Single-chip high-security Bluetooth 5 solution with expandable memory

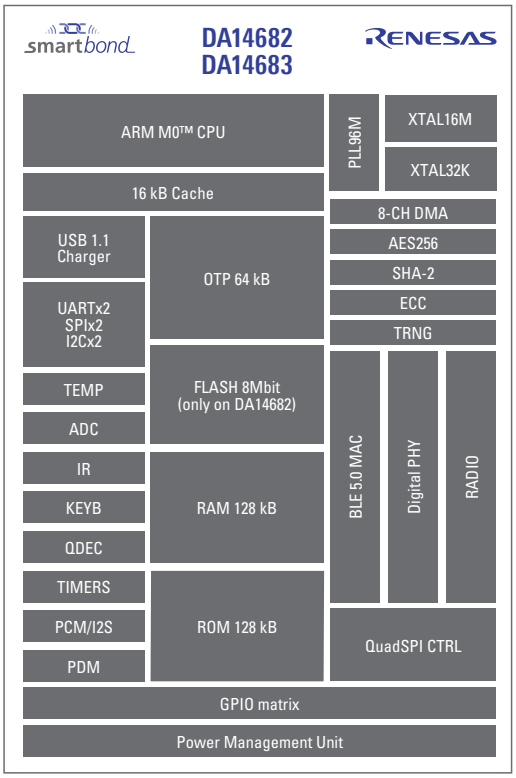
SMARTBOND™ DA14682 AND DA14683

The SmartBond DA14682 and DA14683 are the world's first single-chip solutions for Smart Home, Industrial and wearable devices that meets the highest security standards. These highly integrated System-on-Chip (SoC) devices support Bluetooth 5 as well as Bluetooth mesh, and include a range of dedicated features to ensure cutting-edge security for both consumers and developers.

As part of our SmartBond range, both SoCs offer industry-leading performance from the lowest power consumption and smallest footprint. Their flexible architecture ensures plenty of processing capacity when you need it while saving power when you don't. It also allows the devices to manage multi-sensor arrays and enables always-on sensing.

Both devices offer extensive memory capacity and differ only in their memory configuration. Specifically, the DA14683 supports unlimited external Flash for maximum design flexibility while the DA14682 includes 8 Mbits of onboard Flash, making it ideal for applications with tight space constraints. Both options allow you to benefit from over-the-air updates.

To further simplify your development, our SmartSnippets™ software and versatile Hardware Development Kits help you optimize your software for power consumption.

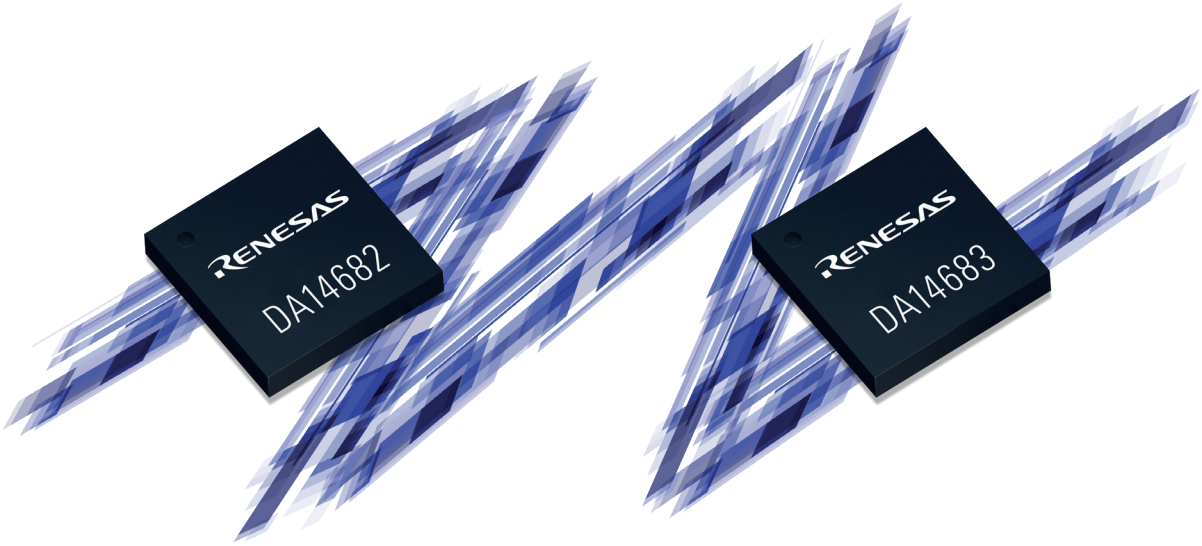


Applications

- Remote controls
- Proximity tags and trackers
- Beacons
- Connected medical devices
- Smart home
- Human Interface Devices
- VR controllers
- Connected sensors
- Wireless charging

Benefits

- Highest level of security
- Support for Bluetooth mesh
- IPv6 connectivity
- Lowest system power
- Lowest system BoM
- Smallest system size



Bluetooth 5

Supporting the Bluetooth 5 core specification, DA14682 and DA14683 enable enhanced Bluetooth low energy functionality that is ideal for applications such as wearables, smart home applications, Bluetooth mesh and much more. Among the new features supported are Data Packet Length Extension, Link Layer Privacy v1.2, Secure Connections, Bluetooth low energy mesh and Efficient Connectable Advertising.

Security

What really sets the DA14682 and DA14683 apart from the competition is their enhanced security for users and developers alike. A dedicated state-of-the-art hardware crypto engine delivers fast and low power processing of cryptographic algorithms, while on-chip key storage and manipulation delivers the best balance between security and affordability. These hardware blocks are complemented by our software security implementation, delivering features such as secure boot and end-to-end encryption to keep both your IP and the user's personal data safe and secure.

Bluetooth Mesh

The DA14682 and DA14683 offer a complete solution for the recently adopted Bluetooth mesh specification which enables longer range, more nodes per network and a many-to-many (m:m) communication topology. The mesh functionality enables new applications for Bluetooth in smart home, lighting, beaconing and asset tracking applications.

IPv6

The DA14682 and DA14683 support the Internet Protocol Support Profile (IPSP), allowing the exchange of IPv6 packets between devices via Bluetooth low energy transport. It enables native IPv6 support for Bluetooth low energy applications, letting them talk directly to cloud services and other connected 'things' over IP-based networks.

Compatibility

As part of the SmartBond DA1468x product family, DA14682 and DA14683 are fully pin- and software-compatible with the popular DA14680 and DA14681.Clear porting guides are available to help upgrade existing designs quickly.

Key Features

Supports Bluetooth 5 core features and supplementary features

32-bit ARM® Cortex®-M0 microcontroller

- Low power consumption, just 30 µA / MHz
- Dynamically controllable clock frequency from 32 kHz up to 96 MHz
- Up to 84 Dhrystone MIPS
- 4-way associative cache controller with 16 kB cache RAM memory

Dedicated application processor hardware encryption engine

Flexible memory architecture

- 8 Mb executable Flash (only on DA14682)
- 64 kB OTP
- 128 kB data SRAM
- 16 kB cache SRAM
- 128 kB ROM

RF performance

- 0 dBm Tx output power and - 93 dBm Rx sensitivity
- 3.4 / 3.1 mA Tx / Rx at 3 V
- Integrated balun
- 50 Ω matched single-wire antenna interface

Available packages

- DA14683
  - WL-CSP53 (3.4 x 3.0 x 0.5 mm, 0.4 mm pitch)
  - AQFN60 (6 x 6 x 0.8 mm, 0.55 mm pitch)
- DA14682
  - AQFN60 (6 x 6 x 0.8 mm, 0.55 mm pitch)

Intergrated Power Management

- Integrated buck DC/DC converter
- Vbat supply voltage range 1.7 V - 4.75 V
- Three power supply pins for external decives
- Supports Li-Polymer, Li-Ion, coin cells, NiMH and alkaline batteries
- Battery charger (up to 5.0 V) with programmable curves
- High accuracy state-of-charge fuel gauge
- Programmable threshold for brownout detection
- USB charge detection and protection

Selection of digital and analog interfaces

- 37 (AQFN) or 21 (WL-CSP) general purpose I/Os with programmable voltage levels
- Quad-SPI Flash interface
- Two UARTs, one with hardware flow control
- Two SPI+ interfaces
- Two I2C bus interfaces at 100 kHz, 400 kHz
- Three-axis capable quadrature decoder
- PDM interface with HW sample rate converter (2 mics or 2 speakers)
- I2S/PCM master/slave interface up to 8 channels
- Keyboard scanner with de-bouncing
- Infrared (IR) interface (PWM)
- USB Full Speed (FS) device interface
- 8-channel 10-bit ADC with averaging capability achieving 11.5 ENOB
- Three matched white LED drivers
- Temperature sensor

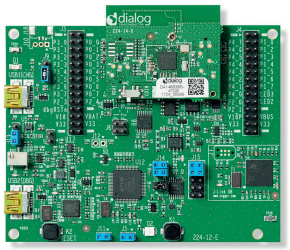
Software and Tools

The DA14682 & DA14683 are supported by Renesas SmartSnippets™ Studio, a royalty-free software development platform for all SmartBond devices. SmartSnippets Studio contains:

- SmartSnippets Toolbox: A tool suite covering all software development needs, including power profiling, Flash or OTP programming and testing
- SmartSnippets IDE: An Eclipse CDT-based IDE with pre-configured plugins for easy out of the box set-up of the build / debug environment
- SmartSnippets DA1468x Software Development Kit and documentation
- SmartSnippets DA1468x HomeKit Software Development Kit and documentation

Part number	Description
DA14682-00F08A92	Bluetooth low energy 5 SoC, 8 Mbit executable Flash, 37 GPIOs in AQFN60 package
DA14683-00000A92	Bluetooth low energy 5, 37 GPIOs in AQFN60 package
DA14683-00000U22	Bluetooth low energy 5, 16 GPIOs in WL-CSP53 package
DA14683-00A9DEVKT-U	Bluetooth low energy Development Kit Basic for DA14683: single board; support for mikroBUS; ideal for SW application development
DA14683-00A9DEVKT-P	Bluetooth low energy Development Kit Pro for DA14683: motherboard, daughterboard and cables; ideal for SW application development and power measurements
DA14683-00U2DB-P	Bluetooth low energy DA14683 WL-CSP53 daughterboard for the DA14683DEVKT-P Pro motherboard
DA14683-00A9DB-P	Bluetooth low energy DA14683 AQFN60 daughterboard for the DA14683DEVKT-P Pro motherboard

For more information and purchasing please visit:
www.renesas.com/DA14682



DA14683 Development Kit-Pro

DA14683 Development Kit-USB

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