

Renesas EEPROM Product Outline

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Standard Memory Products Section,
Standard Products Department, Advanced Analog Division,
Embedded Processing, Digital Power and Signal Chain Solutions Group,
Renesas Electronics Corporation

EEPROM-2023-E-0710-1

Memory Products Portfolio

■ “One-Renesas” provides optimum memory solutions to various application fields

| Memory Types | Products | Sources |
|------------------------|---|---------------|
| Low Power SRAM | <ul style="list-style-type: none"> ■ (5V, 3V) 256Kb, 1Mb, 4Mb ■ (3V) 2Mb, 8Mb, 16Mb, 32Mb, 64Mb | Renesas |
| Asynchronous Fast SRAM | <ul style="list-style-type: none"> ■ (5V, 3.3V) 4Mb ■ (5V) 16Kb, 64Kb ■ (5V, 3.3V) 256Kb, 1Mb ■ (3.3V) 4Mb | |
| Synchronous SRAM | <ul style="list-style-type: none"> ■ Pipeline Burst / Flow-through 1Mb, 2Mb, 4Mb, 9Mb ■ Zero Bus Turnaround (ZBT) 4Mb, 9Mb, 18Mb | former IDT |
| Specialty Memory | <ul style="list-style-type: none"> ■ Multi-Port (5V, 3.3V, 2.5V, 1.8V) 8Kb ~ 36Mb ■ FIFO (5V, 3.3V, 2.5V) 2Kb ~ 18Mb | |
| MRAM | <ul style="list-style-type: none"> ■ Serial I/F: QSPI (3V, 1.8V) 4Mb, 8Mb, 16Mb ■ Parallel I/F: (3V) 4Mb, 8Mb, 16Mb, 32Mb | |
| EEPROM | <ul style="list-style-type: none"> ■ Serial I/F: I2C, SPI (1.8V ~ 5.5V) 2Kb ~ 512Kb | Renesas |
| SPI NOR Flash | <ul style="list-style-type: none"> ■ Standard Products: (1.8V) 8Mb ~ 128Mb (1.8 ~ 3V, Wide Vcc) (3V) 256Kb ~ 128Mb 4Mb ~ 32Mb | former Dialog |
| | <ul style="list-style-type: none"> ■ System-Enhancing Products: Fusion / FusionHD 512Kb~32Mb / DataFlash 2Mb~64Mb / Ultra-Low Energy 1Mb~4Mb | |

Covered by
this Material

Advantages: Renesas EEPROM

1. High reliability by MONOS technology

- ✓ More than 30 years of production, from 3um-process to date
- ✓ Distinguished Erase/Write endurance

2. Stable supply and long-term support

- ✓ PLP (Product Longevity Program) Applicable*

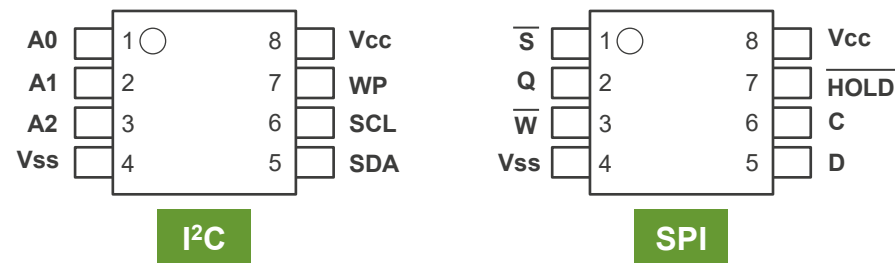
3. Wide variety of product lineup

- ✓ Serial EEPROM : 2Kb to 512Kb for both I²C and SPI



Product **Longevity** Program

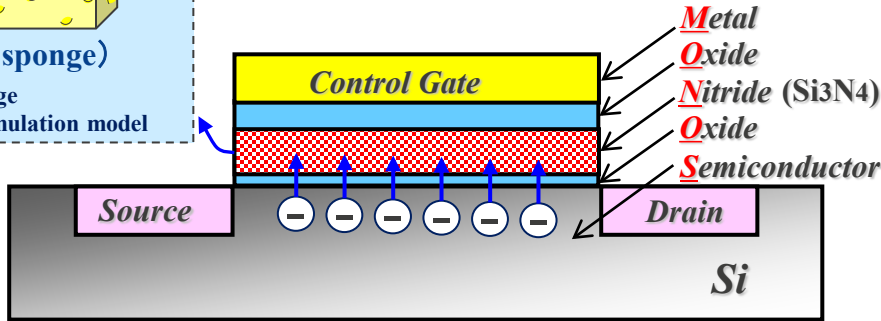
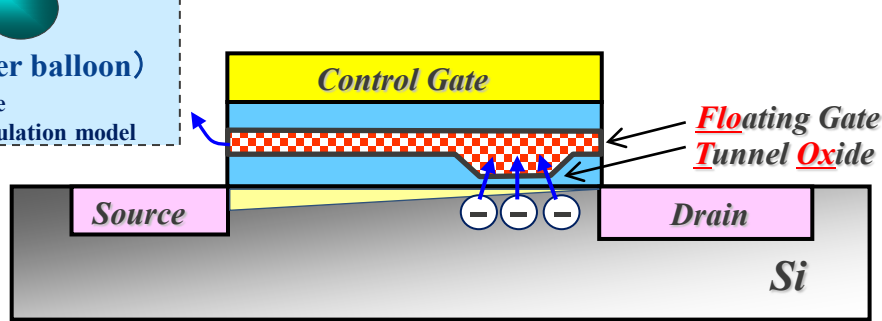
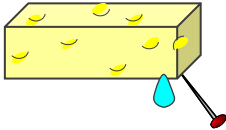
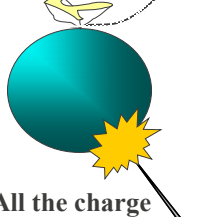
* Contact us for the applicable part names.












Pin Arrangement : 8-pin SOP / 8-pin TSSOP (Top View)



High Reliability of MONOS type

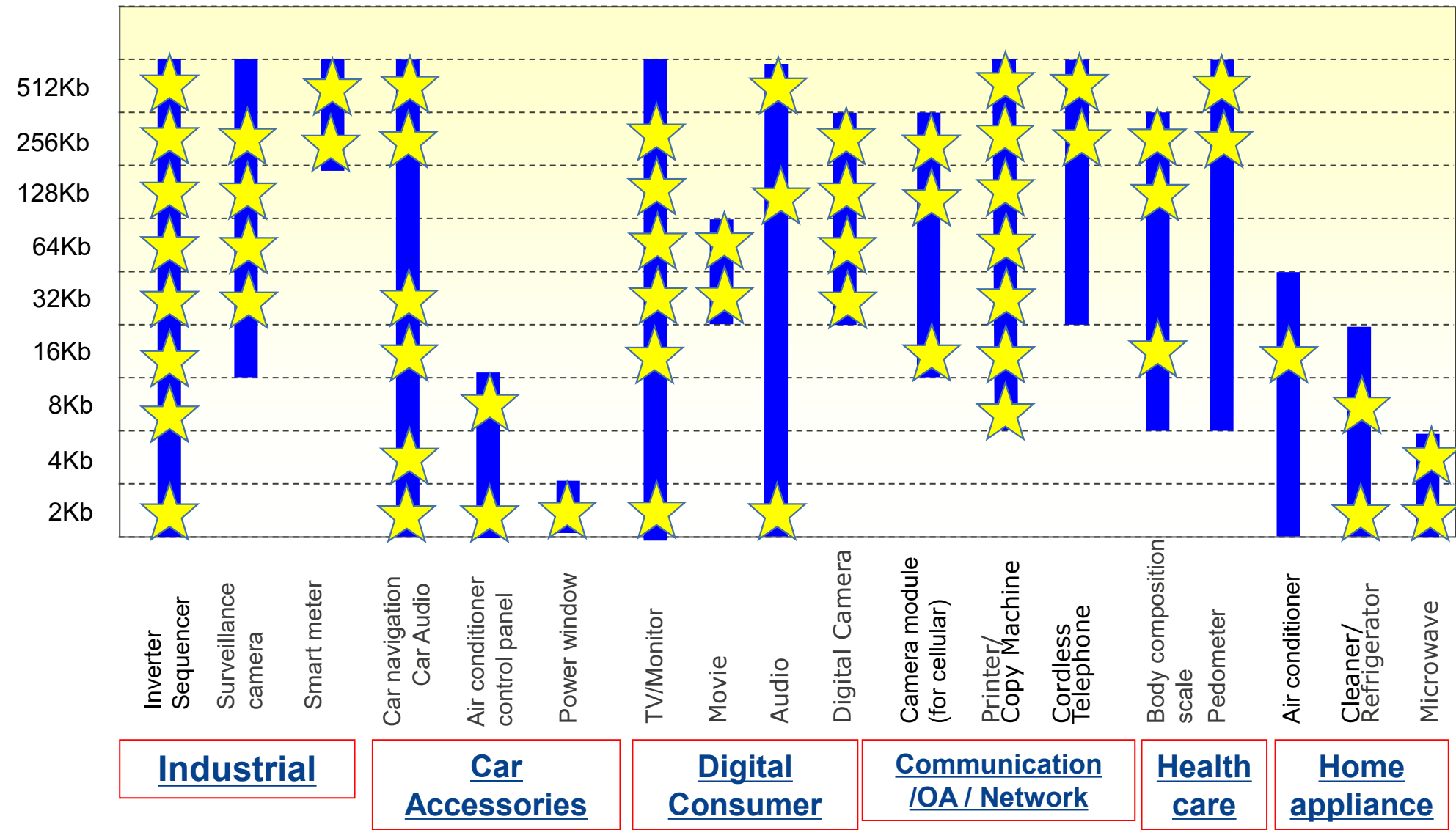
| MONOS type (Renesas) | FLOTOX Type (Competitors) |
|---|--|
|  <p>(sponge) Charge accumulation model</p> <p>Control Gate</p> <p>Metal Oxide Nitride (Si₃N₄) Oxide Semiconductor</p> <p>Source Drain</p> <p>Si</p> |  <p>(Water balloon) Charge accumulation model</p> <p>Control Gate</p> <p>Floating Gate Tunnel Oxide</p> <p>Source Drain</p> <p>Si</p> |
| <p>Put in and out the charge by whole interface of Tunnel oxide film</p> | <p>Put in and out the charge by partial (local) interface of Tunnel oxide film</p> |
| <p>Keeps the charge in <u>dielectric</u> (non-conducting) film</p> <p>-> Even if a defective weak spot occurs in the tunnel oxide, loss of the charge is locally limited.</p> <p>-> Easy to keep the high reliability</p> <p>-> No need for ECC circuit</p>  <p>Charge loss is locally limited</p> | <p>Keeps the charge in <u>conducting</u> film (poly Si)</p> <p>-> A local defect of the tunnel oxide can lead to entire loss of the charge.</p> <p>-> Difficult to keep the reliability</p> <p>-> Needs ECC circuit for large density</p>  <p>All the charge is lost through the defect</p> |

EEPROM Applications

| Industrial | | | | | Consumer | | | |
|--|--|--|---|--|--|--|--|--|
| Factory automation | Energy system | Communication infrastructure | POS system | Car accessory (non-driveline) Navigation, etc. | Healthcare equipment | Consumer electronics | Office automation apparatus | Gaming |
|  |  |  |  |  |  |  |  |  |

Track Records of Renesas EEPROM

★ Use case by application/density



Winning Combinations

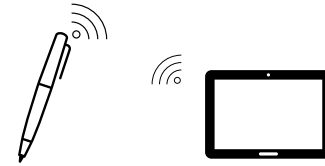
Winning combinations to accelerate
your application design

Analog + Power + Embedded Processing + Connectivity



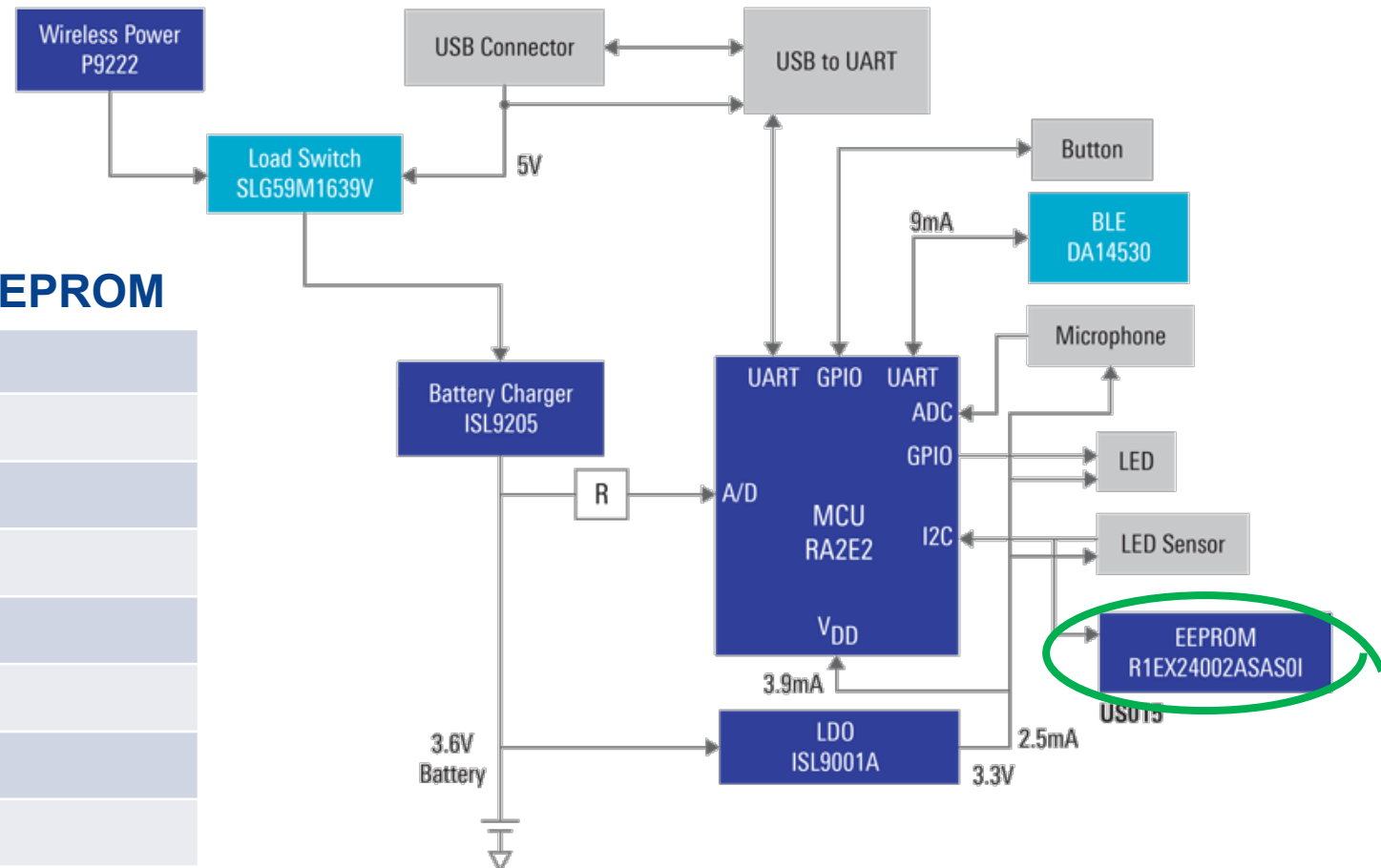
| Application | EEPROM Product | Renesas Website |
|--|-----------------|---|
| Smart Pen | R1EX24002ASAS0I | Smart Pen Renesas |
| Single-Board Computer (SBC) Solution Featuring RZ/G2L MPU | R1EX24002ASAS0I | Single-board Computer (SBC) Solution Featuring RZ/G2L MPU Renesas |
| Automated Optical Inspection | R1EX24016ASAS0I | Automated Optical Inspection (AOI) Solution Renesas |
| Wi-Fi Connected Retail Scale | R1EX24016ASAS0I | Wi-Fi Connected Retail Scale Renesas |
| Wireless Electronic Gaming Table | R1EX24016ASAS0I | Wireless Electronic Gaming Table Renesas |
| Gigabit Industrial Ethernet System-on-Module | R1EX24016ASAS0I | Gigabit Industrial Ethernet System-on-Module (SoM) Solution Renesas |
| High Throughput Wi-Fi 6 Router | R1EX24016ATAS0I | High Throughput Wi-Fi 6 Router Renesas |
| 1-Phase power meter | R1EX25512ATA00I | 1-Phase Power Meter Renesas |

Renesas EEPROM in smart pen



- The LED and detector record's the pen's movement
- The IR LED is invisible, so the user will not be distracted by any light while writing
- Bluetooth® Low Energy (LE) on the pen would transfer the digital data from the pen to a computer or tablet
- An EEPROM on board will store the writing in memory for transfer to a notebook
- Buttons for audio recording to start and to power on/off the pen

This smart pen system is used to record human handwriting and store a copy in a digital format. The pen uses one IR LED to emit light onto the paper and an LED sensor to detect the reflection. The sensor will allow the movement of the pen's pattern to be detected and record what is written.



Packed with Renesas content including EEPROM

| Renesas Part | Type |
|-----------------|-----------------|
| DA14530 | Low Power BLE |
| R1EX24002ASAS0I | EEPROM |
| ISL9001A | LDO |
| SLG59M1639V | Switch |
| RA2E2 | Microcontroller |
| ISL9205 | Battery Charger |
| ISL920 | Power Receiver |

2 Wire Interface - Easy to Implement Serial EEPROM Lineup (I²C)

| Part Name (Product Series) | Density | Interface | Package (pinout) | | Max Clock | Operating Voltage | Operating Temperature | Erase/Write Endurance (cycles) |
|-------------------------------|---------|-----------|------------------|-----------|-----------------------|-------------------|-----------------------|--------------------------------|
| | | | SOP (8) | TSSOP (8) | | | | |
| R1EX24002A | 2Kb | I2C | ✓ | ✓ | 400KHz | 1.8 V ~ 5.5 V | -40°C ~ 85°C | 1,000K (25°C) 100K (85°C) |
| R1EX24004A | 4Kb | I2C | ✓ | ✓ | | | | |
| R1EX24008A | 8Kb | I2C | ✓ | ✓ | | | | |
| R1EX24016A | 16Kb | I2C | ✓ | ✓ | | | | |
| R1EX24032A | 32Kb | I2C | ✓ | ✓ | | | | |
| R1EX24064A | 64Kb | I2C | ✓ | ✓ | | | | |
| R1EX24128B | 128Kb | I2C | ✓ | ✓ | 400KHz | 1.8 V ~ 5.5 V | -40°C ~ 85°C | 1,000K |
| R1EX24256B | 256Kb | I2C | ✓ | ✓ | | | | |
| R1EX24512B | 512Kb | I2C | ✓ | ✓ | 1MHz ^{*Note} | 1.8 V ~ 5.5 V | -40°C ~ 85°C | 1,000K |

*Note: 1MHz (2.5V ~ 5.5V) / 400KHz (1.8V ~ 5.5V)

With Faster Interface

Serial EEPROM Lineup (SPI)

| Part Name (Product Series) | Density | Interface | Package (pinout) | | Max Clock | Operating Voltage | Operating Temperature | Erase/Write Endurance (cycles) |
|-------------------------------|---------|-----------|------------------|-----------|-----------|-------------------|-----------------------|--------------------------------|
| | | | SOP (8) | TSSOP (8) | | | | |
| R1EX25002A | 2Kb | SPI | ✓ | ✓ | 5MHz*Note | 1.8 V ~ 5.5 V | -40°C ~ 85°C | 1,000K (25°C) 100K (85°C) |
| R1EX25004A | 4Kb | SPI | ✓ | ✓ | | | | |
| R1EX25008A | 8Kb | SPI | ✓ | ✓ | | | | |
| R1EX25016A | 16Kb | SPI | ✓ | ✓ | | | | |
| R1EX25032A | 32Kb | SPI | ✓ | ✓ | | | | |
| R1EX25064A | 64Kb | SPI | ✓ | ✓ | | | | |
| HN58X25128 | 128Kb | SPI | ✓ | | | | | |
| HN58X25256 | 256Kb | SPI | ✓ | | | | | |
| R1EX25512A | 512Kb | SPI | ✓ | ✓ | | | | |

*Note: 5MHz (2.5V ~ 5.5V) / 3MHz (1.8V ~ 5.5V)

Serial EEPROM Part Name

R1E X 24 064 A SA S0 I #S0

RENESAS EEPROM

Operating Voltage

| | |
|----------|------------|
| X | 1.8 ~ 5.5V |
| V | 2.5 ~ 5.5V |

Interface

| | |
|-----------|-----|
| 24 | I2C |
| 25 | SPI |

Memory Density

| | | | |
|------------|------|------------|-------|
| 002 | 2Kb | 128 | 128Kb |
| 004 | 4Kb | 256 | 256Kb |
| 008 | 8Kb | 512 | 512Kb |
| 016 | 16Kb | | |
| 032 | 32Kb | | |
| 064 | 64Kb | | |

Chip Generation

| | |
|----------|--------|
| A | A mask |
| B | B mask |

Package

| | |
|-----------|------------|
| SA | 8pin SOP |
| TA | 8pin TSSOP |

Environmental / Packing specs

| | Package Material | | Tape & Reel (pcs / reel) | |
|------------|-----------------------|---------|--------------------------|-----------|
| | | | SOP (8) | TSSOP (8) |
| #S0 | Pb-free | Au-wire | 2,500 | 3,000 |
| #U0 | Pb-free, Halogen-free | Au-wire | 2,500 | 3,000 |
| #K0 | Pb-free, Halogen-free | Cu-wire | 4,000 | |

Operating Temperature

| | |
|----------|------------------------|
| I | Industrial: -40 ~ 85°C |
|----------|------------------------|

Function

| | |
|-----------|-----|
| S0 | I2C |
| 00 | SPI |

[Renesas.com](https://www.renesas.com)