bit 7 (MSTOP) in the clock operation status control register (CSC).



## 3.8 Flash Memory Programming Characteristics

**( $T_A = -40$  to  $+105^\circ\text{C}$ ,  $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}$ ,  $V_{SS} = 0\text{ V}$ )**

| Parameter                                                   | Symbol            | Conditions                                                              | MIN.    | TYP.      | MAX. | Unit  |
|-------------------------------------------------------------|-------------------|-------------------------------------------------------------------------|---------|-----------|------|-------|
| CPU/peripheral hardware clock frequency                     | f <sub>CLK</sub>  | $2.4\text{ V} \leq V_{DD} \leq 5.5\text{ V}$                            | 1       |           | 32   | MHz   |
| Number of code flash rewrites<br><small>Notes 1,2,3</small> | C <sub>enwr</sub> | Retained for 20 years<br>$T_A = 85^\circ\text{C}$ <small>Note 4</small> | 1,000   |           |      | Times |
| Number of data flash rewrites<br><small>Notes 1,2,3</small> |                   | Retained for 1 years<br>$T_A = 25^\circ\text{C}$                        |         | 1,000,000 |      |       |
|                                                             |                   | Retained for 5 years<br>$T_A = 85^\circ\text{C}$ <small>Note 4</small>  | 100,000 |           |      |       |
|                                                             |                   | Retained for 20 years<br>$T_A = 85^\circ\text{C}$ <small>Note 4</small> | 10,000  |           |      |       |

- Notes**
- 1 erase + 1 write after the erase is regarded as 1 rewrite. The retaining years are until next rewrite after the rewrite.
  2. When using flash memory programmer and Renesas Electronics self programming library.
  3. These are the characteristics of the flash memory and the results obtained from reliability testing by Renesas Electronics Corporation.
  4. This temperature is the average value at which data are retained.

## 3.9 Dedicated Flash Memory Programmer Communication (UART)

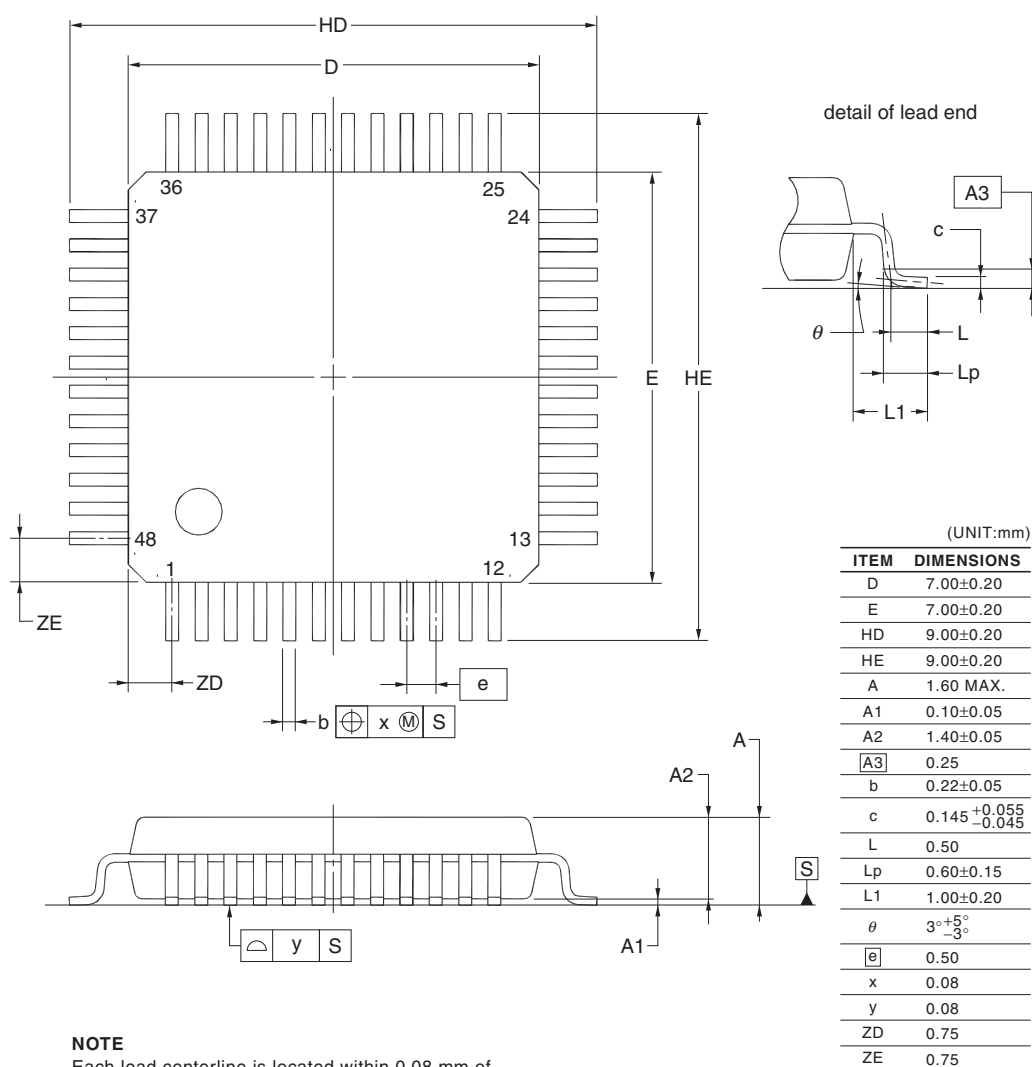
**( $T_A = -40$  to  $+105^\circ\text{C}$ ,  $2.4\text{ V} \leq EV_{DD0} = EV_{DD1} \leq V_{DD} \leq 5.5\text{ V}$ ,  $V_{SS} = EV_{SS0} = EV_{SS1} = 0\text{ V}$ )**

| Parameter     | Symbol | Conditions                | MIN.    | TYP. | MAX.      | Unit |
|---------------|--------|---------------------------|---------|------|-----------|------|
| Transfer rate |        | During serial programming | 115,200 |      | 1,000,000 | bps  |

## 4.9 48-pin Products

R5F100GAAFB, R5F100GCAFB, R5F100GDAFB, R5F100GEAFB, R5F100GFAFB, R5F100GGAFB,  
 R5F100GHAFB, R5F100GJAFB, R5F100GKAFB, R5F100GLAFB  
 R5F101GAAFB, R5F101GCAFB, R5F101GDAFB, R5F101GEAFB, R5F101GFAFB, R5F101GGAFB,  
 R5F101GHAFB, R5F101GJAFB, R5F101GKAFB, R5F101GLAFB  
 R5F100GADFB, R5F100GCDFB, R5F100GDDFB, R5F100GEDFB, R5F100GFDFB, R5F100GGDFB,  
 R5F100GHDFB, R5F100GJDFB, R5F100GKDFB, R5F100GLDFB  
 R5F101GADFB, R5F101GCDFB, R5F101GDDFB, R5F101GEDFB, R5F101GFDFB, R5F101GGDFB,  
 R5F101GHDFB, R5F101GJDFB, R5F101GKDFB, R5F101GLDFB  
 R5F100GAGFB, R5F100GCGFB, R5F100GDGFB, R5F100GEGFB, R5F100GFGFB, R5F100GGGFB,  
 R5F100GHGFB, R5F100GJGFB

| JEITA Package Code | RENESAS Code | Previous Code  | MASS (TYP.) [g] |
|--------------------|--------------|----------------|-----------------|
| P-LFQFP48-7x7-0.50 | PLQP0048KF-A | P48GA-50-8EU-1 | 0.16            |



|                         |                            |
|-------------------------|----------------------------|
| <b>Revision History</b> | <b>RL78/G13 Data Sheet</b> |
|-------------------------|----------------------------|

| Rev. | Date         | Description |                                                                                                                                  |
|------|--------------|-------------|----------------------------------------------------------------------------------------------------------------------------------|
|      |              | Page        | Summary                                                                                                                          |
| 1.00 | Feb 29, 2012 | -           | First Edition issued                                                                                                             |
| 2.00 | Oct 12, 2012 | 7           | Figure 1-1. Part Number, Memory Size, and Package of RL78/G13: Pin count corrected.                                              |
|      |              | 25          | 1.4 Pin Identification: Description of pins INTP0 to INTP11 corrected.                                                           |
|      |              | 40, 42, 44  | 1.6 Outline of Functions: Descriptions of Subsystem clock, Low-speed on-chip oscillator, and General-purpose register corrected. |
|      |              | 41, 43, 45  | 1.6 Outline of Functions: Lists of Descriptions changed.                                                                         |
|      |              | 59, 63, 67  | Descriptions of Note 8 in a table corrected.                                                                                     |
|      |              | 68          | (4) Common to RL78/G13 all products: Descriptions of Notes corrected.                                                            |
|      |              | 69          | 2.4 AC Characteristics: Symbol of external system clock frequency corrected.                                                     |
|      |              | 96 to 98    | 2.6.1 A/D converter characteristics: Notes of overall error corrected.                                                           |
|      |              | 100         | 2.6.2 Temperature sensor characteristics: Parameter name corrected.                                                              |
|      |              | 104         | 2.8 Flash Memory Programming Characteristics: Incorrect descriptions corrected.                                                  |
|      |              | 116         | 3.10 52-pin products: Package drawings of 52-pin products corrected.                                                             |
|      |              | 120         | 3.12 80-pin products: Package drawings of 80-pin products corrected.                                                             |
| 3.00 | Aug 02, 2013 | 1           | Modification of 1.1 Features                                                                                                     |
|      |              | 3           | Modification of 1.2 List of Part Numbers                                                                                         |
|      |              | 4 to 15     | Modification of Table 1-1. List of Ordering Part Numbers, note, and caution                                                      |
|      |              | 16 to 32    | Modification of package type in 1.3.1 to 1.3.14                                                                                  |
|      |              | 33          | Modification of description in 1.4 Pin Identification                                                                            |
|      |              | 48, 50, 52  | Modification of caution, table, and note in 1.6 Outline of Functions                                                             |
|      |              | 55          | Modification of description in table of Absolute Maximum Ratings ( $T_A = 25^{\circ}\text{C}$ )                                  |
|      |              | 57          | Modification of table, note, caution, and remark in 2.2.1 X1, XT1 oscillator characteristics                                     |
|      |              | 57          | Modification of table in 2.2.2 On-chip oscillator characteristics                                                                |
|      |              | 58          | Modification of note 3 of table (1/5) in 2.3.1 Pin characteristics                                                               |
|      |              | 59          | Modification of note 3 of table (2/5) in 2.3.1 Pin characteristics                                                               |
|      |              | 63          | Modification of table in (1) Flash ROM: 16 to 64 KB of 20- to 64-pin products                                                    |
|      |              | 64          | Modification of notes 1 and 4 in (1) Flash ROM: 16 to 64 KB of 20- to 64-pin products                                            |
|      |              | 65          | Modification of table in (1) Flash ROM: 16 to 64 KB of 20- to 64-pin products                                                    |
|      |              | 66          | Modification of notes 1, 5, and 6 in (1) Flash ROM: 16 to 64 KB of 20- to 64-pin products                                        |
|      |              | 68          | Modification of notes 1 and 4 in (2) Flash ROM: 96 to 256 KB of 30- to 100-pin products                                          |
|      |              | 70          | Modification of notes 1, 5, and 6 in (2) Flash ROM: 96 to 256 KB of 30- to 100-pin products                                      |
|      |              | 72          | Modification of notes 1 and 4 in (3) Flash ROM: 384 to 512 KB of 44- to 100-pin products                                         |
|      |              | 74          | Modification of notes 1, 5, and 6 in (3) Flash ROM: 384 to 512 KB of 44- to 100-pin products                                     |
|      |              | 75          | Modification of (4) Peripheral Functions (Common to all products)                                                                |
|      |              | 77          | Modification of table in 2.4 AC Characteristics                                                                                  |
|      |              | 78, 79      | Addition of Minimum Instruction Execution Time during Main System Clock Operation                                                |
|      |              | 80          | Modification of figures of AC Timing Test Points and External System Clock Timing                                                |