

Application brief

EXCELON™

Purpose-built memory for mission-critical data-logging

Embedded in tomorrow

The IoT is exploding, with more than 55 billion devices projected to be in service by 2025. Infineon's IoT leadership is built upon world-class wireless technology, a broad portfolio of MCUs, memories, analog ICs and USB controllers. Our solutions are helping transform traditional markets like industrial, home appliances, medical, and consumer, producing next-generation smart devices and connected/autonomous vehicle applications.

From the entrepreneur building a revolutionary new product in a garage to the Fortune 500 engineering team tasked with making the impossible happen now, Infineon is today's technology partner for tomorrow's innovations.

F-RAM Memory: Technology and Benefits

Nonvolatile

The Ferroelectric RAM (F-RAM) memory cell contains a thin film of lead zirconate titanate, (PZT). The central atom in the PZT crystal changes position when an electric field is applied. The two positions of the central atom are used as binary states for the memory to store one bit. When power is interrupted, the atom's position is retained, protecting the data.

Fast write

The memory cell writes data instantly to nonvolatile memory at bus speed, eliminating "data at risk." There is no write delay due to soak times required by legacy technologies.

High Endurance

High Endurance – the memory cell offers up to 1,000 (10¹⁵) trillion write cycles, far exceeding the capabilities of legacy technologies, ensuring high reliability and long life.

Key features

High density

- > 2 to 16-Mbit

High speed

- > 50 MHz Serial Peripheral Interface (SPI)
- > 54 MHz Double Data Rate (DDR)/ 108 MHz Single Data Rate (SDR) Quad SPI

Ultra-low power

- > Operating voltage range: 1.71 to 1.89 V, 1.8 to 3.6 V
- > Ultra-low (0.1 µA) hibernate current
- > Ultra-low (2.3 µA) standby current
- > Ultra-low (2.4 mA) active current@40 MHz

High reliability

- > 1,000-trillion read/write cycle endurance
- > 100-year data retention

Operating temperatures

- > Commercial: 0 to +70°C
- > Industrial: -40 to +85°C
- > Industrial extended: -40 to +105°C
- > Automotive grade A: -40 to +85°C
- > Automotive grade S: -40 to +105°C
- > Automotive grade E: -40 to +125°C

Introducing EXCELON™ mission-critical memory

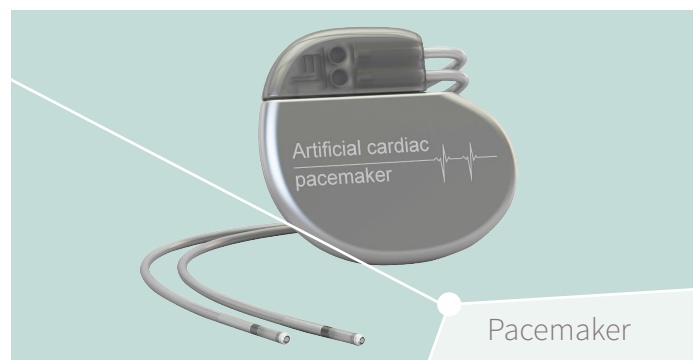
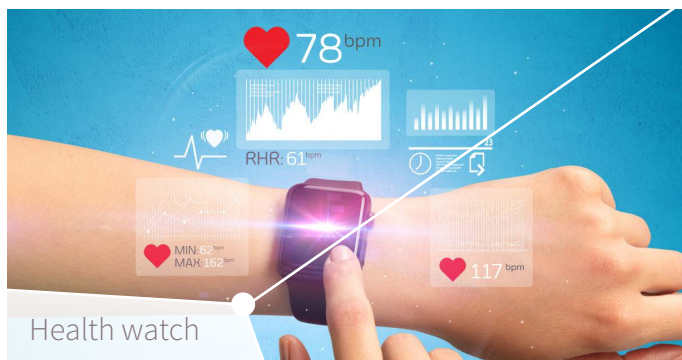
An explosion of small form-factor personal devices, smart connected factories and automotive ADAS has created new challenges. Battery-operated portable medical and wearable devices, factory machinery, and cars with advanced driver assistance systems are

becoming smart and connected. These devices require increased mission-critical data-logging capable of instant, reliable data capture to ensure efficient and safe operation without incurring power and form-factor penalties.

Ultra-low-power in small form factor

Latest-generation portable medical and wearable devices need non-volatile memories to log an increasing amount of user and sensor data continuously and at the lowest power consumption to maximize battery life. EXCELON™ enables this with instant write

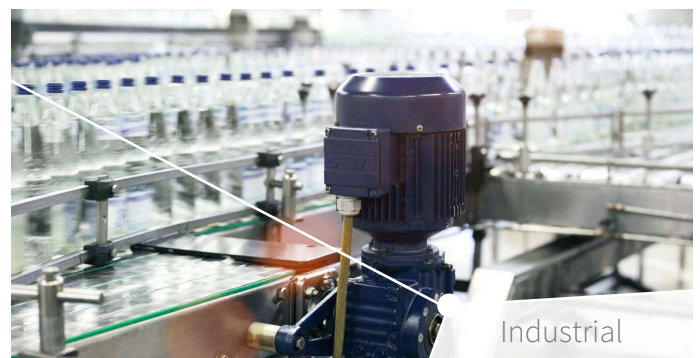
capabilities, virtually unlimited endurance and ultra-low-power modes. These devices also need memories with the smallest package footprint provided by the newest and smallest GQFN package offering with EXCELON™.



Performance, reliability and instant non-volatility in low-pin-count memory

Industrial and automotive systems increasingly require memories to continuously log and instantly capture sensor data in the case of power loss. Harsh operating environments and demanding requirements for cycling endurance and data retention require the most

robust performance possible, while supporting efficient low-pin-count, high-speed interfaces. EXCELON™ mission critical memories support a 108 MHz low-pin-count QSPI interface with 100 trillion cycle write endurance, fast writes and instant non-volatility.



Portable medical and wearable devices



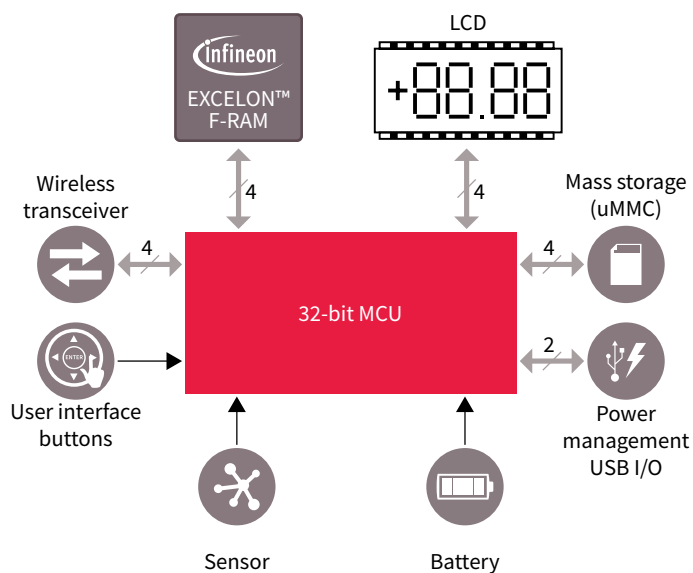
Problem

I'm developing a high-end wearable that has to maximize battery life while logging extensive data at a rapid duty cycle. The memory must be low power and highly reliable while fitting in a small form factor.

Solution

EXCELON™ LP uses 200 times less energy than EEPROM and 3,000 times less energy than NOR Flash, with endurance for 1,000 trillion write cycles to reliably log data every millisecond for more than 3,000 years. It comes in a small footprint GQFN package.

Block diagram



Industrial automation system



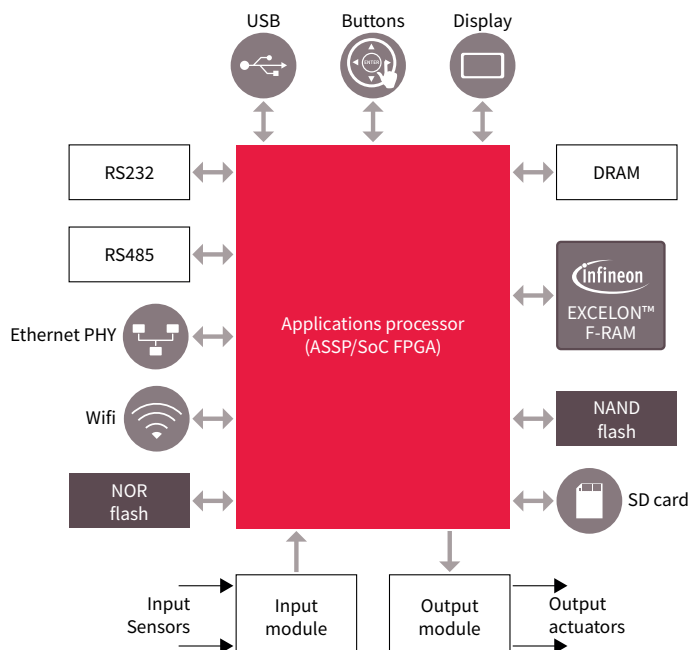
Problem

My factory automation systems require high-performance, reliable data-logging memories at control-level in case of power disruption. Industrial IoT sensors collecting data at field-level need to continuously log data while using minimal battery power. These systems need to operate in harsh, high-temp environments and last 20 years.

Solution

EXCELON™ Ultra offers a low-pin-count 108-MHz QSPI interface to meet performance requirements with NoDelay writes to instantly and reliably capture data on power loss. EXCELON™ LP offers the lowest active and idle power to ensure maximum battery life. Reliability is assured with 1,000-trillion write cycles at 85°C.

Block diagram



Automated Driver-Assist Systems (ADAS)



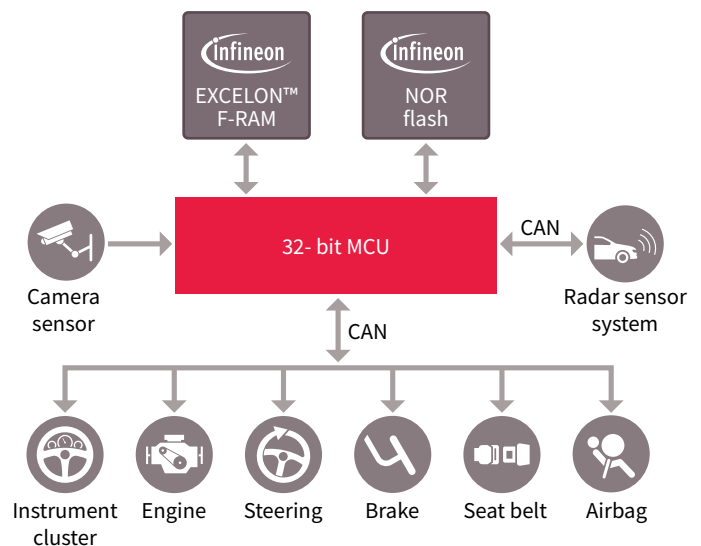
Problem

I must reliably capture the last camera and sensor data instantly on power loss while meeting automotive quality, temperature and long life cycles.

Solution

EXCELON™ Auto captures data instantly with no soak time requirement and without any additional back-up components. It supports virtually unlimited write cycles to log data continuously for 20 years. Provides 125°C, AEC-Q100-qualified and functional safety compliant memory components.

Block diagram



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