



#### CASE STUDY

## Innovative battery technology for neuromodulation

**For many people living with chronic pain, neuromodulation can be the most effective way they can alleviate their symptoms and make life more bearable. This is proving to be an increasingly popular approach, and the neuromodulation market is growing at a double-digit rate.**

**Neuromodulation devices work by implanting a battery-power electrical device that sends signals to electrodes near the spinal cord or nerves. These small electrical signals can act to stop the pain reaching the brain, or at least reduce its intensity, helping manage its impact over the long term for people with chronic pain.**

### **Battery needed for spinal cord stimulator**

One of Quallion's most innovative customers turned to the company for help in providing the battery for its latest spinal cord stimulator, which provides a sophisticated combination of neuromodulation therapies to provide long-lasting relief from chronic pain. Quallion is an innovator in rechargeable batteries for implantable medical devices, and applied all of its experience to finding the best possible solution.

The spinal cord stimulator uses multiple therapies at the same time, improving its effectiveness in treating pain. It can, if required, use different therapies one after another, which may help deal with a patient's habituation to the neuromodulation.

For patients who have pain in more than one location, the stimulator is also capable of delivering different waveforms to multiple places simultaneously.

For this application, the customer needed a battery that would provide a long time between recharging cycles (to minimize the inconvenience to patients), and would provide a long usage life without needing replacement.

## Reliable, long-life solution

To meet these demands, the customer chose Quallion's QL0200I-A, which is a high-power lithium-ion rechargeable cell. It has a capacity of 200mAh, enabling it to power the spinal cord stimulator for longer than competitive batteries. The QL0200I-A is highly reliable and has a long lifetime, with capacity retention at 80% or more after 500 cycles.

The hermetically-sealed battery is compact and lightweight, measuring just 17mm x 35mm x 5.5mm and weighing 8g, which make it convenient for use in implantable applications. It is certified to the UN 38.3 requirement for lithium-ion battery transportation, and to the IEC 62133 safety standard.



*The need for surgical procedures to replace fully discharged and damaged batteries is significantly reduced with Quallion's Zero-Volt™ technology.*

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## Overcoming full discharge problems

One of the potential problems with rechargeable batteries in medical applications can be that patients may occasionally not charge a battery in line with their regular schedule. This might happen if the pain has dissipated for a period of time or during portions of a pregnancy term as example.

In such an instance, the rechargeable battery may become fully discharged, which for some batteries can cause permanent damage, and may mean a surgical procedure is required to replace it.



To overcome this problem, the Quallion battery employs the company's innovative Zero-Volt™ technology. This is one of several novel technologies that Quallion has developed for the medical market.

Zero-Volt enables the Quallion battery to be fully discharged, to zero volts, without causing damage, and without affecting its function or the peak capacity levels that can be reached in the future. The Zero-Volt technology also enables batteries to be stored for long periods in a deep-discharged state, with no permanent capacity loss and with no need for maintenance.

## Reliable supply

As well as these technical benefits, Quallion has been able to ensure the highest quality standards for large orders, and offers the security of supply needed to give the customer confidence in being able to fulfil demands for years to come. Quallion has built a reputation for unrivalled performance and reliability, and its implantable batteries have helped tens of thousands of patients.

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