

The World's Most Energy Efficient MCUs with Arm® Cortex® M Core based on SOTB™ process

# RENEASAS RE FAMILY

## Significantly Extend Battery Life with High Performance Operations

The innovative RE Family is developed with the Silicon On Thin Buried Oxide (SOTB™) process technology, realizing ultra-low current consumption in both active and standby mode and enabling high-speed operation (64MHz) at low voltage (1.62V), which is impossible to achieve with conventional bulk silicon process.

The RE01 MCU can significantly extend battery life and deliver higher performance with a smaller battery size. Its on-chip energy harvesting controller can bring development to a new chapter by eliminating a battery completely in achieving a maintenance-free system.



### The World's Most Energy Efficient

- 705 ULPMark™-CP score certified by EEMBC ULPMark™ benchmark
- Active current: 25µA/MHz (Int. LDO)
- Active current: 12µA/MHz (Ext. DC/DC ISL9123)
- Standby current: 400nA



### High-Speed Operation at Low Voltage

- High-speed operation 64MHz at low voltage 1.62V
- 32-bit CPU Arm Cortex-M Core



### Ultra-Low Power Peripherals

- 14-bit ADC: 4µA, Flash programming: 0.6mA
- 2D Graphics, MIP-LCD parallel I/F
- Energy harvesting control circuit



### Strong Security

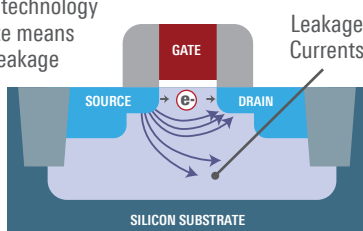
- Trusted Secure IP (AES, random number generation)
- Secure updating of flash memory, secure boot

## SOTB™ Process Technology

Exclusive SOTB™ process technology makes no compromises in providing ultra-low current consumption in both active and standby mode. The combination of dopantless SOI channel, buried oxide insulation layer, and the back-side gate enables SOTB™ to provide extreme low power operation with low leakage current. Also, SOTB™ supports high performance analog with low noise and more accuracy at a lesser power consumption, improving the overall energy efficiency of the system.

### Conventional Bulk Transistor

Smaller technology node size means higher leakage

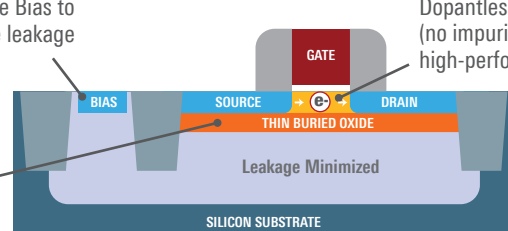


### SOTB Transistor and Back Bias Control

Substrate Bias to further reduce leakage

Dopantless Channel (no impurities) for low-voltage, high-performance operation

Thin Insulation Layer is the foundation to Dopantless Channel



# RENESAS RE FAMILY

## Target Markets and Benefits

### Smart Home/Building



- Improved design with smaller battery
- Reduce the battery maintenance cost by longer battery life and energy harvesting

### Structural Health Monitoring



- Reduce the battery maintenance cost by energy harvesting

### Wearable



- Solar power drive
- High-speed CPU: acceleration / heart rate sensor processing
- Low power graphics

### Tracker



- Preventing missing tracking by maintenance free

### Smart Agriculture



- Easy installation and cost reduction of battery maintenance by energy harvesting

### Healthcare



- High-speed processing at low power
- Ultra low power ADC 4μA for analog sensing
- Ultra low power over-the-air (OTA) 600μA

## Development Tools

| IDE         | Renesas e <sup>2</sup> studio  | IAR EWARM  |
|-------------|--|--|
| Compiler    | <ul style="list-style-type: none"> <li>■ GCC GNU Compiler</li> </ul>                                       | <ul style="list-style-type: none"> <li>■ IAR Arm Compiler</li> </ul>                   |
| Debugger    | <ul style="list-style-type: none"> <li>■ Renesas E2/E2 Lite</li> <li>■ SEGGER J-Link</li> </ul>            | <ul style="list-style-type: none"> <li>■ IAR I-Jet</li> <li>■ SEGGER J-Link</li> </ul> |
| Programmer  | <ul style="list-style-type: none"> <li>■ Renesas PG-FP6, RFP</li> <li>■ SEGGER J-Flash, Flasher</li> </ul> |  |
| Driver      | <ul style="list-style-type: none"> <li>■ Arm CMSIS Driver</li> <li>■ Renesas HAL Driver</li> </ul>         |  |
| Sample code | <ul style="list-style-type: none"> <li>■ Driver sample code</li> <li>■ Low level code</li> </ul>           |  |

## Evaluation Kit

Both EK-RE01 1500KB and EK-RE01 256KB support MCU current measurement, energy harvesting evaluation and sensor connectivity expansion through PMOD or/and Arduino interfaces.

### EK-RE01 1500KB

RTK70E015DS00000BE



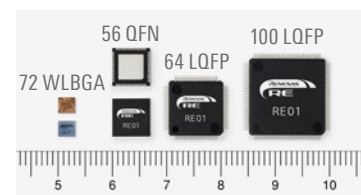
### EK-RE01 256KB

RTK70E0118S00000BJ



## Ordering References

| Products       |                 |                 | 56 QFN                 | 64 LQFP                  | 72 WLPGA                   | 100 LQFP                 | 144 LQFP                 | 156 WLPGA                    |
|----------------|-----------------|-----------------|------------------------|--------------------------|----------------------------|--------------------------|--------------------------|------------------------------|
| Group          | Flash/RAM       | TSIP (Security) | 7 x 7mm<br>0.4mm pitch | 10 x 10mm<br>0.5mm pitch | 3.16x2.88mm<br>0.3mm pitch | 14 x 14mm<br>0.5mm pitch | 20 x 20mm<br>0.5mm pitch | 4.27 x 4.47mm<br>0.3mm pitch |
| RE01<br>1500KB | 1.5MB/<br>256KB | Yes             | -                      | -                        | -                          | R7F0E015D2CFP            | R7F0E015D2CFB            | R7F0E017D2DBN                |
|                |                 | No              | -                      | -                        | -                          | R7F0E014D2CFP            | R7F0E014D2CFB            | R7F0E016D2DBN                |
| RE01<br>256KB  | 256KB/<br>128KB | Yes             | R7F0E01182DNG          | R7F0E01182CFM            | R7F0E01182DBR              | R7F0E01182CFP            | -                        | -                            |
|                |                 | No              | R7F0E01082DNG          | R7F0E01082CFM            | R7F0E01082DBR              | R7F0E01082CFP            | -                        | -                            |



For more details, please visit [www.renesas.com/RE](http://www.renesas.com/RE)

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