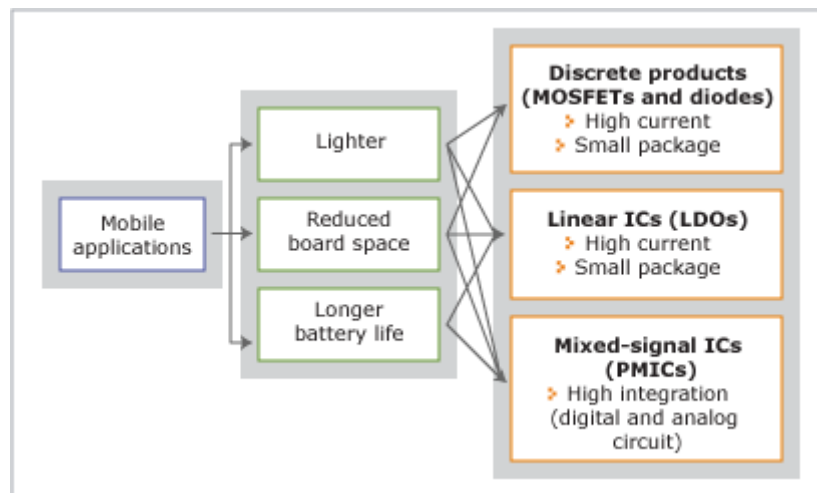


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## Power Management Devices Fact Sheet July 2008

NEC Electronics' power management devices are based on three key technologies – discrete, linear, and mixed-signal – that produce highly innovative solutions to maximize battery life, lower power consumption, support high levels of integration and minimize board space.




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### DISCRETE PRODUCTS

#### Low-Voltage Power MOSFETs

NEC Electronics America's low-voltage power MOSFETs benefit from sophisticated assembly technology, an innovative 0.25-micron wafer fabrication process—the finest process in the power device world—and sophisticated assembly technology. The wide-ranging product lineup includes best-in-class solutions for a variety of power management requirements.

- Super-low ON-resistance due to improvements in both process and packaging
- A wide range of products for applications ranging from automotive electronics to PC power supplies and battery management products
- A wide variety of package types, including multiple-wire-bond, copper-clip connection and chip-scale packaging technologies to suit every mounting requirement
- High reliability based on many years of experience in the automotive industry

## ESD Protection Diodes

NEC Electronics America's unique bidirectional diodes protect against both positive and negative surges while minimizing package size. Because an interface IC's built-in protection is no match for the common electrostatic discharge (ESD) from a person's touch, NEC Electronics' offers NSAD and NNCD Series diodes as a means of external protection.

- Surge Absorber Device (NSAD) Series
  - Protection for data lines at speeds up to 500 Mbps (USB 2.0, IEEE 1394, 100B interface, etc.)
  - Unique bidirectional protection with breakdown voltages in both positive and negative directions (for signal swings such as -5.3V ~ +8V at 25°C); no VCC connection needed
  - Reduced cost and space with two or four bidirectional diodes per package (compared to the four or eight diodes competitors must use in larger packages to protect the same number of data lines and connect to VCC)
  - Ensured protection with  $\pm 14$  kV specs that far exceed the 8 kV specified by IEC 61000-4-2 Level 4
- Noise-Clipping Diode (NNCD) Series
  - Protection against internal and external surges-waveform clipper, power supply, surge absorber, etc.
  - Protection for data lines at speeds up to 20 Mbps
  - Two types: high-ESD and low-capacitance

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## LINEAR ICs

### Low-Dropout Voltage Regulators

NEC Electronics America's CMOS devices minimize power consumption for a wide range of supply voltages. Some products include an on/off function. Others provide high-precision output voltages. The CMOS process technology minimizes operating voltage and power consumption and makes these regulators suitable for applications that use the latest low-voltage chips.

- Output voltages as low as 0.95V
- Current consumption ranging down to 60  $\mu$ A
- Built-in logic that provides an on/off function in some devices – reducing standby current
- High-precision output voltage ( $\pm 1$  percent) set by trimming technology for some devices
- Dual outputs for some devices, which eliminates one regulator and one input capacitor in dual-voltage circuits and thus reduces cost and space

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## MIXED-SIGNAL ICs

### Power Management ICs

NEC Electronics' PMIC solutions combine power management, logic, audio, user interface, connectivity and communications functions to maximize battery life, support high levels of integration and minimize board space-critical requirements for mobile devices. The PMIC solutions are suitable for a variety of applications, including mobile Internet devices, cellular phones, navigation systems, digital still cameras and portable media players.

Leveraging its technical expertise in power management and deep system-level knowledge of mobile devices, NEC Electronics also offers valuable application support, and with fabrication and assembly facilities located worldwide, can support high-volume manufacturing to support customer demand.

- High levels of integration to minimize board space and enable small form factors
- Flatter efficiency over a wide load, range resulting in better battery conversion efficiency
- Reduced noise and EMI emissions with spread-spectrum technology and noise isolation techniques
- Fast turnaround time for a turnkey solution with custom options

### NEC Electronics America, Inc.

NEC Electronics America, Inc., headquartered in Santa Clara, California, is a wholly owned subsidiary of NEC Electronics Corporation (TSE: 6723), a leading provider of semiconductor products encompassing advanced technology solutions for the broadband and communications markets; system solutions for the mobile, PC, automotive and digital consumer markets; and platform solutions for a wide range of customer applications. NEC Electronics America offers a local manufacturing facility in Roseville, California, and the global manufacturing capabilities of its parent company. NEC Electronics America is also the marketing and sales channel in the Americas for industrial-type, active-matrix LCDs from NEC Technologies, Ltd., a global leader in innovative display technologies. More information about the products offered by NEC Electronics America can be found at <http://www.am.necel.com>.

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