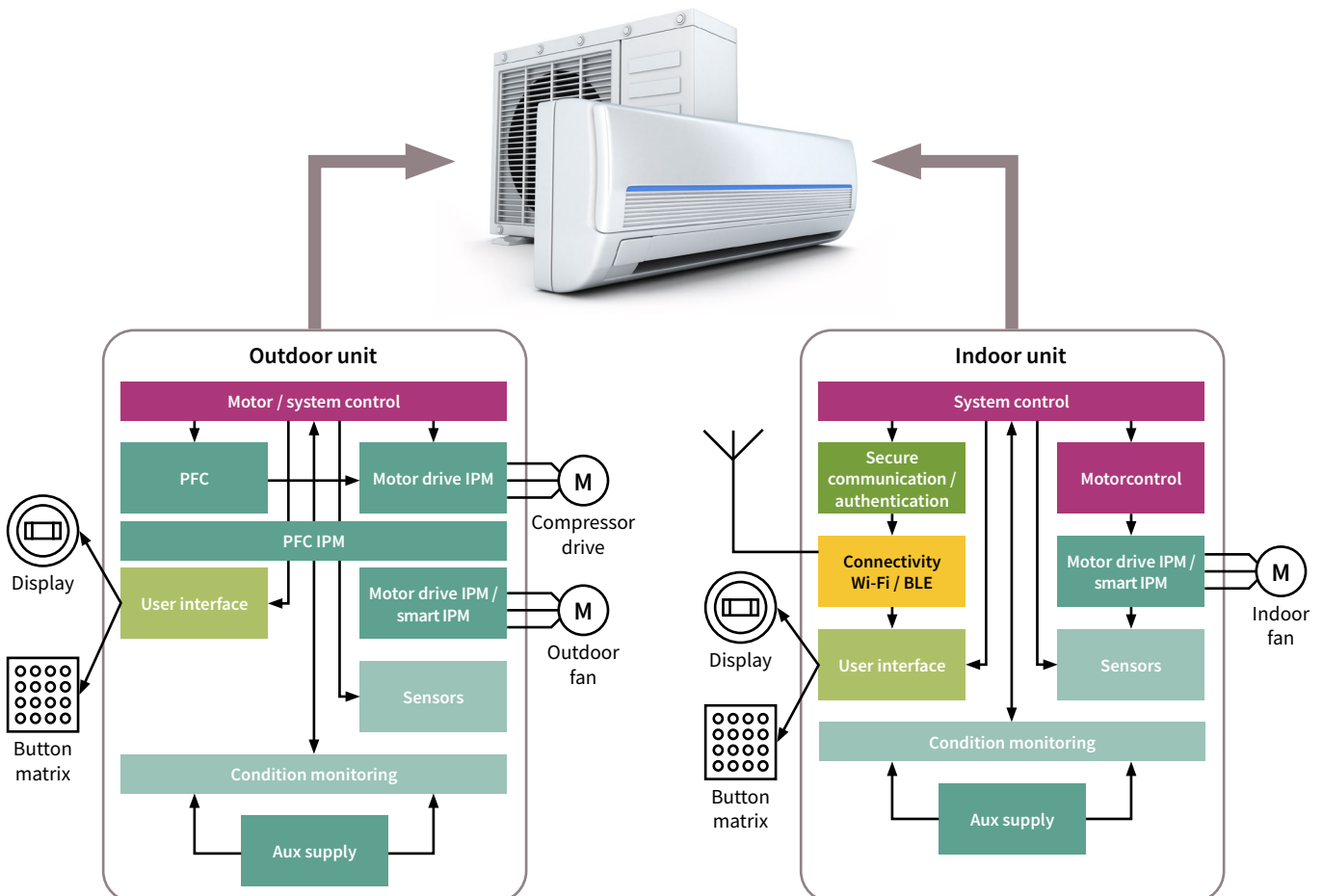![Infineon logo]

Application brief

Residential aircon
Smarter, smaller, more powerful and more energy-efficient

Today's residential air conditioning units must fulfill a growing list of demands. Because they are used in private homes, quiet operation is essential. Functions such as stable and smooth startup, a wide range of operating speeds and vibration suppression round out the list of must-haves.

In addition, it must be possible to integrate residential aircon systems easily and securely with a home automation network to support remote control and condition monitoring. Designing air conditioning units offering these capabilities calls for low-vibration components, a compressor with low acoustic noise, reliable fan control and sensorless field-oriented control. The enabling semiconductor solutions must also be energy-efficient and come in the latest form factors. Last but not least, an excellent price-performance ratio is key, as are new features supporting emerging smart appliance designs. System solutions are the ideal way to meet these criteria, offering proven integration, comprehensive features and robust protection while reducing time-to-market.

Outdoor unit

Motor / system control

PFC

Motor drive IPM → M Compressor drive

PFC IPM

User interface

Motor drive IPM / smart IPM → M Outdoor fan

Sensors

Display

Button matrix

Condition monitoring

Aux supply

Indoor unit

System control

Secure communication / authentication

Motorcontrol

Connectivity Wi-Fi / BLE

Motor drive IPM / smart IPM → M Indoor fan

User interface

Sensors

Display

Button matrix

Condition monitoring

Aux supply

www.infineon.com/home-appliances

Air conditioning system components from Infineon

We have developed a comprehensive semiconductor portfolio meeting all the latest performance and efficiency demands in aircon design. Motor inverterization, for example, improves the noise, vibration and lifetime of the system while also enabling massive energy savings. Easy to integrate, our components for residential air conditioning systems deliver the reliability and energy efficiency you need to differentiate your offering through smaller or thinner form factors, more compact packaging and higher power densities.

Choose from our extensive range of:
› IGBT power semiconductors in discrete or module packages
› EiceDRIVER™ gate driver ICs
› Highly integrated CIPOS™ IPM solutions
› WICED® connectivity products for Wi-Fi® / BLE integration
› PSoC® 6 / XMC™ microcontrollers
› OPTIGA™ Trust product family for embedded security solutions
› XENSIV™ family of magnetic sensors
› CoolSET™ products for auxiliary power supplies

PSoC® 6 bridges the gap between expensive, power-hungry application processors and low performance microcontrollers (MCUs). The ultra low power PSoC® 6 MCU features an Arm® Cortex® M4 for high performance tasks, and an Arm® Cortex® M0+ for low-power tasks. It also comes with built-in security to protect your IoT system.

WICED® Wi-Fi® + Bluetooth® combos integrate IEEE 802.11a/b/g/n/ac WLAN and Bluetooth® in a single-chip solution to enable small-form-factor IoT designs. Combo solutions are available for both 1x1 SISO with up to 433 Mbps PHY data rates and 2x2 MIMO with up to 867 Mbps PHY data rates. These solutions can be coupled with external MCUs from popular vendors or Linux on application processors to implement a complete Wi-Fi® + Bluetooth® system.

Smart and efficient indoor units must be compact and quiet, while easily connecting to the home automation network for easy interfacing, remote control and condition monitoring. Our end-to-end offering covers all building blocks required to create highly compact and reliable indoor units with a rich user interface, combining CIPOS™ IPM products for indoor fans with iMOTION™ controllers or smart IPMs for dedicated motor control or with PSoC® 6 / XMC™ microcontrollers for motor and system control, rounded out by WICED® connectivity products and XENSIV™ sensors.

Outdoor units need to be robust and efficient, with the flexibility to adjust the operating speed to cooling needs. Here also, our all-inclusive offering covers all components required to build highly compact, robust and reliable outdoor units that consume less power. It extends from CIPOS™ IPM products for compressor and fan drives, combined with iMOTION™ products for dedicated motor control or with PSoC® 6 / XMC™ microcontrollers for motor and system control, all the way to XENSIV™ sensors.
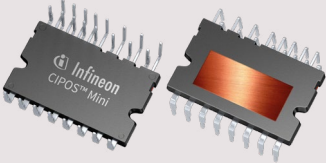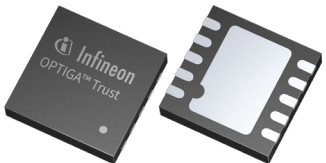
The OPTIGA™ Trust product family offers a full range of turnkey security solutions. OPTIGA™ Trust B, for instance, is designed to help system and device manufacturers safeguard the authenticity, integrity and safety of their original products. Optimized for connected devices, OPTIGA™ Trust M is a high-end security solution providing a unique device identity. It enables extremely flexible, high-performance, secured access to any major cloud provider.

A decisive part of a building's critical infrastructure, HVAC units should be designed for operational continuity. However, components such as fans, motors and compressors are subject to operational stresses and can be susceptible to failure. Predictive maintenance enables a data-driven approach to predicting and preventing device failures before they happen based on pattern recognition and intelligent software models. To collect the data required to monitor the condition of devices in a building, smart XENSIV™ sensors record key status and health parameters such as airflow, current consumption, sound and vibration.
The full potential of condition monitoring and predictive maintenance for HVAC systems is best realized by combining our sensors and microcontrollers with our hardware security solutions.

Choose Infineon and expect complete connectivity, a rich user interface, high efficiency, low vibrations, low-noise acoustic compression and reliable fan control. Our solutions integrate configurable PFC control for added flexibility and programmability. They also decrease system cost by integrating the PFC stage and inverter IPM. For high-efficiency indoor air conditioning designs, discover our CIPOS™ Nano indoor fan and iMOTION™ controllers.

Highlight products

CIPOS™ IPMs		The energy-efficient CIPOS™ (Control Integrated Power System) modules integrate various power and control components to increase reliability, optimize PCB size and reduce system costs. This simplifies power design and reduces time-to-market. Learn more about CIPOS™ IPMs
PSoC® 6 microcontrollers		PSoC® 6 provides a secured solution for IoT developments, supporting multiple, simultaneous environments without the need for external memories or SoCs. These MCUs provide integrated hardware and software security features for IoT systems that require robust protection against cyber threats and hacking. Learn more about PSoC® 6 microcontrollers
Wi-Fi®/BLE combo controllers		WICED® (Wireless Internet Connectivity for Embedded Devices) is a full-featured platform with proven Software Development Kits (SDKs) and turnkey hardware solutions from our partners to readily enable Wi-Fi® and Bluetooth® connectivity in system designs. Learn more about Wi-Fi® / BLE combo controllers
OPTIGA™ Trust family		The OPTIGA™ Trust family provides a root of trust for both connected and non-connected devices. This broad portfolio of products combines ease of integration with robust security capabilities tailored specifically to the needs of different use cases. Learn more about the OPTIGA™ Trust family
XENSIV™ magnetic sensors		The XENSIV™ family includes a wide range of magnetic sensing solutions capable of recording position, speed, angle and current. These devices can thus capture a broad range of data streams. The 3D magnetic sensor TLI493D is a great choice for user interfaces. Learn more about XENSIV™ magnetic sensors

Additional information
For further information on technologies, our products, the application of our products, delivery terms and conditions and/or prices, please contact your nearest Infineon Technologies office (www.infineon.com).

Warnings
Due to technical requirements, our products may contain dangerous substances. For information on the types in question, please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by us in a written document signed by authorized representatives of Infineon Technologies, our products may not be used in any life-endangering applications, including but not limited to medical, nuclear, military, life-critical or any other applications where a failure of the product or any consequences of the use thereof can result in personal injury.