

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 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 |

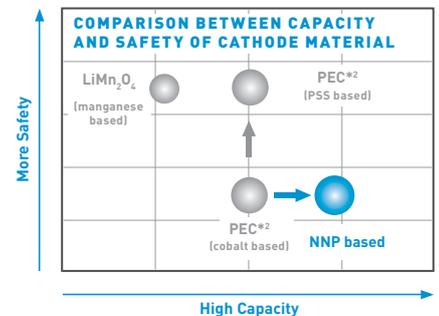


NNP TECHNOLOGY

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**.^{*1}

Characteristics of the new Panasonic NNP Technology:

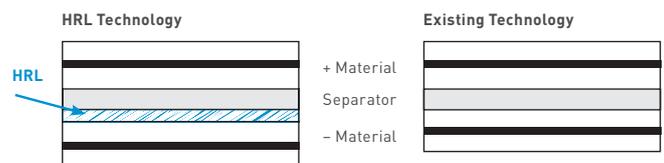
- Superior cycle life performance
- High energy density contributes to downsizing and weight reduction
- The new nickel positive electrode exceeds regarding durability in actual use and charge retention
- Excellent shelf-life due to low self-discharge performance



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.



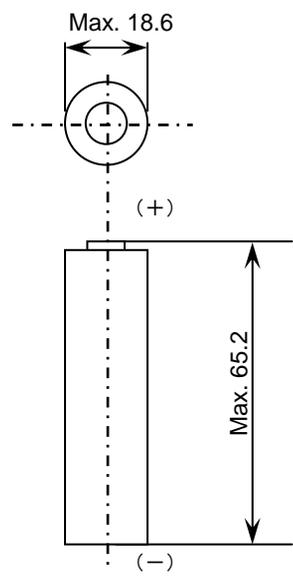
^{*1} Please contact Panasonic to get further information about our new NNP battery series and our entire Li-Ion line-up.

^{*2} PEC: Panasonic Energy Company.

NNP series NCR-18650A

■ Dimensions

(mm)



※Dimensions of a fresh battery.

To ensure safety, the referenced Li-ion cell is not sold as a bare cell. Li-ion cells must be integrated with the appropriate safety circuitry via an authorized Panasonic Li-ion pack assembler.

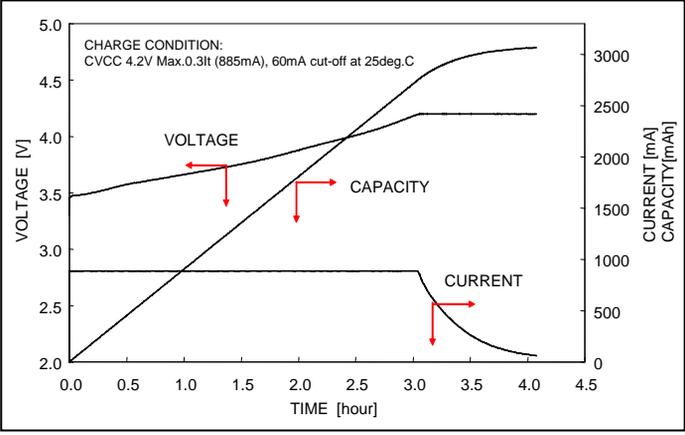
■ Specifications

The data in this document are for descriptive purposes only and are not intended to make or imply any guarantee or warranty.

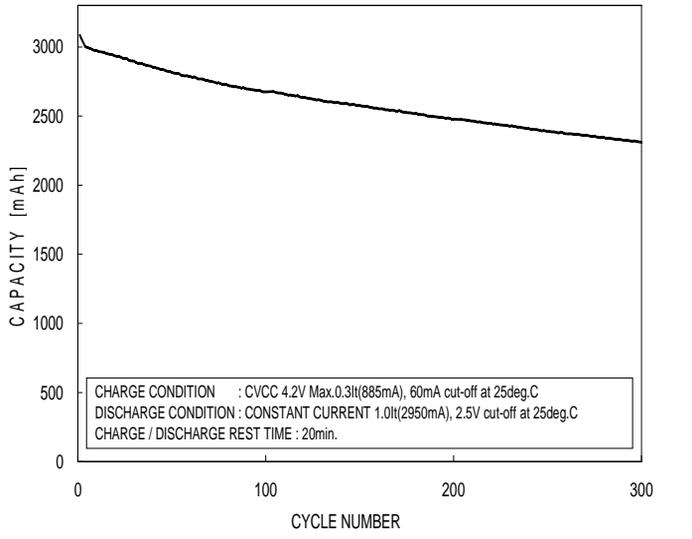
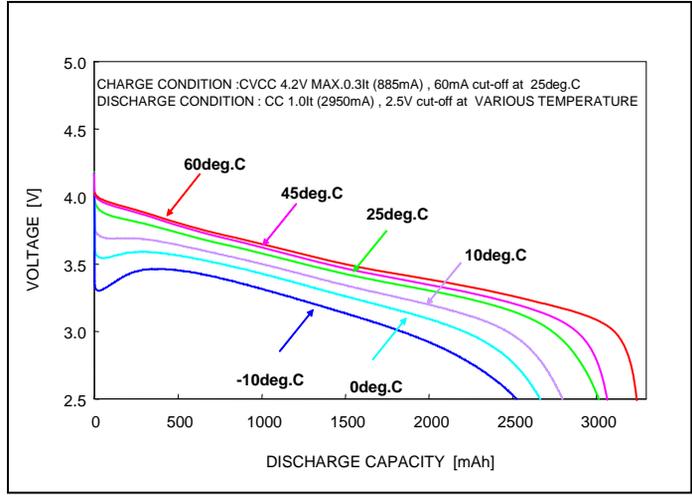
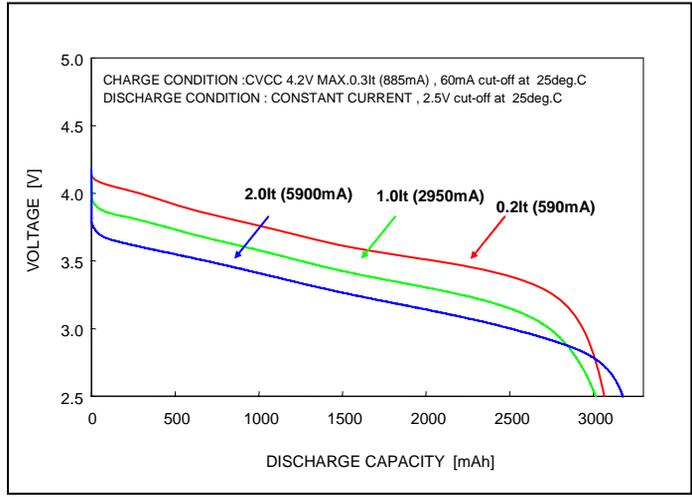
Nominal Voltage		3.6V
Nominal Capacity *1	Minimum	2,950 mAh
	Typical	3,100 mAh
Dimensions	Diameter	Max. 18.6 mm
	Height	Max. 65.2 mm
Approx. Weight		45.5 g

*1 Charge : constant voltage/constant current, 4.2V, max. 885mA, 60mA cut-off at 25deg.C
 Discharge : constant current, 590mA, 2.5V cut-off
 Temperature : 25deg.C

■ Typical charge characteristics



■ Typical discharge characteristics



* CVCC: Constant Voltage Constant Current
 CC: Constant Current