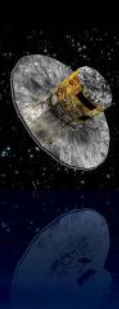


Enabling Energy's Future™



Maxwell Technologies Overview – Corporate & Product



Maxwell
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The Maxwell Name

- **The company was founded by Alan Kolb and 2 partners: Bruce Hayworth and Terrence C. Gooding, who all came from General Dynamics. (1965)**
- **The company spent the early part of its life in the defense contracting market doing most of its work for the government.**
- **Where the Maxwell name came from:**
 - ▶ Maxwell Technologies, formerly Maxwell Laboratories, was named after a Scottish physicist and mathematician, James Clerk Maxwell, who among other notable achievements developed and described a series of equations which is now known as the foundation of the classical theories of electromagnetism, known as Maxwell's Equations.
 - Albert Einstein said of James Maxwell: "The precise formulation of the time-space laws was the work of Maxwell...it took physicists some decades to grasp the full significance of Maxwell's discovery, so bold was the leap that his genius forced upon the conceptions of his fellow workers. (Albert Einstein, Science, May 1940)

Our History – Key Facts

1965

- Maxwell Technologies founded – initially named Maxwell Laboratories

1975

- Condis founded

1995

- Maxwell introduces 1st large Ultracapacitor

1996

- Name change from Maxwell Laboratories to Maxwell Technologies,
- Maxwell receives 1st automotive development contract for UC's

1997

- Maxwell receives 1st Ultracapacitor patent (4/15/97)

1999

- Maxwell purchases Space Electronics, which becomes our Microelectronics business

2000

- Maxwell achieves QML listing (QML-Q, 2000, QML-V 2004)

2002

- Maxwell acquires Montena Components, Ltd. (renamed Maxwell Technologies SA),
- Maxwell announces 1st hybrid bus design-in ISE

2003

- One millionth PC10 produced

2004

- ISO 9000 compliance company wide
- Maxwell introduces D cell ultracapacitor
- Maxwell announces 1st wind turbine design-in for ultracapacitors (Enercon)
- Maxwell produces own, proprietary Electrode

2007

- Contract assembly for large cell ultracapacitor products: Belton Technology Shenzhen

2008

- Maxwell announces first automotive design-in with Continental AG
- TS 16949 certification (Auto industry specific): San Diego 2008; Belton 2008; Lishen 2011

2009

- Maxwell announces design-in for stop-start idle elimination system for autos – Continental AG
- 2 millionth PC10 shipped
- 1 millionth large ultracapacitor shipped

2011

- 2 millionth large cell shipped/Belton
- Over 1 million PC10 cells shipped in Q2 alone (1.5 million planned for Q3)

Our Value Proposition

- **We enable companies around the world and across numerous industries to provide smarter, more efficient and greener energy solutions. (Think Maxwell-Enabled!)**
- **How we do this:**
 - ▶ **Technical leadership**
 - More than 100 patents and patents pending
 - + \$100 million in research and product development
 - Customer application engineering support
 - Research and development in material science and product and system design
 - A foundation of technical innovation and excellence
 - ▶ **Product leadership**
 - Commitment to Quality
 - Continuous innovation and product improvement
 - Customer-focused solutions (vs. just products)
 - Global product availability and support



Brand Value Proposition

- **How we do this:**

- ▶ **Ultracapacitor Specific:**

- Higher value (price/performance)
 - “Life of the application” durability
 - Millions of charge/discharge cycles vs. thousands for batteries
 - Broad operating temperature range (-40°C to 65°C)
 - 95% + turnaround efficiency for stored energy
 - Extending battery life in integrated systems
 - Maintenance free Reduced operating costs

- ▶ **Our Markets:**

- Hybrid & electric vehicle market
 - Passenger vehicle market
 - Wind market
 - Uninterruptible power supply (UPS) in support of mission critical activities across multiple industries
 - Industrial electronics
 - Electric Rail Market



World-Wide Locations



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Headquarters: San Diego, CA, USA

Maxwell Global HQ



- ▶ 30,000 square foot facility
- ▶ Home to Maxwell Executives, Sales, Marketing, Finance & Legal

Operations Center



- ▶ Clean room for Microelectronics testing & assembly
- ▶ Environmental lab for reliability testing
- ▶ Added 1 ultracapacitor electrode line January 2011
 - (Double electrode capacity)
 - Output 8+ million linear meters annually
- ▶ Additional electrode line Q3'2011
- ▶ 46,000 sq ft.
- ▶ 3 manufacturing areas

Technology Center



- ▶ Opened March 2011
- ▶ 40,000 sq ft.
- ▶ 9 self-enclosed Labs for test and process design
- ▶ 4 controlled environment labs
- ▶ Office space for 70 Engineers



Production Facilities and Partners

Rossens, Switzerland



- ISO 9001
- ISO 14001
- ISO/TS 16949



ISO 9001, ISO/TS 16949
ISO 14001

Manufacturing Partners

Taiwan

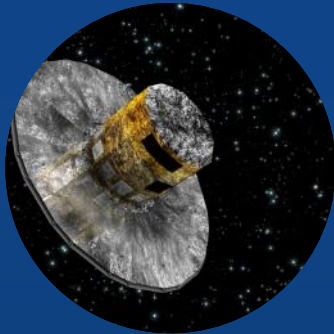
China

ISO 9001/2, ISO 14001, QS 9000, TS16949



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Maxwell Businesses



Microelectronics



Ultracapacitors



High Voltage
Capacitors



Maxwell Technologies Ultracapacitors

- *Maxwell ultracapacitors provide the longest life, low maintenance energy storage for short duration power requirements resulting in the lowest total cost of ownership*

- ▶ Designed to meet the life of the application maintenance-free
- ▶ Module technology to meet environmental conditions
- ▶ Production capability to meet high volume needs
- ▶ Green materials

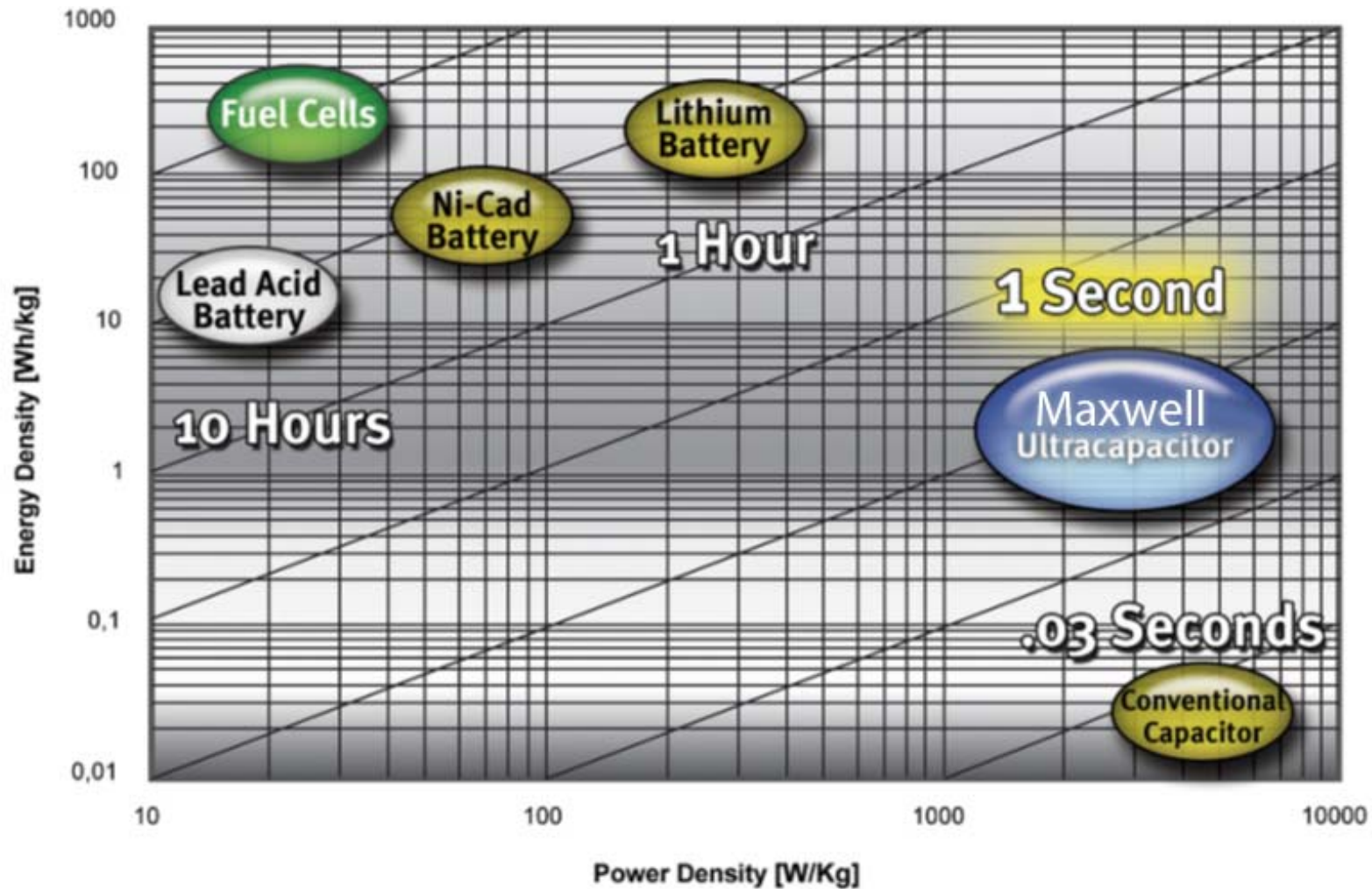


Technology Overview

- **Ultracapacitor energy storage**
 - ▶ Electrostatic energy storage
 - ▶ No moving parts
 - ▶ Green Materials: Carbon, Aluminum, Electrolyte, Paper
 - ▶ High power
 - ▶ Limited total energy
- **Performance**
 - ▶ 100k to 1M charge/discharge cycles
 - ▶ 5-15 year life
- **Proprietary Electrode**
- **Over 100 total patents**



Ultracap vs. Battery: Energy and Power



Industry Involvement

Transportation

- Rail
- Bus
- Auto
- Construction

Renewable Energy

- Wind
- Solar
- Energy Harvesting

- Cranes
- Valves
- Mining
- Smart Grid

Industrial

- Solid State Disk Drive
- Non-volatile RAM
- UPS

Electronics



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Product

Product Overview



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Standard Cells & Modules (multi-cells)

HC Line 1F to 150F



Heavy Transportation Module
HTM125



56V UPS Modules



K2 Line 650F to 3000F



PC Line 10F



75V Module

BC Line 310F to 350F



16 V Modules (Large & Small Cells)



48 V Module Series

Large Cell Overview

- *Maxwell's industry leading large capacity ultracapacitors continue to innovate and lead the industry in energy and power density, reliability and lifetime*



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Large Cell Overview

- **KEY FEATURES**

- ▶ De-facto standard capacities and form factor
- ▶ Multiple terminal configurations for customer usability
- ▶ High reliability welded connections



- **TARGET MARKETS**

- ▶ Heavy Transportation – bus, train, construction, mining, cranes
- ▶ Backup Power
- ▶ Wind
- ▶ Automotive – stop-start, micro hybrids
- ▶ Grid storage



Medium Cell Overview

- *Maxwell's technology leadership in high capacity cells is duplicated in medium capacity cells to bring high density, high reliability, and the longest lifetime*



Medium Cell Overview

- **KEY FEATURES**

- ▶ High reliability cell construction
- ▶ Terminal design for high current, high power applications

- **TARGET MARKETS**

- ▶ Wind turbines
- ▶ UPS <2kW
- ▶ Automotive boardnet stabilization
- ▶ Valves and actuators



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Small Cell Overview

- *PC and HC Series ultracapacitors feature Maxwell Technologies' patented electrode with superior reliability and lifetime*



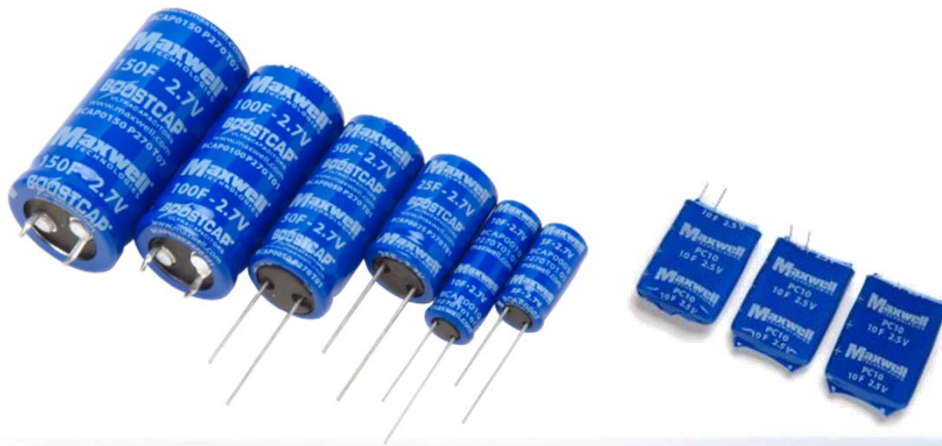
Small Cell Overview

- **KEY FEATURES**

- ▶ HC Series
- ▶ Industry standard form factor
- ▶ Maxwell Technologies electrode
- ▶ PC10 Line
- ▶ Thin form factor
- ▶ High reliability package
- ▶ Maxwell Technologies electrode

- **TARGET MARKETS**

- ▶ Smart Meters, Automated Meter Reading
- ▶ Server, solid-state disk drives
- ▶ Valves, actuators



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Engine Start Module Overview

- *Maxwell Technologies Engine Start Module is an easy to install solution to enhance starting reliability in mission critical trucking environments.*



Overview Engine Start Module

- **KEY FEATURES**

- ▶ Lowers Total Life cycle cost for engine start
- ▶ Green initiatives for private fleets
- ▶ Easy integration into existing starting systems with multiple batteries
- ▶ Life of the truck starting power
- ▶ Standard battery size



- **TARGET MARKETS**

- ▶ Large trucks, 9-15L diesel engines
- ▶ Diesel motor generator sets
- ▶ Marine



16V Module Overview

- *Maxwell Technologies' 16V energy storage modules incorporate industry leading large cells with rugged enclosures to provide superior reliability and lifetime for both cycling and backup power applications.*



16V Module Overview

- **KEY FEATURES**

- ▶ Rugged housing
- ▶ Water resistant
- ▶ Passive or active balancing models
- ▶ 16V rating matches systems designed around batteries



- **TARGET MARKETS / APPLICATIONS**

- ▶ Engine starting
- ▶ Wind turbine pitch control
- ▶ UPS



48V Module Overview

- *Maxwell Technologies' 48V energy storage modules incorporate industry leading large cells with rugged enclosures to provide superior reliability and lifetime for both cycling and backup power applications.*



48V Module Overview

- **KEY FEATURES**

- ▶ Passive balancing for high power cycling
- ▶ Rugged aluminum case
- ▶ Light weight
- ▶ Water and dust resistant



- **TARGET MARKETS/ APPLICATIONS**

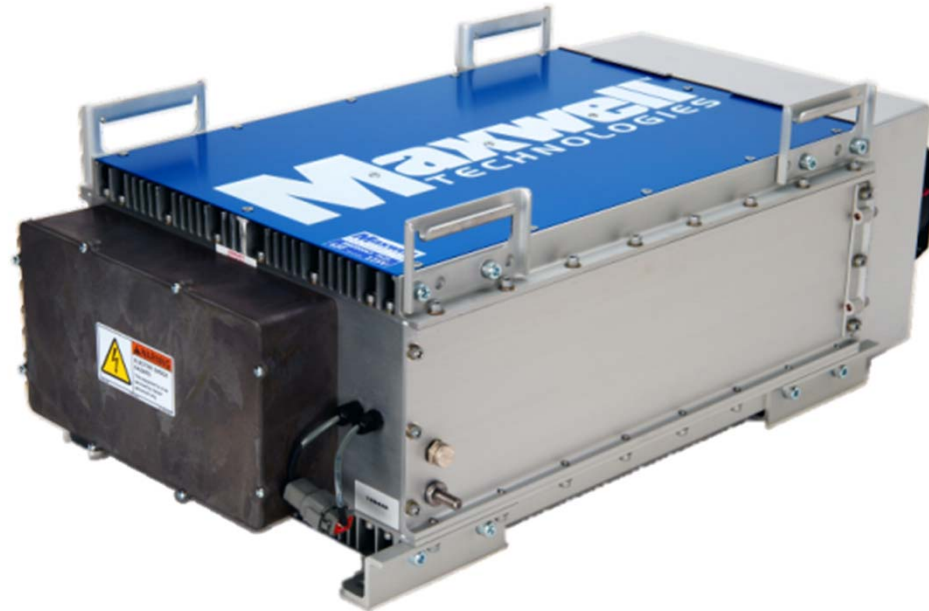
- ▶ Hybrid bus
- ▶ Construction and mining equipment
- ▶ UPS



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125V Module Overview

- *Highly ruggedized module which meets all requirements for heavy transportation applications with digital monitoring*



125V Module Overview

- **KEY FEATURES**

- ▶ Ruggedized construction to meet heavy transportation requirements
- ▶ E-mark certification for to meet EMI/EMC requirements
- ▶ CAN digital communications and monitoring
- ▶ Dust, vibration and water resistant



- **TARGET MARKETS**

- ▶ Hybrid bus, trolley bus
- ▶ Construction and mining
- ▶ Cranes, RTGs



56V UPS Module Overview

- *A long life energy storage module for datacenter, hospital and industrial transition power backup with the Lowest Total Cost of Ownership*



56V Module Overview

- **KEY FEATURES**

- ▶ Form factor for easy installation into standard equipment racks
- ▶ Maintenance free
- ▶ Green, environmentally clean technology, especially compared to lead-acid batteries
- ▶ Long lifetime (8-14 years)
- ▶ Fast recharge



- **TARGET MARKETS**

- ▶ Datacenter UPS with Fuel Cell or Motor-generator
- ▶ Hospital UPS with Fuel Cell or Motor-generator
- ▶ Large industrial manufacturing for flat panel displays, integrated circuits



Low Duty Cycle Modules

- *A long life energy storage module for wind turbine pitch control and DC-DC link voltage support with the high reliability and Lowest Total Cost of Ownership*



Low Duty Cycle Modules

- **KEY FEATURES**

- ▶ 16V, 64V and 75V operating voltage
- ▶ Maintenance free
- ▶ Green, environmentally clean technology, especially compared to lead-acid batteries
- ▶ Long lifetime (up to 15 years)
- ▶ Mechanical design built to survive nacelle vibrations



- **TARGET MARKETS**

- ▶ 1-10MW wind turbines
- ▶ Low voltage or high voltage pitch motors
- ▶ Renewable energy farms DC link up to 480V



The Maxwell Advantage

- **The Global leader in ultracapacitor technology and production (since 1965)**
 - ▶ Technical leadership
 - ▶ +100 patents and patents pending
- **+\$100M in research and product development**
- **Product leadership**
 - ▶ Commitment to quality
 - ▶ Global product availability and support
 - ▶ A broad product portfolio
- **Broad market applications**
- **Production capability to meet high volume needs**
- **Total customer commitment**



Cycling Capabilities: Ultracaps vs. Batteries

Lead acid



3,000 load cycles (20% DOD)

Nickel Cadmium



10,000 load cycles (40% DOD)

Lithium Ion



20,000 load cycles (40% DOD)

Ultracapacitors



More than

1,000,000 load cycles

(75% DOD)

Patented, Industry-Leading Products

Range of Modules
16V – 125V



Range of Cells
1F – 3000F