

RE01 1500KB

Implemented on Silicon on Thin Buried Oxide (SOTB)
The World's Most Energy Efficient MCUs with Arm® Cortex® M Core

Innovative ultra-low power and the 1.5MB of large flash memory

The RE01 1500KB product is based on the SOTB™ process technology which realizes ultra-low current consumption in both active and standby mode and high-speed operation (64MHz) at low voltage (1.62V), which is impossible to achieve with conventional bulk silicon processes. The RE01 1500KB product can significantly extend battery life and deliver high performance even for small batteries. In addition, its on-chip energy harvesting controller can extend the battery life further, or completely eliminate a battery to achieve a maintenance-free system. The 1.5MB of on chip flash memory can be used for applications that require the storage of large amounts of data, such as image information, and applications that require remote firmware updates (Over The Air (OTA)) via a wireless or other communications network.



Innovative ultra-low power

- Active current: 35µA/MHz / 15µA/MHz (Ex DCDC)
- Standby current: 500nA



High-speed operation at low voltage

- High-speed operation 64MHz at low voltage 1.62V
- 32-bit CPU Arm® Cortex®-M0+



Ultra-low power peripherals

- 14-bit ADC: 4µA, Flash programming: 0.6mA,
- RTC operation in Deep standby 380nA@1.8V
- Energy harvesting control circuit



Strong security

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

Features

Part No. ^(*)	7D2DBN	6D2DBN	5D2CFB	4D2CFB	5D2CFP	4D2CFP
Pin count	156		144		100	
Package	WLBGA			LQFP		
Code flash memory /SRAM	1.5Mbytes/ 256Kbytes					
CPU operating frequency	Cortex®-M0+ up to 64MHz					
DMA/DTC	4ch/ Yes					
Energy harvesting control circuit	Yes					
Timers	GPT (PWM timer)		6ch			
	AGT 16-bit timer/ TMR 8-bit timer		2ch/ 2ch			
	RTC / CCC (1second event timer)		1ch/ 1ch			
	WDT/ IWDT		1ch/ 1ch			
	MTDV (Motor driver for watches)		3ch		No	
Communications function	Stopwatch/ Buzzer		Yes/ Yes			
	SCI (UART/simple I2C/simple SPI)		7ch			
Analog	IIC/ SPI/ QSPI		2ch/ 2ch/ 1ch			
	14-bit ADC		18ch		12ch	
	12-bit DAC		1ch			
HMI	Parallel MIP-LCD I/F		Yes			
Graphic	GDT (2D Graphics Engine)		Yes			
Data processing	Data division circuit		Yes			
Security	TSIP-Lite ^(*)	Yes	No	Yes	No	Yes

(*1) The Part No. in the table is only the xxxxxx part of R7F0E01xxxxx.

(*2) TSIP: Trusted Secure IP

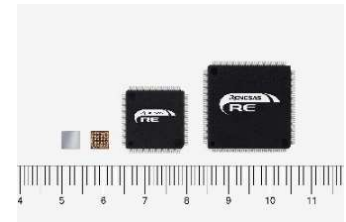
Reduction of active current by External DCDC mode

Current consumption can be reduced to 15µA/MHz by using Renesas' ultra-low Iq ISL9123 as an external step-down regulator. External DCDC mode can be used for applications such as Always On sensing.

Application Note: How to reduce power consumption by using an external DC/DC converter ([R01AN5364](#))

Part No.

	156WLBGA	144LQFP	100LQFP
w/ TSIP	R7F0E017D2DBN	R7F0E015D2CFB	R7F0E015D2CFP
w/o TSIP	R7F0E016D2DBN	R7F0E014D2CFB	R7F0E014D2CFP
Size	4.47mm x 4.27mm	20mm x 20mm	14mm x 14mm
Pin pitch	0.3mm	0.5mm	0.5mm



Target Applications

Hybrid watch

- Solar power drive
- High-speed CPU : acceleration / heart rate
- Low power graphic, MIP-LCD display

Smart home / building

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

Healthcare

- High-speed processing with coin battery
- Ultra low power ADC 4uA for analog sense
- Ultra low power OTA 600uA

Smart meter

- Low power RTC
- OTA (Over the air)with large memory

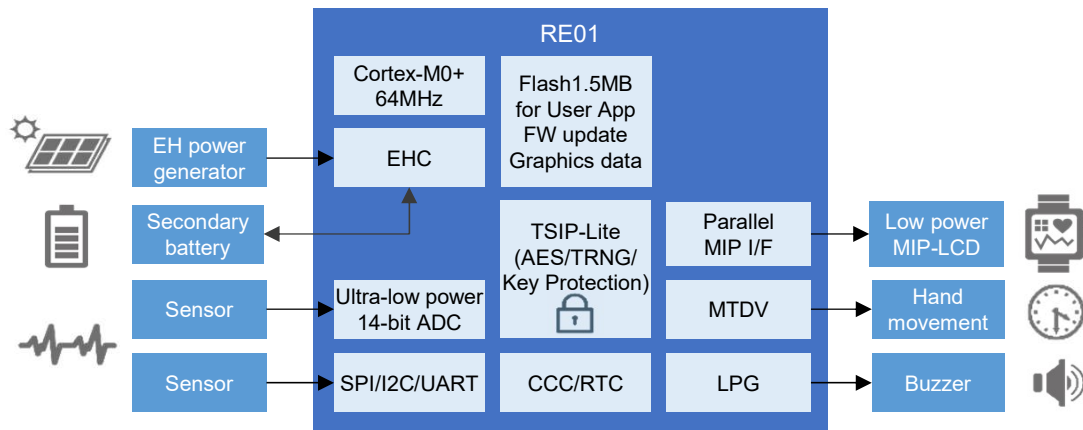
Smart agriculture

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

Tracker

- Preventing missing tracking by maintenance free

Wearable / Hybrid watch example



Development Tools

IDE

IAR EWARM
Renesas e²studio

Compiler

IAR C/C++ Compiler for ARM
GNU C/C++ Compiler

Emulator

SEGGER J-Link
IAR I-jet
Renesas E2/ E2 Lite

Driver Software

Arm® CMSIS
Renesas HAL Driver

Sample Code

Driver SW sample code
Low level code

Evaluation kit

EK-RE01 256KB

Evaluation kit: EK-RE01 150KB



Part No: RTK70E015DS00000BE

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

Kit included

- 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

For more info on the RE01 Family, please go to our website at www.renesas.com/re.