



Nathan Sokal short Biography and most relevant contributions:

He received B.S. and M.S. degrees in Electrical Engineering from the Massachusetts Institute of Technology, Cambridge, Massachusetts, in 1950.

During 1950-1965 he held engineering and supervisory positions for design, manufacture, and applications-engineering of analog and digital equipment.

In 1965, Mr. Sokal founded Design Automation, Inc., a consulting company doing electronics design review, product design, and solving "unsolvable" problems, for equipment-manufacturing clients. Much of that work has been on high-efficiency switching-mode RF power amplifiers at frequencies up to 2.5 GHz, and in switching-mode dc-dc power conversion.

Mr. Sokal holds eight patents in power electronics, and is the author or co-author of two books and more than a hundred technical papers, mostly in high-efficiency generation of RF power and dc power

Nathan Sokal was elected a Fellow of the IEEE, for contributions to the technology of high-efficiency power conversion and RF power amplification.

He also received the IEEE 2007 Microwave Pioneer Award "in recognition of a major, lasting, contribution ...the Class-E RF power amplifier." The award recognizes a "major, lasting contribution" in the society's field of interest made at least 20 years before the award is bestowed.

He is a Technical Adviser to the American Radio Relay League, on RF power amplifiers and dc power supplies, and a member of the Electromagnetics Society, Eta Kappa Nu, and Sigma Xi honorary professional societies.

Among his most important contributions to science and engineering come the fore the Class-E amplifier and converter. He is considered the "father" of Class-E amplification and power conversion. His works have been referenced thousands of times in scientific papers on power electronics and communications electronics.

The Class-E is a switching-mode high-efficiency power amplifier and converter that is small, lightweight, and relatively easy to design. At the present it is considered one of the basis of modern high efficiency transmitters. Class-E principles are used to reduce the energy consumption of almost any class of radio transmitters and it used in applications such as mobile communications systems, broadcasting (radio and TV), RADAR, satellite communications, etc.



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Recent advances both in solid state technology (such as GaN technology) and communication circuits and techniques (such as Envelope Elimination and restoration and Envelope tracking) are contributing to boost the interest on the Class-E amplification because their inherent benefits can be extended to microwave frequencies and complex communication applications demanding highly linear power amplifiers.

It is expected that Class-E technology will play an important role in the recently so called “Green Radios and Networks” (energy efficient radio systems).

Selected IEEE publications:

Sokal, N.O.; Sokal, A.D., “Class E-A new class of high-efficiency tuned single-ended switching power amplifiers”, Solid-State Circuits, IEEE Journal of , Vol. 10 , No. 3, pp. 168 – 176, Jun 1975.

Sokal, N.O., “RF power transistor storage time: theory and measurements”, Solid-State Circuits, IEEE Journal of , Vol. 11 , No. 2, pp. 344 – 346, Apr 1976.

Sokal, N.O., “Measurement of $V_{SUB CE(sat)}$ of RF power transistors and of waveform details near $V_{SUB CE(sat)}$ ”, Solid-State Circuits, IEEE Journal of , Vol. 11 , No. 4 , pp. 555 – 557, Aug 1976.

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Kazimierzczuk, M.; Sokal, N.O., "Cause of instability of power amplifier with parallel-connected power transistors", Solid-State Circuits, IEEE Journal of , Vol. 19 , No. 4 , pp. 541 – 542, Aug 1984.

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Markiewicz-Wrzeciono, M.; Sokal, N.O., "Filters with unequal ripples in the pass-band for class E power amplifiers", Circuits and Systems, 1989., IEEE International Symposium on, Vol.3, pp. 1628 – 1631, May 1989.

Sokal, N.O.; Redl, R., "Computer program for fast simulation and optimization of single-ended inductor-fed zero-voltage switching series-resonant DC/DC converters and DC/AC inverters with any loading topology", Applied Power Electronics Conference and Exposition, 1989. APEC' 89. Conference Proceedings 1989., Fourth Annual IEEE, pp. 303 – 314, Mar 1989. References

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Barbi, I.; Gules, R.; Redl, R.; Sokal, N.O., “DC/DC converter for high input voltage: four switches with peak voltage of $V_{in}/2$, capacitive turn-off snubbing and zero-voltage turn-on”, Power Electronics Specialists Conference, 1998. PESC 98 Record. 29th Annual IEEE, Vol. 1, pp. 1 – 7, May 1998.



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Sokal, N.O., "Class-E switching-mode high-efficiency tuned RF/microwave power amplifier: improved design equations", Microwave Symposium Digest., 2000 IEEE MTT-S International, Vol. 2, pp. 779 – 782, Jun 2000.

Raab, F.H.; Asbeck, P.; Cripps, S.; Kenington, P.B.; Popovic, Z.B.; Potheary, N.; Sevic, J.F.; Sokal, N.O., "Power amplifiers and transmitters for RF and microwave", Microwave Theory and Techniques, IEEE Transactions on, Vol. 50 , No. 3 , pp. 814 – 826, Mar 2002.

Zumel, P.; Sokal, N.O.; Alou, P.; Cobos, J.A.; Uceda, J., "New driving scheme for high-efficiency synchronous rectification in wide-input-voltage-range DC/DC converter has output current always flowing through a low-resistance switch", Power Electronics Specialists Conference, 2002. PESC 02. 2002 IEEE 33rd Annual , Vol. 1, pp. 149 – 154, Nov. 2002.

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Books

Dynamic Analysis of Switching-Mode Dc/Dc Converters

Author: Nathan O. Sokal, Richard Redl, Andre S. Kislovski

Publish Date: June 1991

ISBN-10: 0442239165

ISBN-13: 9780442239169

Switchmode RF Power Amplifiers

Author: Nathan O. Sokal, Andrei Grebennikov

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Selected Patents:

United States Patent 3,919,656

High-efficiency tuned switching power amplifier

Inventors: Sokal; Nathan O. (Lexington, MA), Sokal; Alan D. (Lexington, MA)

Appl. No.: 05/353,588

Filed: April 23, 1973.

United States Patent 3,900,823

Amplifying and processing apparatus for modulated carrier signals

Inventors: Sokal; Nathan O. (Lexington, MA), Sokal; Alan D. (Lexington, MA)

Appl. No.: 05/345,509

Filed: March 28, 1973

United States Patent 4,607,323

Class E high-frequency high-efficiency dc/dc power converter, YS pat 4,607,323

Inventors: Sokal; Nathan O. (Lexington, MA), Redl; Richard (Budapest H-1502, HU), Molnar; Bela (Budapest H-1502, HU)

Appl. No.: 06/601,381

Filed: April 17, 1984

United States Patent 4,928,200

Overcurrent protection for switching mode power converter

Inventors: Redl; Richard (Concord, MA), Sokal; Nathan O. (Lexington, MA)

Assignee: Cherry Semiconductor Corporation (East Greenwich, RI)

Appl. No.: 07/106,698

Filed: October 6, 1987



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United States Patent 4,719,559

Current-mode control of capacitively coupled power converters

Inventors: Sokal; Nathan O. (Lexington, MA), Redl; Richard (Arlington, MA)

Assignee: Cherry Semiconductor Corporation (Greenwich, RI)

Appl. No.: 06/922,006

Filed: October 22, 1986

United States Patent 5,485,361

Flyback charging with current mode controlled flyback converter

Inventors: Sokal; Nathan O. (Lexington, MA)

Appl. No.: 08/461,127

Filed: June 5, 1995

United States Patent 4,607,323

Class E high-frequency high-efficiency dc/dc power converter

Inventors: Sokal; Nathan O. (Lexington, MA), Redl; Richard (Budapest H-1502, HU), Molnar; Bela (Budapest H-1502, HU)

Appl. No.: 06/601,381

Filed: April 17, 1984