

Ensuring Reliability of Portable Device Power

Issues with Current Holder Technology

Today's array of coin cell holders is hardly up to the challenges presented by the ever-increasing array of portable devices. With consumers expecting handheld gadgets to work perfectly anywhere at any time, engineers are presented with some unique problems.

Vibration. Heat. Shock. Humidity. Corrosion. Pressure. These real-world conditions cause device failures, frustrated customers, and higher support costs for suppliers. Without a reliable and continuous supply of current, an electronic device's operation will be interrupted and the system could be damaged. Repeated, forceful battery insertion and removal by consumers could cause stress fractures of plastic or metal components.

In addition to all these design constraints placed on engineers, increasing competition on the global marketplace is forcing manufacturers to cut costs in any way possible. The pressure to rein in material costs is enormous. And yet scrimping on production quality leads to the issues described above, raising costs later in a product's lifecycle. Faced with the two seemingly contradictory demands of quality and cost, what is the electronics manufacturer to do?

Coin cell holder design is traditionally full of trade-offs: size and weight constraints versus durability, ease of battery insertion and removal versus ability to retain the battery under rigorous conditions, and durability of materials versus component cost, to name a few. The increasing demand for ruggedness of portable devices has made the balancing act of coin cell design even trickier.

Additionally, there are numerous industry standards and government regulations to consider in the design and manufacture of electronic components causing confusion, risk of litigation, and aggravation. With all the issues to consider in designing a portable electronic device, how can one find which coin cell holders will best balance customer experience with product cost?

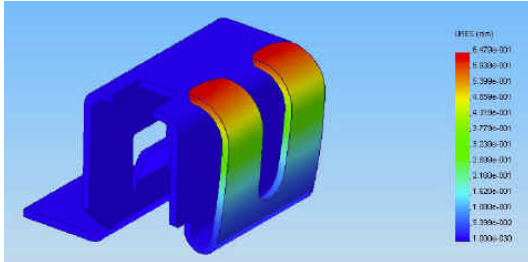
A Coin Cell Holder Buyer's Guide

Now that you are aware of the issues surrounding portable electronic devices, you can consider what specifically to look for in a coin cell holder. By following these simple guidelines, you will be able to improve your product's reliability, cost, and customer satisfaction.



Drop testing simulates real-world conditions your products may face

Retention: A coin cell holder needs to be able to retain the battery even under significant vibration, shock, and torque. Failure to properly hold the battery, even for a matter of microseconds, can result in an interruption of power and device malfunction. A well-designed coin cell holder will resist shock and vibration, while remaining flexible enough to allow ease of battery replacement. Care should be taken to select a holder so that batteries are easy to remove for all users including children, the elderly, and disabled people.



Simulation of stress on a contact can save time, money, and customer aggravation

Durability: Depending on the use, a device could have its battery replaced hundreds or even thousands of times throughout its lifespan. Because of the retention issues described above, a holder must keep its battery held securely. However, this results in extra wear upon battery replacement, as the same high grip which secured the battery causes increased wear under the stresses of

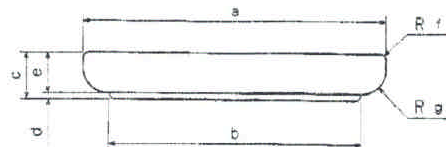
removal and insertion. Thus, it is important to insure that coin cell holder material be durable enough to withstand stresses that could cause dangerous fractures.

Corrosion Resistance: When components are exposed to humidity, airborne pollutants, extreme temperatures, and other environmental conditions, corrosion can result. Over time, this corrosive build-up can cause loss of electrical contact. The use of corrosion resistant contacts is particularly necessary for portable devices, where protection from the elements cannot be guaranteed.

Galvanic Protection: Electrochemically dissimilar metals will corrode when a current flows between them [1]. The chance of corrosion between a battery and its contacts depends largely on the choice of contact material and how well insulated from the elements the point of contact is. With proper insulation and the correct choice of materials for the task, the possibility of galvanic corrosion is greatly reduced.

Smart Tolerances: Not all batteries are created equal. For example, according to industry standards, the height of a CR2032 coin cell may vary by 0.3 millimeters – about 10% of the total height [2]. It is crucial that a coin cell holder be designed to accept all battery sizes that fit the industry-specified tolerances, and yet not accept incompatible batteries. Too loose a holder may accept a battery of a higher or lower voltage, which could result in damage to the device.

Contact Conductivity: The choice of metal in holder contacts determine how easily electricity will flow from the battery to



規定箇所 SPEC	規定値 (mm)								規定値
	SONY	Panasonic	MITSUBISHI	TOSHIBA	SANYO	FDI	Energy	Esura	
a	18.96	19.96	19.94	19.99	19.98	19.88	19.95	19.95	
b	16.70	18.16	17.95	17.14	17.02	18.51	17.25	17.72	
c	3.12	3.11	3.11	3.39	3.18	3.02	3.09	3.09	
R f	0.40	0.40	0.44	0.58	0.40	0.58	0.51	0.56	
R g	2.67	2.71	2.87	2.58	2.78	2.48	2.58	2.53	
R f	0.40	0.30	0.40	0.20	0.40	0.30			
R g	1.25	1.25	1.25	0.75	1.25	0.75			

測定箇所 R f : R f の半径 R g : R g の半径
 PLACE OF MEASUREMENT: R f : R f gauge 0.2mm

Comparison of dimensions of popular coin cells should influence holder design

the device. More conductive metals, such as gold, allow the holder designer to use less force between the contact and the battery, making the battery easier for customers to remove without sacrificing retention strength. Less conductive metals, like tin, require high contact force to ensure continuous current, leading to more difficult battery removal and a higher chance of breaking the holder due to the added stresses involved in retaining the battery. In addition, high conductivity means lower resistance, which allows for longer battery life. Simply put, gold contacts provide longer battery life, increasing customer satisfaction.

Ease of Integration: Manufacturing of portable devices is a highly involved process. Component suppliers, including holder manufacturers, should strive to make their product as easy as possible to include in a final electronic product. This includes standardized tape and reel packaging for high-volume production and trouble-free soldering of the holder onto the board in addition to the special concerns of individual manufacturers. It is highly valuable to have your holder supplier available to address any concerns during the production process.

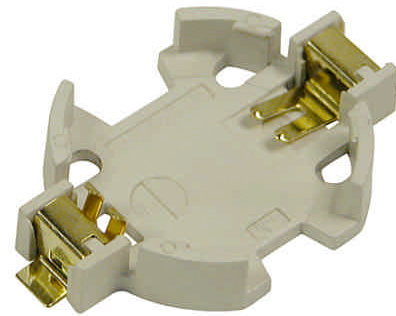
Compliance: With the expansion of RoHS and the Lead-free movement, it is more important than ever to understand what laws and standards are applicable to your project. Conforming to industry standards can lower your production costs both from suppliers and in labor.

Price: Finally, the price of a holder must be balanced against the above features. However, a common mistake made by manufacturers is ignoring this balance and purchasing a less expensive part that is ill-suited for their intended application. This lack of foresight leads to higher costs in the end as reduced reliability increases returns and reduces sales revenue.

The Solution

Memory Protection Devices has designed and produced a revolutionary new coin cell holder, the BU2032SM-JJ-GTR. Rather than starting with an older design and retooling it to meet the needs of portable device manufacturers, MPD built the BU2032SM-JJ-GTR from the ground up to meet their unique needs. Based on patented holder technology and industry-wide standards, the BU2032SM-JJ-GTR is intended for use in the most demanding conditions that consumers can impose on electronic equipment. Using the holder buyer's guide above, you can clearly see the advantages of this product for the portable electronic device manufacturer:

- *Retention:* Professionally shock and vibration tested for maximum battery retention while remaining easy to use by consumers. Focus group testing was performed to ensure anyone can easily replace batteries.
- *Durability:* The holder is Zenite liquid crystal polymer resin, a material known for its strength and heat resistance.



MPD's new BU2032SM-JJ-GTR

- *Corrosion Resistance:* The metal contacts are gold plated, the most corrosion resistant technique on the market.
- *Galvanic Protection:* The gold contacts mate well with the nickel casings customarily used by coin cell battery manufacturers.
- *Smart Tolerances:* MPD has done extensive surveys of common coin cell batteries to determine what sizes to accommodate.
- *Contact Conductivity:* Gold is one of the most conductive metals available, ensuring a reliable flow of current under any conditions and a longer battery life.
- *Ease of Integration:* Packaged in tape and reel and designed for high-temperature reflow soldering. MPD's support staff will work with you to ensure a smooth transition to their part.
- *Compliance:* RoHS compliant for worldwide distribution and surpasses ANSI/EIA standards, guaranteeing quality.
- *Price:* Industry competitive pricing with high volume discounts available.

As you can see, integrating the BU2032SM-JJ-GTR into your portable electronic device will offer the best combination of high quality and low cost. Gone are the days of hard engineering trade-offs: with MPD you can truly have it all!

References

- [1] "Galvanic Series". Wikipedia. Accessed July 6, 2006 from http://en.wikipedia.org/wiki/Galvanic_series.
- [2] American National Standard for Portable Lithium Primary Cells and Batteries - General and Specifications (ANSI C18.3M, Part 1-1999). American National Standards Institute. Page 22.