Fujitsu Semiconductor Develops Ultra-Compact Packaging for 1-Mbit Serial FRAM

Among the industry's smallest, enables smaller and slimmer wearable devices using non-volatile, low-power memory

Fujitsu Semiconductor Limited today announced the development and availability of its 1-Mbit FRAM product, MB85RS1MT, in an 8-pin wafer level chip scale package (WL-CSP). This new package occupies only 23% of the mounted surface area compared with the existing 8-pin small-outline package (SOP), and is roughly one-fifth as a thickness, makes a 1Mbit FRAM with a serial peripheral interface (SPI) available in the industry's smallest size class as FRAM products.

WL-CSP FRAM is the ideal memory for wearable devices. In addition to contributing to smaller overall size for the application itself, FRAM minimizes amount of power consumption during write operations, and contributes to longer battery life.
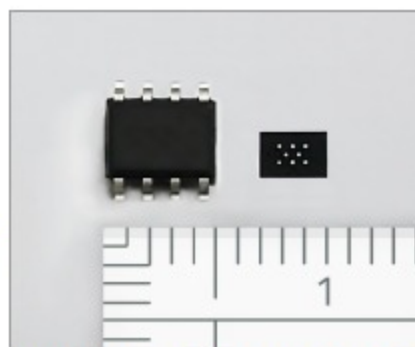

Figure 1: Comparison of the SOP and WL-CSP packages.

The wearable market, which is attracting considerable attention today, is expanding dramatically. While it includes such diverse categories as accessories, such as eyeglasses and head-mounted displays, medical devices, such as hearing aids and pulse meters, and activity trackers that record calories burnt and running data, one feature many of them have in common, is the need to continuously log data in real time.
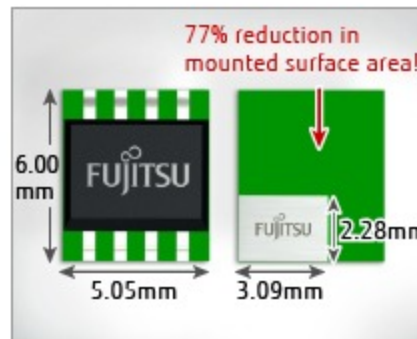

Figure 2: Comparison of mounted surface area

While typical non-volatile memory technologies such as EEPROM and flash memory only guarantee data integrity over 1 million write cycles, Fujitsu's FRAM technology guarantees vastly more than 10 trillion read/write cycles, and making it ideal for storing real-time log data.
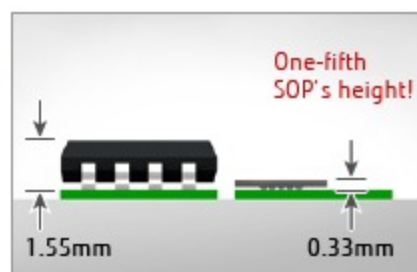

Figure 3: Comparison of mounted height

To make even better use of this feature, Fujitsu Semiconductor has now extended its MB85RS1MT line of 1-Mbit FRAM devices with a new WL-CSP package (Figure 1). The MB85RS1MT is already available in the industry-standard SOP package, and this new WL-CSP has very small dimensions of 3.09 x 2.28 x 0.33 mm. The mounted surface area for WL-CSP is only 23% that of the SOP, or a 77% reduction in area (Figure 2). Furthermore, with a thickness of only 0.33 mm, its roughly half that of a credit card, the total mounted volume resulted in 95% less than that of the SOP (Figures 3, 4).
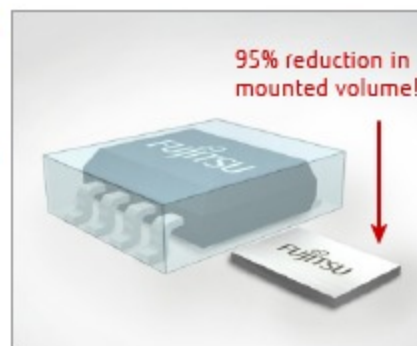

Figure 4: Comparison of mounted volume

One of the benefits of FRAM is its low-power operation. Compared to the commonly used EEPROM non-volatile memory, write operations are faster as well, thereby, consume quite a small amount of power during write operations (Figure 5). For this reason, using this FRAM in wearable devices that need frequent write operation for real-time logging, brings the benefits of both better battery life and smaller size.

Figure 5: Amount of power consumption during write operations

The availability of the MB85RS1MT in the WL-CSP package will help wearable device manufacturers to design smaller, slimmer, and more functional products, and greatly extend battery life. Fujitsu Semiconductor as always continues to provide products and solutions that raise the value and utility of the customers' applications.
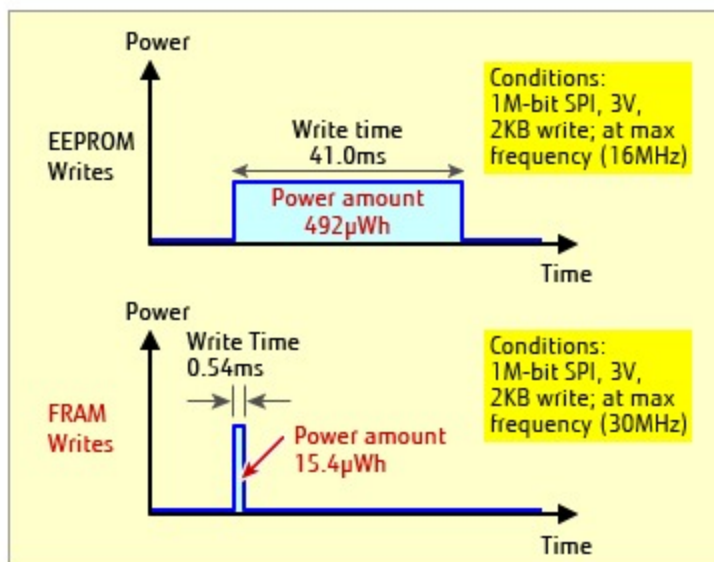
Key Specifications

- Part Number: MB85RS1MT
- Density (configuration): 1 Mbit (128K x 8 bits)
- Interface: serial peripheral interface (SPI)
- Operating voltage: 1.8–3.6 V
- Guaranteed read/write cycles: 10 trillion
- Data retention: 10 years (at +85℃)
- Package: 8-pin WL-CSP, 8-pin SOP

Related Links

- Fujitsu Semiconductor site
- FRAM site
- MB85RS1MT datasheet