MEMORY COMPETENCE CENTER



HOW FERAM ENHANCES ELEVATOR CONTROL SYSTEMS A ROBUST, RELIABLE, AND HIGH-ENDURANCE MEMORY SOLUTION

Executive Summary

Elevator control systems are vital components in modern infrastructure, ensuring safe and efficient vertical transportation. These systems face critical challenges, particularly in power loss scenarios and environments requiring high-frequency data logging. Traditional memory technologies like EEPROM and Flash often fall short in endurance, speed, and reliability. Ferroelectric Random Access Memory (FeRAM) presents a breakthrough alternative with its non-volatile characteristics, superior write endurance, and high-speed operation. This document outlines the technical and commercial advantages of FeRAM in elevator control systems, along with strategic recommendations for adoption by OEMs and Tier-1 suppliers across EMEA and global markets.

1. CHANGING DYNAMICS IN ELEVATOR CONTROL

As smart buildings and urban mobility solutions evolve, elevator systems are becoming more intelligent and connected. This shift demands memory solutions that can handle real-time data capture, system state preservation during power loss, and continuous operation over extended lifespans. FeRAM addresses these challenges by offering a robust alternative to traditional non-volatile memories.

2. TECHNOLOGICAL ADVANTAGES OF FERAM

Ferroelectric Random Access Memory (FRAM or FeRAM) is a non-volatile memory technology that combines the strengths of DRAM and flash memory. It leverages a ferroelectric capacitor to store data, enabling instant write capabilities, ultra-low power consumption, and near-infinite endurance – features that make it uniquely suited for real-time and energy-constrained applications.

FeRAM can successfully substitute EEPROM and NOR flash memory in many embedded systems, particularly where frequent write/erase cycles and fast access are critical. Unlike EEPROM and flash, which suffer from limited endurance (typically in the range of 10⁴ to 10⁵ cycles) and slower write speeds, FeRAM supports up to 10¹³ write cycles and virtually instantaneous write times – without requiring a charge pump or high-voltage circuitry, resulting in lower power draw and simpler system design.

FeRAM is increasingly adopted in applications such as industrial automation, medical instrumentation, automotive electronics, and smart energy meters, where long-term data retention, frequent data updates, and high reliability are essential. While MRAM, ReRAM, and 3D NAND offer competing advantages in scalability or density, FeRAM stands out in embedded and mission-critical systems where deterministic write performance, low latency, and data integrity under power loss are paramount.

2.1 High-Speed Data Logging

FeRAM supports real-time capture of operational data, including:

Passenger occupancy

- Shaft position
- Acceleration/deceleration profiles
- Door status

Brake usage

Its write speed (sub-microsecond) far surpasses EEPROM and Flash, enabling precise system monitoring and response.

2.2 High Write Endurance

Elevator systems generate intensive data traffic. EEPROM typically fails after 1 million cycles (~1.9 years with 60-second logging). FeRAM, with up to 10¹⁴ write cycles, supports high-frequency logging for over 300 years, significantly reducing lifecycle maintenance.

2.3 Non-Volatile Data Retention

In the event of power failure, FeRAM ensures preservation of critical state data. Products like MB85RS2MTA retain data for 95 years at 55°C, ensuring fast system recovery and operational safety.



3. ELEVATOR SYSTEM INTEGRATION

3.1 PLC-Based Control

Hardware-driven control systems benefit from FeRAM's high reliability and fast logging for fault diagnostics and recovery.

3.2 MCU-Based Control

Modern embedded control systems leverage FeRAM for real-time OS operation, predictive maintenance data, and improved cost-efficiency.

3.3 Black Box Implementation

FeRAM serves as an onboard incident recorder, capturing the final seconds before a fault event, enhancing post-event analysis.

3.4 Predictive Maintenance

FeRAM enables long-term storage of operational data used in AI-based analytics to predict component wear and optimize service cycles.

4. RECOMMENDED FeRAM PRODUCTS [RAMXEED]

Part Number	Interface	Density	Endurance	Retention	Temp Range
MB85RS2MTA	SPI	2 Mbit	10 ¹⁴ cycles	95 yrs @ 55°C	-40°C to +85°C
MB85RC256V	I2C	256 Kbit	10 ¹⁴ cycles	95 yrs	-40°C to +85°C
MB85RS128TY	SPI	128 Kbit	10 ¹⁴ cycles	Automotive-grade	-40°C to +125°C

5. CONCLUSION

FeRAM is redefining the memory landscape for elevator control systems. Its unmatched endurance, speed, and reliability support the next generation of intelligent vertical mobility solutions. OEMs and Tier-1 suppliers stand to benefit from improved safety, lower maintenance, and enhanced system performance through FeRAM adoption.

FOR FURTHER ENGAGEMENT:

Contact our technical sales team to request engineering samples, integration support, or design-in consultations.

ABOUT US

MEMPHIS Electronic has been in the memory business for over 30 years. Due to our focus on memory only, we developed into a Memory Competence Center with an unmatched line card of over 18 different memory manufacturers (Samsung, Nanya, SK Hynix, Winbond, Huawei, SkyHigh, Ramxeed, Intelligent Memory, Apacer, Longsys, ESMT, Biwin and many more). We combine this with comprehensive supply chain solutions.

From legacy to latest components and modules, from standard to specialty memories – if it's a memory, we can help. Memory experts in 17 locations worldwide provide regional support and manufacturer recommendations, to ensure customers find the most suitable technology solution for every project.

MEMPHIS LOCATIONS



CONTACT US

For further information, data sheets or samples, please reach out. We are only an email away: <u>sales@memphis.de</u>

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