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Reasons for Using Nichicon's SLB Battery

By **NICHICON CORPORATION**

Nichicon (America) Corporation

Phone: 847-843-7500

Email: sales@nichcion-us.com

Address: 927 E. State Parkway, Schaumburg, IL 60173

When it comes to energy storage on a circuit board there are only 2 types of devices, Supercapacitors (EDLC) and Li-ion batteries. Each has advantages and disadvantages when compared to each other. Supercapacitors have high power density but a low energy density where Li-ion batteries have the opposite. There is no device that has both properties until now. Nichicon's SLB series of LTO (Lithium titanate oxide) batteries has both.

The SLB series has numerous advantages over supercapacitors and Li-ion batteries.

1. High charge/ discharge rates

Lithium-ion batteries have a significantly reduced energy storage capacity after about 1,000 charge-discharge cycles while the SLB can be charged/ discharged over 25,000 times and still retain 80% or more of their energy storage capabilities. EDLCs can be discharged up to 1 million times but the amount of energy is much lower.

2. Very small size

The SLB is very compact compared to an EDLC. The SLB can take up as little as about 15% the volume of an EDLC with the same amount of energy storage. This makes it ideal for applications where large amounts of energy are needed in a very small size. The Samsung Galaxy note S pens is an example of this kind of device where the SLB replaced an EDLC and improved the performance dramatically.
The SLB has case sizes from 3x7mm to 12.5x40mm.

3. Wide range of charging capabilities

The SLB has the flexibility to charge over a wider range of charging currents. It can be efficiently charged at high currents and at very low currents, like in energy harvesting. In addition to a quick charge of as little as 3 minutes (20°C), a slow charge (0.01C) is also possible. EDLCs and Li-ion batteries cannot be charged over this wide a range and have to typically be charged at a defined rate over a specific amount of time. Lithium-ion batteries, in particular, require precise charging with a dedicated charging IC.

4. Safety

Unlike Li-ion batteries in the event of an internal short circuit the SLB won't easily ignite and burn. They can be crushed or pierced by a sharp object while fully charged and they will not ignite. The SLB does not suffer thermal runaway when compared to lithium-ion batteries.

5. Wide temperature range

The SLB can operate at lower temperatures compared to Li-ion batteries. Even at temperature reaching -30°C it can still store 50% of its energy.

6. Easy to mount

The unique shape of the SLB allows them to be soldered directly onto a circuit board without any fixturing. Being supplied a cylindrical shape just like an aluminum electrolytic capacitor the SLB can easily be soldered directly onto a circuit board. EDLC's are soldered in a similar fashion while LI-ion batteries having a coin shape need to have a mounting fixture to hold them in place and they also take up much more board space.

7. Maintenance free

Being a rechargeable battery means you can design them into your application and forget needing to do any maintenance like battery replacement. This allows the SLB to be used in devices where maintenance would be difficult to perform.

8. Numerous ecosystem partners

The SLB has an unlimited range of applications, especially in IoT, and many ecosystem partners are actively evaluating the potential of SLB and proposing joint solutions.

9. High production capacity and market performance

High production capacity with a total of over 70 million units shipped in just 4 years since its introduction in 2019 and a production capacity of several million units per month.

10. Flexible charging for energy harvesting and wireless power

The SLB can accept a wide range of energy charging sources making them the preferred choice in energy harvesting (PV, TEG, etc.) and wireless power transmission. Industries with significant growth opportunities for the future.

The above reasons give you the most flexibility when designing a circuit. The combination of small size, wide charge/ discharge capabilities and safety make them ideal for use in small devices and can help reduce the size of device where larger energy storage is required.