# RL78 FAMILY

Selection Guide

2024.03

# RL78 FAMILY LINEUP

## RL78/G10 (10 to 16 pins)

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/G10 | |
|---|---|---|
| Pin count / ROM (bytes) | 10-pin | 16-pin |
| 512K | | |
| 384K | | |
| 256K | | |
| 192K | | |
| 128K | | |
| 96K | | |
| 64K | | |
| 48K | | |
| 32K | | |
| 24K | | |
| 16K | | |
| 8K | | |
| 4K | R5F10Y17ASP*1<br>(512/—) | R5F10Y47ASP*1<br>(512/—) |
| 2K | R5F10Y16ASP*1<br>(256/—) | R5F10Y46ASP*1<br>(256/—) |
| 1K | R5F10Y14ASP*1<br>(128/—) | R5F10Y44ASP*1<br>(128/—) |
| Package | 10-pin LSSOP<br>SP thickness: 1.45mm<br>4.4×3.6mm<br>Pitch: 0.65mm | 16-pin SSOP<br>SP thickness: 1.725mm<br>4.4×5.0mm<br>Pitch: 0.65mm |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxDxx, ambient operating temperature range: –40 to +85°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G11 (10 to 25 pins)

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/G11 | | | | |
|---|---|---|---|---|---|
| ROM (bytes) \ Pin count | 10-pin | 16-pin | 20-pin | 24-pin | 25-pin |
| 512K | | | | | |
| 384K | | | | | |
| 256K | | | | | |
| 192K | | | | | |
| 128K | | | | | |
| 96K | | | | | |
| 64K | | | | | |
| 48K | | | | | |
| 32K | | | | | |
| 24K | | | | | |
| 16K | R5F1051AASP*1<br>(1.5K/2K) | R5F1054AASP*1<br>R5F1054AANA*1<br>(1.5K/2K) | R5F1056AASP*1<br>R5F1056AASM*1<br>(1.5K/2K) | R5F1057AANA*1<br>(1.5K/2K) | R5F1058AALA*1<br>(1.5K/2K) |
| 8K | | | | | |
| 4K | | | | | |
| 2K | | | | | |
| 1K | | | | | |
| Package | 10-pin LSSOP<br>SP thickness: 1.45mm<br>4.4×3.6mm<br>Pitch: 0.65mm | 16-pin SSOP<br>SP thickness: 1.725mm<br>4.4×5.0mm<br>Pitch: 0.65mm<br>16-pin HWQFN<br>NA thickness: 0.80mm<br>3×3mm<br>Pitch: 0.50mm | 20-pin LSSOP<br>SP thickness: 1.45mm<br>4.4×6.5mm<br>Pitch: 0.65mm<br>20-pin TSSOP<br>SM thickness: 1.20mm<br>4.4×6.5mm<br>Pitch: 0.65mm | 24-pin HWQFN<br>NA thickness: 0.80mm<br>4×4mm<br>Pitch: 0.50mm | 25-pin WFLGA<br>LA thickness: 0.76mm<br>3×3mm<br>Pitch: 0.50mm |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G12 (20 to 30 pins)

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/G12 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pin count / ROM (bytes) | 20-pin | | | | 24-pin | | 30-pin | |
| 512K | | | | | | | | |
| 384K | | | | | | | | |
| 256K | | | | | | | | |
| 192K | | | | | | | | |
| 128K | | | | | | | | |
| 96K | | | | | | | | |
| 64K | | | | | | | | |
| 48K | | | | | | | | |
| 32K | | | | | | | | |
| 16K | R5F1036AASP (1.5K/—) | R5F1036AASM (1.5K/—) | R5F1026AASP*1 (1.5K/2K) | R5F1026AASM*1 (1.5K/2K) | R5F1037AANA (1.5K/—) | R5F1027AANA*1 (1.5K/2K) | R5F103AAASP (2K/—) | R5F102AAASP*1 (2K/2K) |
| 12K | R5F10369ASP (1K/—) | R5F10369ASP (1K/—) | R5F10269ASP*1 (1K/2K) | R5F10269ASM*1 (1K/2K) | R5F10379ANA (1K/—) | R5F10279ANA*1 (1K/2K) | R5F103A9ASP (1K/—) | R5F102A9ASP*1 (1K/2K) |
| 8K | R5F10368ASP (768/—) | R5F10368ASM (768/—) | R5F10268ASP*1 (768/2K) | R5F10268ASM*1 (768/2K) | R5F10378ANA (768/—) | R5F10278ANA*1 (768/2K) | R5F103A8ASP (768/—) | R5F102A8ASP*1 (768/2K) |
| 4K | R5F10367ASP (512/—) | R5F10367ASM (512/—) | R5F10267ASP*1 (512/2K) | R5F10267ASM*1 (512/2K) | R5F10377ANA (512/—) | R5F10277ANA*1 (512/2K) | R5F103A7ASP (512/—) | R5F102A7ASP*1 (512/2K) |
| 2K | R5F10366ASP (256/—) | R5F10366ASM (256/—) | R5F10266ASP*1 (256/2K) | R5F10266ASM*1 (256/2K) | | | | |
| 1K | | | | | | | | |
| Package | 20-pin LSSOP<br>SP thickness: 1.45mm<br>4.4×6.5mm<br>Pitch: 0.65mm<br> <br>20-pin TSSOP<br>SM thickness: 1.20mm<br>4.4×6.5mm<br>Pitch: 0.65mm<br> | | | | 24-pin HWQFN<br>NA thickness: 0.80mm<br>4×4mm<br>Pitch: 0.50mm<br> | | 30-pin LSSOP<br>SP thickness: 1.40mm<br>7.62mm (300mil)<br>Pitch: 0.65mm<br> | |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

# MEMO

## RL78/G13 (20 to 48 pins)

R5F104AGASP (16K/8K): Product name (RAM (bytes) / Data flash (bytes))

| Group | RL78/G13 | | | | |
|---|---|---|---|---|---|
| ROM (bytes) \ Pin count | 20-pin | 24-pin | 25-pin | 30-pin | 32-pin |
| 512K | | | | | |
| 384K | | | | | |
| 256K | | | | | |
| 192K | | | | | |
| 128K | | | | R5F100AGASP (12K/8K)*2<br>R5F101AGASP (12K/—) | R5F100BGANA (12K/8K)*2<br>R5F101BGANA (12K/—) |
| 96K | | | | R5F100AFASP (8K/8K)*2<br>R5F101AFASP (8K/—) | R5F100BFANA (8K/8K)*2<br>R5F101BFANA (8K/—) |
| 64K | R5F1006EASP (4K/4K)*2<br>R5F1016EASP (4K/—)<br>R5F1006EASM (4K/4K)*2<br>R5F1016EASM (4K/—) | R5F1007EANA (4K/4K)*2<br>R5F1017EANA (4K/—) | R5F1008EALA (4K/4K)*2<br>R5F1018EALA (4K/—) | R5F100AEASP (4K/4K)*2<br>R5F101AEASP (4K/—) | R5F100BEANA (4K/4K)*2<br>R5F101BEANA (4K/—) |
| 48K | R5F1006DASP (3K/4K)*2<br>R5F1016DASP (3K/—)<br>R5F1006DASM (3K/4K)*2<br>R5F1016DASM (3K/—) | R5F1007DANA (3K/4K)*2<br>R5F1017DANA (3K/—) | R5F1008DALA (3K/4K)*2<br>R5F1018DALA (3K/—) | R5F100ADASP (3K/4K)*2<br>R5F101ADASP (3K/—) | R5F100BDANA (3K/4K)*2<br>R5F101BDANA (3K/—) |
| 32K | R5F1006CASP (2K/4K)*2<br>R5F1016CASP (2K/—)<br>R5F1006CASM (2K/4K)*2<br>R5F1016CASM (2K/—) | R5F1007CANA (2K/4K)*2<br>R5F1017CANA (2K/—) | R5F1008CALA (2K/4K)*2<br>R5F1018CALA (2K/—) | R5F100ACASP (2K/4K)*2<br>R5F101ACASP (2K/—) | R5F100BCANA (2K/4K)*2<br>R5F101BCANA (2K/—) |
| 16K | R5F1006AASP (2K/4K)*2<br>R5F1016AASP (2K/—)<br>R5F1006AASM (2K/4K)*2<br>R5F1016AASM (2K/—) | R5F1007AANA (2K/4K)*2<br>R5F1017AANA (2K/—) | R5F1008AALA (2K/4K)*2<br>R5F1018AALA (2K/—) | R5F100AAASP (2K/4K)*2<br>R5F101AAASP (2K/—) | R5F100BAANA (2K/4K)*2<br>R5F101BAANA (2K/—) |
| 12K | | | | | |
| 8K | | | | | |
| 4K | | | | | |
| 2K | | | | | |
| 1K | | | | | |
| Package | 20-pin LSSOP<br>SP thickness: 1.40mm<br>7.62mm (300mil)<br>Pitch: 0.65mm<br> <br>20-pin TSSOP<br>SM thickness: 1.20mm<br>4.4×6.5mm<br>Pitch: 0.65mm<br> | 24-pin HWQFN<br>NA thickness: 0.80mm<br>4×4mm<br>Pitch: 0.50mm<br> | 25-pin WFLGA<br>LA thickness: 0.76mm<br>3×3mm<br>Pitch: 0.50mm<br> | 30-pin LSSOP<br>SP thickness: 1.40mm<br>7.62mm (300mil)<br>Pitch: 0.65mm<br> | 32-pin HWQFN<br>NA thickness: 0.80mm<br>5×5mm<br>Pitch: 0.50mm<br> |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)

*1: Industrial grade products are also available. (part number: R5F1xxxDxx, ambient operating temperature range: –40 to +85°C)

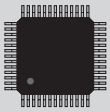
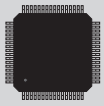
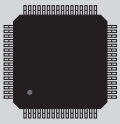
*2: Industrial grade products are also available. (part number: R5F1xxxGxx, ambient operating temperature range: –40 to +105°C)

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

| RL78/G13 | | | | |
|---|---|---|---|---|
| 36-pin | 40-pin | 44-pin | 48-pin | |
| | | R5F100FLAFP (32K/8K)*1<br>R5F101FLAFP (32K/—)*1 | R5F100GLAFB (32K/8K)*1<br>R5F101GLAFB (32K/—)*1 | R5F100GLANA (32K/8K)*1<br>R5F101GLANA (32K/—)*1 |
| | | R5F100FKAFP (24K/8K)*1<br>R5F101FKAFP (24K/—)*1 | R5F100GKAFB (24K/8K)*1<br>R5F101GKAFB (24K/—)*1 | R5F100GKANA (24K/8K)*1<br>R5F101GKANA (24K/—)*1 |
| | | R5F100FJAFP (20K/8K)*2<br>R5F101FJAFP (20K/—) | R5F100GJAFB (20K/8K)*2<br>R5F101GJAFB (20K/—) | R5F100GJANA (20K/8K)*2<br>R5F101GJANA (20K/—) |
| | R5F100EHANA (16K/8K)*2<br>R5F101EHANA (16K/—) | R5F100FHAFP (16K/8K)*2<br>R5F101FHAFP (16K/—) | R5F100GHAFB (16K/8K)*2<br>R5F101GHAFB (16K/—) | R5F100GHANA (16K/8K)*2<br>R5F101GHANA (16K/—) |
| R5F100CGALA (12K/8K)*2<br>R5F101CGALA (12K/—) | R5F100EGANA (12K/8K)*2<br>R5F101EGANA (12K/—) | R5F100FGAFP (12K/8K)*2<br>R5F101FGAFP (12K/—) | R5F100GGAFB (12K/8K)*2<br>R5F101GGAFB (12K/—) | R5F100GGANA (12K/8K)*2<br>R5F101GGANA (12K/—) |
| R5F100CFALA (8K/8K)*2<br>R5F101CFALA (8K/—) | R5F100EFANA (8K/8K)*2<br>R5F101EFANA (8K/—) | R5F100FFAFP (8K/8K)*2<br>R5F101FFAFP (8K/—) | R5F100GFAFB (8K/8K)*2<br>R5F101GFAFB (8K/—) | R5F100GFANA (8K/8K)*2<br>R5F101GFANA (8K/—) |
| R5F100CEALA (4K/4K)*2<br>R5F101CEALA (4K/—) | R5F100EEANA (4K/4K)*2<br>R5F101EEANA (4K/—) | R5F100FEAFP (4K/4K)*2<br>R5F101FEAFP (4K/—) | R5F100GEAFB (4K/4K)*2<br>R5F101GEAFB (4K/—) | R5F100GEANA (4K/4K)*2<br>R5F101GEANA (4K/—) |
| R5F100CDALA (3K/4K)*2<br>R5F101CDALA (3K/—) | R5F100EDANA (3K/4K)*2<br>R5F101EDANA (3K/—) | R5F100FDAFP (3K/4K)*2<br>R5F101FDAFP (3K/—) | R5F100GDAFB (3K/4K)*2<br>R5F101GDAFB (3K/—) | R5F100GDANA (3K/4K)*2<br>R5F101GDANA (3K/—) |
| R5F100CCALA (2K/4K)*2<br>R5F101CCALA (2K/—) | R5F100ECANA (2K/4K)*2<br>R5F101ECANA (2K/—) | R5F100FCAFP (2K/4K)*2<br>R5F101FCAFP (2K/—) | R5F100GCAFB (2K/4K)*2<br>R5F101GCAFB (2K/—) | R5F100GCANA (2K/4K)*2<br>R5F101GCANA (2K/—) |
| R5F100CAALA (2K/4K)*2<br>R5F101CAALA (2K/—) | R5F100EAANA (2K/4K)*2<br>R5F101EAANA (2K/—) | R5F100FAAFP (2K/4K)*2<br>R5F101FAAFP (2K/—) | R5F100GAAFB (2K/4K)*2<br>R5F101GAAFB (2K/—) | R5F100GAANA (2K/4K)*2<br>R5F101GAANA (2K/—) |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| 36-pin WFLGA<br>LA thickness: 0.76mm<br>4×4mm<br>Pitch: 0.50mm | 40-pin HWQFN<br>NA thickness: 0.80mm<br>6×6mm<br>Pitch: 0.50mm | 44-pin LQFP<br>FP thickness: 1.60mm<br>10×10mm<br>Pitch: 0.80mm | 48-pin LFQFP<br>FB thickness: 1.60mm<br>7×7mm<br>Pitch: 0.50mm | 48-pin HWQFN<br>NA thickness: 0.80mm<br>7×7mm<br>Pitch: 0.50mm |

## RL78/G13 (52 to 128 pins)

R5F104AGASP (16K/8K): Product name (RAM (bytes) / Data flash (bytes))

| Group | RL78/G13 | | | |
|---|---|---|---|---|
| Pin count / ROM (bytes) | 52-pin | 64-pin | | |
| 512K | R5F100JLAFA (32K/8K)*1<br>R5F101JLAFA (32K/—)*1 | R5F100LLAFB (32K/8K)*1<br>R5F101LLAFB (32K/—)*1 | R5F100LLAFA (32K/8K)*1<br>R5F101LLAFA (32K/—)*1 | |
| 384K | R5F100JKAFA (24K/8K)*1<br>R5F101JKAFA (24K/—)*1 | R5F100LKAFB (24K/8K)*1<br>R5F101LKAFB (24K/—)*1 | R5F100LKAFA (24K/8K)*1<br>R5F101LKAFA (24K/—)*1 | |
| 256K | R5F100JJAFA (20K/8K)*2<br>R5F101JJAFA (20K/—) | R5F100LJAFB (20K/8K)*2<br>R5F101LJAFB (20K/—) | R5F100LJAFA (20K/8K)*2<br>R5F101LJAFA (20K/—) | R5F100LJABG (20K/8K)*2<br>R5F101LJABG (20K/—) |
| 192K | R5F100JHAFA (16K/8K)*2<br>R5F101JHAFA (16K/—) | R5F100LHAFB (16K/8K)*2<br>R5F101LHAFB (16K/—) | R5F100LHAFA (16K/8K)*2<br>R5F101LHAFA (16K/—) | R5F100LHABG (16K/8K)*2<br>R5F101LHABG (16K/—) |
| 128K | R5F100JGAFA (12K/8K)*2<br>R5F101JGAFA (12K/—) | R5F100LGAFB (12K/8K)*2<br>R5F101LGAFB (12K/—) | R5F100LGAFA (12K/8K)*2<br>R5F101LGAFA (12K/—) | R5F100LGABG (12K/8K)*2<br>R5F101LGABG (12K/—) |
| 96K | R5F100JFAFA (8K/8K)*2<br>R5F101JFAFA (8K/—) | R5F100LFAFB (8K/8K)*2<br>R5F101LFAFB (8K/—) | R5F100LFAFA (8K/8K)*2<br>R5F101LFAFA (8K/—) | R5F100LFABG (8K/8K)*2<br>R5F101LFABG (8K/—) |
| 64K | R5F100JEAFA (4K/4K)*2<br>R5F101JEAFA (4K/—) | R5F100LEAFB (4K/4K)*2<br>R5F101LEAFB (4K/—) | R5F100LEAFA (4K/4K)*2<br>R5F101LEAFA (4K/—) | R5F100LEABG (4K/4K)*2<br>R5F101LEABG (4K/—) |
| 48K | R5F100JDAFA (3K/4K)*2<br>R5F101JDAFA (3K/—) | R5F100LDAFB (3K/4K)*2<br>R5F101LDAFB (3K/—) | R5F100LDAFA (3K/4K)*2<br>R5F101LDAFA (3K/—) | R5F100LDABG (3K/4K)*2<br>R5F101LDABG (3K/—) |
| 32K | R5F100JCAFA (2K/4K)*2<br>R5F101JCAFA (2K/—) | R5F100LCAFB (2K/4K)*2<br>R5F101LCAFB (2K/—) | R5F100LCAFA (2K/4K)*2<br>R5F101LCAFA (2K/—) | R5F100LCABG (2K/4K)*2<br>R5F101LCABG (2K/—) |
| 16K | | | | |
| 12K | | | | |
| 8K | | | | |
| 4K | | | | |
| 2K | | | | |
| 1K | | | | |
| Package | 52-pin LQFP<br>FA thickness: 1.70mm<br>10×10mm<br>Pitch: 0.65mm<br>  | 64-pin LFQFP<br>FB thickness: 1.60mm<br>10×10mm<br>Pitch: 0.50mm<br>  | 64-pin LQFP<br>FA thickness: 1.60mm<br>12×12mm<br>Pitch: 0.65mm<br>  | 64-pin VFBGA<br>BG thickness: 0.99mm<br>4×4mm<br>Pitch: 0.40mm<br> |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)

*1: Industrial grade products are also available. (part number: R5F1xxxxDxx, ambient operating temperature range: –40 to +85°C)

*2: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

| RL78/G13 | | | | |
|---|---|---|---|---|
| 80-pin | | 100-pin | | 128-pin |
| R5F100MLAFB (32K/8K)*1<br>R5F101MLAFB (32K/—)*1 | R5F100MLAFA (32K/8K)*1<br>R5F101MLAFA (32K/—)*1 | R5F100PLAFB (32K/8K)*1<br>R5F101PLAFB (32K/—)*1 | R5F100PLAFA (32K/8K)*1<br>R5F101PLAFA (32K/—)*1 | R5F100SLAFB (32K/8K)*1<br>R5F101SLAFB (32K/—)*1 |
| R5F100MKAFB (24K/8K)*1<br>R5F101MKAFB (24K/—)*1 | R5F100MKAFA (24K/8K)*1<br>R5F101MKAFA (24K/—)*1 | R5F100PKAFB (24K/8K)*1<br>R5F101PKAFB (24K/—)*1 | R5F100PKAFA (24K/8K)*1<br>R5F101PKAFA (24K/—)*1 | R5F100SKAFB (24K/8K)*1<br>R5F101SKAFB (24K/—)*1 |
| R5F100MJAFB (20K/8K)*2<br>R5F101MJAFB (20K/—) | R5F100MJAFA (20K/8K)*2<br>R5F101MJAFA (20K/—) | R5F100PJAFB (20K/8K)*2<br>R5F101PJAFB (20K/—) | R5F100PJAFA (20K/8K)*2<br>R5F101PJAFA (20K/—) | R5F100SJAFB (20K/8K)*1<br>R5F101SJAFB (20K/—)*1 |
| R5F100MHAFB (16K/8K)*2<br>R5F101MHAFB (16K/—) | R5F100MHAFA (16K/8K)*2<br>R5F101MHAFA (16K/—) | R5F100PHAFB (16K/8K)*2<br>R5F101PHAFB (16K/—) | R5F100PHAFA (16K/8K)*2<br>R5F101PHAFA (16K/—) | R5F100SHAFB (16K/8K)*1<br>R5F101SHAFB (16K/—)*1 |
| R5F100MGAFB (12K/8K)*2<br>R5F101MGAFB (12K/—) | R5F100MGAFA (12K/8K)*2<br>R5F101MGAFA (12K/—) | R5F100PGAFB (12K/8K)*2<br>R5F101PGAFB (12K/—) | R5F100PGAFA (12K/8K)*2<br>R5F101PGAFA (12K/—) | |
| R5F100MFAFB (8K/8K)*2<br>R5F101MFAFB (8K/—) | R5F100MFAFA (8K/8K)*2<br>R5F101MFAFA (8K/—) | R5F100PFAFB (8K/8K)*2<br>R5F101PFAFB (8K/—) | R5F100PFAFA (8K/8K)*2<br>R5F101PFAFA (8K/—) | |
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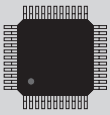
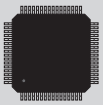
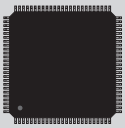
| 80-pin LFQFP<br>FB thickness: 1.60mm<br>12×12mm<br>Pitch: 0.50mm | 80-pin LQFP<br>FA thickness: 1.70mm<br>14×14mm<br>Pitch: 0.65mm | 100-pin LFQFP<br>FB thickness: 1.60mm<br>14×14mm<br>Pitch: 0.50mm | 100-pin LQFP<br>FA thickness: 1.60mm<br>14×20mm<br>Pitch: 0.65mm | 128-pin LFQFP<br>FB thickness: 1.60mm<br>14×20mm<br>Pitch: 0.50mm |

## RL78/G13A (44 to 100 pins)

R5F104AGASP (16K/8K): Product name (RAM (bytes) / Data flash (bytes))

| Group | RL78/G13A | | | |
|---|---|---|---|---|
| ROM (bytes) \ Pin count | 44-pin | 48-pin | 64-pin | 100-pin |
| 768K | | | | |
| 512K | R5F140FLAFP (32K/8K)<br>R5F140FLGFP (32K/8K) | R5F140GLAFB (32K/8K)<br>R5F140GLGFB (32K/8K) | R5F140LLAFB (32K/8K)<br>R5F140LLGFB (32K/8K) | R5F140PLAFB (32K/8K)<br>R5F140PLGFB (32K/8K) |
| 384K | R5F140FKAFP (24K/8K)<br>R5F140FKGFP (24K/8K) | R5F140GKAFB (24K/8K)<br>R5F140GKGFB (24K/8K) | R5F140LKAFB (24K/8K)<br>R5F140LKGFB (24K/8K) | R5F140PKAFB (24K/8K)<br>R5F140PKGFB (24K/8K) |
| 256K | | | | |
| 192K | | | | |
| 128K | | | | |
| 96K | | | | |
| 64K | | | | |
| 48K | | | | |
| 32K | | | | |
| 16K | | | | |
| 12K | | | | |
| 8K | | | | |
| 4K | | | | |
| 2K | | | | |
| 1K | | | | |
| Package | 44-pin LQFP<br>FP thickness: 1.60mm<br>10×10mm<br>Pitch: 0.80mm<br>  | 48-pin LFQFP<br>FB thickness: 1.70mm<br>7×7mm<br>Pitch: 0.50mm<br> | 64-pin LFQFP<br>FB thickness: 1.70mm<br>10×10mm<br>Pitch: 0.50mm<br>  | 100-pin LFQFP<br>FB thickness: 1.70mm<br>14×14mm<br>Pitch: 0.50mm<br>  |

# MEMO

## RL78/G14 (30 to 100 pins)

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/G14 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pin count / ROM (bytes) | 30-pin | 32-pin | | 36-pin | 40-pin | 44-pin | 48-pin | |
| 512K | | | | | | | R5F104GLAFB*1 (48K/8K) | R5F104GLANA*1 (48K/8K) |
| 384K | | | | | | | R5F104GKAFB*1 (32K/8K) | R5F104GKANA*1 (32K/8K) |
| 256K | | | | | | R5F104FJAFP*1 (24K/8K) | R5F104GJAFB*1 (24K/8K) | R5F104GJANA*1 (24K/8K) |
| 192K | | | | | R5F104EHANA*1 (20K/8K) | R5F104FHAFP*1 (20K/8K) | R5F104GHAFB*1 (20K/8K) | R5F104GHANA*1 (20K/8K) |
| 128K | R5F104AGASP*1 (16K/8K) | R5F104BGANA*1 (16K/8K) | R5F104BGAFP*1 (16K/8K) | R5F104CGALA*1 (16K/8K) | R5F104EGANA*1 (16K/8K) | R5F104FGAFP*1 (16K/8K) | R5F104GGAFB*1 (16K/8K) | R5F104GGANA*1 (16K/8K) |
| 96K | R5F104AFASP*1 (12K/8K) | R5F104BFANA*1 (12K/8K) | R5F104BFAFP*1 (12K/8K) | R5F104CFALA*1 (12K/8K) | R5F104EFANA*1 (12K/8K) | R5F104FFAFP*1 (12K/8K) | R5F104GFAFB*1 (12K/8K) | R5F104GFANA*1 (12K/8K) |
| 64K | R5F104AEASP*1 (5.5K/4K) | R5F104BEANA*1 (5.5K/4K) | R5F104BEAFP*1 (5.5K/4K) | R5F104CEALA*1 (5.5K/4K) | R5F104EEANA*1 (5.5K/4K) | R5F104FEAFP*1 (5.5K/4K) | R5F104GEAFB*1 (5.5K/4K) | R5F104GEANA*1 (5.5K/4K) |
| 48K | R5F104ADASP*1 (5.5K/4K) | R5F104BDANA*1 (5.5K/4K) | R5F104BDAFP*1 (5.5K/4K) | R5F104CDALA*1 (5.5K/4K) | R5F104EDANA*1 (5.5K/4K) | R5F104FDAFP*1 (5.5K/4K) | R5F104GDAFB*1 (5.5K/4K) | R5F104GDANA*1 (5.5K/4K) |
| 32K | R5F104ACASP*1 (4K/4K) | R5F104BCANA*1 (4K/4K) | R5F104BCAFP*1 (4K/4K) | R5F104CCALA*1 (4K/4K) | R5F104ECANA*1 (4K/4K) | R5F104FCAFP*1 (4K/4K) | R5F104GCAFB*1 (4K/4K) | R5F104GCANA*1 (4K/4K) |
| 16K | R5F104AAASP*1 (2.5K/4K) | R5F104BAANA*1 (2.5K/4K) | R5F104BAAFP*1 (2.5K/4K) | R5F104CAALA*1 (2.5K/4K) | R5F104EAANA*1 (2.5K/4K) | R5F104FAAFP*1 (2.5K/4K) | R5F104GAAFB*1 (2.5K/4K) | R5F104GAANA*1 (2.5K/4K) |
| 12K | | | | | | | | |
| 8K | | | | | | | | |
| 4K | | | | | | | | |
| 2K | | | | | | | | |
| 1K | | | | | | | | |
| Package | 30-pin LSSOP<br>SP thickness: 1.40mm<br>7.62mm (300mil)<br>Pitch: 0.65mm | 32-pin HWQFN<br>NA thickness: 0.80mm<br>5×5mm<br>Pitch: 0.50mm | 32-pin LQFP<br>FP thickness: 1.70mm<br>7×7mm<br>Pitch: 0.80mm | 36-pin WFLGA<br>LA thickness: 0.76mm<br>4×4mm<br>Pitch: 0.50mm | 40-pin HWQFN<br>NA thickness: 0.80mm<br>6×6mm<br>Pitch: 0.50mm | 44-pin LQFP<br>FP thickness: 1.60mm<br>10×10mm<br>Pitch: 0.80mm | 48-pin LFQFP<br>FB thickness:<br>1.60mm*2<br>7×7mm<br>Pitch: 0.50mm | 48-pin HWQFN<br>NA thickness: 0.80mm<br>7×7mm<br>Pitch: 0.50mm |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.
*2: Products with 384KB or 512KB of ROM are 1.70 mm thick.

| RL78/G14 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 52-pin | 64-pin | | | | 80-pin | | 100-pin | |
| | R5F104LLAFB*1 (48K/8K) | R5F104LLAFA*1 (48K/8K) | | R5F104LLALA*1 (48K/8K) | R5F104MLAFB*1 (48K/8K) | R5F104MLAFA*1 (48K/8K) | R5F104PLAFB*1 (48K/8K) | R5F104PLAFA*1 (48K/8K) |
| | R5F104LKAFB*1 (32K/8K) | R5F104LKAFA*1 (32K/8K) | | R5F104LKALA*1 (32K/8K) | R5F104MKAFB*1 (32K/8K) | R5F104MKAFA*1 (32K/8K) | R5F104PKAFB*1 (32K/8K) | R5F104PKAFA*1 (32K/8K) |
| R5F104JJAFA*1 (24K/8K) | R5F104LJAFB*1 (24K/8K) | R5F104LJAFA*1 (24K/8K) | R5F104LJAFP*1 (24K/8K) | R5F104LJALA*1 (24K/8K) | R5F104MJAFB*1 (24K/8K) | R5F104MJAFA*1 (24K/8K) | R5F104PJAFB*1 (24K/8K) | R5F104PJAFA*1 (24K/8K) |
| R5F104JHAFA*1 (20K/8K) | R5F104LHAFB*1 (20K/8K) | R5F104LHAFA*1 (20K/8K) | R5F104LHAFP*1 (20K/8K) | R5F104LHALA*1 (20K/8K) | R5F104MHAFB*1 (20K/8K) | R5F104MHAFA*1 (20K/8K) | R5F104PHAFB*1 (20K/8K) | R5F104PHAFA*1 (20K/8K) |
| R5F104JGAFA*1 (16K/8K) | R5F104LGAFB*1 (16K/8K) | R5F104LGAFA*1 (16K/8K) | R5F104LGAFP*1 (16K/8K) | R5F104LGALA*1 (16K/8K) | R5F104MGAFB*1 (16K/8K) | R5F104MGAFA*1 (16K/8K) | R5F104PGAFB*1 (16K/8K) | R5F104PGAFA*1 (16K/8K) |
| R5F104JFAFA*1 (12K/8K) | R5F104LFAFB*1 (12K/8K) | R5F104LFAFA*1 (12K/8K) | R5F104LFAFP*1 (12K/8K) | R5F104LFALA*1 (12K/8K) | R5F104MFAFB*1 (12K/8K) | R5F104MFAFA*1 (12K/8K) | R5F104PFAFB*1 (12K/8K) | R5F104PFAFA*1 (12K/8K) |
| R5F104JEAFA*1 (5.5K/4K) | R5F104LEAFB*1 (5.5K/4K) | R5F104LEAFA*1 (5.5K/4K) | R5F104LEAFP*1 (5.5K/4K) | R5F104LEALA*1 (5.5K/4K) | | | | |
| R5F104JDAFA*1 (5.5K/4K) | R5F104LDAFB*1 (5.5K/4K) | R5F104LDAFA*1 (5.5K/4K) | R5F104LDAFP*1 (5.5K/4K) | R5F104LDALA*1 (5.5K/4K) | | | | |
| R5F104JCAFA*1 (4K/4K) | R5F104LCAFB*1 (4K/4K) | R5F104LCAFA*1 (4K/4K) | R5F104LCAFP*1 (4K/4K) | R5F104LCALA*1 (4K/4K) | | | | |
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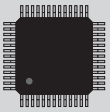
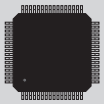
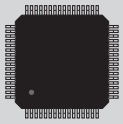
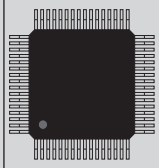
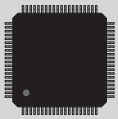
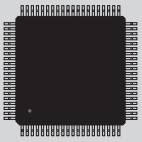
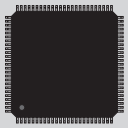
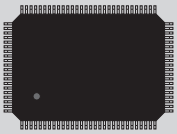
| | | | | | | | | |
| 52-pin LQFP<br>FA thickness: 1.70mm<br>10×10mm<br>Pitch: 0.65mm<br>  | 64-pin LFQFP<br>FB thickness: 1.60mm*2<br>10×10mm<br>Pitch: 0.50mm<br>  | 64-pin LQFP<br>FA thickness: 1.60mm<br>12×12mm<br>Pitch: 0.65mm<br>  | 64-pin LQFP<br>FP thickness: 1.70mm<br>14×14mm<br>Pitch: 0.80mm<br>  | 64-pin WFLGA<br>LA thickness: 0.76mm<br>5×5mm<br>Pitch: 0.50mm<br> | 80-pin LFQFP<br>FB thickness: 1.60mm*2<br>12×12mm<br>Pitch: 0.50mm<br>  | 80-pin LQFP<br>FA thickness: 1.70mm<br>14×14mm<br>Pitch: 0.65mm<br>  | 100-pin LFQFP<br>FB thickness: 1.60mm*2<br>14×14mm<br>Pitch: 0.50mm<br>  | 100-pin LQFP<br>FA thickness: 1.60mm<br>14×20mm<br>Pitch: 0.65mm<br>  |

## RL78/G15 (8 to 20 pins)

R5F12007ANS (1K/1K): Product name (RAM (bytes) / Data flash (bytes))

| Group | RL78/G15 | | | |
|---|---|---|---|---|
| ROM (bytes) \ Pin count | 8-pin | 10-pin | 16-pin | 20-pin |
| 768K | | | | |
| 512K | | | | |
| 384K | | | | |
| 256K | | | | |
| 192K | | | | |
| 128K | | | | |
| 96K | | | | |
| 64K | | | | |
| 48K | | | | |
| 32K | | | | |
| 16K | | | | |
| 12K | | | | |
| 8K | R5F12008ANS (1K/1K)*1 | R5F12018ASP (1K/1K)*1 | R5F12048ASP (1K/1K)*1<br>R5F12048ANA (1K/1K)*1 | R5F12068ASP (1K/1K)*1 |
| 4K | R5F12007ANS (1K/1K)*1 | R5F12017ASP (1K/1K)*1 | R5F12047ASP (1K/1K)*1<br>R5F12047ANA (1K/1K)*1 | R5F12067ASP (1K/1K)*1 |
| 2K | | | | |
| 1K | | | | |
| Package | 8-pin WDFN<br>NS thickness: 0.80mm<br>3×3mm<br>Pitch: 0.65mm | 10-pin LSSOP<br>SP thickness: 1.45mm<br>4.4×3.6mm<br>Pitch: 0.65mm | 16-pin SSOP<br>SP thickness: 1.45mm<br>4.4×6.5mm<br>Pitch: 0.65mm<br>16-pin HWQFN<br>NA thickness: 0.80mm<br>3×3mm<br>Pitch: 0.50mm | 20-pin LSSOP<br>SP thickness: 1.45mm<br>4.4×6.5mm<br>Pitch: 0.65mm |

The above part numbers are consumer grade products. (ambient operating temperature range : –40~+85°C)

*1: Industrial grade products are also available. (part number:R5F120xxGxx, ambient operating temperature range: –40~+105°C, part number:R5F120xxMxx, ambient operating temperature range: –40~+125°C)

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G16 (10 to 32pins)

R5F1211AASP (2K/1K): Product name (RAM((bytes) / Data flash (bytes))

| Group | RL78/G16 | | | | |
|---|---|---|---|---|---|
| ROM (bytes) \ Pin count | 10-pin | 16-pin | 20-pin | 24-pin | 32-pin |
| 768K | | | | | |
| 512K | | | | | |
| 384K | | | | | |
| 256K | | | | | |
| 192K | | | | | |
| 128K | | | | | |
| 96K | | | | | |
| 64K | | | | | |
| 48K | | | | | |
| 32K | R5F1211CASP (2K/1K)*1 | R5F1214CASP (2K/1K)*1<br>R5F1214CANA (2K/1K)*1 | R5F1216CASP (2K/1K)*1 | R5F1217CANA (2K/1K)*1 | R5F121BCANA (2K/1K)*1<br>R5F121BCAFP (2K/1K)*1 |
| 16K | R5F1211AASP (2K/1K)*1 | "R5F1214AASP (2K/1K)*1<br>R5F1214AANA (2K/1K)*1 | R5F1216AASP (2K/1K)*1 | R5F1217AANA (2K/1K)*1 | R5F121BAANA (2K/1K)*1<br>R5F121BAAFP (2K/1K)*1 |
| 12K | | | | | |
| 8K | | | | | |
| 4K | | | | | |
| 2K | | | | | |
| 1K | | | | | |
| Package | 10-pin LSSOP<br>SP thickness: 1.45mm<br>4.4×3.6mm<br>Pitch: 0.65mm | 16-pin SSOP<br>SP thickness: 1.725mm<br>4.4×5mm<br>Pitch: 0.65mm<br>16-pin HWQFN<br>NA thickness: 0.80mm<br>3×3mm<br>Pitch: 0.5mm | 20-pin LSSOP<br>SP thickness: 1.45mm<br>4.4×6.5mm<br>Pitch: 0.65mm | 24-pin HWQFN<br>NA thickness: 0.80mm<br>4×4mm<br>Pitch: 0.5mm | 32-pin HWQFN<br>NA thickness: 0.80mm<br>5×5mm<br>Pitch: 0.5mm<br>32-pin LQFP<br>FP thickness: 1.70mm<br>7×7mm<br>Pitch: 0.8mm |

The above part numbers are consumer grade products. (ambient operating temperature range : –40~+85°C)

*1: Industrial grade products are also available. (part number:R5F121xxGxx, ambient operating temperature range: –40~+105°C, part number:R5F121xxMxx, ambient operating temperature range: –40~+125°C)

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G22 (16 to 48 pins)

R7F102G4E2DNP (4K/2K): Product name (RAM (bytes) / Data flash (bytes))

| Group | RL78/G22 | | | | |
|---|---|---|---|---|---|
| ROM (bytes) \ Pin count | 16-pin | 20-pin | 24-pin | 25-pin | 30-pin |
| 768K | | | | | |
| 512K | | | | | |
| 384K | | | | | |
| 256K | | | | | |
| 192K | | | | | |
| 128K | | | | | |
| 96K | | | | | |
| 64K | R7F102G4E2DNP (4K/2K)*1 | R7F102G6E2DSP (4K/2K)*1 | R7F102G7E2DNP (4K/2K)*1 | R7F102G8E2DLA (4K/2K)*1 | R7F102GAE2DSP (4K/2K)*1 |
| 48K | | | | | |
| 32K | R7F102G4C2DNP (4K/2K)*1 | R7F102G6C2DSP (4K/2K)*1 | R7F102G7C2DNP (4K/2K)*1 | R7F102G8C2DLA (4K/2K)*1 | R7F102GAC2DSP (4K/2K)*1 |
| 16K | | | | | |
| 12K | | | | | |
| 8K | | | | | |
| 4K | | | | | |
| 2K | | | | | |
| 1K | | | | | |
| Package | 16-pin HWQFN<br>NP thickness: 0.80mm<br>3×3mm<br>Pitch: 0.50mm | 20-pin LSSOP<br>SP thickness: 1.45mm<br>4.4×6.5mm<br>Pitch: 0.65mm | 24-pin HWQFN<br>NP thickness: 0.80mm<br>4×4mm<br>Pitch: 0.50mm | 25-pin WFLGA<br>LA thickness: 0.76mm<br>3×3mm<br>Pitch: 0.50mm | 30-pin LSSOP<br>SP thickness: 1.40mm<br>9.85mm (300mil)<br>Pitch: 0.65mm |

The above part numbers are consumer grade products. (ambient operating temperature range : –40~+85°C)

*1: Industrial grade products are also available. (part number: R7F102Gxx3Cxx, ambient operating temperature range: –40~+105°C)

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 111.

| RL78/G22 | | | | |
|---|---|---|---|---|
| 32-pin | 36-pin | 40-pin | 44-pin | 48-pin |
| | | | | |
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| | | | | |
| R7F102GBE2DNP (4K/2K)*1<br>R7F102GBE2DFP (4K/2K)*1 | R7F102GCE2DLA (4K/2K)*1 | R7F102GEE2DNP (4K/2K)*1 | R7F102GFE2DFP (4K/2K)*1 | R7F102GGE2DNP (4K/2K)*1<br>R7F102GGE2DFB (4K/2K)*1 |
| | | | | |
| R7F102GBC2DNP (4K/2K)*1<br>R7F102GBC2DFP (4K/2K)*1 | R7F102GCC2DLA (4K/2K)*1 | R7F102GEC2DNP (4K/2K)*1 | R7F102GFC2DFP (4K/2K)*1 | R7F102GGC2DNP (4K/2K)*1<br>R7F102GGC2DFB (4K/2K)*1 |
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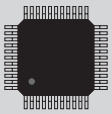
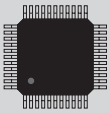
| | | | | |
| 32-pin HWQFN<br>NP thickness: 0.80mm<br>5×5mm<br>Pitch: 0.50mm<br> <br>32-pin LQFP<br>FP thickness: 1.70mm<br>7×7mm<br>Pitch: 0.80mm<br> | 36-pin WFLGA<br>LA thickness: 0.76mm<br>4×4mm<br>Pitch: 0.50mm<br> | 40-pin HWQFN<br>NP thickness: 0.80mm<br>6×6mm<br>Pitch: 0.50mm<br> | 44-pin LQFP<br>FP thickness: 1.60mm<br>10×10mm<br>Pitch: 0.80mm<br>  | 48-pin HWQFN<br>NP thickness: 0.80mm<br>7×7mm<br>Pitch: 0.50mm<br> <br>48-pin LFQFP<br>FB thickness: 1.70mm<br>7×7mm<br>Pitch: 0.50mm<br> |

## RL78/G23 (30 to 128 pins)

R7F100GAJ2DSP(24K/8K): Product name (RAM (bytes) / Data flash (bytes))

| Group | RL78/G23 | | | | |
|---|---|---|---|---|---|
| ROM (bytes) \ Pin count | 30-pin | 32-pin | 36-pin | 40-pin | 44-pin |
| 768K | | | | | R7F100GFN2DFP(48K/8K)*1 |
| 512K | | | | | R7F100GFL2DFP(48K/8K)*1 |
| 384K | | | | | R7F100GFK2DFP(32K/8K)*1 |
| 256K | R7F100GAJ2DSP(24K/8K)*1 | R7F100GBJ2DNP(24K/8K)*1<br>R7F100GBJ2DFP(24K/8K)*1 | R7F100GCJ2DLA(24K/8K)*1 | R7F100GEJ2DNP(24K/8K)*1 | R7F100GFJ2DFP(24K/8K)*1 |
| 192K | R7F100GAH2DSP(20K/8K)*1 | R7F100GBH2DNP(20K/8K)*1<br>R7F100GBH2DFP(20K/8K)*1 | R7F100GCH2DLA(20K/8K)*1 | R7F100GEH2DNP(20K/8K)*1 | R7F100GFH2DFP(20K/8K)*1 |
| 128K | R7F100GAG2DSP(16K/8K)*1 | R7F100GBG2DNP(16K/8K)*1<br>R7F100GBG2DFP(16K/8K)*1 | R7F100GCG2DLA(16K/8K)*1 | R7F100GEG2DNP(16K/8K)*1 | R7F100GFG2DFP(16K/8K)*1 |
| 96K | R7F100GAF2DSP(12K/8K)*1 | R7F100GBF2DNP(12K/8K)*1<br>R7F100GBF2DFP(12K/8K)*1 | R7F100GCF2DSLA(12K/8K)*1 | R7F100GEF2DNP(12K/8K)*1 | R7F100GFF2DFP(12K/8K)*1 |
| 64K | | | | | |
| 48K | | | | | |
| 32K | | | | | |
| 16K | | | | | |
| 12K | | | | | |
| 8K | | | | | |
| 4K | | | | | |
| 2K | | | | | |
| 1K | | | | | |
| Package | 30-pin LSSOP<br>SM thickness: 1.30mm<br>9.85mm (300mil)<br>Pitch: 0.65mm<br> | 32-pin HWQFN<br>NP thickness: 0.80mm<br>5×5mm<br>Pitch: 0.50mm<br> <br>32-pin LQFP<br>FP thickness: 1.70mm<br>7×7mm<br>Pitch: 0.80mm<br> | 36-pin WFLGA<br>LA thickness: 0.76mm<br>4×4mm<br>Pitch: 0.50mm<br> | 40-pin HWQFN<br>NP thickness: 0.80mm<br>6×6mm<br>Pitch: 0.50mm<br> | 44-pin LQFP<br>FP thickness: 1.60mm<br>10×10mm<br>Pitch: 0.80mm<br>  |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)

*1: Industrial grade products are also available. (part number: R7F100Gxx3Cxx, ambient operating temperature range: –40 to +105°C)

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 111.

| RL78/G23 | | | | | |
|---|---|---|---|---|---|
| 48-pin | 52-pin | 64-pin | 80-pin | 100-pin | 128-pin |
| R7F100GGN2DFB(48K/8K)*1<br>R7F100GGN2DNP(48K/8K)*1 | R7F100GJN2DFA(48K/8K)*1 | R7F100GLN2DFA(48K/8K)*1<br>R7F100GLN2DFB(48K/8K)*1<br>R7F100GLN2DLA(48K/8K)*1 | R7F100GMN2DFA(48K/8K)*1<br>R7F100GMN2DFB(48K/8K)*1 | R7F100GPN2DFA(48K/8K)*1<br>R7F100GPN2DFB(48K/8K)*1 | R7F100GSN2DFB(48K/8K)*1 |
| R7F100GGL2DFB(48K/8K)*1<br>R7F100GGL2DNP(48K/8K)*1 | R7F100GJL2DFA(48K/8K)*1 | R7F100GLL2DFA(48K/8K)*1<br>R7F100GLL2DFB(48K/8K)*1<br>R7F100GLL2DLA(48K/8K)*1 | R7F100GML2DFA(48K/8K)*1<br>R7F100GML2DFB(48K/8K)*1 | R7F100GPL2DFA(48K/8K)*1<br>R7F100GPL2DFB(48K/8K)*1 | R7F100GSL2DFB(48K/8K)*1 |
| R7F100GGK2DFB(32K/8K)*1<br>R7F100GGK2DNP(32K/8K)*1 | R7F100GJK2DFA(32K/8K)*1 | R7F100GLK2DFA(32K/8K)*1<br>R7F100GLK2DFB(32K/8K)*1<br>R7F100GLK2DLA(32K/8K)*1 | R7F100GMK2DFA(32K/8K)*1<br>R7F100GMK2DFB(32K/8K)*1 | R7F100GPK2DFA(32K/8K)*1<br>R7F100GPK2DFB(32K/8K)*1 | R7F100GSK2DFB(32K/8K)*1 |
| R7F100GGJ2DFB(24K/8K)*1<br>R7F100GGJ2DNP(24K/8K)*1 | R7F100GJJ2DFA(24K/8K)*1 | R7F100GLJ2DFA(24K/8K)*1<br>R7F100GLJ2DFB(24K/8K)*1<br>R7F100GLJ2DLA(24K/8K)*1 | R7F100GMJ2DFA(24K/8K)*1<br>R7F100GMJ2DFB(24K/8K)*1 | R7F100GPJ2DFA(24K/8K)*1<br>R7F100GPJ2DFB(24K/8K)*1 | R7F100GSJ2DFB(24K/8K)*1 |
| R7F100GGH2DFB(20K/8K)*1<br>R7F100GGH2DNP(20K/8K)*1 | R7F100GJH2DFA(20K/8K)*1 | R7F100GLH2DFA(20K/8K)*1<br>R7F100GLH2DFB(20K/8K)*1<br>R7F100GLH2DLA(20K/8K)*1 | R7F100GMH2DFA(20K/8K)*1<br>R7F100GMH2DFB(20K/8K)*1 | R7F100GPH2DFA(20K/8K)*1<br>R7F100GPH2DFB(20K/8K)*1 | |
| R7F100GGG2DFB(16K/8K)*1<br>R7F100GGG2DNP(16K/8K)*1 | R7F100GJG2DFA(16K/8K)*1 | R7F100GLG2DFA(16K/8K)*1<br>R7F100GLG2DFB(16K/8K)*1<br>R7F100GLG2DLA(16K/8K)*1 | R7F100GMG2DFA(16K/8K)*1<br>R7F100GMG2DNB(16K/8K)*1 | R7F100GPG2DFA(16K/8K)*1<br>R7F100GPG2DNB(16K/8K)*1 | |
| R7F100GGF2DFB(12K/8K)*1<br>R7F100GGF2DNP(12K/8K)*1 | R7F100GJF2DFA(12K/8K)*1 | R7F100GLF2DFA(12K/8K)*1<br>R7F100GLF2DFB(12K/8K)*1<br>R7F100GLF2DLA(12K/8K)*1 | | | |
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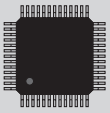
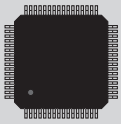
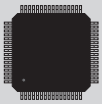
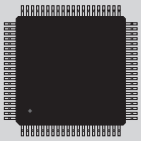
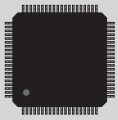
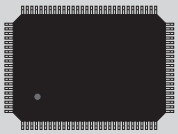
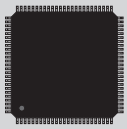
| 48-pin LFQFP<br>FB thickness: 0.70mm<br>7×7mm<br>Pitch: 0.50mm<br> <br>48-pin HWQFN<br>NP thickness: 0.80mm<br>7×7mm<br>Pitch: 0.50mm<br> | 52-pin LQFP<br>FA thickness: 1.70mm<br>10×10mm<br>Pitch: 0.50mm<br>  | 64-pin LQFP<br>FA thickness: 1.60mm<br>12×12mm<br>Pitch: 0.65mm<br>  <br>64-pin LFQFP<br>FB thickness: 1.70mm<br>10×10mm<br>Pitch: 0.50mm<br>  <br>64-pin WFLGA<br>LA thickness: 0.760mm<br>5×5mm<br>Pitch: 0.50mm<br> | 80-pin LQFP<br>FA thickness: 1.70mm<br>14×14mm<br>Pitch: 0.65mm<br>  <br>80-pin LFQFP<br>FB thickness: 1.70mm<br>12×12mm<br>Pitch: 0.50mm<br>  | 100-pin LQFP<br>FA thickness: 1.60mm<br>14×20mm<br>Pitch: 0.65mm<br>  <br>100-pin LFQFP<br>FB thickness: 1.70mm<br>14×14mm<br>Pitch: 0.50mm<br>  | 128-pin LFQFP<br>FB thickness: 1.60mm<br>20×20mm<br>Pitch: 0.50mm<br> |

## RL78/G24 (20 to 64pins)

R7F101G6E2DSP (12K/4K): Product name (RAM (bytes) / Data flash (bytes))

| Group | RL78/G24 | | | | |
|---|---|---|---|---|---|
| ROM (bytes) \ Pin count | 20-pin | 24-pin | 25-pin | 30-pin | 32-pin |
| 768K | | | | | |
| 512K | | | | | |
| 384K | | | | | |
| 256K | | | | | |
| 192K | | | | | |
| 128K | R7F101G6G2DSP (12K/4K)*1 | R7F101G7G2DNP (12K/4K)*1 | R7F101G8G2DLA (12K/4K)*2 | R7F101GAG2DSP (12K/4K)*1 | R7F101GBG2DNP (12K/4K)*1<br>R7F101GBG2DFP (12K/4K)*2 |
| 96K | | | | | |
| 64K | R7F101G6E2DSP (12K/4K)*1 | R7F101G7E2DNP (12K/4K)*1 | R7F101G8E2DLA (12K/4K)*2 | R7F101GAE2DSP (12K/4K)*1 | R7F101GBE2DNP (12K/4K)*1<br>R7F101GBE2DFP (12K/4K)*2 |
| 48K | | | | | |
| 32K | | | | | |
| 16K | | | | | |
| 12K | | | | | |
| 8K | | | | | |
| 4K | | | | | |
| 2K | | | | | |
| 1K | | | | | |
| Package | 20-pin LSSOP<br>SP thickness: 1.45mm<br>4.4×6.5mm<br>Pitch: 0.65mm | 24-pin HWQFN<br>NP thickness: 0.80mm<br>4×4mm<br>Pitch: 0.5mm | 25-pin WFLGA<br>LA thickness: 0.76mm<br>3×3mm<br>Pitch: 0.5mm | 30-pin LSSOP<br>SP thickness: 1.40mm<br>9.85mm(300mil)<br>Pitch: 0.65mm | 32-pin HWQFN<br>NP thickness: 0.80mm<br>5×5mm<br>Pitch:0.5mm<br>32-pin LQFP<br>FP thickness: 1.70mm<br>7×7mm<br>Pitch: 0.8mm |

The above part numbers are consumer grade products. (ambient operating temperature range : –40~+85°C)

*1: Industrial grade products are also available. (part number: R7F101Gxx3Cxx, ambient operating temperature range: –40~+105°C, part number: R7F101Gxx4Cxx, ambient operating temperature range: –40~+125°C)

*2: Industrial grade products are also available. (part number: R7F101Gxx3Cxx, ambient operating temperature range: –40~+105°C)

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 111.

| RL78/G24 | | | | |
|---|---|---|---|---|
| 40-pin | 44-pin | 48-pin | 52-pin | 64-pin |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| R7F101GEG2DNP (12K/4K)*1 | R7F101GFG2DFP (12K/4K)*2 | R7F101GGG2DFB (12K/4K)*1<br>R7F101GGG2DNP (12K/4K)*2 | R7F101GJG2DFA (12K/4K)*1 | R7F101GLG2DFA (12K/4K)*2<br>R7F101GLG2DFB (12K/4K)*2 |
| | | | | |
| R7F101GEE2DNP (12K/4K)*1 | R7F101GFE2DFP (12K/4K)*2 | R7F101GGE2DFB (12K/4K)*1<br>R7F101GGE2DNP (12K/4K)*2 | R7F101GJE2DFA (12K/4K)*1 | R7F101GLE2DFA (12K/4K)*2<br>R7F101GLE2DFB (12K/4K)*2 |
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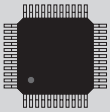
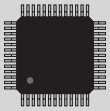
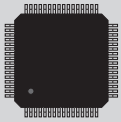
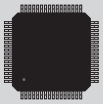
| 40-pin HWQFN<br>NP thickness: 0.80mm<br>6×6mm<br>Pitch: 0.5mm<br> | 44-pin LQFP<br>FP thickness: 1.60mm<br>10×10mm<br>Pitch: 0.8mm<br>  | 48-pin LFQFP<br>FB thickness: 1.70mm<br>7×7mm<br>Pitch: 0.5mm<br> <br>48-pin HWQFN<br>NP thickness: 0.80mm<br>7×7mm<br>Pitch: 0.5mm<br> | 52-pin LQFP<br>FA thickness:1.70mm<br>10×10mm<br>Pitch:0.65mm<br>  | 64-pin LQFP<br>FA thickness:1.60mm<br>12×12mm<br>Pitch:0.65mm<br>  <br>64-pin LFQFP<br>FB thickness:1.70mm<br>10×10mm<br>Pitch:0.5mm<br>  |

## RL78/G1A (25 to 64 pins)

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/G1A | | | | | |
|---|---|---|---|---|---|---|
| Pin count / ROM (bytes) | 25-pin | 32-pin | 48-pin | | 64-pin | |
| 512K | | | | | | |
| 384K | | | | | | |
| 256K | | | | | | |
| 192K | | | | | | |
| 128K | | | | | | |
| 96K | | | | | | |
| 64K | R5F10E8EALA*1 (4K/4K) | R5F10EBEANA*1 (4K/4K) | R5F10EGEAFB*1 (4K/4K) | R5F10EGEANA*1 (4K/4K) | R5F10ELEAFB*1 (4K/4K) | R5F10ELEABG*1 (4K/4K) |
| 48K | R5F10E8DALA*1 (3K/4K) | R5F10EBDANA*1 (3K/4K) | R5F10EGDAFB*1 (3K/4K) | R5F10EGDANA*1 (3K/4K) | R5F10ELDAFB*1 (3K/4K) | R5F10ELDABG*1 (3K/4K) |
| 32K | R5F10E8CALA*1 (2K/4K) | R5F10EBCANA*1 (2K/4K) | R5F10EGCAFB*1 (2K/4K) | R5F10EGCANA*1 (2K/4K) | R5F10ELCAFB*1 (2K/4K) | R5F10ELCABG*1 (2K/4K) |
| 16K | R5F10E8AALA*1 (2K/4K) | R5F10EBAANA*1 (2K/4K) | R5F10EGAAFB*1 (2K/4K) | R5F10EGAANA*1 (2K/4K) | | |
| 12K | | | | | | |
| 8K | | | | | | |
| 4K | | | | | | |
| 2K | | | | | | |
| 1K | | | | | | |
| Package | 25-pin WFLGA<br>LA thickness: 0.76mm<br>3×3mm<br>Pitch: 0.50mm | 32-pin HWQFN<br>NA thickness: 0.80mm<br>5×5mm<br>Pitch: 0.50mm | 48-pin LFQFP<br>FB thickness: 1.60mm<br>7×7mm<br>Pitch: 0.50mm | 48-pin HWQFN<br>NA thickness: 0.80mm<br>7×7mm<br>Pitch: 0.50mm | 64-pin LFQFP<br>FB thickness: 1.60mm<br>10×10mm<br>Pitch: 0.50mm | 64-pin VFBGA<br>BG thickness: 0.99mm<br>4×4mm<br>Pitch: 0.40mm |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G1C (32 to 48 pins)

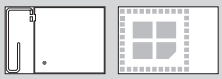
R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/G1C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pin count / ROM (bytes) | 32-pin | | | | 48-pin | | | |
| 512K | | | | | | | | |
| 384K | | | | | | | | |
| 256K | | | | | | | | |
| 192K | | | | | | | | |
| 128K | | | | | | | | |
| 96K | | | | | | | | |
| 64K | | | | | | | | |
| 48K | | | | | | | | |
| 32K | R5F10JBCANA*1 (5.5K/2K) Host/Function | R5F10JBCAFP*1 (5.5K/2K) Host/Function | R5F10KBCANA*1 (5.5K/2K) Function only | R5F10KBCAFP*1 (5.5K/2K) Function only | R5F10JGCANA*1 (5.5K/2K) Host/Function | R5F10JGCAFB*1 (5.5K/2K) Host/Function | R5F10KGCANA*1 (5.5K/2K) Function only | R5F10KGCAFB*1 (5.5K/2K) Function only |
| 24K | | | | | | | | |
| 16K | | | | | | | | |
| 8K | | | | | | | | |
| 4K | | | | | | | | |
| 2K | | | | | | | | |
| 1K | | | | | | | | |
| Package | 32-pin HWQFN NA thickness: 0.80mm 5×5mm Pitch: 0.50mm | 32-pin LQFP FP thickness: 1.70mm 7×7mm Pitch: 0.80mm | 32-pin HWQFN NA thickness: 0.80mm 5×5mm Pitch: 0.50mm | 32-pin LQFP FP thickness: 1.70mm 7×7mm Pitch: 0.80mm | 48-pin HWQFN NA thickness: 0.80mm 7×7mm Pitch: 0.50mm | 48-pin LFQFP FB thickness: 1.60mm 7×7mm Pitch: 0.50mm | 48-pin HWQFN NA thickness: 0.80mm 7×7mm Pitch: 0.50mm | 48-pin LFQFP FB thickness: 1.60mm 7×7mm Pitch: 0.50mm |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G1D (48 pins), RL78/G1D Module (42 pins)

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

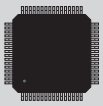
| Group | RL78/G1D | RL78/G1D Module |
|---|---|---|
| Pin count / ROM (bytes) | 48-pin | 42-pin |
| 512K | | |
| 384K | | |
| 256K | R5F11AGJANB*1<br>(20K/8K) | RY7011A0000DZ00*1<br>(20K/8K) |
| 192K | R5F11AGHANB*1<br>(16K/8K) | |
| 128K | R5F11AGGANB*1<br>(12K/8K) | |
| 96K | | |
| 64K | | |
| 48K | | |
| 32K | | |
| 16K | | |
| 12K | | |
| 8K | | |
| 4K | | |
| 2K | | |
| 1K | | |
| Package | 48-pin HWQFN<br>NA thickness: 0.80mm<br>6×6mm<br>Pitch: 0.40mm<br> | 42-pin LGA<br>Thickness: 1.7mm<br>8.95×13.35mm<br>Pitch: 0.85mm<br>  |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxDxx, ambient operating temperature range: –40 to +85°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

*1: Operating temperature range: –25 to +75°C

## RL78/G1F (24 to 64 pins)

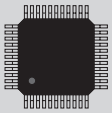
R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/G1F | | | | |
|---|---|---|---|---|---|
| ROM (bytes) \ Pin count | 24-pin | 32-pin | 36-pin | 48-pin | 64-pin |
| 512K | | | | | |
| 384K | | | | | |
| 256K | | | | | |
| 192K | | | | | |
| 128K | | | | | |
| 96K | | | | | |
| 64K | R5F11B7EANA*1<br>(5.5K/4K) | R5F11BBEAFP*1<br>R5F11BBEANA*1<br>(5.5K/4K) | R5F11BCEALA*1<br>(5.5K/4K) | R5F11BGEAFB*1<br>(5.5K/4K) | R5F11BLEAFB*1<br>(5.5K/4K) |
| 48K | | | | | |
| 32K | R5F11B7CANA*1<br>(5.5K/4K) | R5F11BBCAFP*1<br>R5F11BBCANA*1<br>(5.5K/4K) | R5F11BCCALA*1<br>(5.5K/4K) | R5F11BGCAFB*1<br>(5.5K/4K) | R5F11BLCAFB*1<br>(5.5K/4K) |
| 16K | | | | | |
| 12K | | | | | |
| 8K | | | | | |
| 4K | | | | | |
| 2K | | | | | |
| 1K | | | | | |
| Package | 24-pin HWQFN<br>NA thickness: 0.80mm<br>4×4mm<br>Pitch: 0.50mm<br> | 32-pin LQFP<br>FP thickness: 1.70mm<br>7×7mm<br>Pitch: 0.80mm<br> <br>32-pin HWQFN<br>NA thickness: 0.80mm<br>5×5mm<br>Pitch: 0.50mm<br> | 36-pin WFLGA<br>LA thickness: 0.76mm<br>4×4mm<br>Pitch: 0.50mm<br> | 48-pin LFQFP<br>FB thickness: 1.70mm<br>7×7mm<br>Pitch: 0.50mm<br> | 64-pin LFQFP<br>FB thickness: 1.70mm<br>10×10mm<br>Pitch: 0.50mm<br>  |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G1G (30 to 44 pins)

R5F104AGASP — Top: Product name
(16K/8K) — Bottom: (RAM/Data flash (bytes))

| Group | RL78/G1G | | |
|---|---|---|---|
| ROM (bytes) \ Pin count | 30-pin | 32-pin | 44-pin |
| 512K | | | |
| 384K | | | |
| 256K | | | |
| 192K | | | |
| 128K | | | |
| 96K | | | |
| 64K | | | |
| 48K | | | |
| 32K | | | |
| 16K | R5F11EAAASP<br>(1.5K/—) | R5F11EBAAFP<br>(1.5K/—) | R5F11EFAAFP<br>(1.5K/—) |
| 12K | | | |
| 8K | R5F11EA8ASP<br>(1.5K/—) | R5F11EB8AFP<br>(1.5K/—) | R5F11EF8AFP<br>(1.5K/—) |
| 4K | | | |
| 2K | | | |
| 1K | | | |
| Package | 30-pin LSSOP<br>SP thickness: 1.40mm<br>7.62mm (300mil)<br>Pitch: 0.65mm<br> | 32-pin LQFP<br>FP thickness: 1.70mm<br>7×7mm<br>Pitch: 0.80mm<br> | 44-pin LQFP<br>FP thickness: 1.60mm<br>10×10mm<br>Pitch: 0.80mm<br>  |

## RL78/G1H (64 pins)

R5F104AGASP (16K/8K) — Top: Product name
— Bottom: (RAM/Data flash (bytes))

| Group | RL78/G1H |
|---|---|
| Pin count / ROM (bytes) | 64-pin |
| 512K | R5F11FLLANA*1 (48K/8K) |
| 384K | R5F11FLKANA*1 (32K/8K) |
| 256K | R5F11FLJANA*1 (24K/8K) |
| 192K | |
| 128K | |
| 96K | |
| 64K | |
| 48K | |
| 32K | |
| 24K | |
| 16K | |
| 8K | |
| 4K | |
| 2K | |
| 1K | |
| Package | 64-pin HVQFN<br>NA thickness: 1.00mm<br>9×9mm<br>Pitch: 0.50mm |

## RL78/G1M (20 pins)

R5F104AGASP (16K/8K):
Product name (RAM (bytes) / Data flash (bytes))

| Group | RL78/G1M |
|---|---|
| Pin count / ROM (bytes) | 20-pin |
| 768K | |
| 512K | |
| 384K | |
| 256K | |
| 192K | |
| 128K | |
| 96K | |
| 64K | |
| 48K | |
| 32K | |
| 16K | |
| 12K | |
| 8K | R5F11W68ASM (1K/—)<br>R5F11W68DSM (1K/—) |
| 4K | R5F11W67ASM (1K/—)<br>R5F11W67DSM (1K/—) |
| 2K | |
| 1K | |
| Package | 20-pin TSSOP<br>SM thickness: 1.20mm<br>4.4×6.5mm<br>Pitch: 0.65mm |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxDxx, ambient operating temperature range: –40 to +85°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G1N (20 pins)

R5F104AGASP (16K/8K):
Product name (RAM (bytes) / Data flash (bytes))

| Group | RL78/G1N |
|---|---|
| ROM (bytes) \ Pin count | 20-pin |
| 768K | |
| 512K | |
| 384K | |
| 256K | |
| 192K | |
| 128K | |
| 96K | |
| 64K | |
| 48K | |
| 32K | |
| 16K | |
| 12K | |
| 8K | R5F11Y68ASM (1K/—)<br>R5F11Y68DSM (1K/—) |
| 4K | R5F11Y67ASM (1K/—)<br>R5F11Y67DSM (1K/—) |
| 2K | |
| 1K | |
| Package | 20-pin TSSOP<br>SM thickness: 1.20mm<br>4.4×6.5mm<br>Pitch: 0.65mm |

## RL78/G1P (24 to 32 pins)

R5F104AGASP (16K/8K):
Product name (RAM (bytes) / Data flash (bytes))

| Group | RL78/G1P | |
|---|---|---|
| ROM (bytes) \ Pin count | 24-pin | 32-pin |
| 768K | | |
| 512K | | |
| 384K | | |
| 256K | | |
| 192K | | |
| 128K | | |
| 96K | | |
| 64K | | |
| 48K | | |
| 32K | | |
| 16K | R5F11Z7AANA (1.5K/2K)<br>R5F11Z7ADNA (1.5K/2K) | R5F11ZBAAFP (1.5K/2K)<br>R5F11ZBADFP (1.5K/2K) |
| 12K | | |
| 8K | | |
| 4K | | |
| 2K | | |
| 1K | | |
| Package | 24-pin HWQFN<br>NA thickness: 0.80mm<br>4×4mm<br>Pitch: 0.50mm | 32-pin LQFP<br>FP thickness: 1.70mm<br>7×7mm<br>Pitch: 0.80mm |

## RL78/L12 (32 to 64 pins)

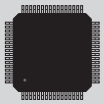
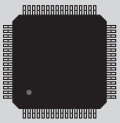
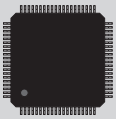
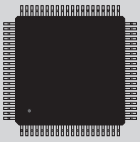
R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/L12 | | | | | | |
|---|---|---|---|---|---|---|---|
| Pin count / ROM (bytes) | 32-pin | 44-pin | 48-pin | 52-pin | 64-pin | | |
| 512K | | | | | | | |
| 384K | | | | | | | |
| 256K | | | | | | | |
| 192K | | | | | | | |
| 128K | | | | | | | |
| 96K | | | | | | | |
| 64K | | | | | | | |
| 48K | | | | | | | |
| 32K | R5F10RBCAFP*1 (1.5K/2K) | R5F10RFCAFP*1 (1.5K/2K) | R5F10RGCAFB*1 (1.5K/2K) | R5F10RJCAFA*1 (1.5K/2K) | R5F10RLCAFB*1 (1.5K/2K) | R5F10RLCAFA*1 (1.5K/2K) | R5F10RLCANB*1 (1.5K/2K) |
| 24K | | | | | | | |
| 16K | R5F10RBAAFP*1 (1K/2K) | R5F10RFAAFP*1 (1K/2K) | R5F10RGAAFB*1 (1K/2K) | R5F10RJAAFA*1 (1K/2K) | R5F10RLAAFB*1 (1K/2K) | R5F10RLAAFA*1 (1K/2K) | R5F10RLAANB*1 (1K/2K) |
| 8K | R5F10RB8AFP*1 (1K/2K) | R5F10RF8AFP*1 (1K/2K) | R5F10RG8AFB*1 (1K/2K) | R5F10RJ8AFA*1 (1K/2K) | | | |
| 4K | | | | | | | |
| 2K | | | | | | | |
| 1K | | | | | | | |
| Package | 32-pin LQFP<br>FP thickness:<br>1.70mm<br>7×7mm<br>Pitch: 0.80mm | 44-pin LQFP<br>FP thickness:<br>1.60mm<br>10×10mm<br>Pitch: 0.80mm | 48-pin LFQFP<br>FB thickness:<br>1.60mm<br>7×7mm<br>Pitch: 0.50mm | 52-pin LQFP<br>FA thickness:<br>1.70mm<br>10×10mm<br>Pitch: 0.65mm | 64-pin LFQFP<br>FB thickness:<br>1.60mm<br>10×10mm<br>Pitch: 0.50mm | 64-pin LQFP<br>FA thickness:<br>1.60mm<br>12×12mm<br>Pitch: 0.65mm | 64-pin HWQFN<br>NB thickness:<br>0.80mm<br>8×8mm<br>Pitch: 0.40mm |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/L13 (64 to 80 pins)

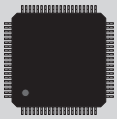
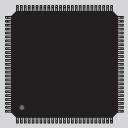
R5F104AGASP — Top: Product name
(16K/8K) — Bottom: (RAM/Data flash (bytes))

| Group | RL78/L13 | | | |
|---|---|---|---|---|
| Pin count / ROM (bytes) | 64-pin | | 80-pin | |
| 512K | | | | |
| 384K | | | | |
| 256K | | | | |
| 192K | | | | |
| 128K | R5F10WLGAFB*1 (8K/4K) | R5F10WLGAFA (8K/4K) | R5F10WMGAFB*1 (8K/4K) | R5F10WMGAFA (8K/4K) |
| 96K | R5F10WLFAFB*1 (6K/4K) | R5F10WLFAFA (6K/4K) | R5F10WMFAFB*1 (6K/4K) | R5F10WMFAFA (6K/4K) |
| 64K | R5F10WLEAFB*1 (4K/4K) | R5F10WLEAFA (4K/4K) | R5F10WMEAFB*1 (4K/4K) | R5F10WMEAFA (4K/4K) |
| 48K | R5F10WLDAFB*1 (2K/4K) | R5F10WLDAFA (2K/4K) | R5F10WMDAFB*1 (2K/4K) | R5F10WMDAFA (2K/4K) |
| 32K | R5F10WLCAFB*1 (1.5K/4K) | R5F10WLCAFA (1.5K/4K) | R5F10WMCAFB*1 (1.5K/4K) | R5F10WMCAFA (1.5K/4K) |
| 24K | | | | |
| 16K | R5F10WLAAFB*1 (1K/4K) | R5F10WLAAFA (1K/4K) | R5F10WMAAFB*1 (1K/4K) | R5F10WMAAFA (1K/4K) |
| 8K | | | | |
| 4K | | | | |
| 2K | | | | |
| 1K | | | | |
| Package | 64-pin LFQFP<br>FB thickness: 1.70mm<br>10×10mm<br>Pitch: 0.50mm<br>  | 64-pin LQFP<br>FA thickness: 1.60mm<br>12×12mm<br>Pitch: 0.65mm<br>  | 80-pin LFQFP<br>FB thickness: 1.70mm<br>12×12mm<br>Pitch: 0.50mm<br>  | 80-pin LQFP<br>FA thickness: 1.70mm<br>14×14mm<br>Pitch: 0.65mm<br>  |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/L1A (80 to 100 pins)

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/L1A | |
|---|---|---|
| Pin count / ROM (bytes) | 80-pin | 100-pin |
| 512K | | |
| 384K | | |
| 256K | | |
| 192K | | |
| 128K | | R5F11MPGAFB (8KB/5.5KB) |
| 96K | R5F11MMFAFB (8KB/5.5KB) | R5F11MPFAFB (8KB/5.5KB) |
| 64K | R5F11MMEAFB (8KB/5.5KB) | R5F11MPEAFB (8KB/5.5KB) |
| 48K | R5F11MMDAFB (8KB/5.5KB) | |
| 32K | | |
| 24K | | |
| 16K | | |
| 8K | | |
| 4K | | |
| 2K | | |
| 1K | | |
| Package | 80-pin LFQFP<br>FB thickness: 1.60mm<br>12×12mm<br>Pitch: 0.50mm<br>  | 100-pin LFQFP<br>FB thickness: 1.60mm<br>14×14mm<br>Pitch: 0.50mm<br>  |

## RL78/L1C (80 to 100 pins)

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/L1C (USB) | | | RL78/L1C (no USB) | | |
|---|---|---|---|---|---|---|
| ROM (bytes) \ Pin count | 80-pin | 85-pin | 100-pin | 80-pin | 85-pin | 100-pin |
| 512K | | | | | | |
| 384K | | | | | | |
| 256K | R5F110MJAFB*1 (16K/8K) | R5F110NJALA*1 (16K/8K) | R5F110PJAFB*1 (16K/8K) | R5F111MJAFB*1 (16K/8K) | R5F111NJALA*1 (16K/8K) | R5F111PJAFB*1 (16K/8K) |
| 192K | R5F110MHAFB*1 (16K/8K) | R5F110NHALA*1 (16K/8K) | R5F110PHAFB*1 (16K/8K) | R5F111MHAFB*1 (16K/8K) | R5F111NHALA*1 (16K/8K) | R5F111PHAFB*1 (16K/8K) |
| 128K | R5F110MGAFB*1 (12K/8K) | R5F110NGALA*1 (12K/8K) | R5F110PGAFB*1 (12K/8K) | R5F111MGAFB*1 (12K/8K) | R5F111NGALA*1 (12K/8K) | R5F111PGAFB*1 (12K/8K) |
| 96K | R5F110MFAFB*1 (10K/8K) | R5F110NFALA*1 (10K/8K) | R5F110PFAFB*1 (10K/8K) | R5F111MFAFB*1 (10K/8K) | R5F111NFALA*1 (10K/8K) | R5F111PFAFB*1 (10K/8K) |
| 64K | R5F110MEAFB*1 (8K/8K) | R5F110NEALA*1 (8K/8K) | R5F110PEAFB*1 (8K/8K) | R5F111MEAFB*1 (8K/8K) | R5F111NEALA*1 (8K/8K) | R5F111PEAFB*1 (8K/8K) |
| 48K | | | | | | |
| 32K | | | | | | |
| 24K | | | | | | |
| 16K | | | | | | |
| 8K | | | | | | |
| 4K | | | | | | |
| 2K | | | | | | |
| 1K | | | | | | |
| Package | 80-pin LFQFP<br>FB thickness: 1.70mm<br>12×12mm<br>Pitch: 0.50mm | 85-pin VFLGA<br>LA thickness: 1.00mm<br>7×7mm<br>Pitch: 0.65mm | 100-pin LFQFP<br>FB thickness: 1.70mm<br>14×14mm<br>Pitch: 0.50mm | 80-pin LFQFP<br>FB thickness: 1.70mm<br>12×12mm<br>Pitch: 0.50mm | 85-pin VFLGA<br>LA thickness: 1.00mm<br>7×7mm<br>Pitch: 0.65mm | 100-pin LFQFP<br>FB thickness: 1.70mm<br>14×14mm<br>Pitch: 0.50mm |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/H1D (48 to 80 pins)

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/H1D | | | | |
|---|---|---|---|---|---|
| Pin count / ROM (bytes) | 48-pin | 64-pin | | 80-pin | |
| 512K | | | | | |
| 384K | | | | | |
| 256K | | | | | |
| 192K | | | | | |
| 128K | R5F11NGGAFB (5.5KB/4KB) | R5F11PLGABG (5.5KB/4KB) | R5F11NLGAFB (5.5KB/4KB) | R5F11NMGAFB (5.5KB/4KB) | R5F11RMGDFB (8KB/4KB) |
| 96K | R5F11NGFAFB (5.5KB/4KB) | R5F11PLFABG (5.5KB/4KB) | R5F11NLFAFB (5.5KB/4KB) | R5F11NMFAFB (5.5KB/4KB) | |
| 64K | | | | R5F11NMEAFB (5.5KB/4KB) | |
| 48K | | | | | |
| 32K | | | | | |
| 24K | | | | | |
| 16K | | | | | |
| 8K | | | | | |
| 4K | | | | | |
| 2K | | | | | |
| 1K | | | | | |
| Package | 48-pin LFQFP<br>FB thickness: 1.60mm<br>7×7mm<br>Pitch: 0.50mm | 64-pin TFBGA<br>BG thickness: 1.10mm<br>4×4mm<br>Pitch: 0.40mm | 64-pin LFQFP<br>FB thickness: 1.60mm<br>10×10mm<br>Pitch: 0.50mm | 80-pin LFQFP<br>FB thickness: 1.60mm<br>12×12mm<br>Pitch: 0.50mm | |

## RL78/I1A (20 to 38 pins)

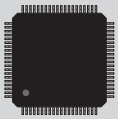
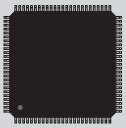
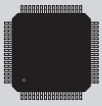
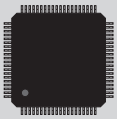
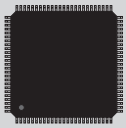
R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/I1A | | |
|---|---|---|---|
| ROM (bytes) \ Pin count | 20-pin | 30-pin | 38-pin |
| 512K | | | |
| 384K | | | |
| 256K | | | |
| 192K | | | |
| 128K | | | |
| 96K | | | |
| 64K | | R5F107AEGSP*1<br>R5F107AEMSP*2<br>(4K/4K) | R5F107DEGSP*1<br>R5F107DEMSP*2<br>(4K/4K) |
| 48K | | | |
| 32K | R5F1076CGSP*1<br>R5F1076CMSP*2<br>(2K/4K) | R5F107ACGSP*1<br>R5F107ACMSP*2<br>(2K/4K) | |
| 16K | | | |
| 12K | | | |
| 8K | | | |
| 4K | | | |
| 2K | | | |
| 1K | | | |
| Package | 20-pin LSSOP<br>SP thickness: 1.45mm<br>4.4×6.5mm<br>Pitch: 0.65mm<br> | 30-pin LSSOP<br>SP thickness: 1.40mm<br>7.62mm (300mil)<br>Pitch: 0.65mm<br> | 38-pin SSOP<br>SP thickness: 2.00mm<br>7.62mm (300mil)<br>Pitch: 0.65mm<br> |

*1: Operating temperature range: –40 to +105°C
*2: Operating temperature range: –40 to +125°C

## RL78/I1B (80 to 100 pins), RL78/I1C (64 to 100 pins)

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/I1B | | RL78/I1C | | |
|---|---|---|---|---|---|
| Pin count / ROM (bytes) | 80-pin | 100-pin | 64-pin | 80-pin | 100-pin |
| 512K | | | | R5F10NMLDFB (32K/2K) | R5F10NPLDFB (32K/2K) |
| 384K | | | | | |
| 256K | | | | R5F10NMJDFB (16K/2K) | R5F10NPJDFB (16K/2K) |
| 192K | | | | | |
| 128K | R5F10MMGDFB (8K/—) | R5F10MPGDFB (8K/—) | R5F10NLGDFB R5F11TLGDFB (8K/2K) | R5F10NMGDFB (8K/2K) | R5F10NPGDFB (8K/2K) |
| 96K | | | | | |
| 64K | R5F10MMEDFB (6K/—) | R5F10MPEDFB (6K/—) | R5F10NLEDFB R5F11TLEDFB (8K/2K) | R5F10NMEDFB (6K/2K) | |
| 48K | | | | | |
| 32K | | | | | |
| 24K | | | | | |
| 16K | | | | | |
| 8K | | | | | |
| 4K | | | | | |
| 2K | | | | | |
| 1K | | | | | |
| Package | 80-pin LFQFP FB thickness: 1.70mm 12×12mm Pitch: 0.50mm  | 100-pin LFQFP FB thickness: 1.70mm 14×14mm Pitch: 0.50mm  | 64-pin LFQFP FB thickness: 1.70mm 10×10mm Pitch: 0.50mm  | 80-pin LFQFP FB thickness: 1.70mm 12×12mm Pitch: 0.50mm  | 100-pin LFQFP FB thickness: 1.70mm 14×14mm Pitch: 0.50mm  |

## RL78/I1D (20 to 48 pins)

R5F104AGASP — Top: Product name
(16K/8K) — Bottom: (RAM/Data flash (bytes))

| Group | RL78/I1D | | | | | |
|---|---|---|---|---|---|---|
| ROM (bytes) \ Pin count | 20-pin | 24-pin | 30-pin | 32-pin | | 48-pin |
| 512K | | | | | | |
| 384K | | | | | | |
| 256K | | | | | | |
| 192K | | | | | | |
| 128K | | | | | | |
| 96K | | | | | | |
| 64K | | | | | | |
| 48K | | | | | | |
| 32K | | | R5F117ACGSP (3K/2K) | R5F117BCGNA (3K/2K) | R5F117BCGFP (3K/2K) | R5F117GCGFB (3K/2K) |
| 24K | | | | | | |
| 16K | R5F1176AGSP (2K/2K) | R5F1177AGNA (2K/2K) | R5F117AAGSP (2K/2K) | R5F117BAGNA (2K/2K) | R5F117BAGFP (2K/2K) | R5F117GAGFB (2K/2K) |
| 8K | R5F11768GSP (0.7K/2K) | R5F11778GNA (0.7K/2K) | R5F117A8GSP (0.7K/2K) | | | |
| 4K | | | | | | |
| 2K | | | | | | |
| 1K | | | | | | |
| Package | 20-pin LSSOP<br>SP thickness: 1.45mm<br>4.4×6.5mm<br>Pitch: 0.65mm | 24-pin HWQFN<br>NA thickness: 0.80mm<br>4×4mm<br>Pitch: 0.50mm | 30-pin LSSOP<br>SP thickness: 1.40mm<br>7.62mm (300mil)<br>Pitch: 0.65mm | 32-pin HVQFN<br>NA thickness: 0.90mm<br>5×5mm<br>Pitch: 0.50mm | 32-pin LQFP<br>FP thickness: 1.70mm<br>7×7mm<br>Pitch: 0.80mm | 48-pin LFQFP<br>FB thickness: 1.70mm<br>7×7mm<br>Pitch: 0.50mm |

## RL78/I1E (32 to 36 pins)

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/I1E | |
|---|---|---|
| ROM (bytes) \ Pin count | 32-pin | 36-pin |
| 512K | | |
| 384K | | |
| 256K | | |
| 192K | | |
| 128K | | |
| 96K | | |
| 64K | | |
| 48K | | |
| 32K | R5F11CBCGNA*1<br>(8K/4K) | R5F11CCCGBG*1<br>(8K/4K) |
| 24K | | |
| 16K | | |
| 8K | | |
| 4K | | |
| 2K | | |
| 1K | | |
| Package | 32-pin HVQFN<br>NA thickness: 0.90mm<br>5×5mm<br>Pitch: 0.50mm | 36-pin TFBGA<br>BG thickness: 1.10mm<br>4×4mm<br>Pitch: 0.5mm |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxMxx, ambient operating temperature range: –40 to +125°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/F23 (32 to 80pins)

R7F123FBG3ANP-C —— Top: Product name
(12K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/F23 | | | |
|---|---|---|---|---|
| ROM (bytes) \ Pin count | 32-pin | 48-pin | 64-pin | 80-pin |
| 768K | | | | |
| 512K | | | | |
| 384K | | | | |
| 256K | | | | |
| 192K | | | | |
| 128K | R7F123FBG3ANP-C (12K/8K)*1 | R7F123FGG3AFB-C (12K/8K)*1 | R7F123FLG3AFB-C (12K/8K)*1 | R7F123FMG3AFB-C (12K/8K)*1 |
| 96K | | | | |
| 64K | | | | |
| 48K | | | | |
| 32K | | | | |
| 16K | | | | |
| 12K | | | | |
| 8K | | | | |
| 4K | | | | |
| 2K | | | | |
| 1K | | | | |
| Package | 32-pin HWQFN<br>NP thickness: 0.80mm<br>5×5mm<br>Pitch: 0.50mm | 48-pin LFQFP<br>FB thickness: 1.6mm/1.7mm<br>7×7mm<br>Pitch: 0.50mm | 64-pin LFQFP<br>FB thickness: 1.6mm/1.7mm<br>10×10mm<br>Pitch: 0.50mm | 80-pin LFQFP<br>FB thickness: 1.6mm/1.7mm<br>12×12mm<br>Pitch: 0.50mm |

Ambient operating temperature range of the above part numbers is –40 to +105°C.

*1: Products with –40 to +125°C ambient operating temperature range (part number: R7F1xxxxx4xxx-C) or –40 to +150°C ambient operating temperature range (part number: R7F1xxxxx5xxx-C) are also available.

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 111.

## RL78/F24 (32 to 100pins)

R7F124FBJ3ANP-C —— Top: Product name
(24K/16K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/F24 | | | | |
|---|---|---|---|---|---|
| ROM (bytes) \ Pin count | 32-pin | 48-pin | 64-pin | 80-pin | 100-pin |
| 768K | | | | | |
| 512K | | | | | |
| 384K | | | | | |
| 256K | R7F124FBJ3ANP-C (24K/16K)*1 | R7F124FGJ3AFB-C (24K/16K)*1 | R7F124FLJ3AFB-C (24K/16K)*1 | R7F124FMJ3AFB-C (24K/16K)*1 | R7F124FPJ3AFB-C (24K/16K)*1 |
| 192K | | | | | |
| 128K | | | | | |
| 96K | | | | | |
| 64K | | | | | |
| 48K | | | | | |
| 32K | | | | | |
| 16K | | | | | |
| 12K | | | | | |
| 8K | | | | | |
| 4K | | | | | |
| 2K | | | | | |
| 1K | | | | | |
| Package | 32-pin HWQFN<br>NP thickness: 0.80mm<br>5×5mm<br>Pitch: 0.50mm | 48-pin LFQFP<br>FB thickness:1.6mm/1.7mm<br>7×7mm<br>Pitch: 0.50mm | 64-pin LFQFP<br>FB thickness: 1.6mm/1.7mm<br>10×10mm<br>Pitch: 0.50mm | 80-pin LFQFP<br>FB thickness: 1.6mm/1.7mm<br>12×12mm<br>Pitch: 0.50mm | 100-pin LFQFP<br>FB thickness: 1.6mm/1.7mm<br>14×14mm<br>Pitch: 0.50mm |

Ambient operating temperature range of the above part numbers is –40 to +105°C.
*1: Products with –40 to +125°C ambient operating temperature range (part number: R7F1xxxxx4xxx-C) or –40 to +150°C ambient operating temperature range (part number: R7F1xxxxx5xxx-C) are also available.
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 111.

## RL78/F13 (20 to 80 pins)

R5F104AGASP — Top: Product name
(16K/8K) — Bottom: (RAM/Data flash (bytes))

| Group | RL78/F13 (CAN & LIN) | | | | | |
|---|---|---|---|---|---|---|
| ROM (bytes) \ Pin count | 30-pin | 32-pin | 48-pin | | 64-pin | 80-pin |
| 512K | | | | | | |
| 384K | | | | | | |
| 256K | | | | | | |
| 192K | | | | | | |
| 128K | R5F10BAGLSP*1 (8K/4K) | R5F10BBGLNA*1 (8K/4K) | R5F10BGGLFB*1 (8K/4K) | R5F10BGGLNA*1 (8K/4K) | R5F10BLGLFB*1 (8K/4K) | R5F10BMGLFB*1 (8K/4K) |
| 96K | R5F10BAFLSP*1 (6K/4K) | R5F10BBFLNA*1 (6K/4K) | R5F10BGFLFB*1 (6K/4K) | R5F10BGFLNA*1 (6K/4K) | R5F10BLFLFB*1 (6K/4K) | R5F10BMFLFB*1 (6K/4K) |
| 64K | R5F10BAELSP*1 (4K/4K) | R5F10BBELNA*1 (4K/4K) | R5F10BGELFB*1 (4K/4K) | R5F10BGELNA*1 (4K/4K) | R5F10BLELFB*1 (4K/4K) | R5F10BMELFB*1 (4K/4K) |
| 48K | R5F10BADLSP*1 (3K/4K) | R5F10BBDLNA*1 (3K/4K) | R5F10BGDLFB*1 (3K/4K) | R5F10BGDLNA*1 (3K/4K) | R5F10BLDLFB*1 (3K/4K) | |
| 32K | R5F10BACLSP*1 (2K/4K) | R5F10BBCLNA*1 (2K/4K) | R5F10BGCLFB*1 (2K/4K) | R5F10BGCLNA*1 (2K/4K) | R5F10BLCLFB*1 (2K/4K) | |
| 24K | | | | | | |
| 16K | | | | | | |
| 8K | | | | | | |
| 4K | | | | | | |
| 2K | | | | | | |
| 1K | | | | | | |
| Package | 30-pin LSSOP<br>SP thickness: 1.40mm<br>7.62mm (300mil)<br>Pitch: 0.65mm | 32-pin HVQFN<br>NA thickness: 0.90mm<br>5×5mm<br>Pitch: 0.50mm | 48-pin LFQFP<br>FB thickness: 1.60mm<br>7×7mm<br>Pitch: 0.50mm | 48-pin HVQFN<br>NA thickness: 0.90mm<br>7×7mm<br>Pitch: 0.50mm | 64-pin LFQFP<br>FB thickness: 1.60mm<br>10×10mm<br>Pitch: 0.50mm | 80-pin LFQFP<br>FB thickness: 1.60mm<br>12×12mm<br>Pitch: 0.50mm |

Ambient operating temperature range of the above part numbers is –40 to +105°C.
*1: Products with –40 to +125°C ambient operating temperature range (part number: R5F1xxxxKxx) or –40 to +150°C ambient operating temperature range (part number: R5F1xxxxYxx) are also available.
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/F13 (LIN) | | | | | | |
|---|---|---|---|---|---|---|---|
| Pin count / ROM (bytes) | 20-pin | 30-pin | 32-pin | 48-pin | | 64-pin | 80-pin |
| 512K | | | | | | | |
| 384K | | | | | | | |
| 256K | | | | | | | |
| 192K | | | | | | | |
| 128K | | | | R5F10AGGLFB*1 (8K/4K) | R5F10AGGLNA*1 (8K/4K) | R5F10ALGLFB*1 (8K/4K) | R5F10AMGLFB*1 (8K/4K) |
| 96K | | | | R5F10AGFLFB*1 (6K/4K) | R5F10AGFLNA*1 (6K/4K) | R5F10ALFLFB*1 (6K/4K) | R5F10AMFLFB*1 (6K/4K) |
| 64K | R5F10A6ELSP*1 (4K/4K) | R5F10AAELSP*1 (4K/4K) | R5F10ABELNA*1 (4K/4K) | R5F10AGELFB*1 (4K/4K) | R5F10AGELNA*1 (4K/4K) | R5F10ALELFB*1 (4K/4K) | R5F10AMELFB*1 (4K/4K) |
| 48K | R5F10A6DLSP*1 (3K/4K) | R5F10AADLSP*1 (3K/4K) | R5F10ABDLNA*1 (3K/4K) | R5F10AGDLFB*1 (3K/4K) | R5F10AGDLNA*1 (3K/4K) | R5F10ALDLFB*1 (3K/4K) | |
| 32K | R5F10A6CLSP*1 (2K/4K) | R5F10AACLSP*1 (2K/4K) | R5F10ABCLNA*1 (2K/4K) | R5F10AGCLFB*1 (2K/4K) | R5F10AGCLNA*1 (2K/4K) | R5F10ALCLFB*1 (2K/4K) | |
| 24K | | | | | | | |
| 16K | R5F10A6ALSP*1 (1K/4K) | R5F10AAALSP*1 (1K/4K) | R5F10ABALNA*1 (1K/4K) | R5F10AGALFB*1 (1K/4K) | R5F10AGALNA*1 (1K/4K) | | |
| 8K | | | | | | | |
| 4K | | | | | | | |
| 2K | | | | | | | |
| 1K | | | | | | | |
| Package | 20-pin LSSOP<br>SP thickness: 1.40mm<br>7.62mm (300mil)<br>Pitch: 0.65mm | 30-pin LSSOP<br>SP thickness: 1.40mm<br>7.62mm (300mil)<br>Pitch: 0.65mm | 32-pin HVQFN<br>NA thickness: 0.90mm<br>5×5mm<br>Pitch: 0.50mm | 48-pin LFQFP<br>FB thickness: 1.60mm<br>7×7mm<br>Pitch: 0.50mm | 48-pin HVQFN<br>NA thickness: 0.90mm<br>7×7mm<br>Pitch: 0.50mm | 64-pin LFQFP<br>FB thickness: 1.60mm<br>10×10mm<br>Pitch: 0.50mm | 80-pin LFQFP<br>FB thickness: 1.60mm<br>12×12mm<br>Pitch: 0.50mm |

Ambient operating temperature range of the above part numbers is –40 to +105°C.
*1: Products with –40 to +125°C ambient operating temperature range (part number: R5F1xxxxKxx) or –40 to +150°C ambient operating temperature range (part number: R5F1xxxxYxx) are also available.
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/F14 (30 to 100 pins)

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/F14 | | | | | | |
|---|---|---|---|---|---|---|---|
| ROM (bytes) \ Pin count | 30-pin | 32-pin | 48-pin | | 64-pin | 80-pin | 100-pin |
| 512K | | | | | | | |
| 384K | | | | | | | |
| 256K | | | R5F10PGJLFB*1 (20K/8K) | R5F10PGJLNA*1 (20K/8K) | R5F10PLJLFB*1 (20K/8K) | R5F10PMJLFB*1 (20K/8K) | R5F10PPJLFB*1 (20K/8K) |
| 192K | | | R5F10PGHLFB*1 (16K/8K) | R5F10PGHLNA*1 (16K/8K) | R5F10PLHLFB*1 (16K/8K) | R5F10PMHLFB*1 (16K/8K) | R5F10PPHLFB*1 (16K/8K) |
| 128K | | | R5F10PGGLFB*1 (10K/8K) | R5F10PGGLNA*1 (10K/8K) | R5F10PLGLFB*1 (10K/8K) | R5F10PMGLFB*1 (10K/8K) | R5F10PPGLFB*1 (10K/8K) |
| 96K | | | R5F10PGFLFB*1 (8K/4K) | R5F10PGFLNA*1 (8K/4K) | R5F10PLFLFB*1 (8K/4K) | R5F10PMFLFB*1 (8K/4K) | R5F10PPFLFB*1 (8K/4K) |
| 64K | R5F10PAELSP*1 (6K/4K) | R5F10PBELNA*1 (6K/4K) | R5F10PGELFB*1 (6K/4K) | R5F10PGELNA*1 (6K/4K) | R5F10PLELFB*1 (6K/4K) | R5F10PMELFB*1 (6K/4K) | R5F10PPELFB*1 (6K/4K) |
| 48K | R5F10PADLSP*1 (4K/4K) | R5F10PBDLNA*1 (4K/4K) | R5F10PGDLFB*1 (4K/4K) | R5F10PGDLNA*1 (4K/4K) | | | |
| 32K | | | | | | | |
| 24K | | | | | | | |
| 16K | | | | | | | |
| 8K | | | | | | | |
| 4K | | | | | | | |
| 2K | | | | | | | |
| 1K | | | | | | | |
| Package | 30-pin LSSOP<br>SP thickness: 1.40mm<br>7.62mm (300mil)<br>Pitch: 0.65mm | 32-pin HVQFN<br>NA thickness: 0.90mm<br>5×5mm<br>Pitch: 0.50mm | 48-pin LFQFP<br>FB thickness: 1.60mm<br>7×7mm<br>Pitch: 0.50mm | 48-pin HVQFN<br>NA thickness: 0.90mm<br>7×7mm<br>Pitch: 0.50mm | 64-pin LFQFP<br>FB thickness: 1.60mm<br>10×10mm<br>Pitch: 0.50mm | 80-pin LFQFP<br>FB thickness: 1.60mm<br>12×12mm<br>Pitch: 0.50mm | 100-pin LFQFP<br>FB thickness: 1.60mm<br>14×14mm<br>Pitch: 0.50mm |

Ambient operating temperature range of the above part numbers is –40 to +105°C.
*1: Products with –40 to +125°C ambient operating temperature range (part number: R5F1xxxxKxx) or –40 to +150°C ambient operating temperature range (part number: R5F1xxxxYxx) are also available.
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/F15 (48 to 144 pins)

R5F104AGASP —— Top: Product name
(16K/8K) —— Bottom: (RAM/Data flash (bytes))

| Group | RL78/F15 | | | | | |
|---|---|---|---|---|---|---|
| Pin count / ROM (bytes) | 48-pin | | 64-pin | 80-pin | 100-pin | 144-pin |
| 512K | R5F113GLLFB*1 (32K/16K) | R5F113GLLNA*1 (32K/16K) | R5F113LLLFB*1 (32K/16K) | R5F113MLLFB*1 (32K/16K) | R5F113PLLFB*1 (32K/16K) | R5F113TLLFB*1 (32K/16K) |
| 384K | R5F113GKLFB*1 (26K/16K) | R5F113GKLNA*1 (26K/16K) | R5F113LKLFB*1 (26K/16K) | R5F113MKLFB*1 (26K/16K) | R5F113PKLFB*1 (26K/16K) | R5F113TKLFB*1 (26K/16K) |
| 256K | | | | | R5F113PJLFB*1 (20K/8K) | R5F113TJLFB*1 (20K/8K) |
| 192K | | | | | R5F113PHLFB*1 (16K/8K) | R5F113THLFB*1 (16K/8K) |
| 128K | | | | | R5F113PGLFB*1 (10K/8K) | R5F113TGLFB*1 (10K/8K) |
| 96K | | | | | | |
| 64K | | | | | | |
| 48K | | | | | | |
| 32K | | | | | | |
| 24K | | | | | | |
| 16K | | | | | | |
| 8K | | | | | | |
| 4K | | | | | | |
| 2K | | | | | | |
| 1K | | | | | | |
| Package | 48-pin LFQFP<br>FB thickness: 1.60mm<br>7×7mm<br>Pitch: 0.50mm | 48-pin HVQFN<br>NA thickness: 0.90mm<br>7×7mm<br>Pitch: 0.50mm | 64-pin LFQFP<br>FB thickness: 1.60mm<br>10×10mm<br>Pitch: 0.50mm | 80-pin LFQFP<br>FB thickness: 1.60mm<br>12×12mm<br>Pitch: 0.50mm | 100-pin LFQFP<br>FB thickness: 1.60mm<br>14×14mm<br>Pitch: 0.50mm | 144-pin LFQFP<br>FB thickness: 1.60mm<br>20×20mm<br>Pitch: 0.50mm |

Ambient operating temperature range of the above part numbers is –40 to +105°C.
*1: Products with –40 to +125°C ambient operating temperature range (part number: R5F1xxxxKxx) is also available.
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

# RL78 FAMILY SPECIFICATIONS

## RL78/G10 (10 to 16 pins)

| Group | | | RL78/G10 | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pin count | | | 10-pin | | | 16-pin | | |
| Product name | | | R5F10Y14ASP | R5F10Y16ASP | R5F10Y17ASP | R5F10Y44ASP | R5F10Y46ASP | R5F10Y47ASP |
| CPU | | | RL78 CPU core | | | | | |
| Memory | Flash ROM [bytes] | | 1K | 2K | 4K | 1K | 2K | 4K |
| | Data flash [bytes] | | — | | | | | |
| | RAM [bytes] | | 128 | 256 | 512 | 128 | 256 | 512 |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 20MHz | | | | | |
| | | External resonator | — | | | 20MHz | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | — | | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 5MHz ($V_{DD}$ = 2.0 to 5.5V)*1 | | |
| | High-speed on-chip oscillator [Hz] | | 1.25 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1.25 to 5MHz ($V_{DD}$ = 2.0 to 5.5V)*1 | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 2.0 to 5.5V)*1 | | | | | |
| | Subclock (32.768 kHz) | | — | | | | | |
| I/O | I/O ports | | 8 | | | 14 | | |
| | | N-channel open drain (6V tolerance) | — | | | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 2 | | | 4 | | |
| Timers | 16-bit timer TAU [channels] | | 2, PWM output × 1 | | | 4, PWM output × 3 | | |
| | Real-time clock (RTC) [channels] | | — | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | |
| | Interval timer [channels] | | — | | | 12-bit × 1 | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 1 | | | — | | |
| | CSI×2, UART×1, simplified $I^2C$×1 | | — | | | 1 | | |
| | $I^2C$×1 | | — | | | 1 | | |
| DMA [channels] | | | — | | | | | |
| External interrupt pins [count] | | | 8 | | | 10 | | |
| OCD | On-chip debugging | | Yes | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 4 | | | 7 | | |
| | Comparator [channels] | | — | | | 1 | | |
| | Multiplier/divider/ multiply-accumulator | | Multiplier (8-bit × 8-bit) | | | | | |
| | Other functions | | Selectable power-on reset (SPOR), clock/buzzer output × 1 | | | | | |
| Safety functions | | | Internal reset at illegal instruction execution*2 | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.0 to 5.5V*1 | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications, D: Industrial applications)*3 | | | | | |
| | Package (size [mm]) | | 10-LSSOP (4.4×3.6mm) | | | 16-SSOP (4.4×5.0mm) | | |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Selectable power-on reset (SPOR) includes a detection voltage (VSPOR), which should be within the range of 2.25 to 5.5V.
*2: An internal reset is generated when the FFH instruction code is executed. No reset occurs when an illegal instruction is executed during emulation using OCD.
*3: Industrial grade products are also available. (part number: R5F1xxxxDxx, ambient operating temperature range: –40 to +85°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G11 (10 to 25 pins)

| Group | | | RL78/G11 | | | | |
|---|---|---|---|---|---|---|---|
| Pin count | | | 10-pin | 16-pin | 20-pin | 24-pin | 25-pin |
| Product name | | | R5F1051AASP *1 | ①R5F1054AASP *1<br>②R5F1054AANA *1 | ①R5F1056AASP *1<br>②R5F1056AASM *1 | R5F1057AANA *1 | R5F1058AALA *1 |
| CPU | | | RL78 CPU core | | | | |
| Memory | Flash ROM [bytes] | | 16KB | | | | |
| | Data flash [bytes] | | 2KB | | | | |
| | RAM [bytes] | | 1.5KB | | | | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 24MHz | | | | |
| | | External resonator | 20MHz | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz: $V_{DD}$ = 2.7 to 5.5V, 1 to 16MHz: $V_{DD}$ = 2.4 to 5.5V, 1 to 8MHz: $V_{DD}$ = 1.8 to 5.5V, 1 to 4MHz: $V_{DD}$ = 1.6 to 5.5V | | | | |
| | High-speed on-chip oscillator [Hz]: 24MHz (max.) | | 1 to 24MHz ($V_{DD}$ = 2.7 to 5.5V): HS mode, 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V): HS mode,<br>1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V): LS mode, 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V): LV mode, 1MHz ($V_{DD}$ = 1.8 to 5.5V): LP mode | | | | |
| | Medium-speed on-chip oscillator [Hz]: 4 MHz (max.) | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz (TYP.): $V_{DD}$ = 1.6 to 5.5V | | | | |
| | Subclock (32.768 kHz) | | — | | | | |
| I/O | I/O ports | | 7 | 13 | 17 | 21 | |
| | | N-channel open drain (6V tolerance) | — | | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | — | 3 | 8 | 13 | |
| Timers | 16-bit timer TAU [channels] | | 2, PWM output × 1 | 4, PWM output × 3 | 4, PWM output × 4 | | |
| | Real-time clock (RTC) [channels] | | — | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | |
| | Timer KB [channels] | | 1, PWM output × 2 | | | | |
| | Interval timer [channels] | | 8-bit × 2 / 16-bit × 1, 12-bit × 1 | | | | |
| Serial interfaces | CSI×2, UART×1, simplified $I^2C$×2 | | — | — | 1 | 2 | |
| | CSI×2, UART×1, simplified $I^2C$×1 | | — | 1 | — | — | |
| | CSI×1, UART×1, simplified $I^2C$×1 | | — | — | 1 | — | |
| | CSI×1, UART×1 | | 1 | — | — | — | |
| | UART×1 | | — | 1 | — | — | |
| | $I^2C$×1 | | — | 1 | 2 | | |
| DMA/DTC | | | DTC × 13 sources | DTC × 22 sources | DTC × 23 sources | DTC × 24 sources | |
| ELC [channels] | | | 11 inputs | 16 inputs | 17 inputs | 18 inputs | |
| External interrupt pins [count] | | | 3 | 8 | 10 | 13 | |
| OCD | On-chip debugging | | Yes | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 3 | 8 | 10 | 11 | |
| | 8-bit D/A converter [channels] | | 1 (CMP0 reference voltage) | 2 (External output × 1, CMP0 reference voltage × 1) | | | |
| | Comparator [channels] | | 1 | 2 | | | |
| | PGA [channels] | | 1 | | | | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set), Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned),<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned), Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), internal reference voltage ($V_{BGR}$),<br>data operation circuit (DOC), clock/buzzer output × 2, Interrupt flag output (INTFO) | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function,<br>RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function,<br>I/O power output signal level detection function | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications) | | | | |
| | Package (size [mm]) | | 10-LSSOP (4.4×3.6mm) | 16-SSOP (4.4×5.0mm)<br>16-HWQFN (3×3mm) | 20-LSSOP (4.4×6.5mm)<br>20-TSSOP (4.4×6.5mm) | 24-HWQFN (4×4mm) | 25-WFLGA (3×3mm) |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)

*1: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G12 (20 to 30 pins)

| Group | | | RL78/G12 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 20-pin | | | | | | | | | |
| Product name | | | ①R5F10266ASP*1 ②R5F10266ASM*1 | ①R5F10267ASP*1 ②R5F10267ASM*1 | ①R5F10268ASP*1 ②R5F10268ASM*1 | ①R5F10269ASP*1 ②R5F10269ASM*1 | ①R5F1026AASP*1 ②R5F1026AASM*1 | ①R5F10366ASP ②R5F10366ASM | ①R5F10367ASP ②R5F10367ASM | ①R5F10368ASP ②R5F10368ASM | ①R5F10369ASP ②R5F10369ASM | ①R5F1036AASP ②R5F1036AASM |
| CPU | | | RL78 CPU core | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 2K | 4K | 8K | 12K | 16K | 2K | 4K | 8K | 12K | 16K |
| | Data flash [bytes] | | 2K | | | | | — | | | | |
| | RAM [bytes] | | 256 | 512 | 768 | 1K | 1.5K | 256 | 512 | 768 | 1K | 1.5K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 24MHz | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V) | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 24MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V) | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.8 to 5.5V) | | | | | | | | | |
| | Subclock (32.768 kHz) | | — | | | | | | | | | |
| I/O | I/O ports | | 18 | | | | | | | | | |
| | | N-channel open drain (6V tolerance) | 2 | | | | | | | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 4 | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 4, PWM output × 3 | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | — | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1 | | — | | | | | 1 | | | | |
| | CSI×2, UART×1, simplified I²C×2 | | 1 | | | | | — | | | | |
| | CSI×1, UART×1, simplified I²C×1 | | — | | | | | | | | | |
| | I²C×1 | | 1 | | | | | | | | | |
| DMA [channels] | | | 2 | | | | | — | | | | |
| External interrupt pins [count] | | | 10 | | | | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 11 | | | | | | | | | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 1 | | | | | | | | | |
| Safety functions | | | RAM parity error detection function,<br>illegal memory access detection function, frequency detection function, A/D converter test function | | | | | | | | | |
| | | | CRC calculation function (general-purpose),<br>RAM guard function,<br>SFR guard function | | | | | — | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.8 to 5.5V | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications)<br>$T_A$ = –40 to +105°C (G: Industrial applications)*1 | | | | | | | | | |
| | Package (size [mm]) | | 20-LSSOP (4.4×6.5mm), 20-TSSOP (4.4×6.5mm) | | | | | | | | | |

* A dedicated library (approx. 8.1 KB) is required to use the data flash.
The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.
*2: Figures in parentheses ( ) are when the PIOR function is used.

| RL78/G12 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24-pin | | | | | | | | 30-pin | | | | | | | |
| R5F10277ANA*1 | R5F10278ANA*1 | R5F10279ANA*1 | R5F1027AANA*1 | R5F10377ANA | R5F10378ANA | R5F10379ANA | R5F1037AANA | R5F102A7ASP*1 | R5F102A8ASP*1 | R5F102A9ASP*1 | R5F102AAASP*1 | R5F103A7ASP | R5F103A8ASP | R5F103A9ASP | R5F103AAASP |
| RL78 CPU core | | | | | | | | | | | | | | | |
| 4K | 8K | 12K | 16K | 4K | 8K | 12K | 16K | 4K | 8K | 12K | 16K | 4K | 8K | 12K | 16K |
| 2K | | | | — | | | | 2K | | | | — | | | |
| 512 | 768 | 1K | 1.5K | 512 | 768 | 1K | 1.5K | 512 | 768 | 1K | 2K | 512 | 768 | 1K | 2K |
| 24MHz | | | | | | | | | | | | | | | |
| 20MHz | | | | | | | | | | | | | | | |
| 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V) | | | | | | | | | | | | | | | |
| 1 to 24MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V) | | | | | | | | | | | | | | | |
| 15kHz ($V_{DD}$ = 1.8 to 5.5V) | | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | | |
| 22 | | | | | | | | 26 | | | | | | | |
| 2 | | | | | | | | | | | | | | | |
| 5 | | | | | | | | 9 | | | | | | | |
| 4, PWM output × 3 | | | | | | | | 8, PWM output × 3 (7)*2 | | | | | | | |
| — | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | |
| 12-bit × 1 | | | | | | | | | | | | | | | |
| — | | | | 1 | | | | — | | | | 1 | | | |
| 1 | | | | — | | | | | | | | | | | |
| — | | | | | | | | 3 | | | | — | | | |
| 1 | | | | | | | | | | | | | | | |
| 2 | | | | — | | | | 2 | | | | — | | | |
| 14 | | | | | | | | 6 | | | | | | | |
| Yes | | | | | | | | | | | | | | | |
| 11 | | | | | | | | 8 | | | | | | | |
| Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 1 | | | | | | | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | |
| RAM parity error detection function,<br>illegal memory access detection function, frequency detection function, A/D converter test function | | | | | | | | | | | | | | | |
| CRC calculation function (general-purpose),<br>RAM guard function,<br>SFR guard function | | | | — | | | | CRC calculation function (general-purpose),<br>RAM guard function,<br>SFR guard function | | | | — | | | |
| $V_{DD}$ = 1.8 to 5.5V | | | | | | | | | | | | | | | |
| $T_A$ = –40 to +85°C (A: Consumer applications)<br>$T_A$ = –40 to +105°C (G: Industrial applications)*1 | | | | | | | | | | | | | | | |
| 24-HWQFN (4×4mm) | | | | | | | | 30-LSSOP (7.62mm (300mil)) | | | | | | | |

## RL78/G13 (20 to 32 pins)

| Group | | | RL78/G13 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 20-pin | | | | | | | | 24-pin | | | | | | | |
| Product name | | | ①R5F1006AASP*2 ②R5F1006AASM*2 | ①R5F1006CASP*2 ②R5F1006CASM*2 | ①R5F1006DASP*2 ②R5F1006DASM*2 | ①R5F1006EASP*2 ②R5F1006EASM*2 | ①R5F1016AASP ②R5F1016AASM | ①R5F1016CASP ②R5F1016CASM | ①R5F1016DASP ②R5F1016DASM | ①R5F1016EASP ②R5F1016EASM | R5F1007AANA*2 | R5F1007CANA*2 | R5F1007DANA*2 | R5F1007EANA*2 | R5F1017AANA | R5F1017CANA | R5F1017DANA | R5F1017EANA |
| CPU | | | RL78 CPU core | | | | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 16K | 32K | 48K | 64K | 16K | 32K | 48K | 64K | 16K | 32K | 48K | 64K | 16K | 32K | 48K | 64K |
| | Data flash [bytes] | | 4K | | | | — | | | | 4K | | | | — | | | |
| | RAM [bytes] | | 2K | 2K | 3K | 4K | 2K | 2K | 3K | 4K | 2K | 2K | 3K | 4K | 2K | 2K | 3K | 4K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 32MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | — | | | | | | | | | | | | | | | |
| I/O | I/O ports | | 16 | | | | | | | | 20 | | | | | | | |
| | | N-channel open drain (6V tolerance) | — | | | | | | | | 2 | | | | | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 5 | | | | | | | | 6 | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 8, PWM output × 2 | | | | | | | | 8, PWM output × 3 | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1*1 | | | | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | | | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 2 | | | | | | | | | | | | | | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | — | | | | | | | | | | | | | | | |
| | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | — | | | | | | | | | | | | | | | |
| | CSI×2, UART (LIN bus support)×1, simplified $I^2C$×2 | | — | | | | | | | | | | | | | | | |
| | $I^2C$×1 | | — | | | | | | | | 1 | | | | | | | |
| DMA [channels] | | | 2 | | | | | | | | | | | | | | | |
| External interrupt pins [count] | | | 3 | | | | | | | | 5 | | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 6 | | | | | | | | | | | | | | | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD) | | | | | | | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 1 | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function | | | | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications)<br>$T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | | | | | | | | | | |
| | Package (size [mm]) | | 20-LSSOP (7.62mm (300mil))<br>20-TSSOP (4.4×6.5mm) | | | | | | | | 24-HWQFN (4×4mm) | | | | | | | |

* A dedicated library is required to overwrite the data flash. Refer to [Development Environments] – [Flash Programming Tools] – [Self-Programming Library] on the Renesas website. https://www.renesas.com/flash_libraries
The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Products with pin counts from 20 to 32 pins are not equipped with a subsystem clock, so only the fixed-cycle interrupt function using the low-speed on-chip oscillator clock (15kHz) is available for use.
*2: Industrial grade products are also available. (part number: R5F1xxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.
*3: Figures in parentheses ( ) are when the PIOR function is used.

| RL78/G13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25-pin | | | | | | | | 30-pin | | | | | | | | | | | | 32-pin | | | | | | | | | | | |
| R5F1008AALA*2 | R5F1008CALA*2 | R5F1008DALA*2 | R5F1008EALA*2 | R5F1018AALA | R5F1018CALA | R5F1018DALA | R5F1018EALA | R5F100AAASP*2 | R5F100ACASP*2 | R5F100ADASP*2 | R5F100AEASP*2 | R5F100AFASP*2 | R5F100AGASP*2 | R5F101AAASP | R5F101ACASP | R5F101ADASP | R5F101AEASP | R5F101AFASP | R5F101AGASP | R5F100BAANA*2 | R5F100BCANA*2 | R5F100BDANA*2 | R5F100BEANA*2 | R5F100BFANA*2 | R5F100BGANA*2 | R5F101BAANA | R5F101BCANA | R5F101BDANA | R5F101BEANA | R5F101BFANA | R5F101BGANA |
| RL78 CPU core | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16K | 32K | 48K | 64K | 16K | 32K | 48K | 64K | 16K | 32K | 48K | 64K | 96K | 128K | 16K | 32K | 48K | 64K | 96K | 128K | 16K | 32K | 48K | 64K | 96K | 128K | 16K | 32K | 48K | 64K | 96K | 128K |
| 4K | | | | — | | | | 4K | | | | 8K | | — | | | | | | 4K | | | | 8K | | — | | | | | |
| 2K | 2K | 3K | 4K | 2K | 2K | 3K | 4K | 2K | 2K | 3K | 4K | 8K | 12K | 2K | 2K | 3K | 4K | 8K | 12K | 2K | 2K | 3K | 4K | 8K | 12K | 2K | 2K | 3K | 4K | 8K | 12K |
| 32MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 to 32MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | | | | | | | | 26 | | | | | | | | | | | | 28 | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | 3 | | | | | | | | | | | |
| 6 | | | | | | | | 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 8, PWM output × 3 | | | | | | | | 8, PWM output × 3 (7)*3 | | | | | | | | | | | | | | | | | | | | | | | |
| 1*1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-bit × 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | 6 | | | | | | | | | | | | | | | | | | | | | | | |
| Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | 8 | | | | | | | | | | | | | | | | | | | | | | | |
| Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 1 | | | | | | | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | | | | | | | | | | | |
| Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function,<br>RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $T_A$ = –40 to +85°C (A: Consumer applications)<br>$T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25-WFLGA (3×3mm) | | | | | | | | 30-LSSOP (7.62mm (300mil)) | | | | | | | | | | | | 32-HWQFN (5×5mm) | | | | | | | | | | | |

## RL78/G13 (36 to 44 pins)

| Group | | | RL78/G13 | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 36-pin | | | | | | | | | | | | 40-pin | | | | | | |
| Product name | | | R5F100CAALA*3 | R5F100CCALA*3 | R5F100CDALA*3 | R5F100CEALA*3 | R5F100CFALA*3 | R5F100CGALA*3 | R5F101CAALA | R5F101CCALA | R5F101CDALA | R5F101CEALA | R5F101CFALA | R5F101CGALA | R5F100EAANA*3 | R5F100ECANA*3 | R5F100EDANA*3 | R5F100EEANA*3 | R5F100EFANA*3 | R5F100EGANA*3 | R5F100EHANA*3 |
| CPU | | | RL78 CPU core | | | | | | | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 16K | 32K | 48K | 64K | 96k | 128k | 16K | 32K | 48K | 64K | 96k | 128k | 16K | 32K | 48K | 64K | 96k | 128k | 192K |
| | Data flash [bytes] | | 4K | | | | 8K | | — | | | | | | 4K | | | | 8K | | |
| | RAM [bytes] | | 2K | 2K | 3K | 4K | 8K | 12K | 2K | 2K | 3K | 4K | 8K | 12K | 2K | 2K | 3K | 4K | 8K | 12K | 16K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | | | | | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 32MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | — | | | | | | | | | | | | 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | |
| I/O | I/O ports | | 32 | | | | | | | | | | | | 36 | | | | | | |
| | | N-channel open drain (6V tolerance) | 3 | | | | | | | | | | | | | | | | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 10 | | | | | | | | | | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 8, PWM output × 3 (7)*4 | | | | | | | | | | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1*1 | | | | | | | | | | | | 1 | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | | | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | | | | | | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 2 | | | | | | | | | | | | | | | | | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | — | | | | | | | | | | | | | | | | | | |
| | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | — | | | | | | | | | | | | | | | | | | |
| | CSI×2, UART (LIN bus support)×1, simplified $I^2C$×2 | | 1 | | | | | | | | | | | | | | | | | | |
| | $I^2C$×1 | | 1 | | | | | | | | | | | | | | | | | | |
| DMA [channels] | | | 2 | | | | | | | | | | | | | | | | | | |
| External interrupt pins [count] | | | 6 | | | | | | | | | | | | 10 | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 8 | | | | | | | | | | | | 9 | | | | | | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function | | | | | | | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications)<br>$T_A$ = –40 to +105°C (G: Industrial applications)*3 | | | | | | | | | | | | | | | | | | |
| | Package (size [mm]) | | 36-WFLGA (4×4mm) | | | | | | | | | | | | 40-HWQFN (6×6mm) | | | | | | |

* A dedicated library is required to overwrite the data flash. Refer to [Development Environments] – [Flash Programming Tools] – [Self-Programming Library] on the Renesas website. https://www.renesas.com/flash_libraries
The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Products with a pin count of 36 pins are not equipped with a subsystem clock, so only the fixed-cycle interrupt function using the low-speed on-chip oscillator clock (15kHz) is available for use.
*2: Industrial grade products are also available. (part number: R5F1xxxxDxx, ambient operating temperature range: –40 to +85°C)
*3: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.
*4: Figures in parentheses ( ) are when the PIOR function is used.

| RL78/G13 | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40-pin | | | | | | | 44-pin | | | | | | | | | | | | | | | | | | | |
| R5F101EAANA | R5F101ECANA | R5F101EDANA | R5F101EEANA | R5F101EFANA | R5F101EGANA | R5F101EHANA | R5F100FAAFP*3 | R5F100FCAFP*3 | R5F100FDAFP*3 | R5F100FEAFP*3 | R5F100FFAFP*3 | R5F100FGAFP*3 | R5F100FHAFP*3 | R5F100FJAFP*3 | R5F100FKAFP*2 | R5F100FLAFP*2 | R5F101FAAFP | R5F101FCAFP | R5F101FDAF*2 | R5F101FEAFP | R5F101FFAFP | R5F101FGAFP | R5F101FHAFP | R5F101FJAFP | R5F101FKAFP*2 | R5F101FLAFP*2 |
| RL78 CPU core | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16K | 32K | 48K | 64K | 96k | 128k | 192K | 16K | 32K | 48K | 64K | 96k | 128k | 192K | 256K | 384K | 512K | 16K | 32K | 48K | 64K | 96k | 128k | 192K | 256K | 384K | 512K |
| — | | | | | | | 4K | | | | 8K | | | | | | — | | | | | | | | | |
| 2K | 2K | 3K | 4K | 8K | 12K | 16K | 2K | 2K | 3K | 4K | 8K | 12K | 16K | 20K | 24K | 32K | 2K | 2K | 3K | 4K | 8K | 12K | 16K | 20K | 24K | 32K |
| 32MHz | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20MHz | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 to 32MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 36 | | | | | | | 40 | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | 4 | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8, PWM output × 3 (7)*4 | | | | | | | 8, PWM output × 4 (7)*4 | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-bit × 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yes | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | 10 | | | | | | | | | | | | | | | | | | | |
| Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function,<br>RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $T_A$ = –40 to +85°C (A: Consumer applications, D: Industrial applications)*2<br>$T_A$ = –40 to +105°C (G: Industrial applications)*3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40-HWQFN (6×6mm) | | | | | | | 44-LQFP (10×10mm) | | | | | | | | | | | | | | | | | | | |

## RL78/G13 (48 to 52 pins)

| Group | | | RL78/G13 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 48-pin | | | | | | | | | | | | |
| Product name | | | ①R5F100GAAFB*2 ②R5F100GAANA*2 | ①R5F100GCAFB*2 ②R5F100GCANA*2 | ①R5F100GDAFB*2 ②R5F100GDANA*2 | ①R5F100GEAFB*2 ②R5F100GEANA*2 | ①R5F100GFAFB*2 ②R5F100GFANA*2 | ①R5F100GGAFB*2 ②R5F100GGANA*2 | ①R5F100GHAFB*2 ②R5F100GHANA*2 | ①R5F100GJAFB*2 ②R5F100GJANA*2 | ①R5F100GKAFB*1 ②R5F100GKANA*1 | ①R5F100GLAFB*1 ②R5F100GLANA*1 | ①R5F101GAAFB ②R5F101GAANA | ①R5F101GCAFB ②R5F101GCANA | ①R5F101GDAFB ②R5F101GDANA |
| CPU | | | RL78 CPU core | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 16K | 32K | 48K | 64K | 96K | 128K | 192K | 256K | 384K | 512K | 16K | 32K | 48K |
| | Data flash [bytes] | | 4K | | | | 8K | | | | | | — | | |
| | RAM [bytes] | | 2K | 2K | 3K | 4K | 8K | 12K | 16K | 20K | 24K | 32K | 2K | 2K | 3K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 32MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | |
| I/O | I/O ports | | 44 | | | | | | | | | | | | |
| | | N-channel open drain (6V tolerance) | 4 | | | | | | | | | | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 11 | | | | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 8, PWM output × 4 (7)*3 | | | | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 1 | | | | | | | | | | | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | 1 | | | | | | | | | | | | |
| | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | — | | | | | | | | | | | | |
| | CSI×2, UART (LIN bus support)×1, simplified $I^2C$×2 | | 1 | | | | | | | | | | | | |
| | $I^2C$×1 | | 1 | | | | | | | | | | | | |
| DMA [channels] | | | 2 | | | | | | | | | | | | |
| External interrupt pins [count] | | | 13 | | | | | | | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 10 | | | | | | | | | | | | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications, D: Industrial applications)*1<br>$T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | | | | | | | |
| | Package (size [mm]) | | ①48-LFQFP (7×7mm) ②48-HWQFN (7×7mm) | | | | | | | | | | | | |

* A dedicated library is required to overwrite the data flash. Refer to [Development Environments] – [Flash Programming Tools] – [Self-Programming Library] on the Renesas website. https://www.renesas.com/flash_libraries
The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxDxx, ambient operating temperature range: –40 to +85°C)
*2: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.
*3. Figures in parentheses ( ) are when the PIOR function is used.

| RL78/G13 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48-pin | | | | | | | 52-pin | | | | | | | | | | | | | | | | | |
| ①R5F101GEAFB ②R5F101GEANA | ①R5F101GFAFB ②R5F101GFANA | ①R5F101GGAFB ②R5F101GGANA | ①R5F101GHAFB ②R5F101GHANA | ①R5F101GJAFB ②R5F101GJANA | ①R5F101GKAFB*1 ②R5F101GKANA*1 | ①R5F101GLAFB*1 ②R5F101GLANA*1 | R5F100JCAFA*2 | R5F100JDAFA*2 | R5F100JEAFA*2 | R5F100JFAFA*2 | R5F100JGAFA*2 | R5F100JHAFA*2 | R5F100JJAFA*2 | R5F100JKAFA*1 | R5F100JLAFA*1 | R5F101JCAFA | R5F101JDAFA | R5F101JEAFA | R5F101JFAFA | R5F101JGAFA | R5F101JHAFA | R5F101JJAFA | R5F101JKAFA | R5F101JLAFA |
| RL78 CPU core | | | | | | | | | | | | | | | | | | | | | | | | |
| 64K | 96K | 128K | 192K | 256K | 384K | 512K | 32K | 48K | 64K | 96K | 128K | 192K | 256K | 384K | 512K | 32K | 48K | 64K | 96K | 128K | 192K | 256K | 384K | 512K |
| — | | | | | | | 4K | | | 8K | | | | | | — | | | | | | | | |
| 4K | 8K | 12K | 16K | 20K | 24K | 32K | 2K | 3K | 4K | 8K | 12K | 16K | 20K | 24K | 32K | 2K | 3K | 4K | 8K | 12K | 16K | 20K | 24K | 32K |
| 32MHz | | | | | | | | | | | | | | | | | | | | | | | | |
| 20MHz | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 to 32MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | |
| 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | |
| 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | |
| 44 | | | | | | | 48 | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | 13 | | | | | | | | | | | | | | | | | |
| 8, PWM output × 4 (7)*3 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-bit × 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | 15 | | | | | | | | | | | | | | | | | |
| Yes | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | 12 | | | | | | | | | | | | | | | | | |
| Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | | | | | | | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function,<br>RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function | | | | | | | | | | | | | | | | | | | | | | | | |
| $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | | | | | | | | | | | | | | | |
| $T_A$ = –40 to +85°C (A: Consumer applications, D: Industrial applications)*1<br>$T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | | | | | | | | | | | | | | | | | | | |
| ①48-LFQFP (7×7mm) ②48-HWQFN (7×7mm) | | | | | | | 52-LQFP (10×10mm) | | | | | | | | | | | | | | | | | |

## RL78/G13 (64 pins)

| Group | | | RL78/G13 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 64-pin | | | | | | |
| Product name | | | ①R5F100LCAFA*2 ②R5F100LCAFB*2 ③R5F100LCABG*2 | ①R5F100LDAFA*2 ②R5F100LDAFB*2 ③R5F100LDABG*2 | ①R5F100LEAFA*2 ②R5F100LEAFB*2 ③R5F100LEABG*2 | ①R5F100LFAFA*2 ②R5F100LFAFB*2 ③R5F100LFABG*2 | ①R5F100LGAFA*2 ②R5F100LGAFB*2 ③R5F100LGABG*2 | ①R5F100LHAFA*2 ②R5F100LHAFB*2 ③R5F100LHABG*2 | ①R5F100LJAFA*2 ②R5F100LJAFB*2 ③R5F100LJABG*2 |
| CPU | | | RL78 CPU core | | | | | | |
| Memory | Flash ROM [bytes] | | 32K | 48K | 64K | 96K | 128K | 192K | 256K |
| | Data flash [bytes] | | 4K | | | 8K | | | |
| | RAM [bytes] | | 2K | 3K | 4K | 8K | 12K | 16K | 20K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | | | | |
| | | External resonator | 20MHz | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 32MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | |
| | Subclock (32.768 kHz) | | 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | |
| I/O | I/O ports | | 58 | | | | | | |
| | | N-channel open drain (6V tolerance) | 4 | | | | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 15 | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 8, PWM output × 7 | | | | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | — | | | | | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | 2 | | | | | | |
| | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | — | | | | | | |
| | CSI×2, UART (LIN bus support)×1, simplified $I^2C$×2 | | 1 | | | | | | |
| | $I^2C$×1 | | 1 | | | | | | |
| DMA [channels] | | | 2 | | | | | | |
| External interrupt pins [count] | | | 16 (18)*3 | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 12 | | | | | | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications)<br>$T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | |
| | Package (size [mm]) | | ①64-LQFP (12×12mm) ②64-LFQFP (10×10mm) ③64-VFBGA (4×4mm) | | | | | | |

* A dedicated library is required to overwrite the data flash. Refer to [Development Environments] – [Flash Programming Tools] – [Self-Programming Library] on the Renesas website. https://www.renesas.com/flash_libraries
The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxDxx, ambient operating temperature range: –40 to +85°C)
*2: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.
*3. Figures in parentheses ( ) are when the PIOR function is used.

| RL78/G13 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 64-pin | | | | | | | | | | |
| ①R5F100LKAFA*1<br>②R5F100LKAFB*1 | ①R5F100LLAFA*1<br>②R5F100LLAFB*1 | ①R5F101LCAFA*2<br>②R5F101LCAFB*2<br>③R5F101LCABG | ①R5F101LDAFA*2<br>②R5F101LDAFB*2<br>③R5F101LDABG | ①R5F101LEAFA*2<br>②R5F101LEAFB*2<br>③R5F101LEABG | ①R5F101LFAFA*2<br>②R5F101LFAFB*2<br>③R5F101LFABG | ①R5F101LGAFA*2<br>②R5F101LGAFB*2<br>③R5F101LGABG | ①R5F101LHAFA*2<br>②R5F101LHAFB*2<br>③R5F101LHABG | ①R5F101LJAFA*2<br>②R5F101LJAFB*2<br>③R5F101LJABG | ①R5F101LKAFA*1<br>②R5F101LKAFB*1 | ①R5F101LLAFA*1<br>②R5F100LLAFB*1 |
| RL78 CPU core | | | | | | | | | | |
| 384K | 512K | 32K | 48K | 64K | 96K | 128K | 192K | 256K | 384K | 512K |
| 8K | | — | | | | | | | | |
| 24K | 32K | 2K | 3K | 4K | 8K | 12K | 16K | 20K | 24K | 32K |
| 32MHz | | | | | | | | | | |
| 20MHz | | | | | | | | | | |
| 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | |
| 1 to 32MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | |
| 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | |
| 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | |
| 58 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 15 | | | | | | | | | | |
| 8, PWM output × 7 | | | | | | | | | | |
| 1 | | | | | | | | | | |
| 1 | | | | | | | | | | |
| 12-bit × 1 | | | | | | | | | | |
| — | | | | | | | | | | |
| 2 | | | | | | | | | | |
| — | | | | | | | | | | |
| 1 | | | | | | | | | | |
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 16 (18)*3 | | | | | | | | | | |
| Yes | | | | | | | | | | |
| 12 | | | | | | | | | | |
| Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | |
| Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function,<br>RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function | | | | | | | | | | |
| $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | |
| $T_A$ = –40 to +85°C (A: Consumer applications, D: Industrial applications)*1<br>$T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | | | | | |
| ①64-LQFP (12×12mm) ②64-LFQFP (10×10mm) ③64-VFBGA (4×4mm) | | | | | | | | | | |

## RL78/G13 (80 to 128 pins)

| Group | | | RL78/G13 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 80-pin | | | | | | | | | | | |
| Product name | | | ①R5F100MFAFB*2 ②R5F100MFAFA*2 | ①R5F100MGAFB*2 ②R5F100MGAFA*2 | ①R5F100MHAFB*2 ②R5F100MHAFA*2 | ①R5F100MJAFB*2 ②R5F100MJAFA*2 | ①R5F100MKAFB*1 ②R5F100MKAFA*1 | ①R5F100MLAFB*1 ②R5F100MLAFA*1 | ①R5F101MFAFB ②R5F101MFAFA | ①R5F101MGAFB ②R5F101MGAFA | ①R5F101MHAFB ②R5F101MHAFA | ①R5F101MJAFB ②R5F101MJAFA | ①R5F101MKAFB*1 ②R5F101MKAFA*1 | ①R5F101MLAFB*1 ②R5F101MLAFA*1 |
| CPU | | | RL78 CPU core | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 96K | 128K | 192K | 256K | 384K | 512K | 96K | 128K | 192K | 256K | 384K | 512K |
| | Data flash [bytes] | | 8K | | | | | | — | | | | | |
| | RAM [bytes] | | 8K | 12K | 16K | 20K | 24K | 32K | 8K | 12K | 16K | 20K | 24K | 32K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 32MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | |
| I/O | I/O ports | | 74 | | | | | | | | | | | |
| | | N-channel open drain (6V tolerance) | 4 | | | | | | | | | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 21 | | | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 12, PWM output × 10 | | | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | — | | | | | | | | | | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | 3 | | | | | | | | | | | |
| | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | — | | | | | | | | | | | |
| | CSI×2, UART (LIN bus support)×1, simplified $I^2C$×2 | | 1 | | | | | | | | | | | |
| | $I^2C$×1 | | 2 | | | | | | | | | | | |
| DMA [channels] | | | 4 | | | | | | | | | | | |
| External interrupt pins [count] | | | 16 (18)*3 | | | | | | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 17 | | | | | | | | | | | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications, D: Industrial applications)*1<br>$T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | | | | | | |
| | Package (size [mm]) | | ①80-LFQFP (12×12mm) ②80-LQFP (14×14mm) | | | | | | | | | | | |

* A dedicated library is required to overwrite the data flash. Refer to [Development Environments] – [Flash Programming Tools] – [Self-Programming Library] on the Renesas website. https://www.renesas.com/flash_libraries
The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxDxx, ambient operating temperature range: –40 to +85°C)
*2: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.
*3. Figures in parentheses ( ) are when the PIOR function is used.

| RL78/G13 | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100-pin | | | | | | | | | | | | 128-pin | | | | | | |
| ①R5F100PFAFB*2 ②R5F100PFAFA*2 | ①R5F100PGAFB*2 ②R5F100PGAFA*2 | ①R5F100PHAFB*2 ②R5F100PHAFA*2 | ①R5F100PJAFB*2 ②R5F100PJAFA*2 | ①R5F100PKAFB*1 ②R5F100PKAFA*1 | ①R5F100PLAFB*1 ②R5F100PLAFA*1 | ①R5F101PFAFB ②R5F101PFAFA | ①R5F101PGAFB ②R5F101PGAFA | ①R5F101PHAFB ②R5F101PHAFA | ①R5F101PJAFB ②R5F101PJAFA | ①R5F101PKAFB*1 ②R5F101PKAFA*1 | ①R5F101PLAFB*1 ②R5F101PLAFA*1 | R5F100SHAFB*1 | R5F100SJAFB*1 | R5F100SKAFB*1 | R5F100SLAFB*1 | R5F101SHAFB*1 | R5F101SJAFB*1 | R5F101SKAFB*1 | R5F101SLAFB*1 |
| RL78 CPU core | | | | | | | | | | | | | | | | | | |
| 96K | 128K | 192K | 256K | 384K | 512K | 96K | 128K | 192K | 256K | 384K | 512K | 192K | 256K | 384K | 512K | 192K | 256K | 384K | 512K |
| 8K | | | | | | — | | | | | | 8K | | | | — | | |
| 8K | 12K | 16K | 20K | 24K | 32K | 8K | 12K | 16K | 20K | 24K | 32K | 16K | 20K | 24K | 32K | 16K | 20K | 24K | 32K |
| 32MHz | | | | | | | | | | | | | | | | | | |
| 20MHz | | | | | | | | | | | | | | | | | | |
| 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | |
| 1 to 32MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | |
| 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | |
| 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | |
| 92 | | | | | | | | | | | | 120 | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | 25 | | | | | | |
| 12, PWM output × 10 | | | | | | | | | | | | 16, PWM output × 14 | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | |
| 12-bit × 1 | | | | | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | |
| 16 (20)*3 | | | | | | | | | | | | | | | | | | |
| Yes | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | 26 | | | | | | |
| Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | | | | | | |
| Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function,<br>RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function | | | | | | | | | | | | | | | | | | |
| $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | | | | | | | | | |
| $T_A$ = –40 to +85°C (A: Consumer applications, D: Industrial applications)*1<br>$T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | | | | | | | | | | | | | |
| ①100-LFQFP (14×14mm) ②100-LQFP (14×20mm) | | | | | | | | | | | | 128-LFQFP (14×20mm) | | | | | | |

## RL78/G13A (44 to 100 pins)

| Group | | | RL78/G13A | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 44-pin | | 48-pin | | 64-pin | | 100-pin | |
| Product name | | | R5F140FKAFP<br>R5F140FKGFP | R5F140FLAFP<br>R5F140FLGFP | R5F140GKAFB<br>R5F140GKGFB | R5F140GLAFB<br>R5F140GLGFB | R5F140LKAFB<br>R5F140LKGFB | R5F140LLAFB<br>R5F140LLGFB | R5F140PKAFB<br>R5F140PKGFB | R5F140PLAFB<br>R5F140PLGFB |
| CPU | | | RL78 CPU core | | | | | | | |
| Memory | Flash ROM [bytes] | | 384K | 512K | 384K | 512K | 384K | 512K | 384K | 512K |
| | Data flash [bytes] | | 8K | | | | | | | |
| | RAM [bytes] | | 24K | 32K | 24K | 32K | 24K | 32K | 24K | 32K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | | | | | |
| | | External resonator | 20MHz | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 32MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz (TYP.) ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | |
| | Subclock | | 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | |
| I/O | I/O ports | | 40 | | 44 | | 58 | | 92 | |
| | | N-channel open drain (6V tolerance) | 4 | | | | | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 10 | | 11 | | 15 | | 24 | |
| Timers | 16-bit timer TAU [channels] | | 8, PWM output × 7 | | | | | | 12, PWM output × 10 | |
| | Real-time clock (RTC) [channels] | | 1 | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 2 | | 1 | | — | | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | — | | 1 | | 2 | | 3 | |
| | CSI×2, UART (LIN bus support)×1, Simplified $I^2C$×2 | | 1 | | | | | | | |
| | $I^2C$ bus | | 1 | | | | | | | |
| DMA [channels] | | | 2 | | | | | | 4 | |
| Interrupt sources | Internal | | 27 | | | | | | 37 | |
| | External | | 7 | | 10 | | 13 | | | |
| OCD | On-chip debugging | | Yes | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 10 | | | | 12 | | 20 | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | |
| Safety function | | | Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function, Trap function | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V ($T_A$ = –40 to +85°C), $V_{DD}$ = 2.4 to 5.5V ($T_A$ = –40 to +105°C) | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications) | | | | | | | |
| | Package (size [mm]) | | 44-LQFP (10×10mm) | | 48-LFQFP (7×7mm) | | 64-LFQFP (10×10mm) | | 100-LFQFP (14×14mm) | |

# MEMO

## RL78/G14 (30 to 48 pins)

| Group | | | RL78/G14 | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 30-pin | | | | | | 32-pin | | | | | | 36-pin | | | | | |
| Product name | | | R5F104AAASP*2 | R5F104ACASP*2 | R5F104ADASP*2 | R5F104AEASP*2 | R5F104AFASP*2 | R5F104AGASP*2 | ①R5F104BAANA*2 ②R5F104BAAFP*2 | ①R5F104BCANA*2 ②R5F104BCAFP*2 | ①R5F104BDANA*2 ②R5F104BDAFP*2 | ①R5F104BEANA*2 ②R5F104BEAFP*2 | ①R5F104BFANA*2 ②R5F104BFAFP*2 | ①R5F104BGANA*2 ②R5F104BGAFP*2 | R5F104CAALA*2 | R5F104CCALA*2 | R5F104CDALA*2 | R5F104CEALA*2 | R5F104CFALA*2 | R5F104CGALA*2 |
| CPU | | | RL78 CPU core | | | | | | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 16K | 32K | 48K | 64K | 96K | 128K | 16K | 32K | 48K | 64K | 96K | 128K | 16K | 32K | 48K | 64K | 96K | 128K |
| | Data flash [bytes] | | 4K | | | | 8K | | 4K | | | | 8K | | 4K | | | | 8K | |
| | RAM [bytes] | | 2.5K | 4K | 5.5K | | 12K | 16K | 2.5K | 4K | 5.5K | | 12K | 16K | 2.5K | 4K | 5.5K | | 12K | 16K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | | | | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | | | | | | |
| | | Timer RD clock | 64MHz ($V_{DD}$ = 2.7 to 5.5V) | | | | | | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 64MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V)<br>*Timer RD only, operation at 48 or 64MHz supported | | | | | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | — | | | | | | | | | | | | | | | | | |
| I/O | I/O ports | | 26 | | | | | | 28 | | | | | | 32 | | | | | |
| | | N-channel open drain (6V tolerance) | 2 | | | | | | 3 | | | | | | | | | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 10 | | | | | | | | | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 4, PWM output × 3 | | | | | | | | | | | | | | | | | |
| | 16-bit timer RJ [channels] | | 1 | | | | | | | | | | | | | | | | | |
| | 16-bit timer RD [channels] | | 2, PWM output × 6 | | | | | | | | | | | | | | | | | |
| | 16-bit timer RG [channels] | | 1, PWM output × 1 | | | | | | | | | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1*1 | | | | | | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | | | | | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 2 | | | | | | | | | | | | 1 | | | | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | — | | | | | | | | | | | | 1 | | | | | |
| | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | 1 | | | | | | | | | | | | | | | | | |
| | CSI×2, UART (LIN bus support)×1, simplified $I^2C$×2 | | — | | | | | | | | | | | | | | | | | |
| | $I^2C$×1 | | 1 | | | | | | | | | | | | | | | | | |
| DTC (sources) | | | 28 | | | | 30 | | 28 | | | | 30 | | 28 | | | | 30 | |
| ELC (inputs/trigger outputs) | | | 19/7 | | | | 21/8 | | 19/7 | | | | 21/9 | | 19/7 | | | | 21/9 | |
| External interrupt pins [count] | | | 6 | | | | | | | | | | | | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 8 | | | | | | | | | | | | | | | | | |
| | 8-bit D/A converter [channels] | | — | | | | 1 | | — | | | | 2 | | — | | | | 2 | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | | | | |
| | Comparator | | — | | | | 2 | | — | | | | 2 | | — | | | | 2 | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function, I/O power output signal level detection function | | | | | | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | | | | | | | | | | | | |
| | Package (size [mm]) | | 30-LSSOP (7.62mm (300mil)) | | | | | | ①32-HWQFN (5×5mm) ②32-LQFP (7×7mm) | | | | | | 36-WFLGA (4×4mm) | | | | | |

* A dedicated library is required to overwrite the data flash. Refer to [Development Environments] – [Flash Programming Tools] – [Self-Programming Library] on the Renesas website. https://www.renesas.com/flash_libraries
The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Products with pin counts from 30 to 36 pins are not equipped with a subsystem clock, so only the fixed-cycle interrupt function using the low-speed on-chip oscillator clock (15kHz) is available for use.
*2: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

| RL78/G14 | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40-pin | | | | | | | 44-pin | | | | | | | | 48-pin | | | | | | | | | | |
| R5F104EAANA*2 | R5F104ECANA*2 | R5F104EDANA*2 | R5F104EEANA*2 | R5F104EFANA*2 | R5F104EGANA*2 | R5F104EHANA*2 | R5F104FAAFP*2 | R5F104FCAFP*2 | R5F104FDAFP*2 | R5F104FEAFP*2 | R5F104FFAFP*2 | R5F104FGAFP*2 | R5F104FHAFP*2 | R5F104FJAFP*2 | ①R5F104GAAFB*2 ②R5F104GAANA*2 | ①R5F104GCAFB*2 ②R5F104GCANA*2 | ①R5F104GDAFB*2 ②R5F104GDANA*2 | ①R5F104GEAFB*2 ②R5F104GEANA*2 | ①R5F104GFAFB*2 ②R5F104GFANA*2 | ①R5F104GGAFB*2 ②R5F104GGANA*2 | ①R5F104GHAFB*2 ②R5F104GHANA*2 | ①R5F104GJAFB*2 ②R5F104GJANA*2 | ①R5F104GKAFB*2 ②R5F104GKANA*2 | ①R5F104GLAFB*2 ②R5F104GLANA*2 |
| RL78 CPU core | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16K | 32K | 48K | 64K | 96K | 128K | 192K | 16K | 32K | 48K | 64K | 96K | 128K | 192K | 256K | 16K | 32K | 48K | 64K | 96K | 128K | 192K | 256K | 384K | 512K | |
| 4K | | | | 8K | | | 4K | | | | 8K | | | | 4K | | | | 8K | | | | | | |
| 2.5K | 4K | 5.5K | | 12K | 16K | 20K | 2.5K | 4K | 5.5K | | 12K | 16K | 20K | 24K | 2.5K | 4K | 5.5K | | 12K | 16K | 20K | 24K | 32K | 48K | |
| 32MHz | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20MHz | | | | | | | | | | | | | | | | | | | | | | | | | |
| 64MHz ($V_{DD}$ = 2.7 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 to 64MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V)<br>*Timer RD only, operation at 48 or 64MHz supported | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | | |
| 36 | | | | | | | 40 | | | | | | | | 44 | | | | | | | | | | |
| 3 | | | | | | | 4 | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | 12 | | | | | | | | | | |
| 4, PWM output × 3 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2, PWM output × 6 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1, PWM output × 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1*1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-bit × 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | — | | | | | | | | | | |
| — | | | | | | | | | | | | | | | 1 | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29 | | | | 31 | | | 29 | | | | 31 | | | | 30 | | | | 32 | | | | | | |
| 20/7 | | | | 22/9 | | | 20/7 | | | | 22/9 | | | | 20/7 | | | | 22/9 | | | | | | |
| 10 | | | | | | | | | | | | | | | 13 | | | | | | | | | | |
| Yes | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | 10 | | | | | | | | | | | | | | | | | | |
| — | | | | 2 | | | — | | | | 2 | | | | — | | | | 2 | | | | | | |
| Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | | | | 2 | | | — | | | | 2 | | | | — | | | | 2 | | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function,<br>SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function, I/O power output signal level detection function | | | | | | | | | | | | | | | | | | | | | | | | | |
| $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | | | | | | | | | | | | | | | | |
| $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40-HWQFN (6×6mm) | | | | | | | 44-LQFP (10×10mm) | | | | | | | | ①48-LFQFP (7×7mm) ②48-HWQFN (7×7mm) | | | | | | | | | | |

## RL78/G14 (52 to 100 pins)

| Group | | | RL78/G14 | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 52-pin | | | | | | | 64-pin | | | | | | | | | | | | | | | |
| Product name | | | R5F104JCAFA*1 | R5F104JDAFA*1 | R5F104JEAFA*1 | R5F104JFAFA*1 | R5F104JGAFA*1 | R5F104JHAFA*1 | R5F104JJAFA*1 | ①R5F104LCAFB*1 ②R5F104LCAFA*1 ③R5F104LCAFP*1 ④R5F104LCALA*1 | | | | ①R5F104LDAFB*1 ②R5F104LDAFA*1 ③R5F104LDAFP*1 ④R5F104LDALA*1 | | | | ①R5F104LEAFB*1 ②R5F104LEAFA*1 ③R5F104LEAFP*1 ④R5F104LEALA*1 | | | | ①R5F104LFAFB*1 ②R5F104LFAFA*1 ③R5F104LFAFP*1 ④R5F104LFALA*1 | | | | ①R5F104LGAFB*1 ②R5F104LGAFA*1 ③R5F104LGAFP*1 ④R5F104LGALA*1 | | | |
| CPU | | | RL78 CPU core | | | | | | | | | | | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 32K | 48K | 64K | 96K | 128K | 192K | 256K | 32K | | | | 48K | | | | 64K | | | | 96K | | | | 128K | | | |
| | Data flash [bytes] | | 4K | | | 8K | | | | 4K | | | | | | | | | | | | 8K | | | |
| | RAM [bytes] | | 4K | 5.5K | | 12K | 16K | 20K | 24K | 4K | | | | 5.5K | | | | | | | | 12K | | | | 16K | | | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | | | | | | | | | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | | | | | | | | | | | |
| | | Timer RD clock | 64MHz ($V_{DD}$ = 2.7 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 64MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V)<br>*Timer RD only, operation at 48 or 64MHz supported | | | | | | | | | | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | |
| I/O | I/O ports | | 48 | | | | | | | 58 | | | | | | | | | | | | | | | |
| | | N-channel open drain (6V tolerance) | 4 | | | | | | | | | | | | | | | | | | | | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 14 | | | | | | | 16 | | | | | | | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 4, PWM output × 3 | | | | | | | | | | | | | | | | | | | | | | |
| | 16-bit timer RJ [channels] | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| | 16-bit timer RD [channels] | | 2, PWM output × 6 | | | | | | | | | | | | | | | | | | | | | | |
| | 16-bit timer RG [channels] | | 1, PWM output × 1 | | | | | | | | | | | | | | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | | | | | | | | | | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$ × 1 | | 1 | | | | | | | — | | | | | | | | | | | | | | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | 1 | | | | | | | 2 | | | | | | | | | | | | | | | |
| | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | — | | | | | | | | | | | | | | | | | | | | | | |
| | CSI×2, UART (LIN bus support)×1, simplified $I^2C$×2 | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| | $I^2C$×1 | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| DTC (sources) | | | 30 | | | 32 | | | | 31 | | | | | | | | | | | | 33 | | | |
| ELC (inputs/trigger outputs) | | | 20/7 | | | 22/9 | | | | 20/7 | | | | | | | | | | | | 22/9 | | | |
| External interrupt pins [count] | | | 15 | | | | | | | 15 (19)*2 | | | | | | | | | | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | | | | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 12 | | | | | | | | | | | | | | | | | | | | | | |
| | 8-bit D/A converter [channels] | | — | | | 2 | | | | — | | | | | | | | | | | | 2 | | | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | | | | | | | | | |
| | Comparator | | — | | | 2 | | | | — | | | | | | | | | | | | 2 | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function, I/O power output signal level detection function | | | | | | | | | | | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications)*1 | | | | | | | | | | | | | | | | | | | | | | |
| | Package (size [mm]) | | 52-LQFP (10×10mm) | | | | | | | ①64-LFQFP (10×10mm) ②64-LQFP (12×12mm) ③64-LQFP (14×14mm) ④64-WFLGA (5×5mm) | | | | | | | | | | | | | | | |

* A dedicated library is required to overwrite the data flash. Refer to [Development Environments] – [Flash Programming Tools] – [Self-Programming Library] on the Renesas website. https://www.renesas.com/flash_libraries
The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.
*2. Figures in parentheses ( ) are when the PIOR function is used.

| RL78/G14 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64-pin | | | | 80-pin | | | | | | 100-pin | | | | |
| ①R5F104LHAFB*1 ②R5F104LHAFA*1 ③R5F104LHAFP*1 ④R5F104LHALA*1 | ①R5F104LJAFB*1 ②R5F104LJAFA*1 ③R5F104LJAFP*1 ④R5F104LJALA*1 | ①R5F104LKAFB*1 ②R5F104LKAFA*1 ④R5F104LKALA*1 | ①R5F104LLAFB*1 ②R5F104LLAFA*1 ④R5F104LLALA*1 | ①R5F104MFAFB*1 ②R5F104MFAFA*1 | ①R5F104MGAFB*1 ②R5F104MGAFA*1 | ①R5F104MHAFB*1 ②R5F104MHAFA*1 | ①R5F104MJAFB*1 ②R5F104MJAFA*1 | ①R5F104MKAFB*1 ②R5F104MKAFA*1 | ①R5F104MLAFB*1 ②R5F104MLAFA*1 | ①R5F104PFAFB*1 ②R5F104PFAFA*1 | ①R5F104PGAFB*1 ②R5F104PGAFA*1 | ①R5F104PHAFB*1 ②R5F104PHAFA*1 | ①R5F104PJAFB*1 ②R5F104PJAFA*1 | ①R5F104PKAFB*1 ②R5F104PKAFA*1 | ①R5F104PLAFB*1 ②R5F104PLAFA*1 |
| RL78 CPU core | | | | | | | | | | | | | | |
| 192K | 256K | 384K | 512K | 96K | 128K | 192K | 256K | 384K | 512K | 96K | 128K | 192K | 256K | 384K | 512K |
| 8K | | | | | | | | | | | | | | |
| 20K | 24K | 32K | 48K | 12K | 16K | 20K | 24K | 32K | 48K | 12K | 16K | 20K | 24K | 32K | 48K |
| 32MHz | | | | | | | | | | | | | | |
| 20MHz | | | | | | | | | | | | | | |
| 64MHz ($V_{DD}$ = 2.7 to 5.5V) | | | | | | | | | | | | | | |
| 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | |
| 1 to 64MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V)<br>*Timer RD only, operation at 48 or 64MHz supported | | | | | | | | | | | | | | |
| 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | |
| 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | |
| 58 | | | | 74 | | | | | | 92 | | | | |
| 4 | | | | | | | | | | | | | | |
| 16 | | | | 25 | | | | | | 28 | | | | |
| 4, PWM output × 3 | | | | 8, PWM output × 6 | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 2, PWM output × 6 | | | | | | | | | | | | | | |
| 1, PWM output × 1 | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 12-bit × 1 | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | |
| 2 | | | | 3 | | | | | | | | | | |
| — | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 1 | | | | 2 | | | | | | | | | | |
| 33 | | | | 39 | | | | | | | | | | |
| 22/9 | | | | 26/9 | | | | | | | | | | |
| 15 (19)*2 | | | | 15 (19)*2 | | | | | | 16 (20)*2 | | | | |
| Yes | | | | | | | | | | | | | | |
| 12 | | | | 17 | | | | | | 20 | | | | |
| 2 | | | | | | | | | | | | | | |
| Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | | |
| Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function,<br>SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function, I/O power output signal level detection function | | | | | | | | | | | | | | |
| $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | | | | | |
| $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications)*1 | | | | | | | | | | | | | | |
| ①64-LFQFP (10×10mm) ②64-LQFP (12×12mm)<br>③64-LQFP (14×14mm) ④64-WFLGA (5×5mm) | | | | ①80-LFQFP (12×12mm) ②80-LQFP (14×14mm) | | | | | | ①100-LFQFP (14×14mm) ②100-LQFP (14×20mm) | | | | | |

## RL78/G15 (8 to 20 pins)

| Group | | | RL78/G15 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 8-pin | | 10-pin | | 16-pin | | | | 20-pin | |
| Product name | | | R5F12007ANS<br>R5F12007GNS<br>R5F12007MNS | R5F12008ANS<br>R5F12008GNS<br>R5F12008MNS | R5F12017ASP<br>R5F12017GSP<br>R5F12017MSP | R5F12018ASP<br>R5F12018GSP<br>R5F12018MSP | R5F12047ASP<br>R5F12047GSP<br>R5F12047MSP | R5F12048ASP<br>R5F12048GSP<br>R5F12048MSP | R5F12047ANA<br>R5F12047GNA<br>R5F12047MNA | R5F12048ANA<br>R5F12048GNA<br>R5F12048MNA | R5F12067ASP<br>R5F12067GSP<br>R5F12067MSP | R5F12068ASP<br>R5F12068GSP<br>R5F12068MSP |
| CPU | | | RL78 CPU core | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 4 | 8 | 4 | 8 | 4 | 8 | 4 | 8 | 4 | 8 |
| | Data flash [bytes] | | 1 | | | | | | | | | |
| | RAM [bytes] | | 1 | | | | | | | | | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 16MHz | | | | | | | | | |
| | | External resonator | — | | | | 12MHz | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | — | | | | 1 to 12MHz | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 MHz, 2 MHz, 4 MHz, 8 MHz, 16 MHz | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15 kHz (TYP.) | | | | | | | | | |
| I/O | I/O ports | | 6 | | 8 | | 14 | | | | 18 | |
| Timers | 16-bit timer TAU [channels] | | 8 | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | |
| | Interval timer [channels] | | 1 | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 1 | | | | — | | | | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | — | | | | 1 | | | | | |
| | $I^2C$ bus | | 1 | | | | | | | | | |
| Interrupt sources | Internal | | 8 | | 10 | | 16 | | | | 19 | |
| | External | | 6 | | 8 | | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 6 | | 8 | | 14 | | | | 18 | |
| | Other functions | | Power-on reset (POR), clock/buzzer output × 1 | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.4 to 5.5 V | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications), $T_A$ = –40 to +125°C (M: Industrial applications) | | | | | | | | | |
| | Package (size [mm]) | | 8-pin WDFN (3×3mm) | | 10-pin LSSOP (4.4×3.6mm) | | 16-pin SSOP (4.4×6.5mm) | | 16-pin HWQFN (3×3mm) | | 20-pin LSSOP (4.4×6.5mm) | |

# MEMO

## RL78/G16 (10 to 32pins)

| Group | | | RL78/G16 | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pin count | | | 10-pin | | 16-pin | | | |
| Product name | | | R5F1211AASP<br>R5F1211AGSP<br>R5F1211AMSP | R5F1211CASP<br>R5F1211CGSP<br>R5F1211CMSP | R5F1214AASP<br>R5F1214AGSP<br>R5F1214AMSP | R5F1214CASP<br>R5F1214CGSP<br>R5F1214CMSP | R5F1214AANA<br>R5F1214AGNA<br>R5F1214AMNA | R5F1214CANA<br>R5F1214CGNA<br>R5F1214CMNA |
| CPU | | | RL78 CPU core | | | | | |
| Memory | Flash ROM [bytes] | | 16 | 32 | 16 | 32 | 16 | 32 |
| | Data flash [bytes] | | 1 | | | | | |
| | RAM [bytes] | | 2 | | | | | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 16MHz | | | | | |
| | | External resonator | — | | 12MHz | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | — | | 1 to 12MHz | | | |
| | High-speed on-chip oscillator [Hz] | | 1 MHz, 2 MHz, 4 MHz, 8 MHz, 16 MHz | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15 kHz (TYP.) | | | | | |
| I/O | I/O ports | | 8 | | 14 | | | |
| Timers | 16-bit timer [channels] | | 8 | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | |
| | Interval timer [channels] | | 1 | | | | | |
| Serial interfaces | CSI×1, UART×1, Simplified $I^2C$×1 | | 1 | | — | | | |
| | CSI×2, UART×2, Simplified $I^2C$×2 | | — | | 1 | | | |
| | CSI×3, UART×3, Simplified $I^2C$×3 | | — | | | | | |
| | $I^2C$ bus | | 1 | | | | | |
| Interrupt sources | Internal | | 23 | | 26 | | | |
| | External | | 8 | | | | | |
| OCD | On-chip debugging | | Yes | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 4 | | 7 | | | |
| | Other functions | | Power-on reset (POR), clock/buzzer output × 1 | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.4 to 5.5 V | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications), $T_A$ = –40 to +125°C (M: Industrial applications) | | | | | |
| | Package (size [mm]) | | 10-pin LSSOP (4.4×3.6mm) | | 16-pin SSOP (4.4×5mm) | | 16-pin HWQFN (3×3mm) | |

| RL78/G16 | | | | | | | |
|---|---|---|---|---|---|---|---|
| 20-pin | | 24-pin | | 32-pin | | | |
| R5F1216AASP<br>R5F1216AGSP<br>R5F1216AMSP | R5F1216CASP<br>R5F1216CGSP<br>R5F1216CMSP | R5F1217AANA<br>R5F1217AGNA<br>R5F1217AMNA | R5F1217CANA<br>R5F1217CGNA<br>R5F1217CMNA | R5F121BAANA<br>R5F121BAGNA<br>R5F121BAMNA | R5F121BCANA<br>R5F121BCGNA<br>R5F121BCMNA | R5F121BAAFP<br>R5F121BAGFP<br>R5F121BAMFP | R5F121BCAFP<br>R5F121BCGFP<br>R5F121BCMFP |
| RL78 CPU core | | | | | | | |
| 16 | 32 | 16 | 32 | 16 | 32 | 16 | 32 |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 16MHz | | | | | | | |
| 12MHz | | | | | | | |
| 1 to 12MHz | | | | | | | |
| 1 MHz, 2 MHz, 4 MHz, 8 MHz, 16 MHz | | | | | | | |
| 15 kHz (TYP.) | | | | | | | |
| 18 | | 22 | | 30 | | | |
| 8 | | | | | | | |
| 1 | | | | | | | |
| 1 | | | | | | | |
| — | | | | | | | |
| — | | | | | | | |
| 1 | | | | | | | |
| 1 | | | | | | | |
| 30 | | | | | | | |
| 8 | | | | | | | |
| Yes | | | | | | | |
| 11 | | | | | | | |
| Power-on reset (POR), clock/buzzer output × 1 | | | | | | | |
| $V_{DD}$ = 2.4 to 5.5 V | | | | | | | |
| $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications), $T_A$ = –40 to +125°C (M: Industrial applications) | | | | | | | |
| 20-pin SSOP (4.4×5mm) | | 20-pin HWQFN (4×4mm) | | 32-pin HWQFN (5×5mm) | | 32-pin LQFP (7×7mm) | |

## RL78/G22 (16 to 48 pins)

| Group | | | RL78/G22 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 16-pin | | 20-pin | | 24-pin | | 25-pin | | 30-pin | |
| Product name | | | R7F102G4C3CNP<br>R7F102G4C2DNP | R7F102G4E3CNP<br>R7F102G4E2DNP | R7F102G6C3CSP<br>R7F102G6C2DSP | R7F102G6E3CSP<br>R7F102G6E2DSP | R7F102G7C3CNP<br>R7F102G7C2DNP | R7F102G7E3CNP<br>R7F102G7E2DNP | R7F102G8C3CLA<br>R7F102G8C2DLA | R7F102G8E3CLA<br>R7F102G8E2DLA | R7F102GAC3CSP<br>R7F102GAC2DSP | R7F102GAE3CSP<br>R7F102GAE2DSP |
| CPU | | | RL78 CPU core | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 32 | 64 | 32 | 64 | 32 | 64 | 32 | 64 | 32 | 64 |
| | Data flash [bytes] | | 2 | | | | | | | | | |
| | RAM [bytes] | | 4 | | | | | | | | | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20 MHz | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 MHz, 2 MHz, 3 MHz, 4 MHz, 6 MHz, 8 MHz, 12 MHz, 16 MHz, 24 MHz, 32 MHz | | | | | | | | | |
| | Middle-speed on-chip oscillator [Hz] | | 1 MHz, 2 MHz, 4 MHz | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 32.768 kHz (TYP.) | | | | | | | | | |
| | Subclock | | 32.768 kHz ($V_{DD}$ = 1.6 to 5.5 V) | | | | | | | | | |
| I/O | I/O ports | | 12 | | 16 | | 20 | | 21 | | 26 | |
| | | N-channel open drain (6V tolerance) | — | | | | 2 | | | | | |
| Timers | 16-bit timer TAU [channels] | | 8 | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | |
| | Interval timer [channels] | | 1 | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 1 | | 2 | | | | | | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | — | | | | | | | | | |
| | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | — | | | | | | | | 1 | |
| | CSI×2, UART (LIN bus support)×1, simplified $I^2C$×2 | | — | | | | | | | | | |
| | Simplified $I^2C$×1 | | 1 | | — | | | | | | | |
| | UARTA | | — | | | | | | | | | |
| | $I^2C$ bus | | — | | | | | | | | 1 | |
| Interrupt sources | Internal | | 23 | | 25 | | 26 | | | | 29 | |
| | External | | | | 3 | | 5 | | | | 6 | |
| Key interrupt | | | — | | | | | | | | | |
| Data transfer controller (DTC) | | | 21 | | 23 | | 25 | | | | 28 | |
| Event link controller (ELCL) | | | 1 | | | | | | | | | |
| SNOOZE mode sequencer (SMS) | | | 1 | | | | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 3 | | 6 | | | | | | 8 | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function, Output level detection function | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$=1.6 to 5.5 V | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (2D: Consumer applications), $T_A$ = –40 to +105°C (3C: Industrial applications) | | | | | | | | | |
| | Package (size [mm]) | | 16-pin HWQFN (3×3mm) | | 20-pin LSSOP (4.4×6.5mm) | | 24-pin HWQFN (4×4mm) | | 25-pin WFLGA (3×3mm) | | 30-pin LSSOP (9.85mm (300mil)) | |

| RL78/G22 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32-pin | | | | 36-pin | | 40-pin | | 44-pin | | 48-pin | | | |
| R7F102GBC3CNP<br>R7F102GBC2DNP | R7F102GBE3CNP<br>R7F102GBE2DNP | R7F102GBC3CFP<br>R7F102GBC2DFP | R7F102GBE3CFP<br>R7F102GBE2DFP | R7F102GCC3CLA<br>R7F102GCC2DLA | R7F102GCE3CLA<br>R7F102GCE2DLA | R7F102GEC3CNP<br>R7F102GEC2DNP | R7F102GEE3CNP<br>R7F102GEE2DNP | R7F102GFC3CFP<br>R7F102GFC2DFP | R7F102GFE3CFP<br>R7F102GFE2DFP | R7F102GGC3CFB<br>R7F102GGC2DFB | R7F102GGE3CFB<br>R7F102GGE2DFB | R7F102GGC3CNP<br>R7F102GGC2DNP | R7F102GGE3CNP<br>R7F102GGE2DNP |
| RL78 CPU core | | | | | | | | | | | | | |
| 32 | 64 | 32 | 64 | 32 | 64 | 32 | 64 | 32 | 64 | 32 | 64 | 32 | 64 |
| 2 | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | |
| 32MHz | | | | | | | | | | | | | |
| 20MHz | | | | | | | | | | | | | |
| 1 to 20 MHz | | | | | | | | | | | | | |
| 1 MHz, 2 MHz, 3 MHz, 4 MHz, 6 MHz, 8 MHz, 12 MHz, 16 MHz, 24 MHz, 32 MHz | | | | | | | | | | | | | |
| 1 MHz, 2 MHz, 4 MHz | | | | | | | | | | | | | |
| 32.768 kHz (TYP.) | | | | | | | | | | | | | |
| 32.768 kHz ($V_{DD}$ = 1.6 to 5.5 V) | | | | | | | | | | | | | |
| 28 | | | | 32 | | 36 | | 40 | | 44 | | | |
| 3 | | | | | | | | 4 | | | | | |
| 8 | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| 2 | | | | | | | | | | 1 | | | |
| — | | | | | | | | | | 1 | | | |
| 1 | | | | — | | | | | | | | | |
| — | | | | 1 | | | | | | | | | |
| — | | | | | | | | | | | | | |
| — | | | | 1 | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| 29 | | | | 32 | | | | | | | | | |
| 6 | | | | | | 7 | | | | 10 | | | |
| — | | | | | | 4 | | | | 6 | | | |
| 28 | | | | 30 | | 31 | | | | 32 | | | |
| 1 | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| Yes | | | | | | | | | | | | | |
| 8 | | | | | | 9 | | 10 | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | |
| Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function, Output level detection function | | | | | | | | | | | | | |
| $V_{DD}$=1.6 to 5.5 V | | | | | | | | | | | | | |
| $T_A$ = –40 to +85°C (2D: Consumer applications), $T_A$ = –40 to +105°C (3C: Industrial applications) | | | | | | | | | | | | | |
| 32-pin HWQFN (5×5mm) | | 32-pin LQFP (7×7mm) | | 36-pin WFLGA (4×4mm) | | 40-pin HWQFN (6×6mm) | | 44-pin LQFP (10×10mm) | | 48-pin LFQFP (7×7mm) | | 48-pin HWQFN (7×7mm) | |

## RL78/G23 (30 to 52 pins)

| Group | | | RL78/G23 | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 30-pin | | | | 32-pin | | | | | | | | 36-pin | | | | 40-pin | | | |
| Product name | | | R7F100GAF3CSP R7F100GAF2DSP | R7F100GAG3CSP R7F100GAG2DSP | R7F100GAH3CSP R7F100GAH2DSP | R7F100GAJ3CSP R7F100GAJ2DSP | R7F100GBF3CNP R7F100GBF2DNP | R7F100GBG3CNP R7F100GBG2DNP | R7F100GBH3CNP R7F100GBH2DNP | R7F100GBJ3CNP R7F100GBJ2DNP | R7F100GBF3CFP R7F100GBF2DFP | R7F100GBG3CFP R7F100GBG2DFP | R7F100GBH3CFP R7F100GBH2DFP | R7F100GBJ3CFP R7F100GBJ2DFP | R7F100GCF3CLA R7F100GCF2DLA | R7F100GCG3CLA R7F100GCG2DLA | R7F100GCH3CLA R7F100GCH2DLA | R7F100GCJ3CLA R7F100GCJ2DLA | R7F100GEF3CNP R7F100GEF2DNP | R7F100GEG3CNP R7F100GEG2DNP | R7F100GEH3CNP R7F100GEH2DNP | R7F100GEJ3CNP R7F100GEJ2DNP |
| CPU | | | RL78 CPU core | | | | | | | | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 96K | 128K | 192K | 256K | 96K | 128K | 192K | 256K | 96K | 128K | 192K | 256K | 96K | 128K | 192K | 256K | 96K | 128K | 192K | 256K |
| | Data flash [bytes] | | 8K | | | | | | | | | | | | | | | | | | | |
| | RAM [bytes] | | 12K | 16K | 20K | 24K | 12K | 16K | 20K | 24K | 12K | 16K | 20K | 24K | 12K | 16K | 20K | 24K | 12K | 16K | 20K | 24K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | | | | | | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz | | | | | | | | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1MHz, 2MHz, 3MHz, 4MHz, 6MHz, 8MHz, 12MHz, 16MHz, 24MHz, 32MHz | | | | | | | | | | | | | | | | | | | |
| | Middle-speed on-chip oscillator [Hz] | | 1MHz, 2MHz, 4MHz | | | | | | | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 32.768kHz (TYP.) | | | | | | | | | | | | | | | | | | | |
| | Subclock | | 32.768kHz ($V_{DD}$ = 2.4 to 5.5V) | | | | | | | | | | | | | | | | 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | |
| I/O | I/O ports | | 20 | | | | 28 | | | | | | | | 32 | | | | 36 | | | |
| | | N-channel open drain (6V tolerance) | 2 | | | | 3 | | | | | | | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 8 | | | | | | | | | | | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | | | | | | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | | | | | | | | |
| | Interval timer [channels] | | 1 channel in 32-bit mode, 2 channels in 16-bit mode, 4 channels in 8-bit mode | | | | | | | | | | | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 2 | | | | | | | | | | | | | | | | | | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | — | | | | | | | | | | | | | | | | | | | |
| | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | 1 | | | | | | | | | | | | — | | | | | | | |
| | CSI×2, UART (LIN bus support)×1, simplified $I^2C$×2 | | — | | | | | | | | | | | | 1 | | | | | | | |
| | UARTA | | — | | | | | | | | | | | | 1 | | | | | | | |
| | $I^2C$ bus | | 1 | | | | | | | | | | | | | | | | | | | |
| Interrupt sources | Internal | | 31 | | | | 32 | | | | | | | | 35 | | | | | | | |
| | External | | 6 | | | | | | | | | | | | | | | | 7 | | | |
| Key interrupt | | | — | | | | | | | | | | | | 1 | | | | 4 | | | |
| Logic and event link controller (ELCL) | | | 1 | | | | | | | | | | | | | | | | | | | |
| SNOOZE mode sequencer (SMS) | | | 1 | | | | | | | | | | | | | | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | | | | | | | | | |
| Peripheral functions | 8/10/12-bit A/D converter [channels] | | 8 | | | | | | | | | | | | | | | | 9 | | | |
| | D/A converter [channels] | | 2 | | | | | | | | | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function, Trap function, Output level detection function | | | | | | | | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V (2D: Consumer applications), $V_{DD}$ = 1.8 to 5.5V (3C: Industrial applications) | | | | | | | | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (2D: Consumer applications), $T_A$ = –40 to +105°C (3C: Industrial applications) | | | | | | | | | | | | | | | | | | | |
| | Package (size [mm]) | | 30-LSSOP (9.85mm (300mil)) | | | | 32-HWQFN (5×5mm) | | | | 32-LQFP (7×7mm) | | | | 36-WFLGA (4×4mm) | | | | 40-HWQFN (6×6mm) | | | |

| RL78/G23 | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44-pin | | | | | | | 48-pin | | | | | | | | | | | | | | | 52-pin | | | | | | |
| R7F100GFF3CFP R7F100GFF2DFP | R7F100GFG3CFP R7F100GFG2DFP | R7F100GFH3CFP R7F100GFH2DFP | R7F100GFJ3CFP R7F100GFJ2DFP | R7F100GFK3CFP R7F100GFK2DFP | R7F100GFL3CFP R7F100GFL2DFP | R7F100GFN3CFP R7F100GFN2DFP | R7F100GGF3CFB R7F100GGF2DFB | R7F100GGG3CFB R7F100GGG2DFB | R7F100GGH3CFB R7F100GGH2DFB | R7F100GGJ3CFB R7F100GGJ2DFB | R7F100GGK3CFB R7F100GGK2DFB | R7F100GGL3CFB R7F100GGL2DFB | R7F100GGN3CFB R7F100GGN2DFB | R7F100GGF3CNP R7F100GGF2DNP | R7F100GGG3CNP R7F100GGG2DNP | R7F100GGH3CNP R7F100GGH2DNP | R7F100GGJ3CNP R7F100GGJ2DNP | R7F100GGK3CNP R7F100GGK2DNP | R7F100GGL3CNP R7F100GGL2DNP | R7F100GGN3CNP R7F100GGN2DNP | R7F100GJF3CFA R7F100GJF2DFA | R7F100GJG3CFA R7F100GJG2DFA | R7F100GJH3CFA R7F100GJH2DFA | R7F100GJJ3CFA R7F100GJJ2DFA | R7F100GJK3CFA R7F100GJK2DFA | R7F100GJL3CFA R7F100GJL2DFA | R7F100GJN3CFA R7F100GJN2DFA |
| RL78 CPU core | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 96K | 128K | 192K | 256K | 384K | 512K | 768K | 96K | 128K | 192K | 256K | 384K | 512K | 768K | 96K | 128K | 192K | 256K | 384K | 512K | 768K | 96K | 128K | 192K | 256K | 384K | 512K | 768K |
| 8K | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12K | 16K | 20K | 24K | 32K | 48K | | 12K | 16K | 20K | 24K | 32K | 48K | | 12K | 16K | 20K | 24K | 32K | 48K | | 12K | 16K | 20K | 24K | 32K | 48K | |
| 32MHz | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20MHz | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 to 20MHz | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1MHz, 2MHz, 3MHz, 4MHz, 6MHz, 8MHz, 12MHz, 16MHz, 24MHz, 32MHz | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1MHz, 2MHz, 4MHz | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32.768kHz (TYP.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | 44 | | | | | | | | | | | | | | 48 | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 channel in 32-bit mode, 2 channels in 16-bit mode, 4 channels in 8-bit mode | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | 1 | | | | | | | | | | | | | | | | | | | |
| — | | | | | | | 1 | | | | | | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | 10 | | | | | | | | | | | | | | 12 | | | | | | |
| 4 | | | | | | | 6 | | | | | | | | | | | | | | 8 | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yes | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | 12 | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function, Trap function, Output level detection function | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $V_{DD}$ = 1.6 to 5.5V (2D: Consumer applications), $V_{DD}$ = 1.8 to 5.5V (3C: Industrial applications) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $T_A$ = –40 to +85°C (2D: Consumer applications), $T_A$ = –40 to +105°C (3C: Industrial applications) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 44-LQFP (10×10mm) | | | | | | | 48-LFQFP (7×7mm) | | | | | | | 48-HWQFN (7×7mm) | | | | | | | 52-LQFP (10×10mm) | | | | | | |

## RL78/G23 (64 to 128 pins)

| Group | | | RL78/G23 | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 64-pin | | | | | | | | | | | | | | | | | | | | |
| Product name | | | R7F100GLF3CFA R7F100GLF2DFA | R7F100GLG3CFA R7F100GLG2DFA | R7F100GLH3CFA R7F100GLH2DFA | R7F100GLJ3CFA R7F100GLJ2DFA | R7F100GLK3CFA R7F100GLK2DFA | R7F100GLL3CFA R7F100GLL2DFA | R7F100GLN3CFA R7F100GLN2DFA | R7F100GLF3CFB R7F100GLF2DFB | R7F100GLG3CFB R7F100GLG2DFB | R7F100GLH3CFB R7F100GLH2DFB | R7F100GLJ3CFB R7F100GLJ2DFB | R7F100GLK3CFB R7F100GLK2DFB | R7F100GLL3CFB R7F100GLL2DFB | R7F100GLN3CFB R7F100GLN2DFB | R7F100GLF3CLA R7F100GLF2DLA | R7F100GLG3CLA R7F100GLG2DLA | R7F100GLH3CLA R7F100GLH2DLA | R7F100GLJ3CLA R7F100GLJ2DLA | R7F100GLK3CLA R7F100GLK2DLA | R7F100GLL3CLA R7F100GLL2DLA | R7F100GLN3CLA R7F100GLN2DLA |
| CPU | | | RL78 CPU core | | | | | | | | | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 96K | 128K | 192K | 256K | 384K | 512K | 768K | 96K | 128K | 192K | 256K | 384K | 512K | 768K | 96K | 128K | 192K | 256K | 384K | 512K | 768K |
| | Data flash [bytes] | | 8K | | | | | | | | | | | | | | | | | | | | |
| | RAM [bytes] | | 12K | 16K | 20K | 24K | 32K | 48K | | 12K | 16K | 20K | 24K | 32K | 48K | | 12K | 16K | 20K | 24K | 32K | 48K | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | | | | | | | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz | | | | | | | | | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1MHz, 2MHz, 3MHz, 4MHz, 6MHz, 8MHz, 12MHz, 16MHz, 24MHz, 32MHz | | | | | | | | | | | | | | | | | | | | |
| | Middle-speed on-chip oscillator [Hz] | | 1MHz, 2MHz, 4MHz | | | | | | | | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 32.768kHz (TYP.) | | | | | | | | | | | | | | | | | | | | |
| | Subclock | | 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | |
| I/O | I/O ports | | 58 | | | | | | | | | | | | | | | | | | | | |
| | | N-channel open drain (6V tolerance) | 4 | | | | | | | | | | | | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 8 | | | | | | | | | | | | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | | | | | | | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | | | | | | | | | |
| | Interval timer [channels] | | 1 channel in 32-bit mode, 2 channels in 16-bit mode, 4 channels in 8-bit mode | | | | | | | | | | | | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | — | | | | | | | | | | | | | | | | | | | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | 2 | | | | | | | | | | | | | | | | | | | | |
| | CSI×1, UART (LIN bus support)×1, Simplified $I^2C$×1 | | — | | | | | | | | | | | | | | | | | | | | |
| | CSI×2, UART (LIN bus support)×1, Simplified $I^2C$×2 | | 1 | | | | | | | | | | | | | | | | | | | | |
| | UARTA | | 2 | | | | | | | | | | | | | | | | | | | | |
| | $I^2C$ bus | | 2 | | | | | | | | | | | | | | | | | | | | |
| Interrupt sources | Internal | | 39 | | | | | | | | | | | | | | | | | | | | |
| | External | | 13 | | | | | | | | | | | | | | | | | | | | |
| Key interrupt | | | 8 | | | | | | | | | | | | | | | | | | | | |
| Logic and event link controller (ELCL) | | | 1 | | | | | | | | | | | | | | | | | | | | |
| SNOOZE mode sequencer (SMS) | | | 1 | | | | | | | | | | | | | | | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | | | | | | | | | | |
| Peripheral functions | 8/10/12-bit A/D converter [channels] | | 12 | | | | | | | | | | | | | | | | | | | | |
| | D/A converter [channels] | | 2 | | | | | | | | | | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function, Trap function, Output level detection function | | | | | | | | | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V (2D: Consumer applications), $V_{DD}$ = 1.8 to 5.5V (3C: Industrial applications) | | | | | | | | | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (2D: Consumer applications), $T_A$ = –40 to +105°C (3C: Industrial applications) | | | | | | | | | | | | | | | | | | | | |
| | Package (size [mm]) | | 64-LQFP (12×12mm) | | | | | | | 64-LFQFP (10×10mm) | | | | | | | 64-WFLGA (5×5mm) | | | | | | |

| RL78/G23 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80-pin | | | | | | | | | | | | 100-pin | | | | | | | | | | | | 128-pin | | | |
| R7F100GMG3CFA R7F100GMG2DFA | R7F100GMH3CFA R7F100GMH2DFA | R7F100GMJ3CFA R7F100GMJ2DFA | R7F100GMK3CFA R7F100GMK2DFA | R7F100GML3CFA R7F100GML2DFA | R7F100GMN3CFA R7F100GMN2DFA | R7F100GMG3CFB R7F100GMG2DFB | R7F100GMH3CFB R7F100GMH2DFB | R7F100GMJ3CFB R7F100GMJ2DFB | R7F100GMK3CFB R7F100GMK2DFB | R7F100GML3CFB R7F100GML2DFB | R7F100GMN3CFB R7F100GMN2DFB | R7F100GPG3CFA R7F100GPG2DFA | R7F100GPH3CFA R7F100GPH2DFA | R7F100GPJ3CFA R7F100GPJ2DFA | R7F100GPK3CFA R7F100GPK2DFA | R7F100GPL3CFA R7F100GPL2DFA | R7F100GPN3CFA R7F100GPN2DFA | R7F100GPG3CFB R7F100GPG2DFB | R7F100GPH3CFB R7F100GPH2DFB | R7F100GPJ3CFB R7F100GPJ2DFB | R7F100GPK3CFB R7F100GPK2DFB | R7F100GPL3CFB R7F100GPL2DFB | R7F100GPN3CFB R7F100GPN2DFB | R7F100GSJ3CFB R7F100GSJ2DFB | R7F100GSK3CFB R7F100GSK2DFB | R7F100GSL3CFB R7F100GSL2DFB | R7F100GSN3CFB R7F100GSN2DFB |
| RL78 CPU core | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 128K | 192K | 256K | 384K | 512K | 768K | 128K | 192K | 256K | 384K | 512K | 768K | 128K | 192K | 256K | 384K | 512K | 768K | 128K | 192K | 256K | 384K | 512K | 768K | 256K | 384K | 512K | 768K |
| 8K | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16K | 20K | 24K | 32K | 48K | | 16K | 20K | 24K | 32K | 48K | | 16K | 20K | 24K | 32K | 48K | | 16K | 20K | 24K | 32K | 48K | | 24K | 32K | 48K | |
| 32MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 to 20MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1MHz, 2MHz, 3MHz, 4MHz, 6MHz, 8MHz, 12MHz, 16MHz, 24MHz, 32MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1MHz, 2MHz, 4MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32.768kHz (TYP.) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 74 | | | | | | | | | | | | 92 | | | | | | | | | | | | 120 | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | 16 | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 channel in 32-bit mode, 2 channels in 16-bit mode, 4 channels in 8-bit mode | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | | | | | | | | | | | 48 | | | |
| 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | 20 | | | | | | | | | | | | 26 | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function, Trap function, Output level detection function | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $V_{DD}$ = 1.6 to 5.5V (2D: Consumer applications), $V_{DD}$ = 1.8 to 5.5V (3C: Industrial applications) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $T_A$ = –40 to +85°C (2D: Consumer applications), $T_A$ = –40 to +105°C (3C: Industrial applications) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80-LQFP (14×14mm) | | | | | | 80-LFQFP (12×12mm) | | | | | | 100-LQFP (14×20mm) | | | | | | 100-LFQFP (14×14mm) | | | | | | 128-LFQFP (20×20mm) | | | |

## RL78/G24 (20 to 64pins)

| Group | | | RL78/G24 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 20-pin | | 24-pin | | 25-pin | | 30-pin | | 32-pin | | | |
| Product name | | | R7F101G6E4CSP<br>R7F101G6E3CSP<br>R7F101G6E2DSP | R7F101G6G4CSP<br>R7F101G6G3CSP<br>R7F101G6G2DSP | R7F101G7E4CNP<br>R7F101G7E3CNP<br>R7F101G7E2DNP | R7F101G7G4CNP<br>R7F101G7G3CNP<br>R7F101G7G2DNP | R7F101G8E3CLA<br>R7F101G8E2DLA | R7F101G8G3CLA<br>R7F101G8G2DLA | R7F101GAE4CSP<br>R7F101GAE3CSP<br>R7F101GAE2DSP | R7F101GAG4CSP<br>R7F101GAG3CSP<br>R7F101GAG2DSP | R7F101GBE4CNP<br>R7F101GBE3CNP<br>R7F101GBE2DNP | R7F101GBG4CNP<br>R7F101GBG3CNP<br>R7F101GBG2DNP | R7F101GBE3CFP<br>R7F101GBE2DFP | R7F101GBG3CFP<br>R7F101GBG2DFP |
| CPU | | | RL78 CPU core | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 64 | 128 | 64 | 128 | 64 | 128 | 64 | 128 | 64 | 128 | 64 | 128 |
| | Data flash [bytes] | | 4 | | | | | | | | | | | |
| | RAM [bytes] | | 12 | | | | | | | | | | | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 48 MHz | | | | | | | | | | | |
| | | External resonator | 20 MHz | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20 MHz | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 MHz, 2 MHz, 3 MHz, 4 MHz, 6 MHz, 8 MHz, 12 MHz, 16 MHz, 24 MHz, 32 MHz, 48MHz, 64MHz | | | | | | | | | | | |
| | Middle-speed on-chip oscillator [Hz] | | 1 MHz, 2 MHz, 4 MHz | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 32.768 kHz (TYP.) | | | | | | | | | | | |
| | Subclock | | 32.768 kHz ($V_{DD}$ = 1.6 to 5.5 V) | | | | | | | | | | | |
| I/O | I/O ports | | 16 | | 20 | | 21 | | 26 | | 28 | | 28 | |
| | | N-channel open drain (6V tolerance) | — | | | | | | 2 | | | | | |
| Timers | 16-bit timer (TAU,RJ,RD2,RX,RG2) [channels] | | 9 | | | | | | | | | | | |
| | 16-bit timer (KB3) [channels] | | 2 | | 3 | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | |
| | Interval timer [channels] | | 1 | | | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 2 | | | | | | | | | | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | — | | | | | | | | | | | |
| | CSI×1, UART (LIN bus support)×1, Simplified $I^2C$×1 | | — | | | | | | 1 | | 1 | | | |
| | CSI×2, UART (LIN bus support)×1, Simplified $I^2C$×2 | | — | | | | | | | | | | | |
| | $I^2C$ bus | | — | | | | | | 1 | | | | | |
| | $I^2C$ (SM/PM) bus | | — | | | | | | 1 | | | | | |
| | DALI | | — | | | | | | 1 | | | | | |
| Interrupt sources | Internal | | 46 | | 55 | | | | | | | | | |
| | External | | 6 | | 8 | | | | 12 | | | | | |
| Key interrupt | | | — | | | | | | | | | | | |
| Data transfer controller (DTC) | | | 42 | | 47 | | | | 52 | | | | | |
| Event link controller (ELC) | | | 1 | | | | | | | | | | | |
| Programmable gain amplifier (PGA) | | | 1 | | | | | | | | | | | |
| Comparator module | | | 3 | | 4 | | | | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | |
| Peripheral functions | 8/10/12-bit A/D converter [channels] | | 12 | | 13 | | 16 | | | | | | | |
| | 8/10-bit D/A converter [channels] | | 2 to 3 | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function, Output level detection function | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5 V (2D: Consumer applications, 3C: Industrial applications), $V_{DD}$ = 2.7 to 5.5 V (4C: Industrial applications) | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (2D: Consumer applications), $T_A$ = –40 to +105°C (3C: Industrial applications)), $T_A$ = –40 to +125°C (4C: Industrial applications) | | | | | | | | | | | |
| | Package (size [mm]) | | 20-pin LSSOP (4.4×6.5mm) | | 24-pin HWQFN (4×4mm) | | 25-pin WFLGA (3×3mm) | | 30-pin LSSOP (7.62mm(300mil)) | | 32-pin HWQFN (5×5mm) | | 32-pin LQFP (7×7mm) | |

| RL78/G24 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40-pin | | 44-pin | | 48-pin | | | | 52-pin | | 64-pin | | | |
| R7F101GEE4CNP<br>R7F101GEE3CNP<br>R7F101GEE2DNP | R7F101GEG4CNP<br>R7F101GEG3CNP<br>R7F101GEG2DNP | R7F101GFE3CFP<br>R7F101GFE2DFP | R7F101GFG3CFP<br>R7F101GFG2DFP | R7F101GGE4CFB<br>R7F101GGE3CFB<br>R7F101GGE2DFB | R7F101GGG4CFB<br>R7F101GGG3CFB<br>R7F101GGG2DFB | R7F101GGE3CNP<br>R7F101GGE2DNP | R7F101GGG3CNP<br>R7F101GGG2DNP | R7F101GJE4CFA<br>R7F101GJE3CFA<br>R7F101GJE2DFA | R7F101GJG4CFA<br>R7F101GJG3CFA<br>R7F101GJG2DFA | R7F101GLE3CFA<br>R7F101GLE2DFA | R7F101GLG3CFA<br>R7F101GLG2DFA | R7F101GLE3CFB<br>R7F101GLE2DFB | R7F101GLG3CFB<br>R7F101GLG2DFB |
| RL78 CPU core | | | | | | | | | | | | | |
| 64 | 128 | 64 | 128 | 64 | 128 | 64 | 128 | 64 | 128 | 64 | 128 | 64 | 128 |
| 4 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 48 MHz | | | | | | | | | | | | | |
| 20MHz | | | | | | | | | | | | | |
| 1 to 20 MHz | | | | | | | | | | | | | |
| 1 MHz, 2 MHz, 3 MHz, 4 MHz, 6 MHz, 8 MHz, 12 MHz, 16 MHz, 24 MHz, 32 MHz, 48MHz, 64MHz | | | | | | | | | | | | | |
| 1 MHz, 2 MHz, 4 MHz | | | | | | | | | | | | | |
| 32.768 kHz (TYP.) | | | | | | | | | | | | | |
| 32.768 kHz ($V_{DD}$ = 1.6 to 5.5 V) | | | | | | | | | | | | | |
| 36 | | 40 | | 44 | | | | 48 | | 58 | | | |
| 2 | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| 1 | | | | | | | | | | — | | | |
| 1 | | | | | | | | | | 2 | | | |
| 1 | | | | — | | | | | | | | | |
| — | | | | 1 | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | |
| 13 | | | | 15 | | | | | | | | | |
| 4 | | | | 6 | | | | 8 | | | | | |
| 53 | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | |
| Yes | | | | | | | | | | | | | |
| 19 | | 21 | | | | | | 23 | | | | | |
| 2 to 3 | | | | | | | | | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | | | | | | | | | | | |
| Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function, Output level detection function | | | | | | | | | | | | | |
| $V_{DD}$ = 1.6 to 5.5 V (2D: Consumer applications, 3C: Industrial applications), $V_{DD}$ = 2.7 to 5.5 V (4C: Industrial applications) | | | | | | | | | | | | | |
| $T_A$ = –40 to +85°C (2D: Consumer applications), $T_A$ = –40 to +105°C (3C: Industrial applications)), $T_A$ = –40 to +125°C (4C: Industrial applications) | | | | | | | | | | | | | |
| 40-pin HWQFN (6×6mm) | | 44-pin LQFP (10×10mm) | | 48-pin LFQFP (7×7mm) | | 48-pin HWQFN (7×7mm) | | 52-pin LQFP (10×10mm) | | 64-pin LQFP (12×12mm) | | 64-pin LFQFP (10×10mm) | |

## RL78/G1A (25 to 64 pins)

| Group | | | RL78/G1A | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 25-pin | | | | 32-pin | | | | 48-pin | | | | 64-pin | | |
| Product name | | | R5F10E8AALA *2 | R5F10E8CALA *2 | R5F10E8DALA *2 | R5F10E8EALA *2 | R5F10EBAANA *2 | R5F10EBCANA *2 | R5F10EBDANA *2 | R5F10EBEANA *2 | ①R5F10EGAAFB *2 ②R5F10EGAANA *2 | ①R5F10EGCAFB *2 ②R5F10EGCANA *2 | ①R5F10EGDAFB *2 ②R5F10EGDANA *2 | ①R5F10EGEAFB *2 ②R5F10EGEANA *2 | ①R5F10ELCAFB *2 ②R5F10ELCABG *2 | ①R5F10ELDAFB *2 ②R5F10ELDABG *2 | ①R5F10ELEAFB *2 ②R5F10ELEABG *2 |
| CPU | | | RL78 CPU core | | | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 16K | 32K | 48K | 64K | 16K | 32K | 48K | 64K | 16K | 32K | 48K | 64K | 32K | 48K | 64K |
| | Data flash [bytes] | | 4K | | | | | | | | | | | | | | |
| | RAM [bytes] | | 2K | | 3K | 4K | 2K | | 3K | 4K | 2K | | 3K | 4K | 2K | 3K | 4K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 3.6V), 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V), 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V), 1 to 4MHz ($V_{DD}$ = 1.6 to 3.6V) | | | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 32MHz ($V_{DD}$ = 2.7 to 3.6V), 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V), 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V), 1 to 4MHz ($V_{DD}$ = 1.6 to 3.6V) | | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 3.6V) | | | | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | — | | | | | | | | 32.768kHz ($V_{DD}$ = 1.6 to 3.6V) | | | | | | |
| I/O | I/O ports | | 19 | | | | 26 | | | | 42 | | | | 56 | | |
| | | N-channel open drain (6V tolerance) | 2 | | | | 3 | | | | 4 | | | | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 6 | | | | 9 | | | | 11 | | | | 12 | | |
| Timers | 16-bit timer TAU [channels] | | 8, PWM output × 1 | | | | | | | | 8, PWM output × 3 | | | | 8, PWM output × 6 | | |
| | Real-time clock (RTC) [channels] | | 1*1 | | | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 2 | | | | | | | | 1 | | | | — | | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | — | | | | | | | | 1 | | | | 2 | | |
| | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | — | | | | 1 | | | | — | | | | | | |
| | CSI×2, UART (LIN bus support)×1, simplified $I^2C$×2 | | — | | | | | | | | 1 | | | | | | |
| | $I^2C$×1 | | 1 | | | | | | | | | | | | | | |
| DMA [channels] | | | 2 | | | | | | | | | | | | | | |
| External interrupt pins [count] | | | 5 | | | | 6 | | | | 13 | | | | 18 | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | | | | |
| Peripheral functions | 8/12-bit A/D converter [channels] | | 13 | | | | 18 | | | | 24 | | | | 28 | | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD) | | | | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose),<br>RAM parity error detection function, RAM guard function, SFR guard function,<br>illegal memory access detection function, frequency detection function, A/D converter test function | | | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 3.6V | | | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | | | | | | | | | |
| | Package (size [mm]) | | 25-WFLGA (3×3mm) | | | | 32-HWQFN (5×5mm) | | | | ①48-LFQFP (7×7mm)<br>②48-HWQFN (7×7mm) | | | | ①64-LFQFP (10×10mm)<br>②64-VFBGA (4×4mm) | | |

* A dedicated library is required to overwrite the data flash. Refer to [Development Environments] – [Flash Programming Tools] – [Self-Programming Library] on the Renesas website. https://www.renesas.com/flash_libraries
The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Products with pin counts from 25 or 32 pins are not equipped with a subsystem clock, so only the fixed-cycle interrupt function using the low-speed on-chip oscillator clock (15 kHz) is available for use.
*2: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G1C (32 to 48 pins)

| Group | | | RL78/G1C | | | |
|---|---|---|---|---|---|---|
| Pin count | | | 32-pin | | 48-pin | |
| Product name | | | ①R5F10JBCANA*1 ②R5F10JBCAFP*1 | ①R5F10KBCANA*1 ②R5F10KBCAFP*1 | ①R5F10JGCANA*1 ②R5F10JGCAFB*1 | ①R5F10KGCANA*1 ②R5F10KGCAFB*1 |
| CPU | | | RL78 CPU core | | | |
| Memory | Flash ROM [bytes] | | 32K | | | |
| | Data flash [bytes] | | 2K | | | |
| | RAM [bytes] | | 5.5K | | | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 24MHz | | | |
| | | External resonator | 20MHz | | | |
| | | USB clock | 48MHz | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V) | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 48MHz ($V_{DD}$ = 2.7 to 5.5V) | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 2.4 to 5.5V) | | | |
| | Subclock (32.768 kHz) | | 32.768kHz ($V_{DD}$ = 2.4 to 5.5V) | | | |
| I/O | Total I/O ports and dedicated USB pins | | 28*2 | 26*3 | 44*2 | 42*3 |
| | I/O ports | | 22 | | 38 | |
| | | N-channel open drain (6V tolerance) | 3 | | 4 | |
| Timers | 16-bit timer TAU [channels] | | 4 | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | |
| Serial interfaces | CSI×2, UART×1, simplified $I^2C$×2 | | 1 | | | |
| | $I^2C$×1 | | 1 | | | |
| USB | Host [channels] | | 2 | — | 2 | — |
| | Function [channels] | | 1 | | | |
| DMA [channels] | | | 2 | | | |
| External interrupts [channels] | | | 8 | | 10 | |
| OCD | On-chip debugging | | Yes | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 8 | | 9 | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | | | |
| | | | — | | RTC output (1Hz) × 1 | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function, I/O power output signal level detection function | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.4 to 5.5V | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications)*1 | | | |
| | Package (size [mm]) | | ①32-HWQFN (5×5mm) ②32-LFQFP (7×7mm) | | ①48-HWQFN (7×7mm) ②48-LFQFP (7×7mm) | |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.
*2: USB uses pins UVBUS, UVDD, UDP0, UDM0, UDP1, and UDM1.
*3: USB uses pins UVBUS, UVDD, UDP0, and UDM0.

## RL78/G1D (48 pins)

| Group | | | RL78/G1D | | |
|---|---|---|---|---|---|
| Pin count | | | 48-pin | | |
| Product name | | | R5F11AGGANB *1 | R5F11AGHANB *1 | R5F11AGJANB *1 |
| CPU | | | RL78 CPU core | | |
| Memory | Flash ROM [bytes] | | 128K | 192K | 256K |
| | Data flash [bytes] | | 8K | | |
| | RAM [bytes] | | 12K | 16K | 20K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | |
| | | External resonator | 20MHz | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 3.6V), 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V), 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V), 1 to 4MHz ($V_{DD}$ = 1.6 to 3.6V) | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 32MHz ($V_{DD}$ = 2.7 to 3.6V), 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V), 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V), 1 to 4MHz ($V_{DD}$ = 1.6 to 3.6V) | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 3.6V) | | |
| | Subclock (32.768 kHz) | | 32.768kHz ($V_{DD}$ = 1.6 to 3.6V) | | |
| | Crystal resonator for RF [Hz] | | 32MHz | | |
| | Low-speed on-chip oscillator for RF [Hz] | | 32.768kHz (with calibration) | | |
| I/O | I/O ports | | 32 | | |
| | | N-channel open drain (6V tolerance) | 2 | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 9 | | |
| Timers | 16-bit timer TAU [channels] | | 8, PWM output × 7 | | |
| | Real-time clock (RTC) [channels] | | 1 | | |
| | Watchdog timer (WDT) [channels] | | 1 | | |
| | 12-bit Interval timer [channels] | | 12-bit × 1 | | |
| 8/10-bit resolution A/D converter [channels] | | | 8 | | |
| Serial interfaces | CSI, simplified I²C, UART | | 1 | | |
| | CSI, simplified I²C | | 1 | | |
| | UART | | 1 | | |
| | I²C bus | | 1 | | |
| DMA [channels] | | | 4 | | |
| External interrupts [channels] | | | 4 (When using RF, this includes connections between the MCU and the RF transceiver via pins externally connected on the board by the user.) | | |
| OCD | On-chip debugging | | Yes | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 8 | | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | |
| | 2.4 GHz RF transceiver | | Bluetooth v4.2 specification (low energy) supported<br>2.4GHz ISM band, GFSK modulation, TDMA/TDD frequency hopping (on-chip AES encryption circuit), adapter function (during slave operation only) | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 1 | | |
| Safety functions | | | WDT, TRAP instruction, flash memory CRC calculation, RAM parity error detection, illegal memory access detection function, frequency detection function, RAM guard function, SFR guard function, A/D test | | |
| Other | Power supply voltage [V] | | 1.6 to 3.6V ($V_{DD}$ = 1.8 to 3.6V: using DC-DC converter) | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C | | |
| | Package (size [mm]) | | 48-HWQFN (6×6mm) | | |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Industrial grade products are also available. (part number: R5F1xxxxDxx, ambient operating temperature range: –40 to +85°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G1D Module (42 pins)

| Group | | | RL78/G1D Module |
|---|---|---|---|
| Pin count | | | 42-pin |
| Product name | | | RY7011A0000DZ00 |
| CPU | | | RL78 CPU core |
| Memory | Flash ROM [bytes] | | 256K |
| | Data flash [bytes] | | 8K |
| | RAM [bytes] | | 20K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz |
| | | External resonator | 20MHz |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 3.6V), 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V), 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V), 1 to 4Hz ($V_{DD}$ = 1.6 to 3.6V) |
| | High-speed on-chip oscillator [Hz] | | 1 to 32MHz ($V_{DD}$ = 2.7 to 3.6V), 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V), 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V), 1 to 4Hz ($V_{DD}$ = 1.6 to 3.6V) |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 3.6V) |
| | Subclock (32.768 kHz) | | 32.768kHz ($V_{DD}$ = 1.6 to 3.6V) |
| | Crystal resonator for RF [Hz] | | 32MHz |
| | Low-speed on-chip oscillator for RF [Hz] | | 32.768kHz (with calibration) |
| I/O | I/O ports | | 24 |
| | | N-channel open drain (6V tolerance) | 2 |
| | | N-channel open drain ($V_{DD}$ tolerance) | 9 |
| Timers | 16-bit timer TAU [channels] | | 8, PWM output × 7 |
| | Real-time clock (RTC) [channels] | | 1 |
| | Watchdog timer (WDT) [channels] | | 1 |
| | 12-bit Interval timer [channels] | | 12-bit × 1 |
| Serial interfaces | CSI, UART, simplified $I^2C$ | | 1 |
| | CSI, simplified $I^2C$ | | 1 |
| | UART | | 1 |
| | $I^2C$ | | 1 |
| DMA [channels] | | | 4 |
| External interrupt pins [count] | | | 3 |
| OCD | On-chip debugging | | Yes |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 8 |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) |
| | 2.4 GHz RF transceiver | | Bluetooth v4.2 specification (low energy) supported<br>2.4GHz ISM band, GFSK modulation, TDMA/TDD frequency hopping (on-chip AES encryption circuit),<br>adapter function (during slave operation only), transmission output: 0dBm, reception sensitivity: –90dBm |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 1 |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function,<br>RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 3.6V ($V_{DD}$ = 1.8 to 3.6V: using DC-DC converter) |
| | Receive/transmit peak current | | Receive: 3.5mA, transmit: 4.3mA (voltage: 3.0V) |
| | Operating ambient temperature [°C] | | $T_A$ = –25 to +75°C |
| | Radio law compliance | | Japan (MIC), Europe (CE), U.S.A. (FCC), Canada (IC) |
| | Product order number | | RY7011A0000DZ00#001: 2500 pcs (1 reel), RY7011A0000DZ00#002: 100 pcs (1 reel) |
| | Package (size [mm]) | | 42-LGA (8.95×13.35mm) |
| Default software | Supplied software | | Software for checking operation of modem configuration for control by host microcontroller via UART |
| | Supplied profiles | | Proximity profile, find me profile, heart rate profile, time profile, alert notification profile,<br>running speed and cadence profile, health thermometer profile, blood pressure profile,<br>glucose profile, phone alert status profile, general-purpose bidirectional communication, firmware update |

*: A dedicated library is required to use the data flash.

## RL78/G1F (24 to 64 pins)

| Group | | | RL78/G1F | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 24-pin | | 32-pin | | 36-pin | | 48-pin | | 64-pin | |
| Product name | | | R5F11B7CANA *2 | R5F11B7EANA *2 | ①R5F11BBCAFP *2 ②R5F11BBCANA *2 | ①R5F11BBEAFP *2 ②R5F11BBEANA *2 | R5F11BCCALA *2 | R5F11BCEALA *2 | R5F11BGCAFB *2 | R5F11BGEAFB *2 | R5F11BLCAFB *2 | R5F11BLEAFB *2 |
| CPU | | | RL78 CPU core | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 32K | 64K | 32K | 64K | 32K | 64K | 32K | 64K | 32K | 64K |
| | Data flash [bytes] | | 4K | | | | | | | | | |
| | RAM [bytes] | | 5.5K | | | | | | | | | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | |
| | | Clock for timer RD/RX | 64MHz ($V_{DD}$ = 2.7 to 5.5V) | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4Hz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 64MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4Hz ($V_{DD}$ = 1.6 to 5.5V)<br>*Timer RD, RX only, operation at 48 or 64MHz supported | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | |
| | Subclock (32.768 kHz) | | — | | | | 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | |
| I/O | I/O ports | | 20 | | 28 | | 31 | | 44 | | 58 | |
| | | N-channel open drain (6V tolerance) | — | | — | | 2 | | 4 | | 4 | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 10 | | 12 | | 10 | | 12 | | 16 | |
| Timers | 16-bit timer TAU [channels] | | 4, PWM output × 3 | | | | | | | | | |
| | 16-bit timer RJ [channels] | | 1 | | | | | | | | | |
| | 16-bit timer RD [channels] | | 2, PWM output × 6 | | | | | | | | | |
| | 16-bit timer RG [channels] | | 1, PWM output × 1 | | | | | | | | | |
| | 16-bit timer RX [channels] | | 1 | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1*1 | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 2 (including 1 UART with IrDA support) | | | | | | 1 | | — | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | — | | | | | | 1 (including 1 UART with IrDA support) | | 2 (including 1 UART with IrDA support) | |
| | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | 1 | | | | | | — | | — | |
| | CSI×2, UART (LIN bus support)×1, simplified $I^2C$×2 | | — | | | | | | 1 | | | |
| | $I^2C$×1 | | 1 | | | | | | | | | |
| DTC (sources) | | | 30 | | 32 | | 31 | | 32 | | 33 | |
| ELC (inputs/trigger outputs) | | | 21 | | | | | | 22 | | | |
| External interrupt pins [count] | | | 9 | | 11 | | 10 | | 16 | | 20 | |
| OCD | On-chip debugging | | Yes | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 8 | | 13 | | 15 | | 17 | | 17 | |
| | 8-bit D/A converter [channels] | | 1 | | 2 | | | | | | | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit ÷ 32-bit = 32-bit (signed/unsigned) | | | | | | | | | |
| | Comparator | | 2 (with reference voltage generator function) | | | | | | | | | |
| | Programmable-gain amplifier | | 1 | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output (48-pin: 1 channel, 64-pin: 2 channels) | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function, I/O power output signal level detection function | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V | | | | $V_{DD}$ = 1.6 to 5.5V ($EV_{DD}$ support) | | $V_{DD}$ = 1.6 to 5.5V | | $V_{DD}$ = 1.6 to 5.5V ($EV_{DD}$ support) | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | | | | |
| | Package (size [mm]) | | 24-HWQFN (4×4mm) | | 32-LQFP (7×7mm)<br>32-HWQFN (5×5mm) | | 36-WFLGA (4×4mm) | | 48-LFQFP (7×7mm) | | 64-LFQFP (10×10mm) | |

* A dedicated library is required to use the data flash.
The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)
*1: Products with pin counts from 24 or 32 pins are not equipped with a subsystem clock, so only the fixed-cycle interrupt function using the low-speed on-chip oscillator clock (15kHz) is available for use.
*2: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)
For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G1G (30 to 44 pins)

| Group | | | RL78/G1G | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pin count | | | 30-pin | | 32-pin | | 44-pin | |
| Product name | | | R5F11EA8ASP | R5F11EAAASP | R5F11EB8AFP | R5F11EBAAFP | R5F11EF8AFP | R5F11EFAAFP |
| CPU | | | RL78 CPU core | | | | | |
| Memory | Flash ROM [bytes] | | 8K | 16K | 8K | 16K | 8K | 16K |
| | Data flash [bytes] | | — | | | | | |
| | RAM [bytes] | | 1.5K | | | | | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 24MHz | | | | | |
| | | External resonator | 20MHz | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V) | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 48MHz ($V_{DD}$ = 2.7 to 5.5V) *Timer RD only, operation at 48MHz supported | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 2.7 to 5.5V) | | | | | |
| | Subclock (32.768 kHz) | | — | | | | | |
| I/O | I/O ports | | 26 | | 28 | | 40 | |
| | | N-channel open drain (6V tolerance) | — | | | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 7 | | | | | |
| Timers | 16-bit timer TAU [channels] | | 4, PWM output × 3 | | | | | |
| | 16-bit timer RJ [channels] | | 1 | | | | | |
| | 16-bit timer RD [channels] | | 2, PWM output × 6 | | | | | |
| | Real-time clock (RTC) [channels] | | — | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 1 | | | | | |
| | UART×1 | | 1 | | | | | |
| ELC (inputs/trigger outputs) | | | 18/6 | | | | 19/6 | |
| External interrupt pins [count] | | | 6 | | | | 10 | |
| OCD | On-chip debugging | | Yes | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 8 | | | | 12 | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | |
| | Comparator [channels] | | 2 (with reference voltage generator function) | | | | | |
| | Programmable-gain amplifier | | 1 | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function, I/O power output signal level detection function | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.7 to 5.5V | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications) | | | | | |
| | Package (size [mm]) | | 30-LSSOP (7.62mm) | | 32-LQFP (7×7mm) | | 44-LQFP (10×10mm) | |

## RL78/G1H (64 pins)

| Group | | RL78/G1H | | |
|---|---|---|---|---|
| Pin count | | 64-pin | | |
| Product name | | R5F11FLJANA *1 | R5F11FLKANA *1 | R5F11FLLANA *1 |
| CPU | | RL78 CPU core | | |
| Memory | Flash ROM [bytes] | 256KB | 384KB | 512KB |
| | Data flash [bytes] | 8KB | | |
| | RAM [bytes] | 24KB | 32KB | 48KB |
| Main system clock | High-speed system clock | X1 (crystal/ceramic) oscillator, external main system clock input (EXCLK),<br>HS (high-speed main) mode: 1 to 20MHz ($V_{DD}$ = 2.7 to 3.6V), HS (high-speed main) mode: 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V),<br>LS (low-speed main) mode: 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V) | | |
| | High-speed on-chip oscillator clock | HS (high-speed main) mode: 1 to 32MHz ($V_{DD}$ = 2.7 to 3.6V), HS (high-speed main) mode: 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V),<br>LS (low-speed main) mode: 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V) | | |
| Subclock (32.768 kHz) | | XT1 (crystal) oscillator, external subsystem clock input (EXCLKS)<br>32.768kHz (TYP.) | | |
| Low-speed on-chip oscillator [Hz] | | 15kHz (TYP.) | | |
| RF reference clock | | 48MHz (TYP.) | | |
| General-purpose register | | 8 bits × 32 registers (8 bits × 8 registers × 4 banks) | | |
| Minimum instruction execution time | | 0.03125μs (High-speed on-chip oscillator clock: $f_{IH}$ = 32MHz operation) | | |
| | | 0.05μs (High-speed system clock: $f_{MX}$ = 20MHz operation) | | |
| | | 30.5μs (Subsystem clock: $f_{SUB}$ = 32.768kHz operation) | | |
| Instruction set | | Data transfer (8/16bits), Adder and subtractor/logical operation (8/16bits), Multiplication (8bits × 8bits, 16bits × 16bits), Division (16bits ÷ 16bits, 32bits ÷ 32bits),<br>Multiplication and Accumulation (16bits × 16bits + 32bits), Rotate, barrel shift, and bit manipulation (set, reset, test, and boolean operation), etc. | | |
| I/O ports | Total | 41 | | |
| | CMOS I/O | 26 | | |
| | CMOS input | 5 | | |
| | CMOS output | 1 | | |
| | N-ch open-drain I/O (6V tolerance) | 4 | | |
| | GPIO (RF unit) | 5 | | |
| SubGHz<br>RF transceiver | Operating frequency band | 863MHz to 928MHz | | |
| | Modulation scheme / Data rate (kbps) | 2FSK/GFSK: 10/20/40/50/100/150/200/300 4FSK/GFSK: 200/400 | | |
| | Quiescent current (RF portion) | Vcc=3.3V, typ. RX: 6.3mA, RX wait: 5.8mA / TX: 20mA (+10dBm) | | |
| | Receiving sensitivity | –114dBm (GFSK 10Kbps, BER<0.1%) –104dBm (GFSK 100Kbps, BER < 0.1%) | | |
| | Support IEEE802.15.4e/g | Dual Sub-GHz Communication filtering, Transmission frame auto-generation function, *Preamble length: 4 – 1000 Bytes can be set, Auto ACK Reply / Reception function support | | |
| Timers | 16-bit timer [channels] | 9 | | |
| | Watchdog timer (WDT) [channels] | 1 | | |
| | Real-time clock (RTC) [channels] | 1 | | |
| | 12-bit interval timer | 1 | | |
| | Timer output | 1 | | |
| Serial interfaces | | CSI/UART: 2 channels, CSI: 2 channels (1 channel of 2 channels is used for the internal communication between MCU and RF transceiver.) | | |
| | I²C Bus | 2 | | |
| DTC (sources) | | 21 | | |
| Vectored interrupt sources | Internal | 26 | | |
| | External | 7 | | |
| OCD | On-chip debugging | Yes | | |
| Peripheral functions | 10-bit resolution A/D converter | 6 | | |
| | Multiplier/divider/multiply-accumulator | Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned), Divide: 32-bit ÷ 32-bit = 32-bit (unsigned),<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | |
| | Reset | Reset by RESET# pin, Internal reset by watchdog timer, Internal reset by power-on-reset, Internal reset by voltage detector,<br>Internal reset by illegal instruction execution, Internal reset by RAM parity error, Internal reset by illegal-memory access | | |
| | Power-on-reset circuit | Power-on-reset: 1.51 (TYP.), Power-down-reset: 1.50 (TYP.) | | |
| | Voltage detector | Rising edge: 1.88V to 3.13V (10 stages), Falling edge: 1.84V to 3.06V (10 stages) | | |
| | Clock output/buzzer output | 2 | | |
| | | 2.44kHz, 4.88kHz, 9.76kHz, 1.25MHz, 2.5MHz, 5MHz, 10MHz (Main system clock: $f_{MAIN}$ = 20MHz operation),<br>256Hz, 512Hz, 1.024kHz, 2.048kHz, 4.096kHz, 8.192kHz, 16.384kHz, 32.768kHz (Subsystem clock: $f_{SUB}$ = 32.768kHz operation) | | |
| Other | Power supply voltage [V] | $V_{DD}$ = 1.8 to 3.6V | | |
| | Operating ambient temperature [°C] | $T_A$ = –40 to +85°C (A: Consumer applications, D: Industrial applications) | | |
| | Package (size [mm]) | 64-HVQFN (9×9mm) | | |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)

*1: Industrial grade products are also available. (part number: R5F1xxxxDxx, ambient operating temperature range: –40 to +85°C)

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/G1M (20 pins)

| Group | | | RL78/G1M | |
|---|---|---|---|---|
| Pin count | | | 20-pin | |
| Product name | | | R5F11W67ASM<br>R5F11W67DSM | R5F11W68ASM<br>R5F11W68DSM |
| CPU | | | RL78 CPU core | |
| Memory | Flash ROM [bytes] | | 4K | 8K |
| | RAM [bytes] | | 0.5K | 1K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 20MHz | |
| Clock generator circuit | High-speed on-chip oscillator [Hz] | | 1.25 to 20MHz ($V_{DD}$ = 2.7 to 5.5V)<br>1.25 to 5MHz ($V_{DD}$ = 2.0 to 5.5V*1) | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz (TYP.) | |
| I/O | I/O ports | | 18 | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 14 | |
| Timers | 16-bit timer TAU [channels] | | 4 | |
| | Watchdog timer (WDT) [channels] | | 1 | |
| | Interval timer [channels] | | 12-bit × 1 | |
| Serial interfaces | | | CSI: 1 channel, UART: 1 channel | |
| Interrupt sources | Internal | | 12 | |
| | External | | 7 | |
| OCD | On-chip debugging | | Yes | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 8 | |
| | Other functions | | Power-on reset (POR), Clock/buzzer output × 1, Real time output × 8 | |
| Safety function | | | Trap function | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.0 to 5.5V*1 | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C | |
| | Package (size [mm]) | | 20-TSSOP (4×4mm) | |

*1: Use this product within the voltage range from 2.25 to 5.5V because the detection voltage (VSPOR) of the selectable power-on-reset (SPOR) circuit should also be considered.

## RL78/G1N (20 pins)

| Group | | | RL78/G1N | |
|---|---|---|---|---|
| Pin count | | | 20-pin | |
| Product name | | | R5F11Y67ASM<br>R5F11Y67DSM | R5F11Y68ASM<br>R5F11Y68DSM |
| CPU | | | RL78 CPU core | |
| Memory | Flash ROM [bytes] | | 4K | 8K |
| | RAM [bytes] | | 0.5K | 1K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 20MHz | |
| Clock generator circuit | High-speed on-chip oscillator [Hz] | | 1.25 to 20MHz ($V_{DD}$ = 2.7 to 5.5V)<br>1.25 to 5MHz ($V_{DD}$ = 2.0 to 5.5V*1) | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz (TYP.) | |
| I/O | I/O ports | | 18 | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 14 | |
| | | P-ch open-drain output (high current pin) | 6 | |
| Timers | 16-bit timer TAU [channels] | | 4 | |
| | Watchdog timer (WDT) [channels] | | 1 | |
| | Interval timer [channels] | | 12-bit × 1 | |
| Serial interfaces | | | CSI: 1 channel, UART: 1 channel | |
| Interrupt sources | Internal | | 12 | |
| | External | | 7 | |
| OCD | On-chip debugging | | Yes | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 8 | |
| | Other functions | | Power-on reset (POR), Clock/buzzer output × 1 | |
| Safety function | | | Trap function | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.0 to 5.5V*1 | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C | |
| | Package (size [mm]) | | 20-TSSOP (4×4mm) | |

*1: Use this product within the voltage range from 2.25 to 5.5V because the detection voltage (VSPOR) of the selectable power-on-reset (SPOR) circuit should also be considered.

## RL78/G1P (24 to 32 pins)

| Group | | | RL78/G1P | |
|---|---|---|---|---|
| Pin count | | | 24-pin | 32-pin |
| Product name | | | R5F11Z7AANA<br>R5F11Z7ADNA | R5F11ZBAAFP<br>R5F11ZBADFP |
| CPU | | | RL78 CPU core | |
| Memory | Flash ROM [bytes] | | 16K | |
| | Data flash [bytes] | | 2K | |
| | RAM [bytes] | | 1.5K | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | |
| | | External resonator | 20MHz | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 3.6V) | |
| | High-speed on-chip oscillator [Hz] | | 1 to 32MHz ($V_{DD}$ = 2.7 to 3.6V) | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz (TYP.) ($V_{DD}$ = 2.7 to 3.6V) | |
| I/O | I/O ports | | 20 | 28 |
| | | N-channel open drain (6V tolerance) | 2 | 2 |
| Timers | 16-bit timer TAU [channels] | | 4 | |
| | Watchdog timer (WDT) [channels] | | 1 | |
| Serial interfaces | | | CSI: 1 channel, UART: 1 channel<br>1 channel (2 slave addresses) | |
| DMA [channels] | | | 2 | |
| Interrupt sources | Internal | | 12 | |
| | External | | 6 | |
| OCD | On-chip debugging | | Yes | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 6 | 8 |
| | 10-bit D/A CONVERTER [ch] | | 2 | |
| | EVENT LINK CONTROLLER (ELC) | | Event input: 10, Event trigger output: 3 | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output × 2 | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory accessdetection function, frequency detection function, A/D converter test function, Trap function | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.7 to 3.6V | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C | |
| | Package (size [mm]) | | 24-HWQFN (4×4mm) | 32-LQFP (7×7mm) |

## RL78/L12 (32 to 64 pins)

| Group | | | RL78/L12 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 32-pin | | | 44-pin | | | 48-pin | | | 52-pin | | | 64-pin | |
| Product name | | | R5F10RB8AFP *4 | R5F10RBAAFP *4 | R5F10RBCAFP *4 | R5F10RF8AFP *4 | R5F10RFAAFP *4 | R5F10RFCAFP *4 | R5F10RG8AFB *4 | R5F10RGAAFB *4 | R5F10RGCAFB *4 | R5F10RJ8AFA *4 | R5F10RJAAFA *4 | R5F10RJCAFA *4 | ①R5F10RLAAFB *4 ②R5F10RLAAFA *4 ③R5F10RLAANB *4 | ①R5F10RLCAFB *4 ②R5F10RLCAFA *4 ③R5F10RLCANB *4 |
| CPU | | | RL78 CPU core | | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 8K | 16K | 32K | 8K | 16K | 32K | 8K | 16K | 32K | 8K | 16K | 32K | 16K | 32K |
| | Data flash [bytes] | | 2K | | | | | | | | | | | | | |
| | RAM [bytes]*1 | | 1K | 1K | 1.5K | 1K | 1K | 1.5K | 1K | 1K | 1.5K | 1K | 1K | 1.5K | 1K | 1.5K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 24MHz | | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 24MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | — | | | 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | | | | | |
| I/O | Total I/O ports and LCD pins (SEG and COM) | | 28 | | | 40 | | | 44 | | | 48 | | | 58 | |
| | | I/O ports | 20 | | | 29 | | | 33 | | | 37 | | | 47 | |
| | | N-channel open drain ($EV_{DD}$ tolerance) | 2 | | | | | | | | | | | | | |
| LCD controller/Driver | | | Selectable among internal voltage boost, capacitor split, and external resistance division | | | | | | | | | | | | | |
| | Segment signal outputs | | 13 | | | 22 (18)*2 | | | 26 (22)*2 | | | 30 (26)*2 | | | 39 (35)*2 | |
| | Common signal outputs | | 4 | | | 4 (8)*2 | | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 4, PWM output × 3 | | | 5, PWM output × 4 | | | 6, PWM output × 5 | | | 8, PWM output × 7 | | | | |
| | Real-time clock (RTC) [channels] | | 1*3 | | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | | |
| | Interval timer [channels] | | 1 | | | | | | | | | | | | | |
| Serial interfaces | CSI×2/UART (LIN bus support)×1 | | 1 | | | | | | | | | | | | | |
| | $I^2C$×1 | | 1 | | | | | | | | | | | | | |
| DMA [channels] | | | 2 | | | | | | | | | | | | | |
| External interrupts [channels] | | | 4 | | | 6 | | | 7 | | | | | | 9 | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 4 | | | 7 | | | 9 | | | 10 | | | | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output, Remote control carrier wave output × 1 | | | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function | | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V | | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications)<br>$T_A$ = –40 to +105°C (G: Industrial applications)*4 | | | | | | | | | | | | | |
| | Package (size [mm]) | | 32-LQFP (7×7mm) | | | 44-LQFP (10×10mm) | | | 48-LFQFP (7×7mm) | | | 52-LQFP (10×10mm) | | | ①64-LFQFP (10×10mm)<br>②64-LQFP (12×12mm)<br>③64-HWQFN (8×8mm) | ①64-LFQFP (10×10mm)<br>②64-LQFP (12×12mm)<br>③64-HWQFN (8×8mm) |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)

*1: 630 bytes when using self-programming function and data flash function.

*2: Figure in parentheses ( ) is number of signal lines when using 8 COM.

*3: Products with a pin count of 32 pins are not equipped with a subsystem clock, so only the fixed-cycle interrupt function using the low-speed on-chip oscillator clock (15kHz) is available for use.

*4: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

# MEMO

## RL78/L13 (64 to 80 pins)

| Group | | | RL78/L13 | | | | |
|---|---|---|---|---|---|---|---|
| Pin count | | | 64-pin | | | | |
| Product name | | | ①R5F10WLAAFB *2<br>②R5F10WLAAFA | ①R5F10WLCAFB *2<br>②R5F10WLCAFA | ①R5F10WLDAFB *2<br>②R5F10WLDAFA | ①R5F10WLEAFB *2<br>②R5F10WLEAFA | ①R5F10WLFAFB *2<br>②R5F10WLFAFA |
| CPU | | | RL78 CPU core | | | | |
| Memory | Flash ROM [bytes] | | 16K | 32K | 48K | 64K | 96K |
| | Data flash [bytes] | | 4K | | | | |
| | RAM [bytes] | | 1K | 1.5K | 2K | 4K | 6K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 24MHz | | | | |
| | | External resonator | 20MHz | | | | |
| | | Timer KB20 clock | 48MHz ($V_{DD}$ = 2.7 to 5.5V) | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 24MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | |
| | Subclock (32.768 kHz) | | 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | |
| I/O | Total I/O ports and LCD pins (SEG and COM) | | 57 | | | | |
| | I/O ports | | 49 | | | | |
| | | N-channel open drain (6V tolerance) | 2 | | | | |
| LCD controller | LCD drive voltage generation method | | Selectable among internal voltage boost, capacitor split, and external resistance division | | | | |
| | Segment signal outputs | | 36 (32)*1 | | | | |
| | Common signal outputs | | 4 (8)*1 | | | | |
| Timers | 16-bit timer TAU [channels] | | 8 , PWM output × 7 | | | | |
| | 16-bit timer KB20 [channels] | | 1, PWM output × 2 | | | | |
| | Real-time clock2 (RTC2) [channels] | | 1 (0.96 ppm minimum resolution) | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | |
| Serial interfaces | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | 1 | | | | |
| | CSI×1, UART×1, simplified I2C×1 | | 1 | | | | |
| | UART×1 | | 1 | | | | |
| | $I^2C$×1 | | 1 | | | | |
| DMA [channels] | | | 4 | | | | |
| External interrupts [channels] | | | 9 | | | | |
| OCD | On-chip debugging | | Yes | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 9 | | | | |
| | Comparator [channels] | | 2 | | | | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), RTC output (1 Hz) × 1, clock/buzzer output × 2, remote control carrier wave output × 1 | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function, I/O power output signal level detection function | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 5.5V | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications)<br>$T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | |
| | Package (size [mm]) | | ①64-LFQFP (10×10mm)<br>②64-LQFP (12×12mm) | | | | |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)

*1: Figure in parentheses ( ) is number of signal lines when using 8 COM.

*2: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

| RL78/L13 | | | | | | |
|---|---|---|---|---|---|---|
| 64-pin | 80-pin | | | | | |
| ①R5F10WLGAFB *2<br>②R5F10WLGAFA | ①R5F10WMAAFB *2<br>②R5F10WMAAFA | ①R5F10WMCAFB *2<br>②R5F10WMCAFA | ①R5F10WMDAFB *2<br>②R5F10WMDAFA | ①R5F10WMEAFB *2<br>②R5F10WMEAFA | ①R5F10WMFAFB *2<br>②R5F10WMFAFA | ①R5F10WMGAFB *2<br>②R5F10WMGAFA |
| RL78 CPU core | | | | | | |
| 128K | 16K | 32K | 48K | 64K | 96K | 128K |
| 4K | | | | | | |
| 8K | 1K | 1.5K | 2K | 4K | 6K | 8K |
| 24MHz | | | | | | |
| 20MHz | | | | | | |
| 48MHz ($V_{DD}$ = 2.7 to 5.5V) | | | | | | |
| 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | |
| 1 to 24MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.8 to 5.5V), 1 to 4MHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | |
| 15kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | |
| 32.768kHz ($V_{DD}$ = 1.6 to 5.5V) | | | | | | |
| 57 | 73 | | | | | |
| 49 | 65 | | | | | |
| 2 | | | | | | |
| Selectable among internal voltage boost, capacitor split, and external resistance division | | | | | | |
| 36 (32)*1 | 51 (47)*1 | | | | | |
| 4 (8)*1 | | | | | | |
| 8 , PWM output × 7 | | | | | | |
| 1, PWM output × 2 | | | | | | |
| 1 (0.96 ppm minimum resolution) | | | | | | |
| 1 | | | | | | |
| 12-bit × 1 | | | | | | |
| 1 | | | | | | |
| 1 | | | | | | |
| 1 | 2 | | | | | |
| 1 | | | | | | |
| 4 | | | | | | |
| 9 | | | | | | |
| Yes | | | | | | |
| 9 | 12 | | | | | |
| 2 | | | | | | |
| Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), RTC output (1 Hz) × 1, clock/buzzer output × 2, remote control carrier wave output × 1 | | | | | | |
| Flash memory CRC calculation function (high-speed), CRCcalculation function (general-purpose), RAM parity error detection function,<br>RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function,<br>I/O power output signal level detection function | | | | | | |
| $V_{DD}$ = 1.6 to 5.5V | | | | | | |
| $T_A$ = –40 to +85°C (A: Consumer applications)<br>$T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | |
| ①64-LFQFP (10×10mm)<br>②64-LQFP (12×12mm) | ①80-LFQFP (12×12mm)<br>②80-LQFP (14×14mm) | | | | | |

## RL78/L1A (80 to 100 pins)

| Group | | | RL78/L1A | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pin count | | | 80-pin | | | 100-pin | | |
| Product name | | | R5F11MMDAFB | R5F11MMEAFB | R5F11MMFAFB | R5F11MPEAFB | R5F11MPFAFB | R5F11MPGAFB |
| CPU | | | RL78 CPU core | | | | | |
| Memory | Flash ROM [bytes] | | 48K | 64K | 96K | 64K | 96K | 128K |
| | Data flash [bytes] | | 8K | | | | | |
| | RAM [bytes] | | 5.5K | | | | | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 24MHz | | | | | |
| | | External resonator | 20MHz | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz: $V_{DD}$ = 2.7 to 3.6V, 1 to 8MHz: $V_{DD}$ = 1.8 to 2.7V | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 24MHz ($V_{DD}$ = 2.7 to 3.6V), 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V), 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V) | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.8V to 3.6V) | | | | | |
| | Subclock (32.768 kHz) | | 32.768kHz ($V_{DD}$ = 1.8 to 3.6V) | | | | | |
| I/O | Total I/O ports and LCD pins | | 59 | | | 79 | | |
| LCD controller | LCD drive voltage generation method | | Selectable among internal voltage boost, capacitor split, and external resistance division | | | | | |
| | Segment signal outputs | | 32 (28)*1 | | | 45 (41)*1 | | |
| | Common signal outputs | | 4 (8)*1 | | | | | |
| Timers | 16-bit timer TAU [channels] | | 8 (Timer output × 8, PWM output × 7) | | | | | |
| | 8/16-bit interval timer [channels] | | 2 (8-bit)/1 (16-bit) | | | | | |
| | Real-time clock2 (RTC2) [channels] | | 1 | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | |
| | 12-bit interval timer [channels] | | 1 | | | | | |
| Serial interfaces | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | 1 | | | | | |
| | CSI×1, UART×1, simplified $I^2C$×1 | | 3 | | | | | |
| | $I^2C$×1 | | 1 | | | | | |
| DTC (sources) | | | 30 | | | | | |
| ELC (inputs/trigger outputs) | | | Event inputs: 22, event outputs: 8 | | | | | |
| External interrupts [channels] | | | 8 | | | | | |
| OCD | On-chip debugging | | Yes | | | | | |
| Peripheral functions | 8/12-bit A/D converter[ch] | | 10 | | | 14 | | |
| | 12-bit D/A converter [channels] | | 3 | | | | | |
| | Op-amp [channels] | | 3 (of which, 2 channels have 2 I/O switches) | | | 3 (of which, 2 channels have 4 I/O switches) | | |
| | Reference voltage | | 2.5/2.048/1.8/1.5V | | | | | |
| | Comparator [channels] | | 1 | | | | | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), RTC output (1 Hz) × 1, clock/buzzer output × 2 | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function, I/O power output signal level detection function | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.8 to 3.6V | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications) | | | | | |
| | Package (size [mm]) | | 80-LQFP (12×12mm) | | | 100-LQFP (14×14mm) | | |

*1: Figure in parentheses ( ) is number of signal lines when using 8 COM.

# MEMO

## RL78/L1C (80 to 100 pins)

| Group | | | RL78/L1C (USB) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 80-pin | | | | | 85-pin | | | | | 100-pin | | | | |
| Product name | | | R5F110MEAFB *2 | R5F110MFAFB *2 | R5F110MGAFB *2 | R5F110MHAFB *2 | R5F110MJAFB *2 | R5F110NEALA *2 | R5F110NFALA *2 | R5F110NGALA *2 | R5F110NHALA *2 | R5F110NJALA *2 | R5F110PEAFB *2 | R5F110PFAFB *2 | R5F110PGAFB *2 | R5F110PHAFB *2 | R5F110PJAFB *2 |
| CPU | | | RL78 CPU core | | | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 64K | 96K | 128K | 192K | 256K | 64K | 96K | 128K | 192K | 256K | 64K | 96K | 128K | 192K | 256K |
| | Data flash [bytes] | | 8K | | | | | | | | | | | | | | |
| | RAM [bytes] | | 8K | 10K | 12K | 16K | 16K | 8K | 10K | 12K | 16K | 16K | 8K | 10K | 12K | 16K | 16K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 24MHz | | | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | | | |
| | | Timer KB2 clock, USB clock | 48MHz ($V_{DD}$ = 2.7 to 3.6V) | | | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 3.6V), 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V), 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V), 1 to 4MHz ($V_{DD}$ = 1.6 to 3.6V) | | | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 48MHz ($V_{DD}$ = 2.7 to 3.6V), 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V), 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V), 1 to 4MHz ($V_{DD}$ = 1.6 to 3.6V) | | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 3.6V) | | | | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | 32.768kHz ($V_{DD}$ = 1.6 to 3.6V) | | | | | | | | | | | | | | |
| I/O | Total I/O ports and LCD pins (SEG and COM)*3 | | 71 | | | | | | | | | | 89 | | | | |
| | | I/O ports | 59 | | | | | | | | | | 77 | | | | |
| | | N-channel open drain (6V tolerance) | 2 | | | | | | | | | | | | | | |
| LCD controller | LCD drive voltage generation method | | Selectable among internal voltage boost, capacitor split, and external resistance division | | | | | | | | | | | | | | |
| | Segment signal outputs | | 44 (40)*1 | | | | | | | | | | 56 (52)*1 | | | | |
| | Common signal outputs | | 4 (8)*1 | | | | | | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 8 (PWM output × 7) | | | | | | | | | | | | | | |
| | 16-bit timer KB20 [channels] | | 3 (PWM output × 6) | | | | | | | | | | | | | | |
| | Real-time clock2 (RTC2) [channels] | | 1 (0.96 ppm accuracy correction) | | | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | | | | | | | | | | |
| Serial interfaces | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | 1 | | | | | | | | | | | | | | |
| | CSI×1, UART×1, simplified $I^2C$×1 | | 3 | | | | | | | | | | | | | | |
| | $I^2C$×1 | | 1 | | | | | | | | | | | | | | |
| USB | Function [channels] | | 1 | | | | | | | | | | | | | | |
| DTC (sources) | | | 32 | | | | | | | | | | 33 | | | | |
| ELC (inputs/trigger outputs) | | | 30 | | | | | | | | | | 31 | | | | |
| External interrupts [channels] | | | 9 | | | | | | | | | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | | | | |
| Peripheral functions | 8/12-bit A/D converter [channels] | | 9 | | | | | | | | | | 13 | | | | |
| | 8-bit D/A converter [channels] | | 2 | | | | | | | | | | | | | | |
| | Comparator [channels] | | 1 | | | | | | | | | | 2 | | | | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), RTC output (1 Hz) × 1, clock/buzzer output × 2, remote control carrier wave output × 1 | | | | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function, I/O power output signal level detection function | | | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 3.6V | | | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | | | | | | | | | |
| | Package (size [mm]) | | 80-LFQFP (12×12mm) | | | | | 85-VFLGA (7×7mm) | | | | | 100-LFQFP (14×14mm) | | | | |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)

*1: Figure in parentheses ( ) is number of signal lines when using 8 COM.

*2: Industrial grade products are also available. (part number: R5F1xxxGxx, ambient operating temperature range: –40 to +105°C)

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

*3: LCD uses SEG pins and COM pins. USB uses UVBUS, UREGC, UDP, and UDM pins.

## RL78/L1C (80 to 100 pins)

| Group | | | RL78/L1C (no USB) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 80-pin | | | | | 85-pin | | | | | 100-pin | | | | |
| Product name | | | R5F111MEAFB *2 | R5F111MFAFB *2 | R5F111MGAFB *2 | R5F111MHAFB *2 | R5F111MJAFB *2 | R5F111NEALA *2 | R5F111NFALA *2 | R5F111NGALA *2 | R5F111NHALA *2 | R5F111NJALA *2 | R5F111PEAFB *2 | R5F111PFAFB *2 | R5F111PGAFB *2 | R5F111PHAFB *2 | R5F111PJAFB *2 |
| CPU | | | RL78 CPU core | | | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 64K | 96K | 128K | 192K | 256K | 64K | 96K | 128K | 192K | 256K | 64K | 96K | 128K | 192K | 256K |
| | Data flash [bytes] | | 8K | | | | | | | | | | | | | | |
| | RAM [bytes] | | 8K | 10K | 12K | 16K | 16K | 8K | 10K | 12K | 16K | 16K | 8K | 10K | 12K | 16K | 16K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 24MHz | | | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | | | |
| | | Timer KB2 clock, USB clock | 48MHz ($V_{DD}$ = 2.7 to 3.6V) | | | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 3.6V), 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V), 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V), 1 to 4MHz ($V_{DD}$ = 1.6 to 3.6V) | | | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 48MHz ($V_{DD}$ = 2.7 to 3.6V), 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V), 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V), 1 to 4MHz ($V_{DD}$ = 1.6 to 3.6V) | | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz (TYP.): $V_{DD}$ = 1.6 to 3.6V | | | | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | 32.768kHz ($V_{DD}$ = 1.6 to 3.6V) | | | | | | | | | | | | | | |
| I/O | Total I/O ports and LCD pins (SEG and COM)*3 | | 71 | | | | | | | | | | 89 | | | | |
| | I/O ports | | 63 | | | | | | | | | | 81 | | | | |
| | | N-channel open drain (6V tolerance) | 2 | | | | | | | | | | | | | | |
| LCD controller | LCD drive voltage generation method | | Selectable among internal voltage boost, capacitor split, and external resistance division | | | | | | | | | | | | | | |
| | Segment signal outputs | | 44 (40)*1 | | | | | | | | | | 56 (52)*1 | | | | |
| | Common signal outputs | | 4 (8)*1 | | | | | | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 8 (PWM output × 7) | | | | | | | | | | | | | | |
| | 16-bit timer KB20 [channels] | | 3 (PWM output × 6) | | | | | | | | | | | | | | |
| | Real-time clock2 (RTC2) [channels] | | 1 (0.96 ppm accuracy correction) | | | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | | | | | | | | | | | | |
| Serial interfaces | CSI×1, UART (LIN bus support)×1, simplified $I^2C$×1 | | 1 | | | | | | | | | | | | | | |
| | CSI×1, UART×1, simplified $I^2C$×1 | | 3 | | | | | | | | | | | | | | |
| | $I^2C$×1 | | 1 | | | | | | | | | | | | | | |
| DTC (sources) | | | 30 | | | | | | | | | | 31 | | | | |
| ELC (inputs/trigger outputs) | | | 30 | | | | | | | | | | 31 | | | | |
| External interrupts [channels] | | | 9 | | | | | | | | | | | | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | | | | |
| Peripheral functions | 8/12-bit A/D converter [channels] | | 11 | | | | | | | | | | 13 | | | | |
| | 8-bit D/A converter [channels] | | 2 | | | | | | | | | | | | | | |
| | Comparator [channels] | | 1 | | | | | | | | | | 2 | | | | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), RTC output (1 Hz) × 1, clock/buzzer output × 2, remote control carrier wave output × 1 | | | | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function, I/O power output signal level detection function | | | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 3.6V | | | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications), $T_A$ = –40 to +105°C (G: Industrial applications)*2 | | | | | | | | | | | | | | |
| | Package (size [mm]) | | 80-LFQFP (12×12mm) | | | | | 85-VFLGA (7×7mm) | | | | | 100-LFQFP (14×14mm) | | | | |

The above part numbers are consumer grade products. (ambient operating temperature range : –40 to +85°C)

*1: Figure in parentheses ( ) is number of signal lines when using 8 COM.

*2: Industrial grade products are also available. (part number: R5F1xxxxGxx, ambient operating temperature range: –40 to +105°C)

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/H1D (48 to 80 pins)

| Group | | | RL78/H1D | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 48-pin | | 64-pin | | | | 80-pin | | | |
| Product name | | | R5F11NGGAFB | R5F11NGFAFB | R5F11PLGABG | R5F11PLFABG | R5F11NLGAFB | R5F11NLFAFB | R5F11NMGAFB | R5F11NMFAFB | R5F11NMEAFB | R5F11RMGDFB |
| CPU | | | RL78 CPU core | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 128KB | 96KB | 128KB | 96KB | 128KB | 96KB | 128KB | 96KB | 64KB | 128KB |
| | Data flash [bytes] | | 4KB | | | | | | | | | |
| | RAM [bytes] | | 5.5KB | | | | | | | | | 8KB |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 24MHz | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz: $V_{DD}$ = 2.7 to 5.5V, 1 to 16MHz: $V_{DD}$ = 2.4 to 2.7V | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 24MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 16MHz ($V_{DD}$ = 2.4 to 2.7V) | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 2.4V to 5.5V) | | | | | | | | | |
| | Subclock (32.768 kHz) | | 32.768kHz ($V_{DD}$ = 2.4 to 5.5V) | | | | | | | | | |
| I/O | Total I/O ports and LCD pins | | 29 | | | | 36 | | 53 | | | 63 |
| LCD controller | LCD drive voltage generation method | | Selectable among internal voltage boost, capacitor split, and external resistance division | | | | | | | | | |
| | Segment signal outputs | | — | | | | 27 (23)*1 | | 36 (32)*1 | | | |
| | Common signal outputs | | — | | | | 4 (8) *1 | | | | | |
| Timers | 16-bit timer TAU [channels] | | 8 (Timer output: 8, PWM output: 7) | | | | | | | | | |
| | 8/16-bit interval timer [channels] | | 2 (8-bit)/1 (16-bit) | | | | | | | | | 6 (8-bit)/3 (16-bit) |
| | Real-time clock2 (RTC2) [channels] | | 1 | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | |
| | 12-bit interval timer [channels] | | 1 | | | | | | | | | |
| | 16-bit timer RJ [channels] | | — | | | | | | | | | 2, Timer output: 2 |
| | External signal sampler [channels] | | — | | | | | | | | | 1 |
| | Sampling output timer detector (SMOTD) [channels] | | — | | | | | | | | | Input: 6, Output: 3 |
| Serial interfaces | CSI×1, UART (LIN bus support)×1, simplified I²C×1 | | | | | | | | | | | |
| | CSI×1, UART×1, simplified I²C×1 | | 2 | | | | | | | | | |
| | I²C×1 | | 1 | | | | | | | | | |
| | Serial interface UARTMG | | — | | | | | | | | | 1 |
| DTC (sources) | | | 24 | | | | 25 | | 26 | | | 35 |
| ELC (inputs/trigger outputs) | | | Event input: 19<br>Event trigger output: 10 | | | | Event input: 18<br>Event trigger output: 10 | | Event input: 20<br>Event trigger output: 7 | | | Event input: 26<br>Event trigger output: 5 |
| External interrupts [channels] | | | 7 | | | | 6 | | 8 | | | |
| OCD | On-chip debugging | | Yes | | | | | | | | | |
| Peripheral functions | 24-bit ΔΣ A/D converter with programmable gain instrumentation amplifier 0 (PGA0) | | Analog input:<br>2 channels (differential or single-ended),<br>3 channels (single-ended) | | | | Analog input:<br>1 channel (differential or single-ended),<br>3 channels (single-ended) | | Analog input:<br>1 channel (differential or single-ended) | | | — |
| | 8/10-bit resolution A/D converter | External [channels] | 3 | | | | | | | | | |
| | | Internal [channels] | 2 [internal reference voltage (1.45V), temperature sensor output voltage (only selectable in HS (high-speed main) mode)] | | | | | | | | | |
| | D/A converter | 12-bit [channels] | 1 (with an output amplifier but no external output pin) | | | | | | — | | | |
| | | 8-bit [channels] | 1 (without an output amplifier and no external output pin) | | | | | | | | | — |
| | Programmable gain instrumentation amplifier 1 (PGA1) [channels] | | 1 | | | | | | — | | | |
| | Rail-to-rail op-amp [channels] (AMP0) | | 1 | | | | | | | | | — |
| | General-purpose op-amp [channels] (AMP1, AMP2) | | 2 | | | | | | — | | | |
| | Multiplier/divider/multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set), Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned), Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), RTC output (1Hz) × 1 | | | | | | | | | |
| | | | Clock/buzzer output × 2 | | | | Clock/buzzer output × 1 | | Clock/buzzer output × 2 | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function,<br>RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function,<br>A/D converter test function, I/O power output signal level detection function | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.4 to 5.5V (10-bit SAR ADC: 2.4 to 5.5V, operating voltage of the analog front-end (AFE): 2.7 to 5.5V) | | | | | | | | | $V_{DD}$ = 1.8 to 5.5V |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (A: Consumer applications) | | | | | | | | | $T_A$ = –40 to +85°C (D: Industrial applications) |
| | Package (size [mm]) | | 48-LQFP (7×7mm) | | 64-TFBGA (4×4mm) | | 64-LQFP (10×10mm) | | 80-LQFP (12×12mm) | | | |

*1: The number in parentheses indicates the number of signal outputs when 8 coms are used.

## RL78/I1A (20 to 38 pins)

| Group | | | RL78/I1A | | | |
|---|---|---|---|---|---|---|
| Pin count | | | 20-pin | 30-pin | | 38-pin |
| Product name | | | ①R5F1076CGSP ②R5F1076CMSP | ①R5F107ACGSP ②R5F107ACMSP | ①R5F107AEGSP ②R5F107AEMSP | ①R5F107DEGSP ②R5F107DEMSP |
| CPU | | | RL78 CPU core | | | |
| Memory | Flash ROM [bytes] | | 32K | | 64K | |
| | Data flash [bytes] | | 4K | | | |
| | RAM [bytes] | | 2K | | 4K | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz ($T_A$ = –40 to +105°C), 16MHz ($T_A$ = 105 to 125°C) | | | |
| | | External resonator | 20MHz | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V) | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 32MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 8MHz ($V_{DD}$ = 2.7 to 5.5V) | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 2.7 to 5.5V) | | | |
| | Subclock (32.768 kHz) | | — | | | 32.768kHz ($V_{DD}$ = 2.7 to 5.5V) |
| I/O | I/O ports | | 16 | 26 | | 34 |
| | | N-channel open drain (6V tolerance) | — | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 6 | 10 | | 11 |
| Timers | 16-bit timer TAU [channels] | | 8 | 8, PWM output × 1 | | 8, PWM output × 3 |
| | 16-bit timer KB [channels] | | 2, PWM output × 4 | 3, PWM output × 6 | | 3, PWM output × 6 |
| | 16-bit timer KC [channels] | | 1, PWM output × 3 | 1, PWM output × 6 | | 1, PWM output × 6 |
| | Real-time clock (RTC) [channels] | | 1*1 | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | |
| | Interval timer [channels] | | 12-bit × 1 | | | |
| Serial interfaces | UART×1 | | — | 1 | | |
| | CSI×1, UART (LIN bus and DMX512 support)×1 | | — | | | 1 |
| | UART (LIN bus and DMX512 support)×1*2 | | 1 | | | — |
| | UART (DALI communication support)×1*2 | | 1 | | | |
| | I²C×1 | | 1 | | | |
| DMA [channels] | | | 2 | | | |
| External interrupts [channels] | | | 7 | 10 | | 11 |
| OCD | On-chip debugging | | Yes | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 6 | 11 | | |
| | Comparator [channels] | | 4 | 6 | | |
| | PGA [channels] | | 1 | | | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD) | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose),<br>RAM parity error detection function, RAM guard function, SFR guard function,<br>illegal memory access detection function, frequency detection function, A/D converter test function | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.7 to 5.5V | | | |
| | Operating ambient temperature [°C] | | ①$T_A$ = –40 to +105°C (G: Industrial applications), ②$T_A$ = –40 to +125°C (M: Industrial applications) | | | |
| | Package (size [mm]) | | 20-LSSOP (4.4×6.5mm) | 30-LSSOP (7.62mm (300mil)) | | 38-SSOP (7.62mm (300mil)) |

* A dedicated library is required to overwrite the data flash. Refer to [Development Environments] – [Flash Programming Tools] – [Self-Programming Library] on the Renesas website. https://www.renesas.com/flash_libraries

*1: Products with pin counts from 20 or 30 pins are not equipped with a subsystem clock, so only the fixed-cycle interrupt function using the low-speed on-chip oscillator clock (15kHz) is available for use.

*2: The same pin is used for both functions on 20-pin products, so only one function may be used at any given time.

## RL78/I1B (80 to 100 pins)

| Group | | | RL78/I1B | | | |
|---|---|---|---|---|---|---|
| Pin count | | | 80-pin | | 100-pin | |
| Product name | | | R5F10MMEDFB | R5F10MMGDFB | R5F10MPEDFB | R5F10MPGDFB |
| CPU | | | RL78 CPU core | | | |
| Memory | Flash ROM [bytes] | | 64K | 128K | 64K | 128K |
| | Data flash [bytes] | | — | | | |
| | RAM [bytes] | | 6K | 8K | 6K | 8K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 24MHz | | | |
| | | External resonator | 20MHz | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 5.5V), 1 to 8MHz ($V_{DD}$ = 1.9 to 5.5V) | | | |
| | High-speed on-chip oscillator [Hz] | | 24/12/6/3MHz ($V_{DD}$ = 2.7 to 5.5V), 12/6/3MHz ($V_{DD}$ = 2.4 to 5.5V), 6/3MHz ($V_{DD}$ = 1.9 to 5.5V) | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.9 to 5.5V) | | | |
| | Subclock (32.768 kHz) | | 32.768kHz ($V_{DD}$ = 1.9 to 5.5V) | | | |
| I/O | Total I/O ports and LCD pins (SEG and COM) | | 61 | | 77 | |
| | | I/O ports | 53 | | 69 | |
| | | N-channel open drain (6V tolerance) | 3 | | | |
| Timers | 16-bit timer TAU [channels] | | 8, PWM output × 7 | | | |
| | Real-time clock (RTC) [channels] | | 1 (high-precision, 0.96 ppm minimum resolution) | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | |
| | Interval timer [channels] | | 12-bit × 1, 8-bit × 4 | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 1 | | | |
| | UART×1, simplified $I^2C$×1 | | 1 | | | |
| | UART×1, IrDA×1 | | 1 | | | |
| | $I^2C$×1 | | 1 | | | |
| LCD controller | LCD drive voltage generation method | | Selectable among internal voltage boost, capacitor split, and external resistance division | | | |
| | Segment signal outputs | | 34 (30)*1 | | 42 (38)*1 | |
| | Common signal outputs | | 4 (8)*1 | | | |
| DTC (sources) | | | 30 | | | |
| External interrupts [channels] | | | 10 | | | |
| OCD | On-chip debugging | | Yes | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 4 | | 6 | |
| | 24-bit ΔΣ A/D converter [channels] | | 3 | | 4 | |
| | Comparator [channels] | | 2 | | | |
| | PGA | | ×1, ×2, ×4, ×8, ×16, (×32) | | | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD),<br>battery backup function, RTC output (1 Hz) × 1 | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function,<br>A/D converter test function, I/O power output signal level detection function | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.9 to 5.5V | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +85°C (D: Industrial applications) | | | |
| | Package (size [mm]) | | 80-LFQFP (12×12mm) | | 100-LFQFP (14×14mm) | |

*1: The number in parentheses indicates the number of signal outputs when 8 coms are used.

## RL78/I1C (64 to 100 pins)

| Group | | RL78/I1C | | | |
|---|---|---|---|---|---|
| Pin count | | 64-pin | 80-pin | | 100-pin |
| Product name | | R5F10NLE/G | R5F10NME/G | R5F10NMJ | R5F10NPJ/G |
| Code flash [bytes] | | 64K to 128K | 64K to 128K | 256K | 128K to 256K |
| Data flash [bytes] | | 2K | | | |
| RAM [bytes] | | 6K to 8K | 6K to 8K | 16K | 8K to 16K |
| System clocks | External | High-speed clock 1 to 20MHz, Low-speed clock 32.768kHz | | | |
| | On-chip oscillator clock | High-speed 1.5 to 24MHz, Middle-speed 1 to 4MHz, Low-speed 15kHz | | | |
| | PLL clock | — | | 32MHz | |
| High-speed on-chip oscillator clock frequency correction function | | Yes | | | |
| 24-bit ΔΣ A/D converter | Input channels | 4ch | 3ch | 3ch | 4ch |
| | SNDR | to 80dB (gain × 1) | | | |
| | Sampling frequency | 3.906kHz/1.953kHz | | | |
| | PGA | ×1, ×2, ×4, ×8, ×16, (×32) | | | |
| | Internal reference voltage (temperature coefficient) | 0.8V (10ppm/°C) | | | |
| | Zero-cross detection | HW Zero-cross detection | | | |
| 8/10-bit A/D converter | | 4ch | | | 6ch |
| 32-bit multiply-and accumulate circuit | | Yes | | | |
| LCD controller | Segment/common signal combinations | 15/8, 19/4 | 30/8, 34/4 | 30/8, 34/4 | 38/8, 42/4 |
| | Drive voltage generation method | Selectable among internal voltage boost, capacitor split, and external resistance division | | | |
| Timers | | 16-bit timer array unit: 8ch | | | |
| | | 12-bit Interval timer: 1ch | | | |
| | | 8-bit Interval timer: 4ch | | | |
| RTC with independent power supply | | 1ch | | | |
| Serial interfaces | CSI0, UART0, simplified $I^2C0$ | 1ch | | | |
| | CSI1, UART1, simplified $I^2C1$ | 1ch | | | |
| | UART2, IrDA | 1ch | | | |
| | CSI3, UART3, simplified $I^2C3$ | — | | | 1ch |
| | MultiMaster $I^2C$ | 1ch | | | |
| DTC (sources) | | 36 | | | 38 |
| ELC | | 22 event generation sources, 5 selectable event output destinations | | | |
| Battery backup functions | CPU | VDD/VBAT | | | |
| | 24-bit ΔΣ A/D converter | VDD/VBAT | | | |
| | RTC | VRTC (independent power supply) | | | |
| Low-voltage detection circuit (LVD) | | Internal VDD, VDD pin, VBAT pin, VRTC pin, external pin | | | |
| AES HW | | Encryption mode: GCM/ECB/CBC, encryption key length: 128/192/256-bit | | | |
| Key interrupts | | 5pins | 8pins | | |
| Other peripheral functions | | Watchdog timer, power-on reset (POR), safety function | | | |
| Power supply voltage [V] | | 1.7V to 5.5V | | | |
| Operating ambient temperature [°C] | | –40°C to 85°C | | | |
| Package (size [mm]) | | 64-LFQFP (10×10mm) | 80-LFQFP (12×12mm) | | 100-LFQFP (14×14mm) |

## RL78/I1C (512KB) (80 to 100 pins)

| Group | | | RL78/I1C (512KB) | |
|---|---|---|---|---|
| Pin count | | | 80-pin | 100-pin |
| Product name | | | R5F10NMLDFB | R5F10NPLDFB |
| CPU | | | RL78 CPU core | |
| Memory | Flash ROM [bytes] | | 512K (256KB × 2 banks) | |
| | Data flash [bytes] | | 2K | |
| | RAM [bytes] | | 32K*1 | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | |
| | | External resonator | 20MHz | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | High-speed clock 1 to 20MHz, Low-speed clock 32.768kHz | |
| | On-chip oscillator [Hz] | | High-speed 1.5 to 24MHz, Middle-speed 1 to 4MHz, Low-speed 15kHz | |
| | PLL [Hz] | | 32MHz | |
| High-speed on-chip oscillator clock frequency correction function | | | Yes | |
| 24-bit ΔΣ A/D converter | Input channels [ch] | | 3 | 4 |
| | SNDR | | to 80dB (gain × 1) | |
| | Sampling frequency | | 3.906kHz/1.953kHz | |
| | PGA | | ×1, ×2, ×4, ×8, ×16, (×32) | |
| | Internal reference voltage (temperature coefficient) | | 0.8V (10ppm/°C) | |
| | Zero-cross detection | | HW Zero-cross detection | |
| 12-bit A/D converter [ch] | | | 4 | 6 |
| 32-bit multiply-and accumulate circuit | | | Yes | |
| LCD controller | Segment/common signal combinations | | 30/8, 34/4 | 38/8, 42/4 |
| | Drive voltage generation method | | Selectable among internal voltage boost, capacitor split, and external resistance division | |
| Timers | | | 16-bit timer array unit: 8ch | |
| | | | 12-bit Interval timer: 1ch | |
| | | | 8-bit Interval timer: 8ch | |
| RTC with independent power supply [ch] | | | 1 | |
| Serial interfaces | CSI0/UART/simplified $I^2C$ [ch] | | 2 | 3 |
| | UART/IrDA [ch] | | 1 | |
| | UART [ch] | | — | 1 |
| | $I^2C$ bus [ch] | | 1 | |
| | UARTMG [ch] | | 2 | |
| Data transfer controller (DTC) (sources) | | | 46 | 50 |
| Event link controller (ELC) | Event input | | 7 | |
| | Event trigger input | | 30 | |
| Battery backup functions | CPU | | $V_{DD}$/VBAT | |
| | 24-bit ΔΣ A/D converter | | $V_{DD}$/VBAT | |
| | RTC | | VRTC (independent power supply) | |
| Low-voltage detection circuit (LVD) | | | Internal $V_{DD}$, $V_{DD}$ pin, VBAT pin, VRTC pin, external pin | |
| AES HW | | | Encryption mode: GCM/ECB/CBC, encryption key length: 128/192/256-bit | |
| Key interrupts | | | 8pins | |
| Other peripheral functions | | | Watchdog timer, power-on reset (POR), safety function | |
| Power supply voltage [V] | | | 1.6V to 5.5V | |
| Operating ambient temperature [°C] | | | –40°C to 85°C | |
| Package (size [mm]) | | | 80-LFQFP (12×12mm) | 100-LFQFP (14×14mm) |

*1: This is about 31 KB when the self-programming function is used.

# MEMO

## RL78/I1D (20 to 48 pins)

| Group | | | RL78/I1D | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 20-pin | | 24-pin | | 30-pin | | | 32-pin | | | | 48-pin | |
| Product name | | | R5F11768GSP | R5F11768GSP | R5F11778GNA | R5F11777AGNA | R5F117A8GSP | R5F117AAGSP | R5F117ACGSP | R5F117BAGNA | R5F117BCGNA | R5F117BAGFP | R5F117BCGFP | R5F117GAGFB | R5F117GCGFB |
| CPU | | | RL78 CPU core | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 8K | 16K | 8K | 16K | 8K | 16K | 32K | 16K | 32K | 16K | 32K | 16K | 32K |
| | Data flash [bytes] | | 2K | | | | | | | | | | | | |
| | RAM [bytes] | | 0.7K | 2K | 0.7K | 2K | 0.7K | 2K | 3K | 2K | 3K | 2K | 3K | 2K | 3K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 24MHz | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz ($V_{DD}$ = 2.7 to 3.6V), 1 to 8MHz ($V_{DD}$ = 1.8 to 2.7V), 1 to 4MHz ($V_{DD}$ = 1.6 to 1.8V) | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 24MHz ($V_{DD}$ = 2.7 to 3.6V), 1 to 16MHz ($V_{DD}$ = 2.4 to 3.6V), 1 to 8MHz ($V_{DD}$ = 1.8 to 3.6V), 1 to 4MHz ($V_{DD}$ = 1.6 to 3.6V), 1MHz ($V_{DD}$ = 1.8 to 3.6V) | | | | | | | | | | | | |
| | Middle-speed on-chip oscillator [Hz] | | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz ($V_{DD}$ = 1.6 to 3.6V) | | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | — | | | | 32.768kHz ($V_{DD}$ = 1.6 to 3.6V) | | | | | | | | |
| I/O | I/O ports | | 14 | | 18 | | 24 | | | 26 | | | | 42 | |
| | | N-channel open drain (6V tolerance) | — | | — | | — | | | — | | | | 4 | |
| | | N-channel open drain ($V_{DD}$ tolerance) | — | | | | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 4 | | | | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1*1 | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | |
| | Interval timer [channels] | | 8-bit × 4 (or 16-bit × 2), 12-bit × 1 | | | | | | | | | | | | |
| Serial interfaces | CSI×1, UART×1, simplified $I^2C$×1 | | 1 | | — | | 1 | | | — | | | | — | |
| | CSI×2, UART×1, simplified $I^2C$×2 | | — | | 1 | | — | | | 1 | | | | 1 | |
| DTC (sources) | | | 16 | | 20 | | 19 | | | 20 | | | | 23 | |
| ELC (inputs/trigger outputs) | | | 13/5 | | 17/5 | | 16/7 | | | 17/7 | | | | 20/7 | |
| External interrupt pins [count] | | | 3 | | 5 | | | | | | | | | 8 | |
| OCD | On-chip debugging | | Yes | | | | | | | | | | | | |
| Peripheral functions | 12-bit A/D converter [channels] | | 6 | | | | 12 | | | | | | | 17 | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | |
| | Op-amp [channels] | | 2 | | | | 4 | | | | | | | | |
| | Comparator [channels] | | 2 | | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), clock/buzzer output, data operation circuit (DOC) | | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function, I/O power output signal level detection function | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 1.6 to 3.6 | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | –40 to +105°C (G: Industrial applications) | | | | | | | | | | | | |
| | Package (size [mm]) | | 20-LSSOP (4.4×6.5mm) | | 24-HWQFN (4×4mm) | | 30-LSSOP (7.62mm (300mil)) | | | 32-HVQFN (5×5mm) | | 32-LQFP (7×7mm) | | 48-LFQFP (7×7mm) | |

* A dedicated library is required to overwrite the data flash. Refer to [Development Environments] – [Flash Programming Tools] – [Self-Programming Library] on the Renesas website. https://www.renesas.com/flash_libraries

*1: Products with pin counts from 20 or 24 pins are not equipped with a subsystem clock, so only the fixed-cycle interrupt function using the low-speed on-chip oscillator clock (15kHz) is available for use.

## RL78/I1E (32 to 36 pins)

| Group | | | RL78/I1E | | | |
|---|---|---|---|---|---|---|
| Pin count | | | 32-pin | | 36-pin | |
| Product name | | | R5F11CBCGNA | R5F11CBCMNA | R5F11CCCGBG | R5F11CCCMBG |
| CPU | | | RL78 CPU core | | | |
| Memory | Flash ROM [bytes] | | 32K | | | |
| | Data flash [bytes] | | 4K | | | |
| | RAM [bytes] | | 8K | | | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz | | | |
| | | External resonator | 20MHz | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz (2.7 to 5.5V), 1 to 16MHz (2.4 to 2.7V) | | | |
| | High-speed on-chip oscillator [Hz] | | 1 to 32MHz (2.7 to 5.5V) | 1 to 24MHz (2.7 to 5.5V) | 1 to 32MHz (2.7 to 5.5V) | 1 to 24MHz (2.7 to 5.5V) |
| | | | 1 to 16MHz (2.4 to 2.7V) | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz | | | |
| | Subclock (32.768 kHz) | | — | | | |
| I/O | I/O ports | | 10 | | 14 | |
| | | N-channel open drain (6V tolerance) | — | | | |
| | | N-channel open drain ($V_{DD}$ tolerance) | 6 | | | |
| Timers | 16-bit timer TAU [channels] | | 6 | | | |
| | 16-bit timer RJ [channels] | | 1 | | | |
| | 16-bit timer RG [channels] | | 1 | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | |
| | Interval timer [channels] | | 15-bit × 1 | | | |
| Serial interfaces | CSIx2, UART×1, simplified $I^2C$×2 | | 1 | | | |
| | UART×1 | | 1 | | | |
| DTC (sources) | | | 23 | | | |
| ELC (inputs/trigger outputs) | | | 16/7 | | | |
| External interrupt pins [count] | | | 7 | | 8 | |
| OCD | On-chip debugging | | Yes | | | |
| Peripheral functions | Instrumentation amplifier + 24-bit ΔΣ A/D converter [channels] | | 3 | | 4 | |
| | 8/10-bit A/D converter [channels] | | 8 | | 10 | |
| | 12-bit D/A converter [channels] | | 1 | | | |
| | Configurable amplifier [channels] | | 3 | | | |
| | Multiplier/divider/ multiply-accumulator | | Library support for multiply/divide/multiply-accumulate operations (equipped with functional unit)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), temperature sensor, reference voltage generation circuit | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), RAM parity error detection function, RAM guard function, SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function, I/O power output signal level detection function | | | |
| Other | Power supply voltage [V] | | Vcc = 2.4 to 5.5V | | | |
| | Operating ambient temperature [°C] | | Ta = –40 to +105°C (G: Industrial applications) | Ta = –40 to +125°C (M: Industrial applications) | Ta = –40 to +105°C (G: Industrial applications) | Ta = –40 to +125°C (M: Industrial applications) |
| | Package (size [mm]) | | 32-HVQFN (5×5mm) | | 36-TFBGA (4×4mm) | |

## RL78/F23 (32 to 80pins)

| Group | | | RL78/F23 | | | |
|---|---|---|---|---|---|---|
| Pin count | | | 32-pin | 48-pin | 64-pin | 80-pin |
| Product name | | | R7F123FBG3ANP-C*1 | R7F123FGG3AFB-C*1 | R7F123FLG3AFB-C*1 | R7F123FMG3AFB-C*1 |
| CPU | | | RL78 CPU core | | | |
| Memory | Flash ROM [bytes] | | 128 | | | |
| | Data flash [bytes] | | 8 | | | |
| | RAM [bytes] | | 12 | | | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 40 MHz | | | |
| | | External resonator | 20 MHz | | | |
| | | Timer RD clock | 80 MHz | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz | | | |
| | High-speed on-chip oscillator [Hz] | | MAX. 80MHz (±2%) | | | |
| | Low-speed on-chip oscillator [Hz] | | 15 kHz (TYP.) | | | |
| | Subclock | | 32.768 kHz (VDD = 2.7 to 5.5 V) | | | |
| | PLL | | Multiplication factors: ×3, ×4, ×5, ×6, ×8, ×10 | | | |
| I/O | I/O ports | | 25 | 38 | 52 | 68 |
| | | N-channel open drain (6V tolerance) | — | | | |
| | | N-channel open drain ($EV_{DD}$ tolerance) | — | | 30 | 45 |
| Timers | 16-bit timer (TAU) [channels] | | 12 | | | |
| | 16-bit timer (RJ) [channels] | | 1 | | | |
| | 16-bit timer (RDe) [channels] | | 2 | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | |
| Serial interfaces | CSI×4, UART×2, Simplified $I^2C$×4 | | — | 1 | | |
| | CSI×3, UART×2, Simplified $I^2C$×3 | | 1 | — | | |
| | UART×1, LIN (RLIN3)×1 | | 1 | | | |
| | CAN (RS-CANFD lite)×1 | | — | | | |
| | Multi-master $I^2C$×1 | | 1 | | | |
| Data transfer controller (DTC) (activation sources) | | | 35 | 36 | | |
| Event link controller (ELC) (inputs/trigger outputs) | | | — | | | |
| Interrupt sources | External | | 8 | 12 | 14 | 15 |
| OCD | On-chip debugging | | Yes (Hot plugin, On-chip trace) | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 8 | 13 | 16 | |
| | 8-bit D/A converter [channels] | | — | | | |
| | Comparator [channels] | | — | | | |
| | Clock/buzzer output | | — | 1 | | |
| | Multiplier/divider/ multiply-accumulator | | Application Accelerator Unit (AAU, the dedicated arithmetic assist hardware to reduce the software load for FOC algorithm processing) | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), RTC output (1Hz) × 1 | | | |
| Safety functions | ASIL-B (ISO26262) | | WWDT (window watchdog timer), Flash memory fast CRC operation function, General purpose CRC operation, Code flash memory 1-bit error correction function, Code flash memory 2-bit error detection function, RAM 1-bit error correction function, RAM 2-bit error detection function, Invalid memory access detection function, Frequency detection function, Clock monitoring function, CPU Stack pointer monitor function, A/D converter test function | | | |
| Security functions | Evita light (ISO/SAE21434) | | AESEA (ECB/CBC mode and CMAC (AES-128, 192, 256)) Random number generator (TRNG) | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.7 to 5.5 V | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +105°C (3: Automotive applications), $T_A$ = –40 to +125°C (4: Automotive applications)*1, $T_A$ = –40 to +150°C (5: Automotive applications)*1 | | | |
| | Package (size [mm]) | | 32-pin HWQFN (5x5mm) | 48-pin LFQFP (7×7mm) | 64-pin LFQFP (10×10mm) | 80-pin LFQFP (12×12mm) |

Ambient operating temperature range of the above part numbers is –40 to +105°C.

*1: Products with –40 to +125°C ambient operating temperature range (part number: R7F1xxxxx4xxx-C) or –40 to +150°C ambient operating temperature range (part number: R7F1xxxxx5xxx-C) are also available.

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 111.

## RL78/F24 (32 to 100pins)

| Group | | | RL78/F24 | | | | |
|---|---|---|---|---|---|---|---|
| Pin count | | | 32-pin | 48-pin | 64-pin | 80-pin | 100-pin |
| Product name | | | R7F124FBJ3ANP-C*1 | R7F124FGJ3AFB-C*1 | R7F124FLJ3AFB-C*1 | R7F124FMJ3AFB-C*1 | R7F124FPJ3AFB-C*1 |
| CPU | | | RL78 CPU core | | | | |
| Memory | Flash ROM [bytes] | | 256 | | | | |
| | Data flash [bytes] | | 16 | | | | |
| | RAM [bytes] | | 24 | | | | |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 40 MHz | | | | |
| | | External resonator | 20 MHz | | | | |
| | | Timer RD clock | 80 MHz | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz | | | | |
| | High-speed on-chip oscillator [Hz] | | MAX. 80MHz (±2%) | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15 kHz (TYP.) | | | | |
| | Subclock | | 32.768 kHz ($V_{DD}$ = 2.7 to 5.5 V) | | | | |
| | PLL | | Multiplication factors: ×3, ×4, ×5, ×6, ×8, ×10 | | | | |
| I/O | I/O ports | | 25 | 38 | 52 | 68 | 86 |
| | | N-channel open drain (6V tolerance) | — | | | | |
| | | N-channel open drain ($EV_{DD}$ tolerance) | — | | 30 | 45 | 57 |
| Timers | 16-bit timer (TAU) [channels] | | 16 | | | | |
| | 16-bit timer (RJ) [channels] | | 1 | | | | |
| | 16-bit timer (RDe) [channels] | | 2 | | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | |
| Serial interfaces | CSI×4, UART×2, Simplified $I^2C$×4 | | — | 1 | | | |
| | CSI×3, UART×2, Simplified $I^2C$×3 | | 1 | — | | | |
| | UART×1, LIN (RLIN3)×1 | | 2 | | | | |
| | CAN (RS-CANFD lite)×1 | | 1 | | | | |
| | Multi-master $I^2C$×1 | | 1 | | | | |
| Data transfer controller (DTC) (activation sources) | | | 43 | 44 | | | |
| Event link controller (ELC) (inputs/trigger outputs) | | | 26/10 | | | | |
| Interrupt sources | External | | 10 | 14 | 15 | 16 | |
| OCD | On-chip debugging | | Yes (Hot plugin, On-chip trace) | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 8 | 13 | 16 | | |
| | 8-bit D/A converter [channels] | | 1 | | | | |
| | Comparator [channels] | | 1unit (4ch) | | | | |
| | Clock/buzzer output | | — | 1 | | | |
| | Multiplier/divider/ multiply-accumulator | | Application Accelerator Unit (AAU, the dedicated arithmetic assist hardware to reduce the software load for FOC algorithm processing) | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), RTC output (1Hz) × 1 | | | | |
| Safety functions | ASIL-B (ISO26262) | | WWDT (window watchdog timer), Flash memory fast CRC operation function, General purpose CRC operation, Code flash memory 1-bit error correction function, Code flash memory 2-bit error detection function, RAM 1-bit error correction function, RAM 2-bit error detection function, Invalid memory access detection function, Frequency detection function, Clock monitoring function, CPU Stack pointer monitor function, A/D converter test function | | | | |
| Security functions | Evita light (ISO/SAE21434) | | AESEA (ECB/CBC mode and CMAC (AES-128, 192, 256)) Random number generator (TRNG) | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.7 to 5.5 V | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +105°C (3: Automotive applications), $T_A$ = –40 to +125°C (4: Automotive applications)*1, $T_A$ = –40 to +150°C (5: Automotive applications)*1 | | | | |
| | Package (size [mm]) | | 32-pin HWQFN (5x5mm) | 48-pin LFQFP (7×7mm) | 64-pin LFQFP (10×10mm) | 80-pin LFQFP (12×12mm) | 100-pin LFQFP (14×14mm) |

Ambient operating temperature range of the above part numbers is –40 to +105°C.

*1: Products with –40 to +125°C ambient operating temperature range (part number: R7F1xxxxx4xxx-C) or –40 to +150°C ambient operating temperature range (part number: R7F1xxxxx5xxx-C) are also available.

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 111.

## RL78/F13 (30 to 80 pins)

| Group | | | RL78/F13 (CAN & LIN) | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 30-pin | | | | | 32-pin | | | | | 48-pin | | | | | 64-pin | | | | | 80-pin | | |
| Product name | | | R5F10BACLSP*1 | R5F10BADLSP*1 | R5F10BAELSP*1 | R5F10BAFLSP*1 | R5F10BAGLSP*1 | R5F10BBCLNA*1 | R5F10BBDLNA*1 | R5F10BBELNA*1 | R5F10BBFLNA*1 | R5F10BBGLNA*1 | ①R5F10BGCLFB*1 ②R5F10BGCLNA*1 | ①R5F10BGDLFB*1 ②R5F10BGDLNA*1 | ①R5F10BGELFB*1 ②R5F10BGELNA*1 | ①R5F10BGFLFB*1 ②R5F10BGFLNA*1 | ①R5F10BGGLFB*1 ②R5F10BGGLNA*1 | R5F10BLCLFB*1 | R5F10BLDLFB*1 | R5F10BLELFB*1 | R5F10BLFLFB*1 | R5F10BLGLFB*1 | R5F10BMELFB*1 | R5F10BMFLFB*1 | R5F10BMGLFB*1 |
| CPU | | | RL78 CPU core | | | | | | | | | | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 32K | 48K | 64K | 96K | 128K | 32K | 48K | 64K | 96K | 128K | 32K | 48K | 64K | 96K | 128K | 32K | 48K | 64K | 96K | 128K | 64K | 96K | 128K |
| | Data flash [bytes] | | 4K | | | | | 4K | | | | | 4K | | | | | 4K | | | | | 4K | | |
| | RAM [bytes] | | 2K | 3K | 4K | 6K | 8K | 2K | 3K | 4K | 6K | 8K | 2K | 3K | 4K | 6K | 8K | 2K | 3K | 4K | 6K | 8K | 4K | 6K | 8K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz (automotive applications, $T_A$ = –40 to +105°C), 24MHz (automotive applications, $T_A$ = –40 to +125°C, $T_A$ = –40 to +150°C) | | | | | | | | | | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | | | | | | | | | | |
| | | Timer RD clock | 64MHz | | | | | | | | | | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz | | | | | | | | | | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 64MHz (±2%): automotive applications/$T_A$ = –40 to +105°C, 48MHz (±3%): automotive applications/$T_A$ = –40 to +125°C, 48MHz (±5%): automotive applications/$T_A$ = –40 to +150°C | | | | | | | | | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz | | | | | | | | | | | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | — | | | | | | | | | | 32.768kHz | | | | | | | | | | | |
| | PLL | | Multiplication factors: ×3, ×4, ×6, ×8 | | | | | | | | | | | | | | | | | | | | | |
| I/O | I/O ports | | 23 | | | | | 25 | | | | | 38 | | | | | 52 | | | | | 68 | | |
| | | N-channel open drain (6V tolerance) | — | | | | | | | | | | | | | | | | | | | | | |
| | | N-channel open drain ($EV_{DD}$ tolerance) | 9 | | | | | 13 | | | | | 16 | | | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 16 | | | | | | | | | | | | | | | | | | | | | |
| | Timer RJ | | 1 | | | | | | | | | | | | | | | | | | | | | |
| | Timer RD | | 2 | | | | | | | | | | | | | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | | | | | | | | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | | | | | | | | | | |
| Serial interfaces | CSI×2, UART×1, simplified $I^2C$×2 | | 1 | | | | | | | | | | — | | | | | | | | | | | |
| | CSI×4, UART×2, simplified $I^2C$×4 | | — | | | | | | | | | | 1 | | | | | | | | | | | |
| | UART×1, LIN (RLIN3)×1 | | 1 | | | | | | | | | | | | | | | | | | | | | |
| | CAN (RS-CAN lite)×1 | | 1 | | | | | | | | | | | | | | | | | | | | | |
| | Multi-master $I^2C$×1 | | — | | | | | 1 | | | | | | | | | | | | | | | | |
| DTC (sources) | | | 36 | | | | | | | | | | 37 | | | | | | | | | | | |
| External interrupts [channels] | | | 9 | | | | | | | | | | 13 | | | | | 14 | | | | | | |
| OCD | On-chip debugging | | Yes (hot plugin, trace) | | | | | | | | | | | | | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 12 | | | | | 10 | | | | | 15 | | | | | 19 | | | | | 20 | |
| | 8-bit D/A converter [channels] | | — | | | | | | | | | | | | | | | | | | | | | |
| | Comparator [channels] | | — | | | | | | | | | | | | | | | | | | | | | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), RTC output (1Hz) × 1 | | | | | | | | | | | | | | | | | | | | | |
| | | | — | | | | | | | | | | Clock/buzzer output × 1 | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), SRAM ECC function,<br>CPU stack pointer monitor function, clock monitor function, RAM guard function, SFR guard function,<br>illegal memory access detection function, frequency detection function, A/D converter test function,<br>I/O power output signal level detection function | | | | | | | | | | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.7 to 5.5V | | | | | | | | | | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +105°C (L: automotive applications), $T_A$ = –40 to +125°C (K: automotive applications)*1, $T_A$ = –40 to +150°C (Y: automotive applications)*1 | | | | | | | | | | | | | | | | | | | | | |
| | Package (size [mm]) | | 30-LSSOP (6.1×9.85mm) | | | | | 32-HVQFN (5×5mm) | | | | | ①48-LFQFP (7×7mm)<br>②48-HVQFN (7×7mm) | | | | | 64-LFQFP (10×10mm) | | | | | 80-LFQFP (12×12mm) | | |

Ambient operating temperature range of the above part numbers is –40 to +105°C.

*1: Products with –40 to +125°C ambient operating temperature range (part number: R5F1xxxxKxx) or –40 to +150°C ambient operating temperature range (part number: R5F1xxxxYxx) are also available.

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/F13 (20 to 80 pins)

| Group | | | RL78/F13 (LIN) | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 20-pin | | | | 30-pin | | | | 32-pin | | | | 48-pin | | | | | | 64-pin | | | | | 80-pin | | |
| Product name | | | R5F10A6ALSP*1 | R5F10A6CLSP*1 | R5F10A6DLSP*1 | R5F10A6ELSP*1 | R5F10AAALSP*1 | R5F10AACLSP*1 | R5F10AADLSP*1 | R5F10AAELSP*1 | R5F10ABALNA*1 | R5F10ABCLNA*1 | R5F10ABDLNA*1 | R5F10ABELNA*1 | ①R5F10AGALFB*1 ②R5F10AGALNA*1 | ①R5F10AGCLFB*1 ②R5F10AGCLNA*1 | ①R5F10AGDLFB*1 ②R5F10AGDLNA*1 | ①R5F10AGELFB*1 ②R5F10AGELNA*1 | ①R5F10AGFLFB*1 ②R5F10AGFLNA*1 | ①R5F10AGGLFB*1 ②R5F10AGGLNA*1 | R5F10ALCLFB*1 | R5F10ALDLFB*1 | R5F10ALELFB*1 | R5F10ALFLFB*1 | R5F10ALGLFB*1 | R5F10AMELFB*1 | R5F10AMFLFB*1 | R5F10AMGLFB*1 |
| CPU | | | RL78 CPU core | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 16K | 32K | 48K | 64K | 16K | 32K | 48K | 64K | 16K | 32K | 48K | 64K | 16K | 32K | 48K | 64K | 96K | 128K | 32K | 48K | 64K | 96K | 128K | 64K | 96K | 128K |
| | Data flash [bytes] | | 4K | | | | 4K | | | | 4K | | | | 4K | | | | | | 4K | | | | | | | |
| | RAM [bytes] | | 1K | 2K | 3K | 4K | 1K | 2K | 3K | 4K | 1K | 2K | 3K | 4K | 1K | 2K | 3K | 4K | 6K | 8K | 2K | 3K | 4K | 6K | 8K | 4K | 6K | 8K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz (automotive applications, $T_A$ = –40 to +105°C), 24MHz (automotive applications, $T_A$ = –40 to +125°C, $T_A$ = –40 to +150°C) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Timer RD clock | 64MHz | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 64MHz (±2%): automotive applications/$T_A$ = –40 to +105°C, 48MHz (±3%): automotive applications/$T_A$ = –40 to +125°C, 48MHz (±5%): automotive applications/$T_A$ = –40 to +150°C | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | — | | | | | | | | | | | | 32.768kHz | | | | | | | | | | | | | | |
| | PLL | | Multiplication factors: ×3, ×4, ×6, ×8 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I/O | I/O ports | | 13 | | | | 23 | | | | 25 | | | | 38 | | | | | | 52 | | | | | 68 | | |
| | | N-channel open drain (6V tolerance) | — | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | N-channel open drain ($EV_{DD}$ tolerance) | 6 | | | | | | | | 10 | | | | 16/13 | | | | | | 16/13 | | | | | 16 | | |
| Timers | 16-bit timer TAU [channels] | | 8 | | | | | | | | | | | | | | | | 12 | | 8 | | | 12 | | | | |
| | Timer RJ | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Timer RD | | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Serial interfaces | CSI×2, UART×1, simplified $I^2C$×2 | | 1 | | | | | | | | | | | | | | | | — | | 1 | | | | | | | |
| | CSI×4, UART×2, simplified $I^2C$×4 | | — | | | | | | | | | | | | | | | | 1 | | | | | | | | | |
| | UART×1, LIN (RLIN3)×1 | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | CAN (RS-CAN lite)×1 | | — | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Multi-master $I^2C$×1 | | — | | | | | | | | | | | | | | | | 1 | | — | | | 1 | | | | |
| DTC (sources) | | | 28 | | | | 29 | | | | | | | | 30 | | | | 36 | | 30 | | | 36 | | | | |
| External interrupts [channels] | | | 7 | | | | 8 | | | | | | | | 10 | | | | 12 | | 10 | | | 13 | | | | |
| OCD | On-chip debugging | | Yes (hot plugin, trace) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 4 | | | | 10 | | | | 8 | | | | 12 | | | | 15 | | 12 | | | 19 | | 20 | | |
| | 8-bit D/A converter [channels] | | — | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Comparator [channels] | | — | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), RTC output (1Hz) × 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | — | | | | | | | | | | | | Clock/buzzer output × 1 | | | | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose), SRAM ECC function,<br>CPU stack pointer monitor function, clock monitor function, RAM guard function, SFR guard function,<br>illegal memory access detection function, frequency detection function, A/D converter test function,<br>I/O power output signal level detection function | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.7 to 5.5V | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +105°C (L: automotive applications), $T_A$ = –40 to +125°C (K: automotive applications)*1, $T_A$ = –40 to +150°C (Y: automotive applications)*1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Package (size [mm]) | | 20-LSSOP (6.1×6.65mm) | | | | 30-LSSOP (6.1×9.85mm) | | | | 32-HVQFN (5×5mm) | | | | ①48-LFQFP (7×7mm)<br>②48-HVQFN (7×7mm) | | | | | | 64-LFQFP (10×10mm) | | | | | 80-LFQFP (12×12mm) | | |

Ambient operating temperature range of the above part numbers is –40 to +105°C.

*1: Products with –40 to +125°C ambient operating temperature range (part number: R5F1xxxxKxx) or –40 to +150°C ambient operating temperature range (part number: R5F1xxxxYxx) are also available.

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

## RL78/F14 (30 to 100 pins)

| Group | | | RL78/F14 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 30-pin | | 32-pin | | 48-pin | | | | | |
| Product name | | | R5F10PADLSP*1 | R5F10PAELSP*1 | R5F10PBDLNA*1 | R5F10PBELNA*1 | ①R5F10PGDLFB*1 ②R5F10PGDLNA*1 | ①R5F10PGELFB*1 ②R5F10PGELNA*1 | ①R5F10PGFLFB*1 ②R5F10PGFLNA*1 | ①R5F10PGGLFB*1 ②R5F10PGGLNA*1 | ①R5F10PGHLFB*1 ②R5F10PGHLNA*1 | ①R5F10PGJLFB*1 ②R5F10PGJLNA*1 |
| CPU | | | RL78 CPU core | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 48K | 64K | 48K | 64K | 48K | 64K | 96K | 128K | 192K | 256K |
| | Data flash [bytes] | | 4K | | 4K | | 4K | | | 8K | | |
| | RAM [bytes] | | 4K | 6K | 4K | 6K | 4K | 6K | 8K | 10K | 16K | 20K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz (automotive applications, $T_A$ = –40 to +105°C), 24MHz (automotive applications, $T_A$ = –40 to +125°C), 24MHz (automotive applications, $T_A$ = –40 to +150°C) | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | |
| | | Timer RD clock | 64MHz | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 64MHz (±2%): automotive applications/$T_A$ = –40 to +105°C, 48MHz (±3%): automotive applications/$T_A$ = –40 to +125°C, 48MHz (±5%): automotive applications/$T_A$ = –40 to +150°C | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz | | | | | | | | | |
| | Subclock (32.768 kHz) | | — | | | | 32.768kHz | | | | | |
| | PLL | | Multiplication factors: ×3, ×4, ×6, ×8 | | | | | | | | | |
| I/O | I/O ports | | 23 | | 25 | | 38 | | | | | |
| | | N-channel open drain (6V tolerance) | — | | | | | | | | | |
| | | N-channel open drain ($EV_{DD}$ tolerance) | 9 | | 13 | | 16 | | | | | |
| Timers | 16-bit timer TAU [channels] | | 12 | | | | 16 or 12 | | | | | |
| | 16-bit timer RJ [channels] | | 1 | | | | | | | | | |
| | 16-bit timer RD [channels] | | 2 | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | |
| Serial interfaces | CSI×3, UART×2, simplified $I^2C$×3 | | 1 | | | | — | | | | | |
| | CSI×4, UART×2, simplified $I^2C$×4 | | — | | | | 1 | | | | | |
| | UART×1, LIN (RLIN3)×1 | | 1 | | | | 2 or 1 | | | | | |
| | CAN (RS-CAN lite)×1 | | 1 | | | | | | | | | |
| | Multi-master $I^2C$×1 | | — | | 1 | | | | | | | |
| DTC (sources) | | | 37 | | | | 44/38 | | | | | |
| ELC (inputs/trigger outputs) | | | 20/7 | | | | 26 (20)/9 (7) | | | | | |
| External interrupts [channels] | | | 9 | | | | 14 or 13 | | | | | |
| OCD | On-chip debugging | | Yes (hot plugin, trace) | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 10 | | 8 | | 13 | | | | | |
| | 8-bit D/A converter [channels] | | 1 | | | | | | | | | |
| | Comparator [channels] | | 1 | | | | | | | | | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), RTC output (1 Hz) × 1, clock/buzzer output × 2 | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function(general-purpose), SRAM ECC function,<br>CPU stack pointer monitor function, clock monitor function, RAM guard function, SFR guard function, illegal memory access detection function,<br>frequency detection function, A/D converter test function, I/O power output signal level detection function | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.7 to 5.5V | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +105°C (L: automotive applications), $T_A$ = –40 to +125°C (K: automotive applications)*1, $T_A$ = –40 to +150°C (Y: automotive applications)*1 | | | | | | | | | |
| | Package (size [mm]) | | 30-LSSOP (6.1×9.85mm) | | 32-HVQFN (5×5mm) | | ①48-LFQFP (7×7mm)<br>②48-HVQFN (7×7mm) | | | | | |

Ambient operating temperature range of the above part numbers is –40 to +105°C.

*1: Products with –40 to +125°C ambient operating temperature range (part number: R5F1xxxxKxx) or –40 to +150°C ambient operating temperature range (part number: R5F1xxxxYxx) are also available.

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

| RL78/F14 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64-pin | | | | | 80-pin | | | | | 100-pin | | | | |
| R5F10PLELFB*1 | R5F10PLFLFB*1 | R5F10PLGLFB*1 | R5F10PLHLFB*1 | R5F10PLJLFB*1 | R5F10PMELFB*1 | R5F10PMFLFB*1 | R5F10PMGLFB*1 | R5F10PMHLFB*1 | R5F10PMJLFB*1 | R5F10PPELFB*1 | R5F10PPFLFB*1 | R5F10PPGLFB*1 | R5F10PPHLFB*1 | R5F10PPJLFB*1 |
| RL78 CPU core | | | | | | | | | | | | | | |
| 64K | 96K | 128K | 192K | 256K | 64K | 96K | 128K | 192K | 256K | 64K | 96K | 128K | 192K | 256K |
| 4K | | 8K | | | 4K | | 8K | | | 4K | | 8K | | |
| 6K | 8K | 10K | 16K | 20K | 6K | 8K | 10K | 16K | 20K | 6K | 8K | 10K | 16K | 20K |
| 32MHz (automotive applications, $T_A$ = –40 to +105°C), 24MHz (automotive applications, $T_A$ = –40 to +125°C), 24MHz (automotive applications, $T_A$ = –40 to +150°C) | | | | | | | | | | | | | | |
| 20MHz | | | | | | | | | | | | | | |
| 64MHz | | | | | | | | | | | | | | |
| 1 to 20MHz | | | | | | | | | | | | | | |
| 64MHz (±2%): automotive applications/$T_A$ = –40 to +105°C, 48MHz (±3%): automotive applications/$T_A$ = –40 to +125°C, 48MHz (±5%): automotive applications/$T_A$ = –40 to +150°C | | | | | | | | | | | | | | |
| 15kHz | | | | | | | | | | | | | | |
| 32.768kHz | | | | | | | | | | | | | | |
| Multiplication factors: ×3, ×4, ×6, ×8 | | | | | | | | | | | | | | |
| 52 | | | | | 68 | | | | | 86 | | | | |
| — | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | |
| 16 or 12 | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| — | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 2 or 1 | | | | | | | | | | 2 | | | | |
| 1 | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 44/38 | | | | | | | | | | 44 | | | | |
| 26 (20)/9 (7) | | | | | | | | | | 26/9 | | | | |
| 15 or 14 | | | | | 16 or 14 | | | | | 16 | | | | |
| Yes (hot plugin, trace) | | | | | | | | | | | | | | |
| 17 or 16 | | | | | 18 or 16 | | | | | 24 | | | | |
| 1 | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | |
| Power-on reset (POR), low-voltage detection circuit (LVD), RTC output (1 Hz) × 1, clock/buzzer output × 2 | | | | | | | | | | | | | | |
| Flash memory CRC calculation function (high-speed), CRC calculation function(general-purpose), SRAM ECC function,<br>CPU stack pointer monitor function, clock monitor function, RAM guard function, SFR guard function, illegal memory access detection function,<br>frequency detection function, A/D converter test function, I/O power output signal level detection function | | | | | | | | | | | | | | |
| $V_{DD}$ = 2.7 to 5.5V | | | | | | | | | | | | | | |
| $T_A$ = –40 to +105°C (L: automotive applications), $T_A$ = –40 to +125°C (K: automotive applications)*1, $T_A$ = –40 to +150°C (Y: automotive applications)*1 | | | | | | | | | | | | | | |
| 64-LFQFP (10×10mm) | | | | | 80-LFQFP (12×12mm) | | | | | 100-LFQFP (14×14mm) | | | | |

## RL78/F15 (48 to 144 pins)

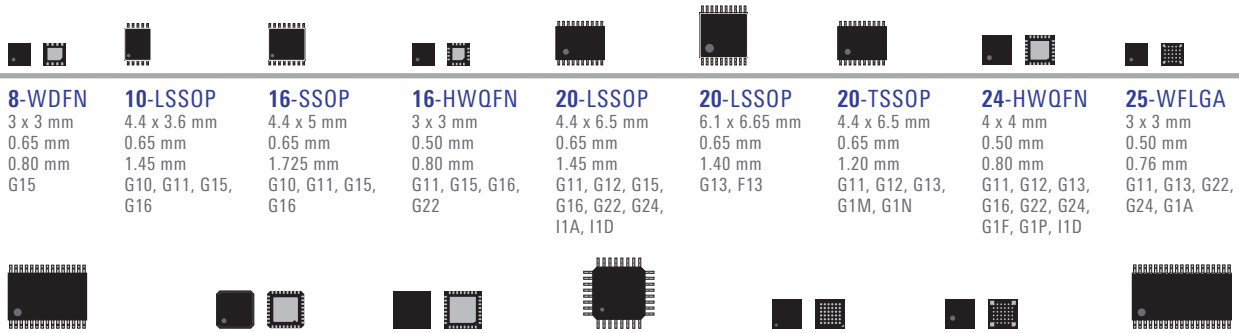
| Group | | | RL78/F15 | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pin count | | | 48-pin | | | | 64-pin | | 80-pin | | 100-pin | | | | | 144-pin | | | | |
| Product name | | | R5F113GKLFB*1 | R5F113GLLFB*1 | R5F113GKLNA*1 | R5F113GLLNA*1 | R5F113LKLFB*1 | R5F113LLLFB*1 | R5F113MKLFB*1 | R5F113MLLFB*1 | R5F113PGLFB*1 | R5F113PHLFB*1 | R5F113PJLFB*1 | R5F113PKLFB*1 | R5F113PLLFB*1 | R5F113TGLFB*1 | R5F113THLFB*1 | R5F113TJLFB*1 | R5F113TKLFB*1 | R5F113TLLFB*1 |
| CPU | | | RL78 CPU core | | | | | | | | | | | | | | | | | |
| Memory | Flash ROM [bytes] | | 384K | 512K | 384K | 512K | 384K | 512K | 384K | 512K | 128K | 192K | 256K | 384K | 512K | 128K | 192K | 256K | 384K | 512K |
| | Data flash [bytes] | | 16K | | | | | | | | 8K | | | 16K | | 8K | | | 16K | |
| | RAM [bytes] | | 26K | 32K | 26K | 32K | 26K | 32K | 26K | 32K | 10K | 16K | 20K | 26K | 32K | 10K | 16K | 20K | 26K | 32K |
| Operating clocks | Maximum operating frequency [Hz] | On-chip oscillator clock | 32MHz (automotive applications, $T_A$ = –40 to +105°C), 24MHz (automotive applications, $T_A$ = –40 to +125°C) | | | | | | | | | | | | | | | | | |
| | | External resonator | 20MHz | | | | | | | | | | | | | | | | | |
| | | Timer RD clock | 64MHz | | | | | | | | | | | | | | | | | |
| Clock generator circuit | Crystal/ceramic oscillator [Hz] | | 1 to 20MHz | | | | | | | | | | | | | | | | | |
| | High-speed on-chip oscillator [Hz] | | 64MHz (±2%): automotive applications/$T_A$ = –40 to +105°C, 48MHz (±3%): automotive applications/$T_A$ = –40 to +125°C | | | | | | | | | | | | | | | | | |
| | Low-speed on-chip oscillator [Hz] | | 15kHz | | | | | | | | | | | | | | | | | |
| | Subclock (32.768 kHz) | | 32.768kHz | | | | | | | | | | | | | | | | | |
| | PLL | | Multiplication factors: ×3, ×4, ×6, ×8 | | | | | | | | | | | | | | | | | |
| I/O | I/O ports | | 38 | | | | 52 | | 68 | | 86 | | | | | 130 | | | | |
| | | N-channel open drain (6V tolerance) | — | | | | | | | | | | | | | | | | | |
| | | N-channel open drain ($EV_{DD}$ tolerance) | 16 | | | | | | | | | | | | | | | | | |
| Timers | 16-bit timer TAU [channels] | | 16 | | | | | | | | | | | | | 24 | | | | |
| | 16-bit timer RJ [channels] | | 1 | | | | | | | | | | | | | | | | | |
| | 16-bit timer RD [channels] | | 2 | | | | | | | | | | | | | | | | | |
| | Real-time clock (RTC) [channels] | | 1 | | | | | | | | | | | | | | | | | |
| | Watchdog timer (WDT) [channels] | | 1 | | | | | | | | | | | | | | | | | |
| Serial interfaces | CSI×6, UART×3, simplified I²C×4 | | 1 | | | | | | | | | | | | | | | | | |
| | CSI×3, UART×2, simplified I²C×3 | | — | | | | | | | | 1 | | | | | | | | | |
| | CSI×4, UART×2, simplified I²C×4 | | 1 | | | | | | | | — | | | | | | | | | |
| | UART×1, LIN (RLIN3)×1 | | 2 | | | | | | | | 3 | | | | | | | | | |
| | CAN (RS-CAN lite)×1 | | 2 | | | | | | | | | | | | | | | | | |
| | IEBus controller | | 1 | | | | | | | | | | | | | | | | | |
| | Multi-master I²C×1 | | 1 | | | | | | | | | | | | | | | | | |
| DTC (sources) | | | 46 | | | | | | | | 50 | | | | | 52 | | | | |
| ELC (inputs/trigger outputs) | | | 26/9 | | | | | | | | | | | | | | | | | |
| External interrupts [channels] | | | 15 | | | | 18 | | 19 | | 20 | | | | | 22 | | | | |
| OCD | On-chip debugging | | Yes (hot plugin, trace) | | | | | | | | | | | | | | | | | |
| Peripheral functions | 8/10-bit A/D converter [channels] | | 13 | | | | 17 | | 18 | | 24 | | | | | | | | | |
| | 8-bit D/A converter [channels] | | 1 | | | | | | | | | | | | | | | | | |
| | Comparator [channels] | | 1 | | | | | | | | | | | | | | | | | |
| | Multiplier/divider/ multiply-accumulator | | Multiply/divide/multiply-accumulate instructions supported (included in CPU instruction set)<br>Multiply: 16-bit × 16-bit = 32-bit (signed/unsigned)<br>Divide: 32-bit ÷ 32-bit = 32-bit (unsigned)<br>Multiply-accumulate: 16-bit × 16-bit + 32-bit = 32-bit (signed/unsigned) | | | | | | | | | | | | | | | | | |
| | Other functions | | Power-on reset (POR), low-voltage detection circuit (LVD), RTC output (1Hz) × 1, clock/buzzer output × 2 | | | | | | | | | | | | | | | | | |
| Safety functions | | | Flash memory CRC calculation function (high-speed), CRC calculation function (general-purpose),<br>SRAM ECC function, CPU stack pointer monitor function, clock monitor function, RAM guard function,<br>SFR guard function, illegal memory access detection function, frequency detection function, A/D converter test function,<br>I/O power output signal level detection function | | | | | | | | | | | | | | | | | |
| Other | Power supply voltage [V] | | $V_{DD}$ = 2.7 to 5.5V | | | | | | | | | | | | | | | | | |
| | Operating ambient temperature [°C] | | $T_A$ = –40 to +105°C (L: automotive applications), $T_A$ = –40 to +125°C (K: automotive applications)*1 | | | | | | | | | | | | | | | | | |
| | Package (size [mm]) | | 48-LFQFP (7×7mm) | | 48-HVQFN (7×7mm) | | 64-LFQFP (10×10mm) | | 80-LFQFP (12×12mm) | | 100-LFQFP (14×14mm) | | | | | 144-LFQFP (20×20mm) | | | | |

Ambient operating temperature range of the above part numbers is –40 to +105°C.

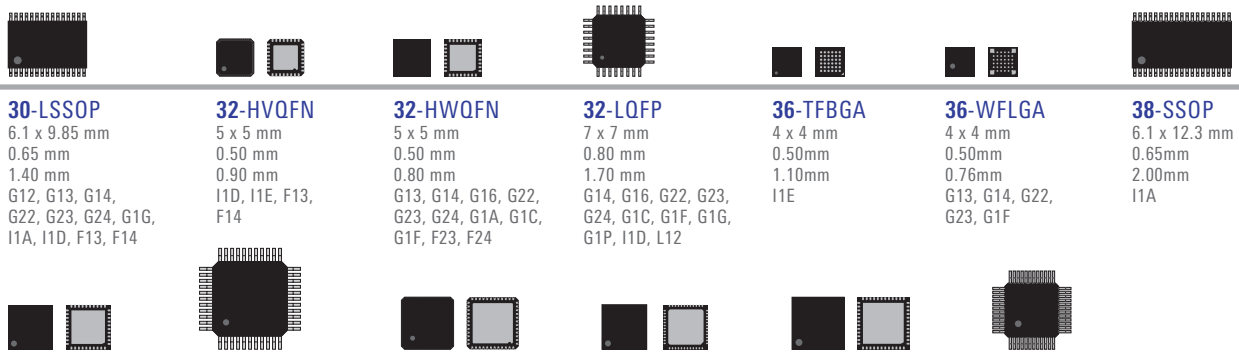
*1: Products with –40 to +125°C ambient operating temperature range (part number: R5F1xxxxKxx) is also available.

For detail about part number, please see "Explanation of Orderable Part Numbers" on page 110.

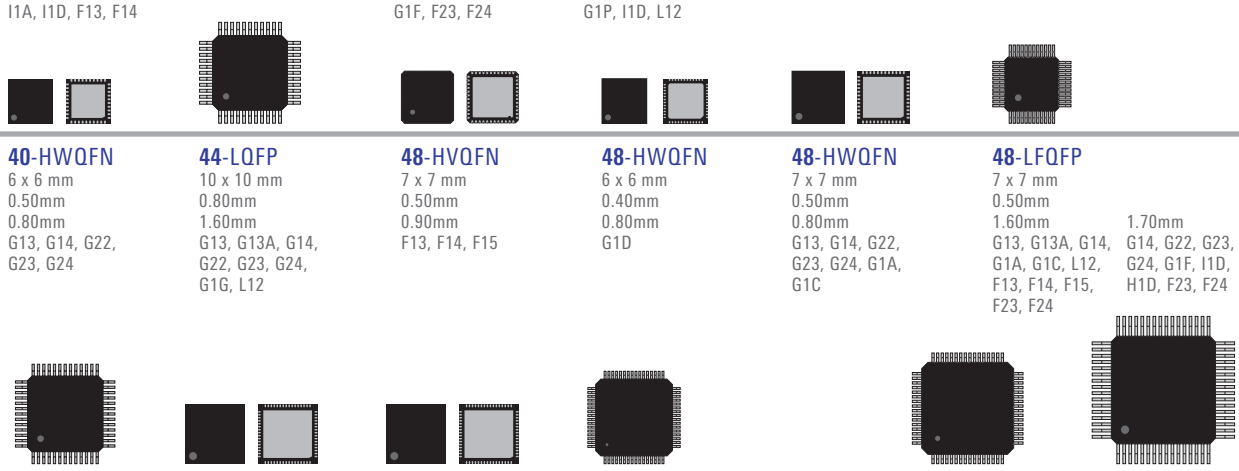
# RL78 FAMILY PACKAGE LINEUP



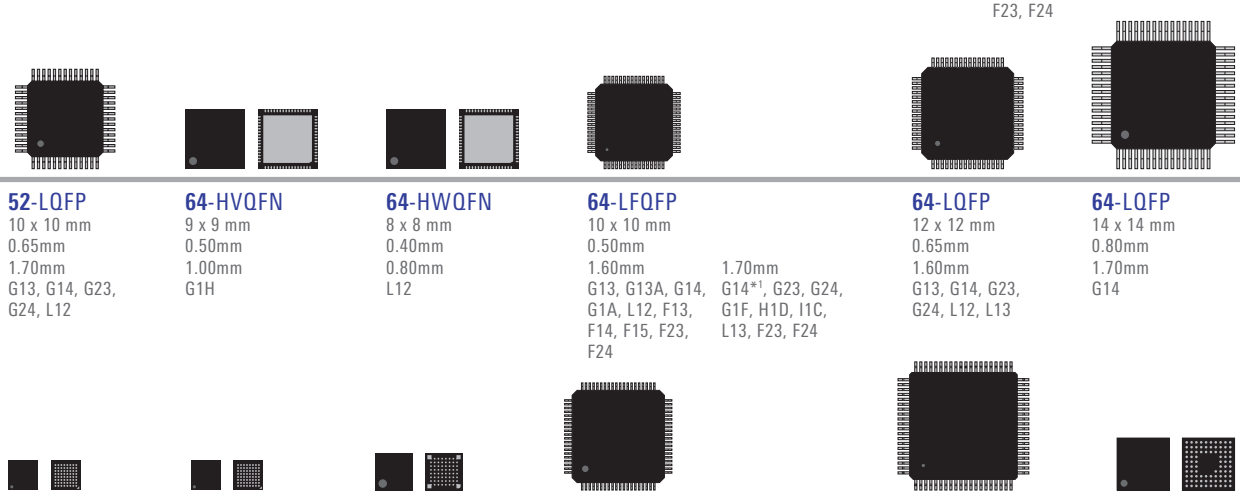
| Pin-type: | 8-WDFN | 10-LSSOP | 16-SSOP | 16-HWQFN | 20-LSSOP | 20-LSSOP | 20-TSSOP | 24-HWQFN | 25-WFLGA |
|---|---|---|---|---|---|---|---|---|---|
| Size: | 3 x 3 mm | 4.4 x 3.6 mm | 4.4 x 5 mm | 3 x 3 mm | 4.4 x 6.5 mm | 6.1 x 6.65 mm | 4.4 x 6.5 mm | 4 x 4 mm | 3 x 3 mm |
| Pitch: | 0.65 mm | 0.65 mm | 0.65 mm | 0.50 mm | 0.65 mm | 0.65 mm | 0.65 mm | 0.50 mm | 0.50 mm |
| Thickness: | 0.80 mm | 1.45 mm | 1.725 mm | 0.80 mm | 1.45 mm | 1.40 mm | 1.20 mm | 0.80 mm | 0.76 mm |
| Group: | G15 | G10, G11, G15, G16 | G10, G11, G15, G16 | G11, G15, G16, G22 | G11, G12, G15, G16, G22, G24, I1A, I1D | G13, F13 | G11, G12, G13, G1M, G1N | G11, G12, G13, G16, G22, G24, G1F, G1P, I1D | G11, G13, G22, G24, G1A |



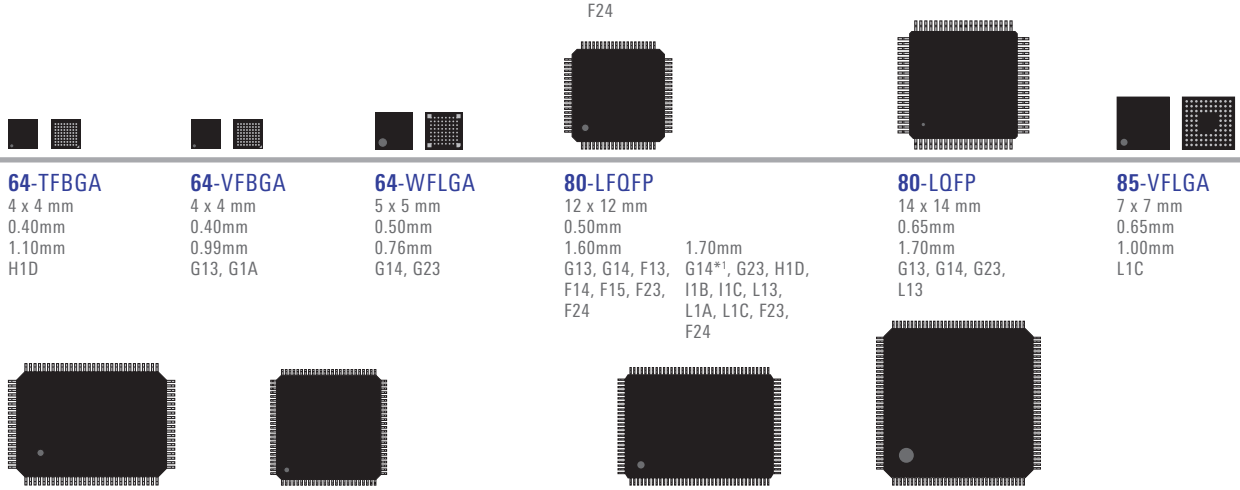
| Pin-type: | 30-LSSOP | 32-HVQFN | 32-HWQFN | 32-LQFP | 36-TFBGA | 36-WFLGA | 38-SSOP |
|---|---|---|---|---|---|---|---|
| Size: | 6.1 x 9.85 mm | 5 x 5 mm | 5 x 5 mm | 7 x 7 mm | 4 x 4 mm | 4 x 4 mm | 6.1 x 12.3 mm |
| Pitch: | 0.65 mm | 0.50 mm | 0.50 mm | 0.80 mm | 0.50mm | 0.50mm | 0.65mm |
| Thickness: | 1.40 mm | 0.90 mm | 0.80 mm | 1.70 mm | 1.10mm | 0.76mm | 2.00mm |
| Group: | G12, G13, G14, G22, G23, G24, G1G, I1A, I1D, F13, F14 | I1D, I1E, F13, F14 | G13, G14, G16, G22, G23, G24, G1A, G1C, G1F, F23, F24 | G14, G16, G22, G23, G24, G1C, G1F, G1G, G1P, I1D, L12 | I1E | G13, G14, G22, G23, G1F | I1A |



| Pin-type: | 40-HWQFN | 44-LQFP | 48-HVQFN | 48-HWQFN | 48-HWQFN | 48-LFQFP | |
|---|---|---|---|---|---|---|---|
| Size: | 6 x 6 mm | 10 x 10 mm | 7 x 7 mm | 6 x 6 mm | 7 x 7 mm | 7 x 7 mm | |
| Pitch: | 0.50mm | 0.80mm | 0.50mm | 0.40mm | 0.50mm | 0.50mm | |
| Thickness: | 0.80mm | 1.60mm | 0.90mm | 0.80mm | 0.80mm | 1.60mm | 1.70mm |
| Group: | G13, G14, G22, G23, G24 | G13, G13A, G14, G22, G23, G24, G1G, L12 | F13, F14, F15 | G1D | G13, G14, G22, G23, G24, G1A, G1C | G13, G13A, G14, G1A, G1C, L12, F13, F14, F15, F23, F24 | G14, G22, G23, G24, G1F, I1D, H1D, F23, F24 |



| Pin-type: | 52-LQFP | 64-HVQFN | 64-HWQFN | 64-LFQFP | | 64-LQFP | 64-LQFP |
|---|---|---|---|---|---|---|---|
| Size: | 10 x 10 mm | 9 x 9 mm | 8 x 8 mm | 10 x 10 mm | | 12 x 12 mm | 14 x 14 mm |
| Pitch: | 0.65mm | 0.50mm | 0.40mm | 0.50mm | | 0.65mm | 0.80mm |
| Thickness: | 1.70mm | 1.00mm | 0.80mm | 1.60mm | 1.70mm | 1.60mm | 1.70mm |
| Group: | G13, G14, G23, G24, L12 | G1H | L12 | G13, G13A, G14, G1A, L12, F13, F14, F15, F23, F24 | G14*1, G23, G24, G1F, H1D, I1C, L13, F23, F24 | G13, G14, G23, G24, L12, L13 | G14 |



| Pin-type: | 64-TFBGA | 64-VFBGA | 64-WFLGA | 80-LFQFP | | 80-LQFP | 85-VFLGA |
|---|---|---|---|---|---|---|---|
| Size: | 4 x 4 mm | 4 x 4 mm | 5 x 5 mm | 12 x 12 mm | | 14 x 14 mm | 7 x 7 mm |
| Pitch: | 0.40mm | 0.40mm | 0.50mm | 0.50mm | | 0.65mm | 0.65mm |
| Thickness: | 1.10mm | 0.99mm | 0.76mm | 1.60mm | 1.70mm | 1.70mm | 1.00mm |
| Group: | H1D | G13, G1A | G14, G23 | G13, G14, F13, F14, F15, F23, F24 | G14*1, G23, H1D, I1B, I1C, L13, L1A, L1C, F23, F24 | G13, G14, G23, L13 | L1C |



| Pin-type: | 100-LQFP | 100-LFQFP | | 128-LFQFP | 144-LFQFP |
|---|---|---|---|---|---|
| Size: | 14 x 20 mm | 14 x 14 mm | | 14 x 20 mm | 20 x 20 mm |
| Pitch: | 0.65mm | 0.50mm | | 0.50mm | 0.50mm |
| Thickness: | 1.60mm | 1.60mm | 1.70mm | 1.60mm | 1.60mm |
| Group: | G13, G14, G23 | G13, G13A, G14, F14, F15, F24 | G14*1, G23, I1B, I1C, L1A, L1C, F24 | G13, G23 | F15 |

Note: *1. G14 (384, 512 KB)

# EXPLANATION OF ORDERABLE PART NUMBERS
## (For part numbers start with R5F)

**R5 F 1 00 6 E C A SP #Vx**

| R5 | F | 1 |
|---|---|---|
| Renesas MCU | ROM Type F: Flash | RL78 Family |

**Product group**

| | | |
|---|---|---|
| 00 | G13 | Data Flash |
| 01 | | No Data Flash |
| 02 | G12 | Data Flash |
| 03 | | No Data Flash |
| 04 | G14 | |
| 05 | G11 | |
| 07 | I1A | |
| 09 | F12 | |
| 0A | F13 | LIN |
| 0B | | LIN & CAN |
| 0E | G1A | |
| 0F | G1E | |
| 0J | G1C | USB Host & Function |
| 0K | | USB Function |
| 0M | I1B | |
| 0N | I1C On-chip AES | |
| 0P | F14 | |
| 0R | L12 | |
| 0W | L13 | |
| 0Y | G10 | |
| 10 | L1C | LCD & USB Function |
| 11 | | LCD |
| 13 | F15 | |
| 17 | I1D | |
| 1A | G1D | |
| 1B | G1F | |
| 1C | I1E | |
| 1E | G1G | |
| 1F | G1H | |
| 1M | L1A | |
| 1N | H1D | AFE, LFQFP package |
| 1P | | AFE, TFBGA package |
| 1R | | Meter, Timer |
| 1T | I1C No On-chip AES | |
| 1W | G1M | |
| 1Y | G1N | |
| 1Z | G1P | |
| 20 | G15 | |
| 21 | G16 | |
| 40 | G13A | |

**Pin count**

| | |
|---|---|
| 0 | 8 |
| 1 | 10 |
| 4 | 16 |
| 6 | 20 |
| 7 | 24 |
| 8 | 25 |
| A | 30 |
| B | 32 |
| C | 36 |
| D | 38 |
| E | 40 |
| F | 44 |
| G | 48 |
| J | 52 |
| L | 64 |
| M | 80 |
| P | 100 |
| S | 128 |
| T | 144 |

**ROM Size (KB)**

| | |
|---|---|
| 4 | 1 |
| 6 | 2 |
| 7 | 4 |
| 8 | 8 |
| 9 | 12 |
| A | 16 |
| B | 24 |
| C | 32 |
| D | 48 |
| E | 64 |
| F | 96 |
| G | 128 |
| H | 192 |
| J | 256 |
| K | 384 |
| L | 512 |

**Bonding wire** (Only part of RL78/F1x)*2

| | |
|---|---|
| C | Cu (Copper) |

**Temperature & Quality Grade**

| | | |
|---|---|---|
| A | -40°C to 85°C | Consumer |
| D | -40°C to 85°C | Industrial |
| G | -40°C to 105°C | Industrial |
| M | -40°C to 125°C | Industrial |
| J | -40°C to 85°C | Automotive |
| L | -40°C to 105°C | Automotive |
| K | -40°C to 125°C | Automotive |
| Y | -40°C to 150°C | Automotive |

**Package, Pin Pitch**

| | | | | |
|---|---|---|---|---|
| SP | SSOP 0.65 mm | | LA | WFLGA 0.5 mm |
| | LSSOP 0.65 mm | | | VFLGA 0.65 mm |
| SM | TSSOP 0.65 mm | | BG | VFBGA 0.4 mm |
| NA | HWQFN 0.5 mm | | | TFBGA 0.5 mm |
| | HVQFN 0.5 mm | | FA | LQFP 0.65 mm |
| NB | HWQFN 0.65 mm | | FB | LFQFP 0.5 mm |
| | HWQFN 0.4 mm | | FP | LQFP 0.8 mm |

**Packaging, Material (Pb-free)**

| | |
|---|---|
| #G, #0 | Full Carton (HWQFN,HVQFN,WFLGA) |
| #H, #1 | Full Carton (SSOP,LSSOP,LQFP,LFQFP,TSSOP,WDFN) |
| #U, #2 | Tray (HWQFN,HVQFN.VFBGA,VFLGA,WFLGA,FLGA,TFBGA) |
| #V, #3 | Tray, Tube*1 (SSOP,LSSOP,LQFP,LFQFP,TSSOP,WDFN) |
| #W, #4 | Embossed Tape (HWQFN,HVQFN,VFBGA,VFLGA,WFLGA,FLGA,TFBGA) |
| #X, #5 | Embossed Tape (SSOP,LSSOP,LQFP,LFQFP,TSSOP,WDFN) |

Notes: 1. For 20-pin RL78/G11, RL78/G12, RL78/G15, RL78/G16 RL78/I1A and RL78/I1D LSSOP products only the package specification is tube.
2. Please contact Renesas sales or agent for details.

# EXPLANATION OF ORDERABLE PART NUMBERS
## (For part numbers start with R7F)

**R7 F 1 00G L J 3 C FB -C #AAx**

- **R7** — Renesas MCU
- **F** — ROM Type F: Flash
- **1** — RL78 Family
- **00G** — Product group
- **L** — Pin count
- **J** — ROM Size (KB)
- **3** — Temperature
- **C** — Quality Grade
- **FB** — Package, Pin Pitch
- **-C** — Bonding wire
- **#AAx** — Packaging, Material (Pb-free)

**Product group**

| | | | |
|---|---|---|---|
| 00G | G23 | 23F | F23 |
| 01G | G24 | 24F | F24 |
| 02G | G22 | | |

**Pin count**

| | |
|---|---|
| 4 | 16 |
| 6 | 20 |
| 7 | 24 |
| 8 | 25 |
| A | 30 |
| B | 32 |
| C | 36 |
| E | 40 |
| F | 44 |
| G | 48 |
| J | 52 |
| L | 64 |
| M | 80 |
| P | 100 |
| S | 128 |

**ROM Size (KB)**

| | |
|---|---|
| C | 32 |
| E | 64 |
| F | 96 |
| G | 128 |
| H | 192 |
| J | 256 |
| K | 384 |
| L | 512 |
| N | 768 |

**Temperature**

| | |
|---|---|
| 2 | -40˚C to 85˚C |
| 3 | -40˚C to 105˚C |
| 4 | -40˚C to 125˚C |
| 5 | -40˚C to 150˚C |

**Quality Grade**

| | |
|---|---|
| A | Automotive |
| C | Industrial |
| D | Consumer |

**Package, Pin Pitch**

| | |
|---|---|
| SP | LSSOP 0.65 mm |
| FP | LQFP 0.8 mm |
| FA | LQFP 0.65 mm |
| FB | LFQFP 0.5 mm |
| NP | HWQFN 0.5 mm |
| LA | WFLGA 0.5 mm |
| BG | VFBGA 0.4 mm |

**Bonding wire** (Only part of RL78/F2x)

| | |
|---|---|
| C | Cu (Copper) |

**Packaging, Material (Pb-free)**

| | |
|---|---|
| #UA<br>#BA<br>#AA | Tray<br>(LFQFP, LQFP, LSSOP, HWQFN) |
| #UC<br>#BC<br>#AC | Tray<br>(WFLGA) |
| #CA | Tube* (LSSOP)<br>* Also known as “magazine”<br>(shipping form is the same) |
| #HA | Embossed Tape<br>(LFQFP, LQFP, LSSOP, HWQFN) |
| #HC | Embossed Tape<br>(WFLGA) |

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