Application Brief

Applications Driving the Need for Single-Wire FRAM Devices

Introduction

Single-wire FRAM devices, as shown in Figure 1, provide an affordable equipment upgrade with electronic features, including identification, tracking data, and the delivery of calibration data or manufacturing information. These devices offer memory reliability, robustness, and a simple one-contact interface all in a small package. This application brief provides an overview of the advantages of single-wire FRAM devices in cables, battery packs, tool and appliance attachments, and PCB and asset tracking applications.

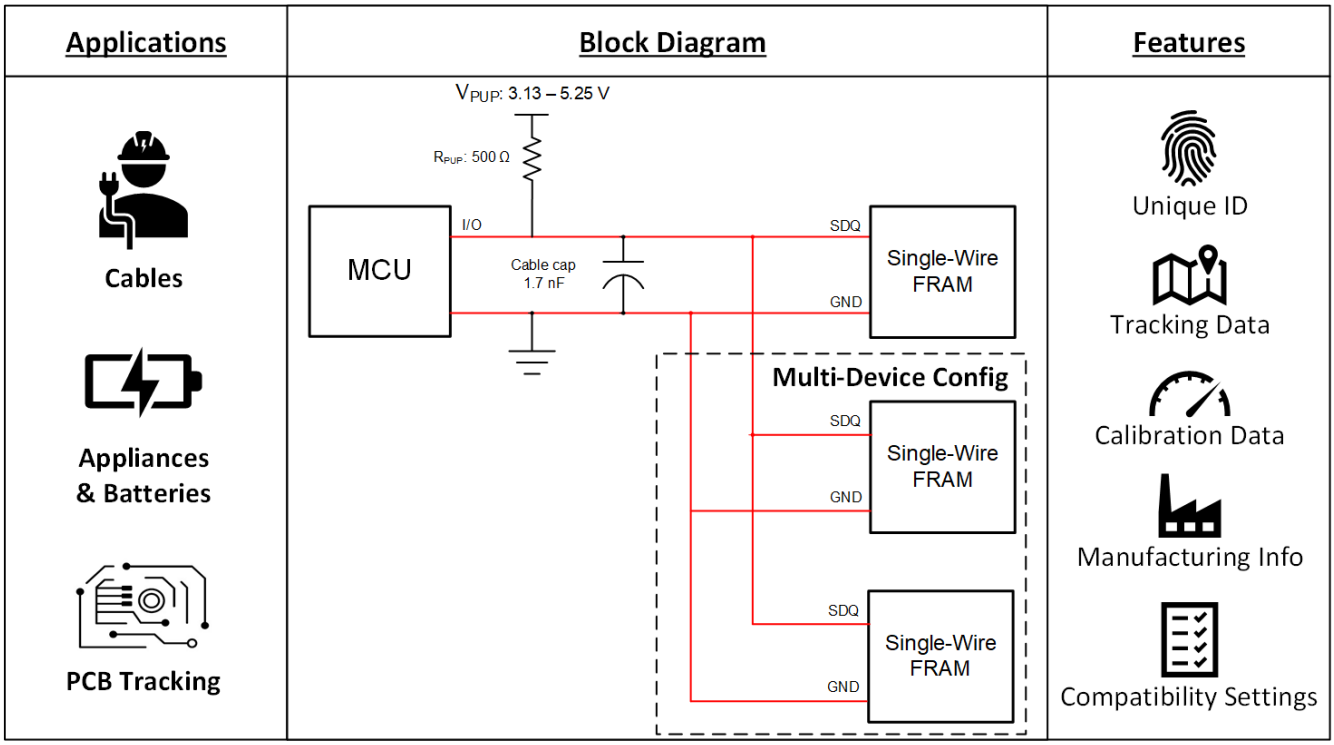

Figure 1. Single-Wire FRAM Overview

Cables

Single-wire FRAM devices store cable information such as function, source, and connectivity. Each device comes with a factory-programmed, unique, and unalterable 64-bit identification number (ID) that is used to verify cable authenticity and correctness (the identification number is customizable, contact TI for additional details). The device resets when unplugged or disconnected and signals the presence of the device when reconnected. When integrated into a cable network, such as in Figure 2, these memory devices facilitate automatic cable recognition and configuration, eliminating the need for manual labeling or constant cable sorting. For example, in manufacturing and industrial processes, these devices help in fast and accurate setup and maintenance.

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In addition, these devices can carry calibration and usage data for sensors and disposables. This data is useful for quality control and maintenance. For example, in medical equipment, these devices offer quick, accurate, and calibrated connections, and prevent overuse of disposable cables.

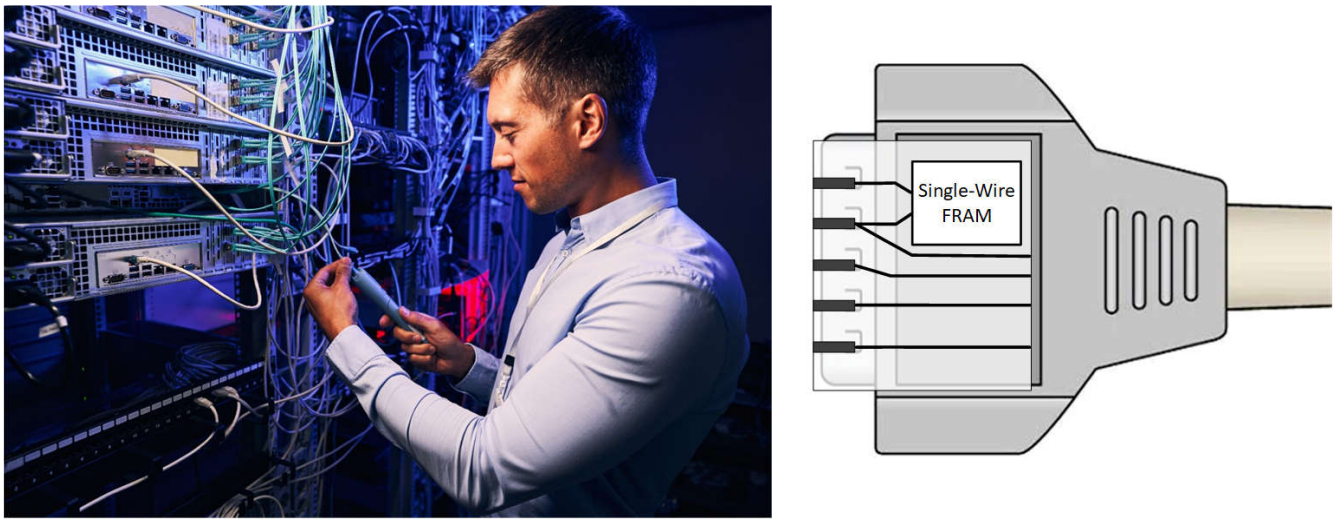

Figure 2. Single-Wire FRAM in Cables

Battery Packs

Single-wire FRAM devices, as shown in Figure 3, offer smart and safe connections for battery packs. These memory devices store essential information about each battery cell, such as cell capacity, health, and charging history. This information facilitates excellent power distribution, battery life extension, and accident prevention. For example, a smart phone can use this information to regulate how the attached battery pack charges. This information allows the smart phone to charge faster and prevent battery damage or overloading. The smart phone can also verify if the battery pack is from a reliable manufacturer and reject any counterfeit or unsafe batteries.

Tool and Appliance Attachments

Single-wire FRAM technology offers smart connections for various tool and appliance attachments by automatically adjusting the power levels, checking the compatibility, and authenticating the genuineness of each attachment. For example, these devices can be incorporated into different sized drill batteries and tool attachments. The devices also support appliance attachments, making them easy to plug and play by setting the power levels to match the needs of the appliance, check for compatibility, and identify the attachment as genuine and not counterfeit. For example, a vacuum cleaner with this technology can automatically adapt to different attachments, such as an electric brush. This way, you can use various attachments without any hassle. This technology simplifies user interaction, reduces downtime, and enhances performance.

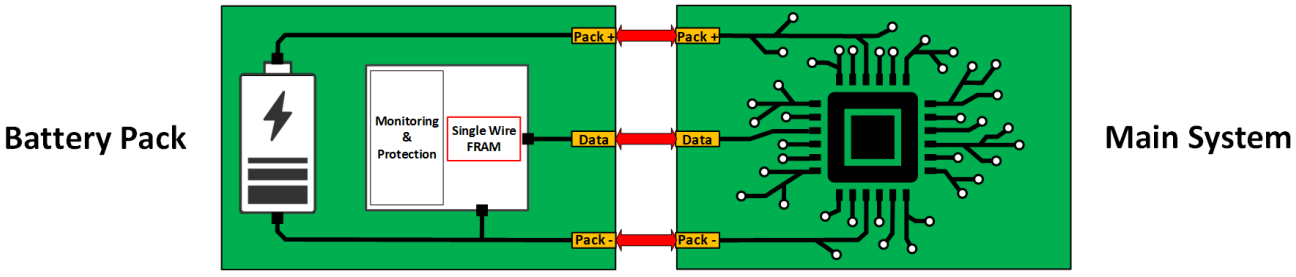

Figure 3. Single-Wire FRAM Battery Pack Block Diagram

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PCB and Asset Tracking

Single-wire FRAM devices enhance PCB tracking and management in electronics by providing identification validation usage records and counterfeit protection. These features allow reliable PCB monitoring from production to maintenance. Single-wire FRAM devices encode data, such as, serial numbers, manufacturing dates, specifications, and the history on PCBs, offering easy and accurate identification throughout the life cycle. The device also has a unique ID that verifies the PCB authenticity and compatibility with the host system, preventing unauthorized or counterfeit PCBs. Moreover, these devices are reliable and ESD resistant, designed for long-term operation without data loss or corruption.

Conclusion

Single-wire FRAM devices, as listed in Table 1, are designed for cables, battery packs, tool and appliance attachments, and asset tracking applications. The devices can provide identification, tracking data, calibration data, and manufacturing information. Single-wire FRAM devices are a cost-effective way to enhance equipment with electronic features and improve performance, tracking, and safety.

Table 1. TI Single-Wire FRAM Devices

Single-Wire FRAM Device	Memory Size
BQF0008	8K bits

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