



A Charger IC, N Kinds of Applications

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The [MP2639A](#) is a fully integrated and flexible [battery charge management IC](#) that can charge two cells in series from a 5V power supply. USB ports are widely used by portable devices due to their universal compatibility and reduced e-waste of in-box power supplies. Furthermore, with the increased proliferation of USB Type-C, it is now possible to draw up to 15W of power from a standard USB power supply without incurring the added cost of supporting USB power delivery. For its functional diversity, control flexibility, and high reliability, the MP2639A from Monolithic Power Systems (MPS) is ideal for a variety of applications, such as electrical point-of-sale (POS) machines, Bluetooth speakers, electronic cigarettes, power banks, and so on. In this article, we will introduce a variety of applications using the MP2639A.

The sophisticated features of the MP2639A include:

- Bidirectional operation for charging or discharging
- Cell balance and protection escorting for two-series cell charging
- Light-load detection for discharge mode
- Battery-current monitoring
- Input current and voltage loop control
- Integrated voltage-based fuel gauge using four LED drivers
- Other safety mechanisms, including battery temperature protection and back-up safety timers

Figure 1 shows a typical application circuit of the MP2639A.

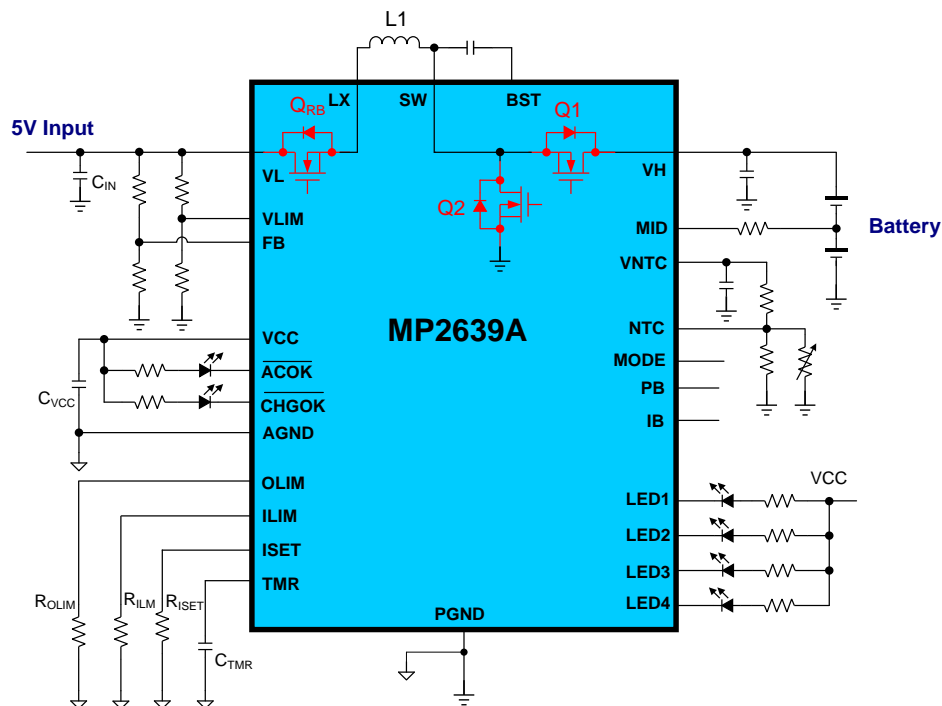
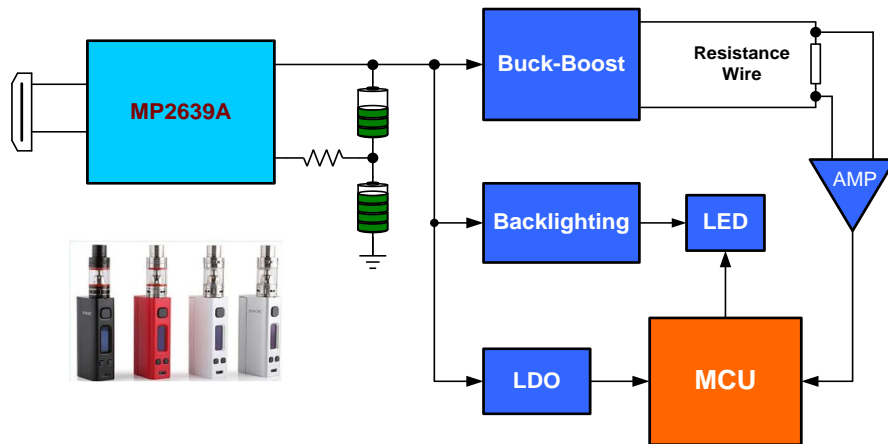


Figure 1: Typical Application Circuit

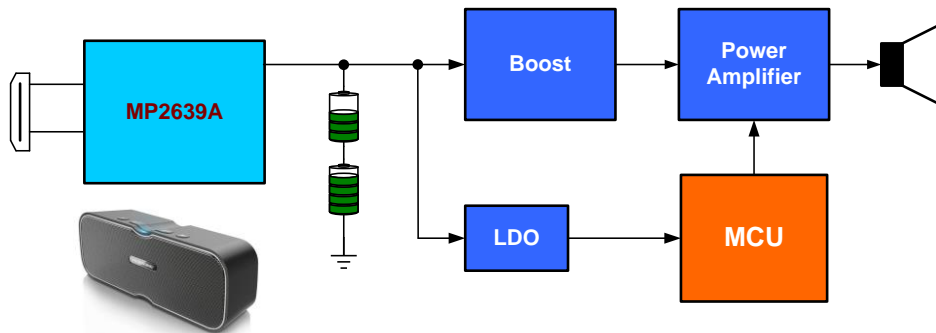
Due to its diversified features, the MP2639A can be applied to a variety of applications, such as E-cigarettes, Bluetooth speakers, POS machines, power banks, and so on.

E-Cigarette



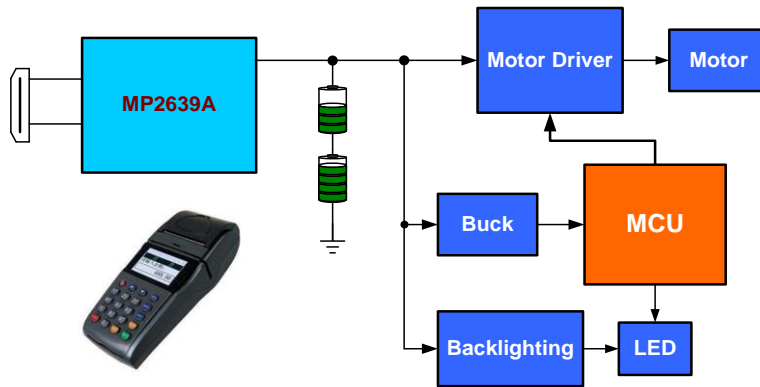
In some high-power E-cigarettes, a battery with two cells in series is used for high instant power to atomize oil. To be compliant with the USB input, a boost charger is required. Since this application produces large peak-battery discharge current, the life span of the cells is somewhat short. As such, each cell is expected to be independently replaceable, which means the cells installed do not have matched capacity. The MP2639A is an ideal candidate for this application due to the boost charging topology and integrated cell balancing control.

Bluetooth Speaker



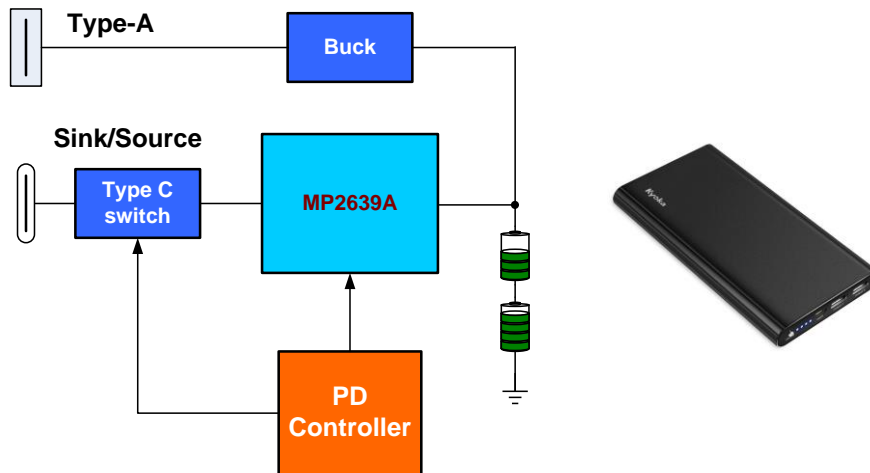
For better sound performance and increased battery life, a battery with two cells in series is used in many Bluetooth speakers. To be compliant with the 5V USB input, a boost charger, such as the MP2639A, is required to charge the 2-cell battery. The MP2639A has a programmable input current limit and input voltage limit, which allows it to be compatible with various power inputs and the full range of USB-C current up to 3A. Furthermore, the MP2639A also features a source mode (buck) regulator, which can supply up to 5A of current for charging an externally connected smartphone. This feature is convenient for speakers with power bank mode using the USB-C port.

POS Machine



In point-of-sale (POS) machines, a stepping motor is required to print receipts, typically. Two-cell batteries are used to achieve high voltage to power the driver of the stepping motor. Therefore, a boost charger is required to charge the 2-cell battery to be compliant with the 5V USB input. The MP2639A can supply the 4-LED indication of the battery capacity, or provide a battery current monitoring output to the microcontroller (MCU) for a more accurate state of charge (SOC) by calibrating the voltage drop across the battery’s internal resistance.

Power Bank



The [MP2639A charger ic](#) also can be used in power applications due to its bidirectional operation mode. The MP2639A can provide a 5V/5A output when it is configured in buck-discharge mode. The device can also provide simple voltage-based SOC data through the 4-LED indication and IB pin for battery current monitoring.

Conclusion

The fully integrated charger with a diverse range of programmable features make the [MP2639A](#) ideal for a wide range of USB-powered applications such as E-cigarettes, Bluetooth speakers, POS machines, and power banks. The low on resistance in the MP2639A optimizes efficiency, and the cell balance function allows customers to use initially unmatched cells to lower cost. The bidirectional power stage can operate in either sink or source (OTG) mode to charge the battery or provide power bank functionality. Together, these features make the MP2639A an excellent choice for USB-compliant, 2-cell battery applications.