

SPECIAL ISSUE

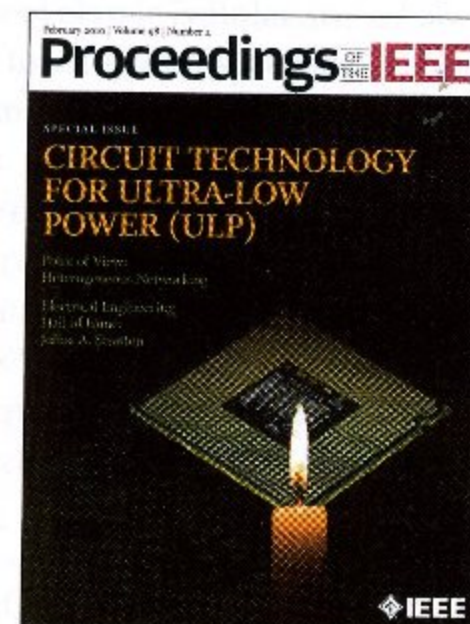
CIRCUIT TECHNOLOGY FOR ULTRA-LOW POWER (ULP)

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- 144 SmartReflex Power and Performance Management Technologies for 90 nm, 65 nm, and 45 nm Mobile Application Processors**
 By G. Gammie, A. Wang, H. Mair, R. Lagerquist, M. Chau, P. Royannez, S. Gururajarao, and U. Ko
 | INVITED PAPER | Industry standardization of ultra-low-power designs for wireless devices allows new tools and methods to be incorporated into the design flow as they mature.
- 160 Digital Computation in Subthreshold Region for Ultralow-Power Operation: A Device-Circuit-Architecture Codesign Perspective**
 By S. K. Gupta, A. Raychowdhury, and K. Roy
 | INVITED PAPER | When the supply voltage is less than the threshold value needed to sustain normal operation, useful digital circuit performance can be obtained by using leakage current for computation.
- 191 Technologies for Ultradynamic Voltage Scaling**
 By A. P. Chandrakasan, D. C. Daly, D. F. Finchelstein, J. Kwong, Y. K. Ramadass, M. E. Sinangil, V. Sze, and N. Verma
 | INVITED PAPER | Circuits such as logic cells, static random access memories, analog-digital converters and dc-dc converters can be used as building blocks for applications that can function efficiently over a wide range of supply voltages.
- 215 Practical Strategies for Power-Efficient Computing Technologies**
 By L. Chang, D. J. Frank, R. K. Montoye, S. J. Koester, B. L. Ji, P. W. Coteus, R. H. Dennard, and W. Haensch
 | INVITED PAPER | An eightfold improvement in power efficiency can be achieved without loss of performance for modestly parallelizable CMOS-based computer systems.
- 237 Ultralow-Power Design in Near-Threshold Region**
 By D. Marković, C. C. Wang, L. P. Alarcón, T.-T. Liu, and J. M. Rabaey
 | INVITED PAPER | New basic logic that selects between possible output values using a sense amplifier may be able to dramatically improve ultralow-power system performance.
- 253 Near-Threshold Computing: Reclaiming Moore's Law Through Energy Efficient Integrated Circuits**
 By R. G. Dreslinski, M. Wieckowski, D. Blaauw, D. Sylvester, and T. Mudge
 | INVITED PAPER | Future computer systems promise to achieve an energy reduction of 100 or more times with memory design, device structure, device fabrication techniques, and clocking, all optimized for low-voltage operation.

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On the Cover: Our cover illustration this month includes a single candle to suggest the idea of new circuit designs that require only ultralow power to operate effectively in a new generation of electronic devices.

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SPECIAL ISSUE: CIRCUIT TECHNOLOGY FOR ULTRA-LOW POWER (ULP)

- 267 Flexible Circuits and Architectures for Ultralow Power**
By B. H. Calhoun, J. F. Ryan, S. Khanna, M. Putic, and J. Lach
| INVITED PAPER | A programmable gate array optimized for ultralow-power operation may provide hardware flexibility and allow rapid low-cost implementation of many new applications.
- 283 Power and Energy Perspectives of Nonvolatile Memory Technologies**
By N. Derhacopian, S. C. Hollmer, N. Gilbert, and M. N. Kozicki
| INVITED PAPER | Memory cells that store information by modulating the resistance of a dielectric may provide nonvolatile memory for next-generation ultralow-energy applications.
- 299 Ultralow-Power Operation in Subthreshold Regimes Applying Clockless Logic**
By R. D. Jorgenson, L. Sorensen, D. Leet, M. S. Hagedorn, D. R. Lamb, T. H. Friddell, and W. P. Snapp
| INVITED PAPER | New logic circuits promise to provide exceptional throughput and energy savings when the supply voltage is less than the threshold value needed to sustain normal operation.
- 315 Zero-Crossing-Based Ultra-Low-Power A/D Converters**
By H.-S. Lee, L. Brooks, and C. G. Sodini
| INVITED PAPER | A/D converters that can immediately detect when the input voltage is zero, promise greatly reduced power consumption and elimination of gain and stability concerns.
- 333 FDSOI Process Technology for Subthreshold-Operation Ultralow-Power Electronics**
By S. A. Vitale, P. W. Wyatt, N. Checka, J. Kedzierski, and C. L. Keast
| INVITED PAPER | Silicon-on-insulator devices designed for optimum operation at 0.3 V promise longer operational life than conventional application-specific integrated circuits.



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