RENESAS
BIG IDEAS FOR EVERY SPACE

RENESAS RE

The World's Most Energy Efficient MCUs with Arm® Cortex® M Core based on SOTB™ process
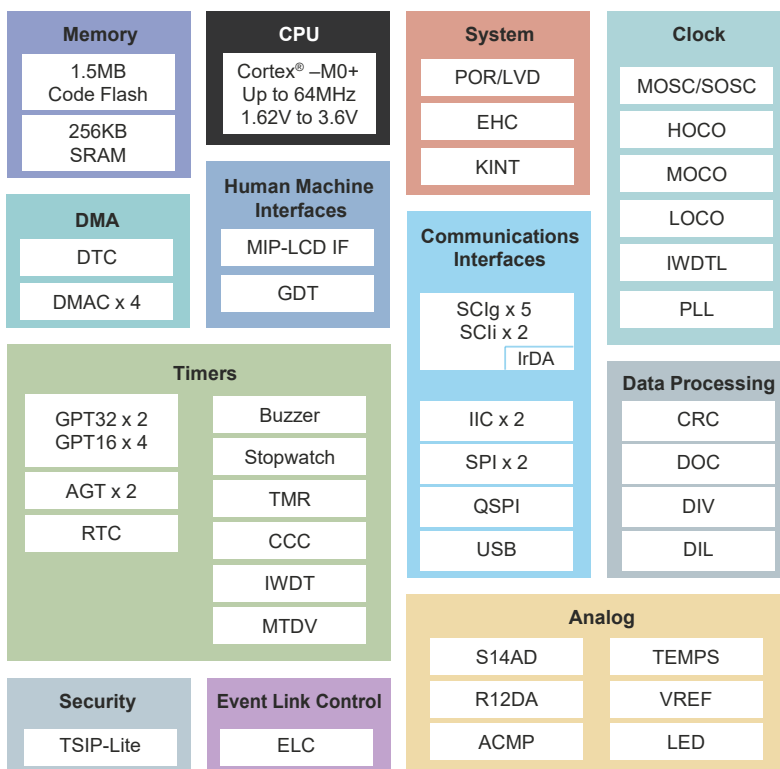
RE01 1500KB MCU GROUP

Innovative Ultra-Low Power Boosting Battery Life with 1500KB Large Flash Memory

The RE01 1500KB MCU is developed based on 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 processes.

Key Benefits

- Significantly extend battery life and deliver high performance with smaller battery size.
- High-speed operation of many functions simultaneously at a low voltage.
- Strong security with Trusted Secure IP.
- Realize small form factor and light weight due to a significant reduction of battery size.

- On-chip energy harvesting controller can eliminate a battery completely in achieving a maintenance-free system.
- 1500KB on-chip flash memory is optimal for applications requiring large amounts of data storage (image information), and applications requiring remote firmware updates (Over The Air (OTA)) through wireless or other communications network.
- Reduce current consumption further when used with ISL9123 to support always on sensing applications.

Block Diagram

Memory	CPU	System	Clock
1.5MB Code Flash	Cortex® –M0+ Up to 64MHz 1.62V to 3.6V	POR/LVD	MOSC/SOSC
256KB SRAM		EHC	HOCO
		KINT	MOCO

DMA
- DTC
- DMAC x 4

Human Machine Interfaces
- MIP-LCD IF
- GDT

Communications Interfaces
- SCIg x 5 SCIi x 2 / IrDA
- IIC x 2
- SPI x 2
- QSPI
- USB

Clock
- MOSC/SOSC
- HOCO
- MOCO
- LOCO
- IWDTL
- PLL

Timers
- GPT32 x 2 GPT16 x 4
- AGT x 2
- RTC
- Buzzer
- Stopwatch
- TMR
- CCC
- IWDT
- MTDV

Data Processing
- CRC
- DOC
- DIV
- DIL

Security
- TSIP-Lite

Event Link Control
- ELC

Analog
- S14AD
- R12DA
- ACMP
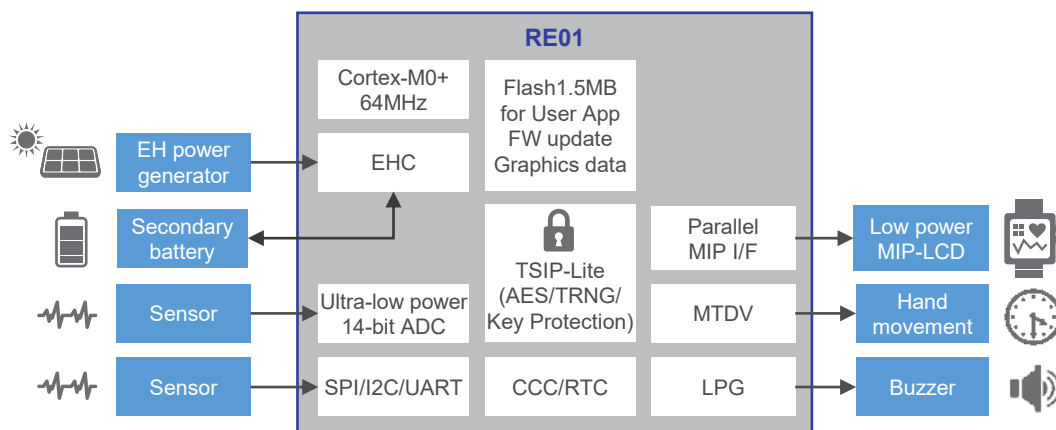- TEMPS
- VREF
- LED

Key Features

- 32-bit CPU Arm® Cortex®-M0+
- 1500kB Flash Memory and 256kB SRAM
- Scalable from 100pin to 156pin Packages
- Run 35μA/MHz (15μA/MHz with ext. DC/DC), Standby 500nA
- 14-bit ADC 4μA & Flash Programming 600μA
- Energy Harvesting Control Circuit
- Memory in Pixel Display Parallel Interface
- 2D Graphics Engine
- Motor Driver for Watches
- Trusted Secure IP

Applications

- Hybrid watch
- Smart home / building
- Healthcare
- Smart meter
- Smart agriculture
- Tracker

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Application Example – Wearable/ Hybrid Watch

RE01

Cortex-M0+ 64MHz	Flash1.5MB for User App FW update Graphics data
EHC	

- EH power generator
- Secondary battery
- Sensor → Ultra-low power 14-bit ADC
- Sensor → SPI/I2C/UART

- TSIP-Lite (AES/TRNG/ Key Protection)
- CCC/RTC

- Parallel MIP I/F → Low power MIP-LCD
- MTDV → Hand movement
- LPG → Buzzer

Development Tools

IDE	Renesas e²studio	IAR EWARM
Compiler	■ GCC GNU Compiler	■ IAR Arm Compiler
Debugger	■ Renesas E2/E2 Lite ■ SEGGER J-Link	■ IAR I-Jet ■ SEGGER J-Link
Programmer	■ Renesas PG-FP6, RFP ■ SEGGER J-Flash, Flasher	
Driver	■ Arm CMSIS Driver ■ Renesas HAL Driver	
Sample code	■ Driver sample code ■ Low level code	

Evaluation Kit

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

### EK-RE01 1500KB
RTK70E015DS00000BE

Kit includes
- ■ Main board
- ■ Solar panel
- ■ MIP-LCD expansion board
- ■ USB cable (type-A male to micro-B male)

Web download
- ■ Software tool
- ■ Sample code
- ■ User's manual
- ■ Schematics
- ■ Gerber data
- ■ BOM file

Ordering References

	156 WLBGA	144 LQFP	100 LQFP
w/ TSIP	R7F0E017D2DBN	R7F0E015D2CFB	R7F0E015D2CFP
w/o TSIP	R7F0E016D2DBN	R7F0E014D2CFB	R7F0E014D2CFP
Size	4.47mm x 4.27mm	20mm x 20mm	14mm x14mm
Pin pitch	0.3mm	0.5mm	0.5mm
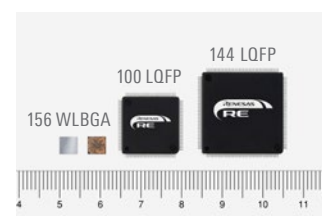
For more details, please visit www.renesas.com/RE