VARTA Microbattery

PoLiFlex

Lithium Polymer Technology
Basic technology
Chemical construction and reaction

Electrochemistry

The lithium-ion rechargeable battery

Copper negative current collector

Li+ conducting electrolyte

Aluminum positive current collector
Chemical construction and reaction

**Technology**

- Hot-lamination step guarantees a very good adhesion between:
  - current collector and electrode material
  - separator and electrode material

⇒ Low impedance and very good capacity over cycling
- Most advanced lithium rechargeable technology
- Next generation after Lithium Ion
- High volumetric and gravimetric energy density
- Low swelling (up to 0.3mm for the life of the battery at RT)
- Excellent cycle life
- Excellent discharge rate capability
- Excellent performance even at extreme temperatures
- Excellent performance at 45°C and 60°C
Benefits of PoLiFlex-Technology

**Li-Ion prismatic hard casing**

- More weight at similar capacity
- Thickness mostly >5mm
- Liquid electrolyte: may leak and destroy electronic
- Safety circuit needs additional space
- Electrode coiled: no solid contacts

**VARTA PoLiFlex™**

- 15-30% **less weight** (i.e. comp. to steel can)
- **Slim**: down to 1.5mm (actually)
- **Low swelling**
- **No free liquid electrolyte, no risk** of damage the electronic
- Safe circuit needs **no additional space** (incorporated in sealing area)
- Lamination technology: **solid contact**, **high reliability**
Benefits of PoLiFlex™ Technology

**VARTA PoLiFlex™ Applications.**

All VARTA PoLiFlex™ were produces at plat Ellwangen in series production.


- Biometric Card (Bloomberg)

- Mobile Phone (Siemens/BenQ CF110)
PoLiFlex® for NEW Apple iPod nano, 2th generation, available from sept. 2006

PoLiFlex®-Batterie: 2,4 mm
PoLiFlex® for NEW Apple iPod nano

PoLiFlex®-Batterie: 2,4 mm flach

Aluminium-Gehäuse: 4,5 mm flach (innen)
Biometric Card (Bloomberg)

2,6 mm PoLiFlex™ inside
VARTA PoLiFlex™ Applications.

All VARTA PoLiFlexTM were produces at plat Ellwangen in series production.


- Biometric Card (Bloomberg)

- Mobile Phone (Siemens/BenQ CF110)
Siemens Slider-Handy CF110

PoLiFlex Tyoe 44 34 41 (Flamingo)
Preparation of the electrodes

Casting of electrode films

Slurry

Casting onto carrier film or current collector
Preparation of the electrodes

- Hot-Lamination of the electrodes in case of coating onto carrier foil
- Electrode band
- Current collector
- Electrode band

Electrode slitting
Lamination of Bi-cells

Preslitted electrodes and separators

Connecting by hot lamination process

Positive
Separator
Negative
Separator
Positive

Bi-cell
Stacking and welding the Bi-cells

Machine making Bi-cells by hot lamination process

Stacking Bi-cells

Cutting Bi-cell current collectors and connecting them by ultrasonic welding
A. Partial cell packaging in multilayer aluminum foil

B. Pouch activation through open side with electrolyte which is completely bound in the stack

C. Formation, degassing, cutting of gas pouch, final sealing and folding

D. Assembly of PCM (protection circuit module)
VARTA PoLiFlex™-Batteries are produced with highly automated plant at Ellwangen (Germany)
Flexibility of PoLiFlex™ cells

- Modular stacking concept
- Very flexible range of footprints
- Different shapes

PoLiFlex™ cells can be stacked in a modular manner, allowing for a very flexible range of footprints and different shapes.
Thank you