

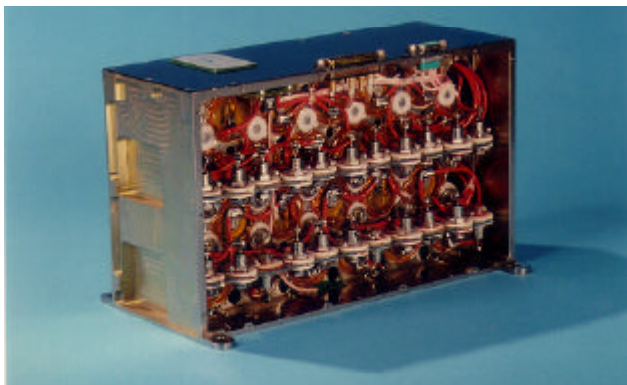
SSTL NiCd Batteries for Space Flight



The Nickel Cadmium batteries are flight proven units, suitable for a variety of small satellite applications. The batteries are selected from commercial cells which have undergone a rigorous screening and selection process at the SSTL specialist facilities. From previously flown models to custom made solutions, the batteries are ideal for demanding low cost missions.

For the past 18 years, satellite engineers at Surrey have successfully applied commercially available Nickel Cadmium (NiCd) batteries to Low Earth Orbit (LEO) micro and mini-satellite programmes. As a small satellite manufacturer, SSTL has been able to apply its own requirements (rapid procurement, low-cost, a good level of qualification and reliability) to the design of these commercially available batteries. Commercial cell batteries have been flown on 14 SSTL missions, with no failures, and accumulated over 60 in-orbit years or 300,000 charge-discharge cycles. As a satellite operator, SSTL has used its own operational performance data to continuously add to their design and value. With this long running experience SSTL can now offer:

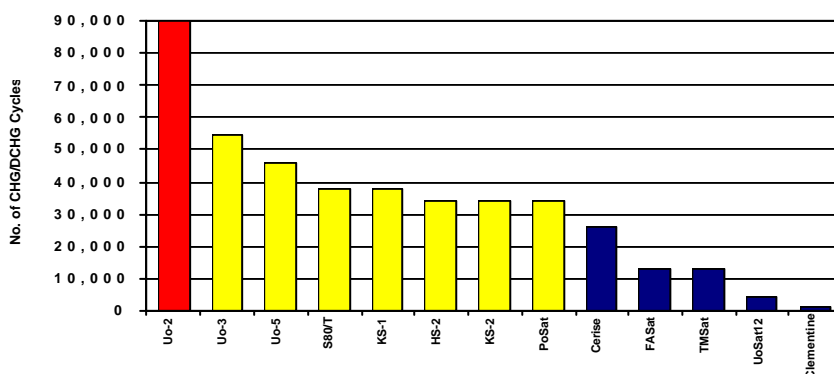
- Rapid acquisition, flexible specification commercial grade batteries for space flight
- ESA approved battery screening service benefitting from design and operational experience



+28V SLOSHSAT Battery

For the past 18 years, satellite engineers at Surrey have successfully applied commercially available NiCd batteries to LEO micro and mini-satellite programmes:

Number of Charge/Discharge Cycles to date per Satellite (25% DOD)



affordable access to space

Specifications & Options

- Capacity: custom
- Battery voltage: custom
- Cells: SANYO Cadnica range
- Cells may be arranged to provide battery capacity and voltage to suit customer requirements
- Battery housing can be designed and tested to customer requirements
- Screening service available independently
- Battery packs can be fused and in the unlikely event of electrolyte leakage, they are designed to safely contain any released materials, to comply with NASA Manned Space flight requirements.

Features

- **Low cost** - Use of screened commercial cells vastly reduces costs
- **Short lead time** - As short as 2 months to fit in with tight mission schedules
- **Flight proven** in excess of 80,000 cycles in LEO environment!
- **Custom Designs** can be readily arranged using proven cell technology
- **ESA Qualified** Assembly and Inspection
- **Test & Performance Data** available on request

Qualification / Heritage

- Gates cells flown on UoSAT-1 - 2, -3, -4, -5, KITSAT-1, S80T, HealthSat, POSat, FASAT-Alfa, CERISE. SANYO cells flown on FASAT-Bravo, TMSAT, CLEMENTINE, UoSAT-12
- Planned TiungSat, PICOSat, Tsinghua-1, BiltanSat, E-SAT constellation

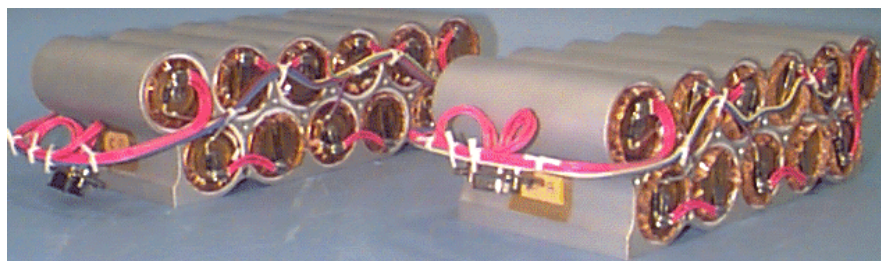
SSTL NiCd Batteries for Space Flight



Technical Information

SSTL selected Sanyo Cadnic KR series, following extensive testing of F-cells from a number of suppliers, as the most suitable battery for small satellite applications. The cells are screened at SSTL to a set of exacting standards which is used as a basis for rooting out cells which are not likely to perform to specification. Having been tagged, cleaned and wrapped in insulating material, the cells are potted in the housing using a foam potting compound. An absorbant material can be used to contain any electrolyte leakage if this is a mission requirement. The exact mechanical and electrical design will determine the overall battery capacity, voltage and housing configuration.

The cost of these cells, including rigorous screening and PA, still remains far lower than the prohibitive cost of space qualified cells. The flexibility of the system means that these qualities can be tailored to suit most missions at a small cost and also be available within tight schedules.



Low mass 28 V, 7 Ah configuration - as typically used on SSTL mini and microsatellites

Acceptance Screening

The test regime adopted by SSTL was originally based on standard aerospace Nickel Cadmium battery acceptance test procedures and adapted for the testing of commercial nickel cadmium cells. As the cells are outside SSTL's quality control procedures during their manufacture, and also because they are intended for commercial purposes, it is important that the cells are thoroughly screened prior to selection for use in the flight battery pack. With this in mind, most of the tests are performed on a battery at a cell level. These tests include both electrical and mechanical and are designed to verify the specified electrical performance and mechanical integrity. Tests performed include:

- visual inspection
- vibration testing
- X-ray inspection
- leakage tests
- electrical performance characterisation
- pack selection

Other SSTL Products

- **Power Conditioning Systems** - Modular designs which can be customised to user requirements based on battery charge regulators, power conditioning units and power distribution units.
- **Complete low cost small satellite solutions**, based on SSTL range of nano, micro, enhanced micro and mini satellites, including technology/know-how transfer and rapid and affordable access to space.
- Complete **spacecraft sub-systems**, unit level equipment and **ground segments**

affordable access to space

Environmental (Acceptance Level)

- Random Vibration: 15g
- Radiation:
 - Cumulative dose >10kRad
- EMC: as per MIL-STD-462
- Charge Temp. 0°C to +45°C (recommended +10°C to +20°C)
- Discharge Temp. +20°C to +60°C (recommended +10°C to +20°C)
- Storage Temp. -30°C to +50°C (recommended 0°C to +20°C)

Contact



Surrey Space Centre
University of Surrey
Guildford, Surrey GU2 7XH
United Kingdom

Tel: (44) 1483 259278
Fax: (44) 1483 259503
E-mail: info@ee.surrey.ac.uk
www: www.sstl.co.uk

Issue Number & Notice

SSTL-9005-02. 15-06-2000. This data sheet is not contractual and can be changed without any notice. Please contact SSTL (see above) for further information.