

LITHIUM-ION / NNP + HRL TECHNOLOGY

Panasonic is one of the leading Lithium-Ion battery manufacturers in the world. A perfect combination of high energy density, safety and long life shows what is possible with this battery technology. A continuous co-development with electrical companies all over the world has led to outstandingly good results. Panasonic especially focuses on enhancing safety technologies such as PSS and HRL in order to always guarantee people's safety. On the top of this we have invented our so called NNP technology which gives us the possibility to achieve eminently high battery capacities. Excellent battery safety on one hand, and superior battery performance on the other: this is what Panasonic stands for.

LI-ION • 3D ILLUSTRATION*1

- | | |
|---|-----------------------------------|
| 1 Positive pole | 6 Cathode |
| 2 PTC (positive temperature coefficient device) | 7 Anode |
| 3 Gasket | 8 Negative pole (cell can) |
| 4 Collector | 9 Separator |
| 5 Insulator | 10 CID (current interrupt device) |
| | 11 Exhaust gas hole |



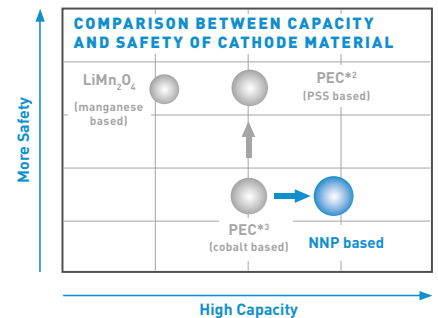
NNP TECHNOLOGY

Li-Ion battery cells have become indispensable as a power source for cordless equipment, such as laptops, that supports a ubiquitous society. As cordless devices become more sophisticated and powerful, they require more robust battery cells. Panasonic has responded to these challenges with the new battery cells, employing its unique high capacity nickel based positive electrode technology as well as its material and processing technology which prevents deformation of the alloy-based negative electrode when subjected to repeated charge and discharge. This new battery technology is called **Nickel Oxide based New Platform**.*2

Characteristics of the new Panasonic

NNP Technology:

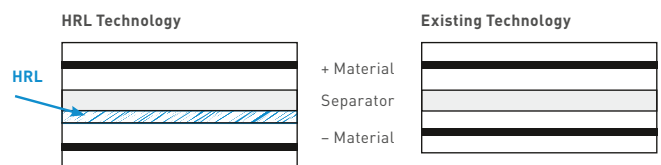
- Superior cycle life performance
- High energy density contributes to downsizing and weight reduction
- The new nickel positive electrode exceeds regarding durability in actual use and charge retention
- Excellent shelf-life due to low self-discharge performance



HRL TECHNOLOGY

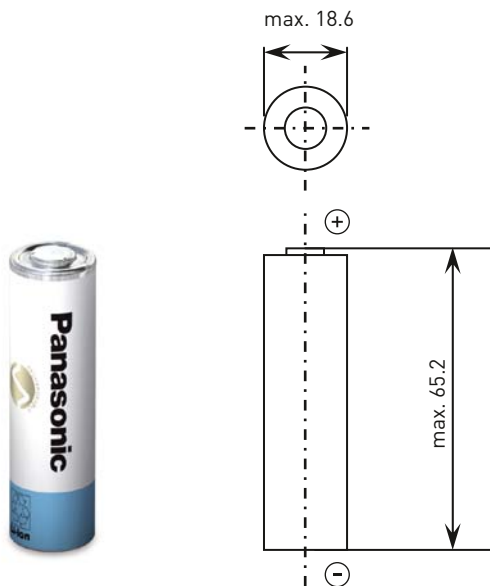
As a power source for mobile and digital equipment essential for a ubiquitous networking society, demand for Lithium-Ion batteries has grown fast. As such equipment including notebook PCs, mobile phones, medical equipment and power-tools become more powerful, sophisticated and feature-laden, they require more robust and safer batteries. Increasing energy-density, however, raises the risk of overheating and igniting due to short-circuiting. Panasonic employs the **HRL (Heat Resistance Layer) Technology** to improve the safety of Lithium-Ion batteries significantly. This heat resistance layer consist of an insulating metal oxide on the surface of the electrodes which leads the battery not to overheat even if a short-circuit occurs.

Safety is the base for everything. Higher Energy can be established based on safety technology.



*1 This battery is not equipped with a PTC.
 *2 Please contact Panasonic to get further information about our new NNP battery series and our entire Li-Ion line-up.
 *3 PEC: Panasonic Energy Company.

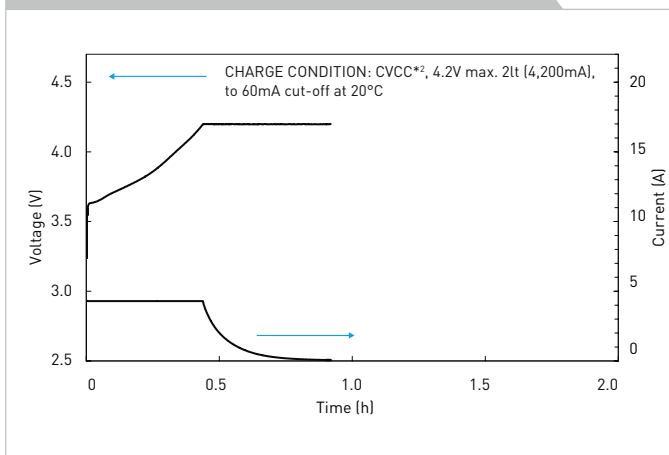
DIMENSIONS (MM)



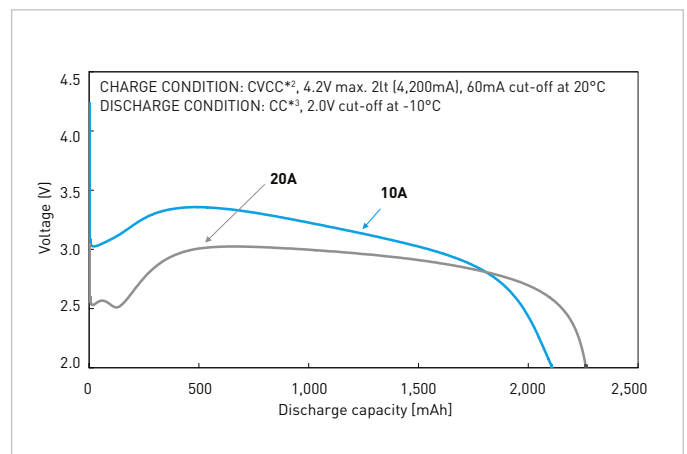
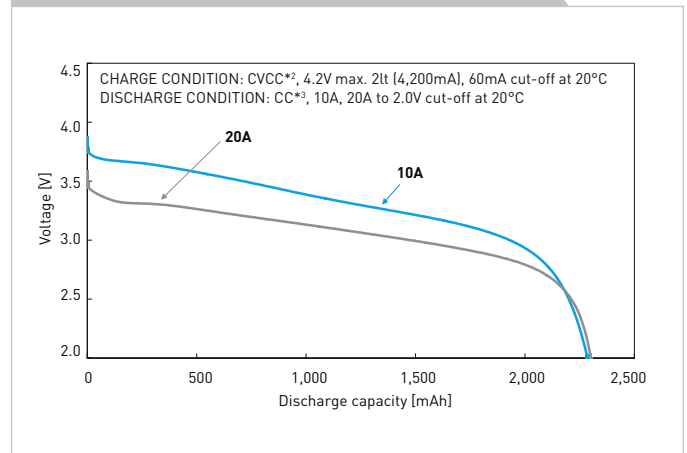
SPECIFICATIONS

Model Number	NCR-18650E
Nominal voltage (V)	3.6
Nominal capacity* ¹ - Minimum (mAh)	2,100
Nominal capacity* ¹ - Typical (mAh)	2,250
Dimensions - Diameter (mm)	max. 18.6
Dimensions - Height (mm)	max. 65.2
Approx. Weight (g)	45

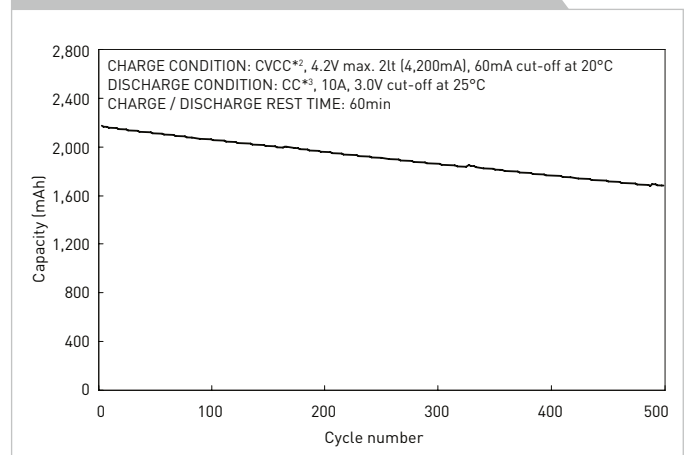
TYPICAL CHARGE CHARACTERISTICS



TYPICAL DISCHARGE CHARACTERISTICS



TYPICAL LIFE CHARACTERISTICS



*¹ Charge: Constant Voltage / Constant Current, 4.2V, max. 4,200mA, 60mA cut-off; Discharge: Constant Current, 10A, 2.0V cut-off; Temperature: 20°C

*² CVCC: Constant Voltage / Constant Current *³ CC: Constant Current

⚠ Notice to Readers

We are unable to support single cell business or accept orders from consumers. We design Lithium-Ion battery packs including a suitable safety unit device based on the technical specification of the customer. Due to the need for careful review when selecting Lithium-Ion battery solutions please contact your local Panasonic Sales Office. In order to avoid a lack of supply please check the battery availability with your Panasonic sales team before design-in.