



New Product Introduction:

2Mb-to-16Mb Excelon™ F-RAM Family

Energy-Efficient, High-Performance, High-Reliability NVM



Modern Systems Need Energy-Efficient, High-Performance, High-Reliability NVM Solutions



- › The market for F-RAM, one type of NVM, is projected to grow from \$251 million in 2015 to \$461 million in 2020 at a CAGR of 13%¹
- › 2Mb-to-16Mb F-RAM target market segments:

Medical Devices



Neuromodulator

Wearables



Smartwatch

Industrial Control and Automation



Motor Control

Automotive



Infotainment System

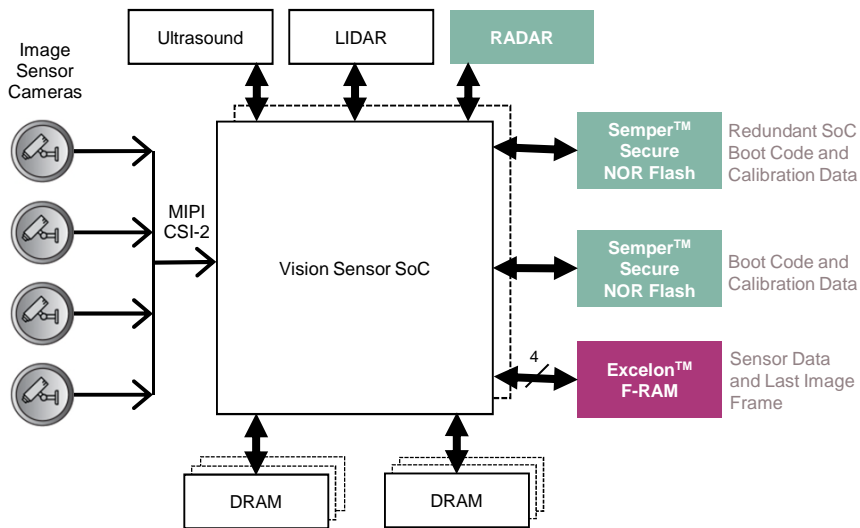
- › Systems in these market segments require NVMs to frequently log sensor data and instantly capture critical system data on power loss

¹ Sources: Web-Foot Research, Semicast, Gartner, internal market research

F-RAM NVM – Essential for Mission-Critical Data-Logging in Fail-Safe Automotive and Industrial Systems

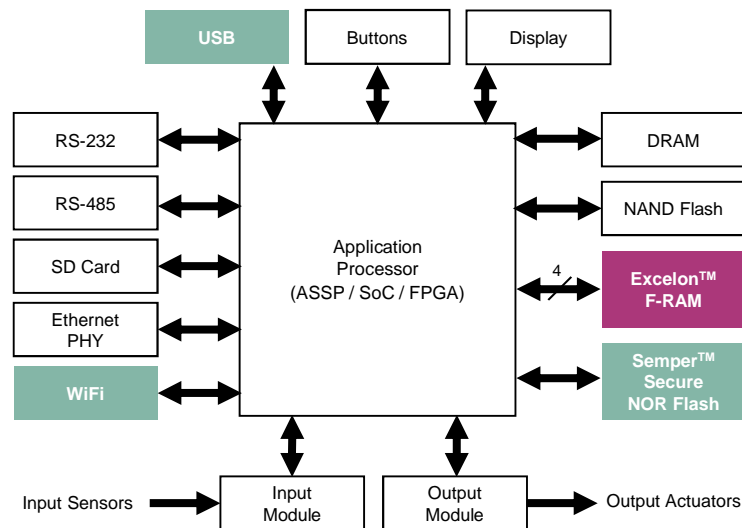
ADAS Vision System

- Capture real-time data instantly and store data on power-loss
- Ensure sufficient write-cycle endurance to log data for 20 years
- Retain data for > 5 years
- Should be designed with AEC-Q100 qualified memory components



Programmable Logic Controller

- Capture real-time data instantly and store data on power-loss
- Write data at throughputs equivalent to parallel battery-backed SRAMs
- Need sufficient NVM density and write cycle endurance to log data continuously over a 15-year product lifespan
- Eliminate back-up batteries to reduce cost and increase reliability

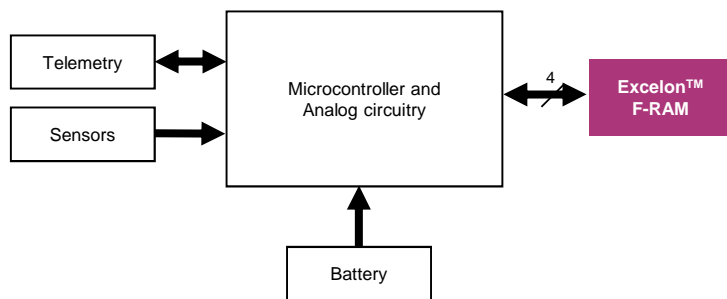


Excelon™ F-RAM Other Infineon Portfolio Products

F-RAM NVM – Growing Need for High Density, Reliable Data-Logging in Portable and Implantable Medical Devices

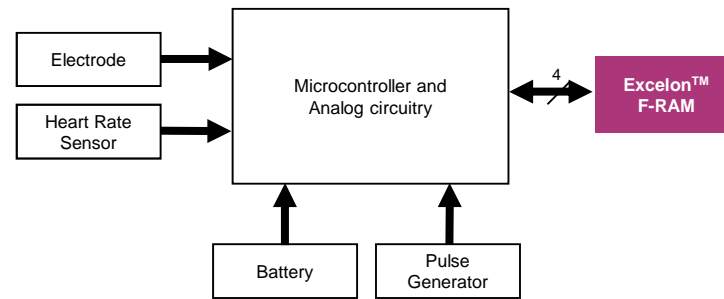
Neuromodulator

- Require lowest energy components to maximize battery life
- Need sufficient NVM density and write cycle endurance to log data continuously over the product's lifetime
- Should be immune to magnetic field effect and radiation
- Accommodate smallest footprint components to deliver small form-factors



Cardiac Implant

- Require lowest energy components to maximize battery life
- Need sufficient NVM density and write cycle endurance to log data continuously over the product's lifetime
- Should be immune to magnetic field effect and radiation
- Accommodate smallest footprint components to deliver small form-factors



Introducing Excelon™ F-RAM – The No-Data-Loss NVM



**HIGH
PERFORMANCE**

Fast as Parallel Interface SRAMs

- › Low-pin-count Quad SPI interface
- › 54MBps throughput at 108-MHz frequency
- › NoDelay™ writes



**UNMATCHED
RELIABILITY**

Best-in-Class Reliability

- › 100 trillion read/write cycles of endurance
- › 160 years data retention at 50°C
- › AEC-Q100 and Functional Safety (ISO 26262) compliant



**ENERGY
EFFICIENT**

Ultra-Low-Energy

- › 200x less energy than EEPROMs
- › Inrush current control during power-up
- › Low-power modes: Standby, Deep-Power-Down, Hibernate

EXCELON™ F-RAM



HIGH PERFORMANCE



RELIABLE



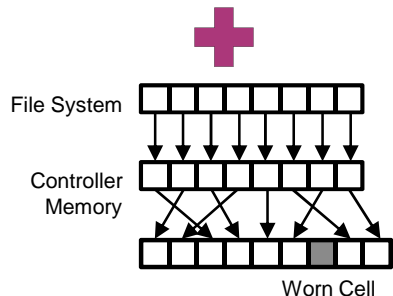
ULTRA-LOW-ENERGY

Excelon™ F-RAM: Better Solution at a Lower Cost

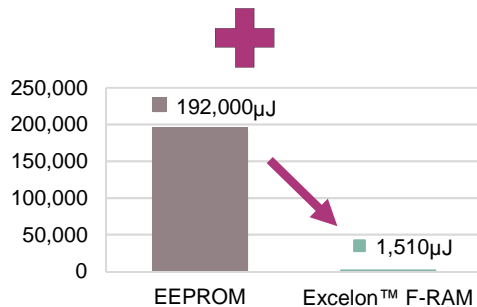
Simplify a conventional, complex, battery-operated, EEPROM-based design...



2x EEPROM capacity for wear leveling



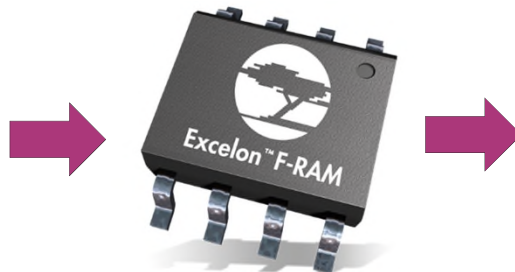
Wear leveling software algorithm to increase EEPROM write endurance



High-write energy consumption¹ compared with Excelon™ F-RAM

¹ Conditions: 4-Mb density, maximum current (0.6 mA for F-RAM, 3 mA for EEPROM), burst write at 5-MHz SPI, 2.7 to 3.6 V

By **choosing F-RAM** as your serial NVM solution...



F-RAM pin-for-pin replacement for EEPROM SOIC8

To produce **better solutions for battery-operated applications at a lower cost.**

Medical Devices



Wearables



2Mb-to-16Mb Excelon™ F-RAM Family

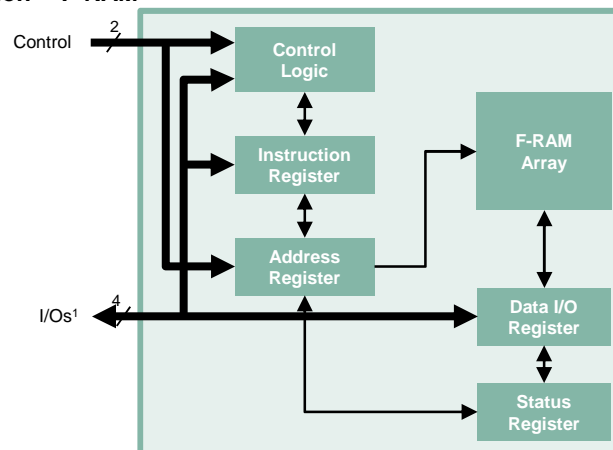
Applications

Medical devices, wearables, industrial control and automation, and automotive

Features

- › **Excelon™ Ultra**
 - 2Mb to 16Mb
 - 54-MHz Double Data Rate (DDR)/108-MHz Single Data Rate (SDR) Quad SPI
 - Industrial temperature range grade "I": -40 °C to +85 °C
- › **Excelon™ Auto**
 - 4Mb to 16Mb Auto "A", 8Mb to 16Mb Auto "S", 2Mb to 8Mb Auto "E"
 - 54-MHz Double Data Rate (DDR)/108-MHz Single Data Rate (SDR) Quad SPI
 - 40/50-MHz Serial Peripheral Interface (SPI)
 - Automotive temperature range grade "A": -40 °C to +85 °C
 - Automotive temperature range grade "S": -40 °C to +105 °C
 - Automotive temperature range grade "E": -40 °C to +125 °C
- › **Excelon™ LP**
 - 2Mb to 16Mb
 - 20-MHz SPI (Commercial/Industrial), 40/50-MHz SPI (Industrial)
 - Ultra low (0.75 µA) deep power down current
 - Ultra low (0.1 µA) hibernate current
 - Commercial temperature range grade "C": 0 °C to +70 °C
 - Industrial temperature range grade "I": -40 °C to +85 °C
 - Industrial temperature range grade "Q": -40 °C to +105 °C
- › **Common features for Excelon™ Ultra/Auto/LP**
 - Operating voltage ranges: 1.71 V to 1.89 V, 1.80 V to 3.60 V
 - 100-trillion read/write cycle endurance & 100-year data retention

Excelon™ F-RAM



Family Table

Density	Standby Current (Typ.)	Active Current (Typ.)	Packages
2Mb	2.3 µA	2.4 mA	SOIC (8), TDFN (8)
4Mb	2.3 µA	2.4 mA	SOIC (8), GQFN (8)
8Mb	3.5 µA	2.6 mA	SOIC (8), GQFN (8)
16Mb	8.0 µA	2.7 mA	FBGA (24)

¹ Quad SPI has 4 I/Os

Excelon™ F-DRAM Portfolio

Ultra Low Power | High Speed | High Endurance



	Excelon™ Auto		Excelon™ Ultra		Excelon™ LP	
2Mb–16Mb	CY15B116QSN 16Mb; 1.8–3.6 V 24-ball FBGA 108-MHz QSPI ¹ Auto S ²	CY15V116QSN 16Mb; 1.71–1.89 V 24-ball FBGA 108-MHz QSPI Auto S	CY15B116QSN 16Mb; 1.8–3.6 V 24-ball FBGA 108-MHz QSPI, Ind ³	CY15V116QSN 16Mb; 1.71–1.89 V 24-ball FBGA 108-MHz QSPI, Ind	CY15B116QI/N 16Mb; 1.8–3.6 V 24-ball FBGA 20/40-MHz SPI, Comm ⁴ , Ind	CY15V116QI/N 16Mb; 1.71–1.89 V 24-ball FBGA 20/40-MHz SPI, Comm, Ind
	CY15B116QN 16Mb; 1.8–3.6 V 24-ball FBGA 40-MHz SPI; Auto A ⁵	CY15V116QN 16Mb; 1.71–1.89 V 24-ball FBGA 40-MHz SPI; Auto A				
	CY15B108QSN 8Mb; 1.8–3.6 V 24-ball FBGA 108-MHz QSPI; Auto S	CY15V108QSN 8Mb; 1.71–1.89 V 24-ball FBGA 108-MHz QSPI; Auto S	CY15B108QSN 8Mb; 1.8–3.6 V 24-ball FBGA 108-MHz QSPI, Ind	CY15V108QSN 8Mb; 1.71–1.89 V 24-ball FBGA 108-MHz QSPI, Ind	CY15B108QN 8Mb; 1.8–3.6 V 24-ball FBGA 50-MHz SPI, Ind, Ind Q ⁷	CY15V108QN 8Mb; 1.71–1.89 V 24-ball FBGA 50-MHz SPI, Ind, Ind Q
	CY15B108QSN 8Mb; 1.8–3.6 V 8-pin SOIC 50-MHz SPI; Auto E ⁶	CY15V108QSN 8Mb; 1.71–1.89 V 8-pin SOIC 50-MHz SPI; Auto E	CY15B108QSN 8Mb; 1.8–3.6 V 8-pin GQFN, SOIC 108-MHz QSPI, Ind	CY15V108QSN 8Mb; 1.71–1.89 V 8-pin GQFN, SOIC 108-MHz QSPI, Ind	CY15B108QI/N 8Mb; 1.8–3.6 V 8-pin GQFN 20/40-MHz SPI, Comm, Ind	CY15V108QI/N 8Mb; 1.71–1.89 V 8-pin GQFN 20/40-MHz SPI, Comm, Ind
	CY15B104QN 4Mb; 1.8–3.6 V 8-pin SOIC 50-MHz SPI; Auto E	CY15V104QN 4Mb; 1.71–1.89 V 8-pin SOIC 50-MHz SPI; Auto E				
	CY15B104QN 4Mb; 1.8–3.6 V 8-pin SOIC 50-MHz SPI; Auto A	CY15V104QN 4Mb; 1.71–1.89 V 8-pin SOIC 50-MHz SPI; Auto A	CY15B104QSN 4Mb; 1.8–3.6 V 8-pin GQFN, SOIC 108-MHz QSPI, Ind	CY15V104QSN 4Mb; 1.71–1.89 V 8-pin GQFN, SOIC 108-MHz QSPI, Ind	CY15B104QI/N 4Mb; 1.8–3.6 V 8-pin GQFN, SOIC 20/50-MHz SPI, Comm, Ind	CY15V104QI/N 4Mb; 1.71–1.89 V 8-pin GQFN, SOIC 20/50-MHz SPI, Comm, Ind
	CY15B102QN 2Mb; 1.8–3.6 V 8-pin SOIC 50-MHz SPI; Auto E	CY15V102QN 2Mb; 1.71–1.89 V 8-pin SOIC 50-MHz SPI; Auto E	CY15B102QSN 2Mb; 1.8–3.6 V 8-pin SOIC 108-MHz QSPI, Ind	CY15V102QSN 2Mb; 1.71–1.89 V 8-pin SOIC 108-MHz QSPI, Ind	CY15B102QN 2Mb; 1.8–3.6 V 8-pin DFN, SOIC 50-MHz SPI, Ind	CY15V102QN 2Mb; 1.71–1.89 V 8-pin DFN, SOIC 50-MHz SPI, Ind

¹ Quad serial peripheral interface

² AEC-Q100 -40 °C to +105 °C

³ Industrial grade -40 °C to +85 °C

Commercial grade 0 °C to +70 °C

⁵ AEC-Q100 -40 °C to +85 °C

⁶ AEC-Q100 -40 °C to +125 °C

⁷ Industrial Q grade -40 °C to +105 °C

	Concept	Development	Sampling	Production
Industrial				
Automotive				

Getting Started With Excelon™ F-RAM

1. Download our application note: [SPI Guide for F-RAM \(AN304\)](#)
2. [Register](#) to access online support
3. [Contact Sales](#) to request a datasheet

Medical Devices



Neuromodulator

Wearables



Smartwatch

Industrial Control and Automation



Motor Control

Automotive



Infotainment System

Excelon™ F-RAM Resources



Webpage

- › Excelon™ F-RAM Webpage
<https://www.cypress.com/products/excelon-fram>



Product Overview (Webpage)

- › Brochure: [Excelon™ Ultra F-RAM Memory](#)
- › Brochure: [Excelon™ Auto F-RAM Memory](#)
- › Brochure: [Excelon™ LP F-RAM Memory](#)



Application Notes

- › [Designing with Cypress Quad SPI \(QSPI\) F-RAM](#)
- › [Designing with Excelon™ LP SPI F-RAM Low-Power Modes](#)
- › [SPI Guide for F-RAM](#)



Datasheets

- › [2Mb Excelon™ Auto F-RAM with Automotive-E Temperature Datasheet](#)
- › [4Mb Excelon™ Ultra F-RAM with Quad SPI Interface Datasheet](#)
- › [8Mb Excelon™ LP F-RAM with Inrush Current Control Datasheet](#)



Solution Videos

- › [High-Speed Nonvolatile Data-Logging for Industry 4.0](#)
- › [No-Data-Loss Automotive EDR with Excelon™ F-RAM](#)
- › [Excelon™ LP for Portable & Implantable Medical Devices](#)



Kits & Development Boards

- › [Excelon™ F-RAM Development Kit](#)
- › [PSoC® 6 WiFi-Bluetooth Pioneer Kit](#) with Excelon™ Ultra F-RAM on-board
- › [Access](#) software and tools including example projects

Summary



Embedded systems require high-reliability NVMs to log data reliably in an energy-efficient manner

Excelon™ F-RAM is the only NVM that offers high-reliability and high-performance with ultra-low-power consumption

Excelon™ offers high-density, high-performance, low-pin-count interfaces to quickly access both program and log data

More Information: www.cypress.com/excelon-ram



Part of your life. Part of tomorrow.