

Application Brief

MSPM0Cx- Toothbrush and Shaver



Introduction

Personal care products like electric toothbrushes and electric shavers have gained significant popularity as people seek convenient and efficient methods to enhance daily hygiene routines.

Compared to traditional manual toothbrushes, electric toothbrushes with vibrating brush heads powered by motors can provide improved oral care experience by reaching areas that are often missed by manual brushing. Electric toothbrushes also provide better brushing techniques such as maintaining the recommended brushing time and applying appropriate pressure.

Likewise, electric shavers utilizing rotating blades powered by motors have revolutionized the shaving experience, offering comfortable, safe, and precise grooming results.

Both devices need MCU integrated to enable precise motor control, sensing, power management and user interface functions. Now, TI's low-cost MSPM0 MCUs with high-performance and small size can be leveraged to empower small but powerful electrical toothbrushes and electrical shavers!



Figure 1. Electric Toothbrush and Electric Shaver

Why is MSPM0 an Excellent Choice for Electric Toothbrushes and Electric Shavers?

TI's MSPM0Cx MCUs featuring Arm® Cortex®-M0+ core with 24 MHz CPU, 32-bit structure, 4 to 16 KB Flash provide cost-effective designs for electric toothbrush and shaver applications.

- **Accurate PWM control:** three flexible timers, containing one advanced with complementary outputs and dead-band
- **Integrated analog:** 10-bit, 10ch ADC with 1 Msps sampling rate
- **Adequate interfaces:** Serial Peripheral Interface (SPI), Inter-Integrated Circuit (I2C) and Universal Asynchronous Receiver/Transmitter (UART)
- **Low power consumption:** excellent power consumption performance in both run mode and standby mode
- **Low cost:** Low-cost Arm Cortex-M0+ MCU featured with in-system programmable flash
- **Small package size:** seven package options, the smallest no-lead 8-pin WSON with 2.0 x 2.0 mm² size and smallest leaded 8-pin SOT with 2.8 x 2.9 mm² size.
- **GPIO:** Up to 6 IO in 8-pin packages and 18 general-purpose input/output (GPIO) in 20-pin packages

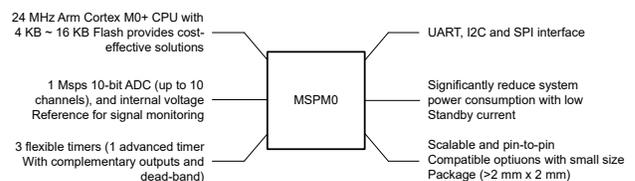


Figure 2. MSPM0C Series Overview

What Can MSPM0 do in Electric Toothbrushes and Electric Shavers?

The integration of MSPM0 in electric toothbrush and shaver enhances overall performance, efficiency, and user experience.

- High-performance motor control with precise motor speed and movement pattern regulation, LED control for battery level display and timing function for preset brushing durations:

- Three flexible timers, including one advanced timer with complementary outputs and dead-band and two low-power timers
- Accurate battery voltage gauge and pressure detection:
 - 12/10-bit, 10ch ADC with 1 Msps sampling rate
- Brush/razor head detection, user interaction through buttons by GPIO
- Communication
 - SPI, I2C and UART interfaces

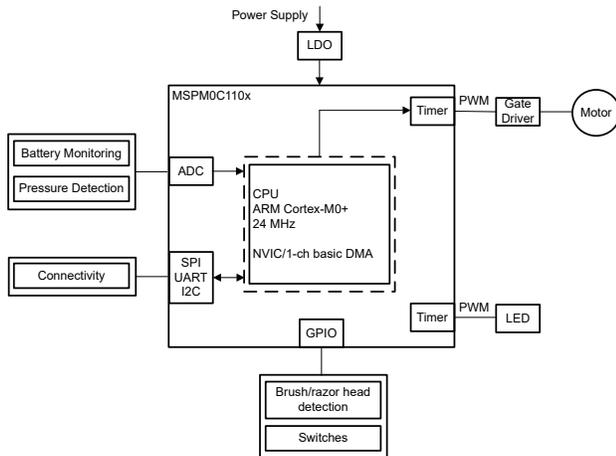


Figure 3. System Block Diagram Based on MSPM0C110x

Resources

Get started today by learning more about how MSPM0 can benefit your design.

- Texas Instruments, [MSPM0C1104](#).
- Texas Instruments, [Programming tools](#).
- Texas Instruments, [MSPM0 Academy](#).
- Texas Instruments, [LP-MSPM0C1104](#).

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