

# **Si2 Compact Model Coalition 2023 Updates**

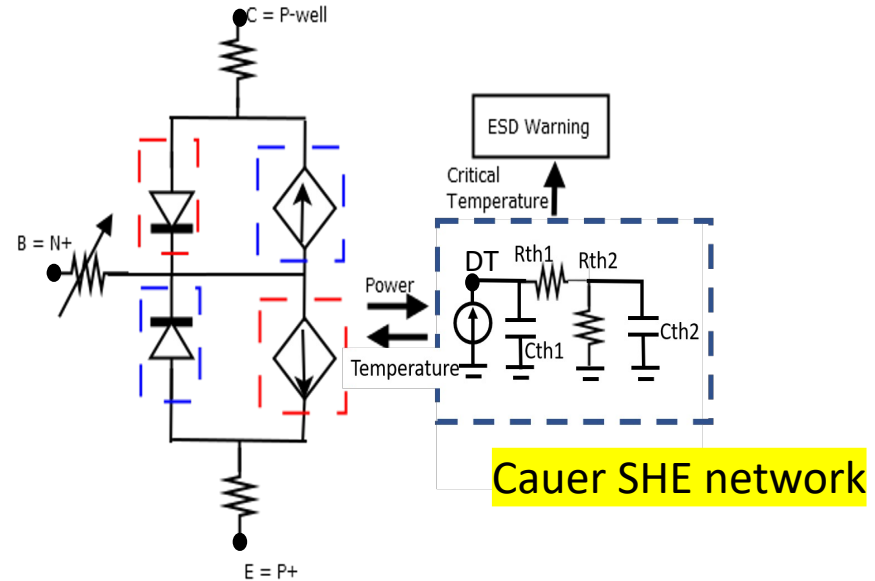
Peter M. Lee, CMC Chairman  
(presented by Colin Shaw (SILVACO))

# Notable Highlights

- First face-to-face quarterly meeting in three years occurred with our 2022Q4 quarterly meeting in the San Jose area in December, 2022
- New standard was created for the ESD Diode device and the first official standard model was released on December 8, 2022.
- 10 new versions of existing standard models were released.
- Four versions of the Verilog-A linter program were released.
- Phase 1 of the standardization process continuing for the following:
  - SiC Standard Model: Three model candidates.
  - RTN Standard Model: Two model candidates.
- Two new work groups were formed to investigate the need for standardization for (1) the memristor device; and (2) self-heating
- New CEO and team members from Si2 are supporting the CMC.
- CMC currently has 32 members, and is responsible for 20 official worldwide standards.

# ESD Model Related

- New standard was created for the ESD Diode device, and after completing the four-phase standardization process, the first official model, the ASM-ESD Diode Model developed by Macquarie University, was announced on Dec. 8, 2022.



# Standard Releases

## • 10 Standard Model Releases in 2023

• L-UTSOI	102.7.0	January 6	SOI MOSFET	CEA-Leti
• HiSIM_HV	2.5.1	February 17	HV MOSFET	Hiroshima Univ.
• MVSG_CMC	3.2.0	April 20	GaN FET	Univ. of Waterloo
• ASM-HEMT	101.4.0	May 2	GaN FET	MacQuarie Univ.
• Mextram	505.4.0	May 11	Bipolar	Auburn Univ.
• R2_CMC	1.0.2	June 16	Resistor	CMC
• R3_CMC	1.1.2	June 16	Resistor	CMC
• HICUM_L0	2.1.0	August 15	Bipolar	ADM Enterprises
• PSP	104.0.0	September 11	MOSFET	CEA-Leti
• BSIM-SOI	100.1.0	October 17	SOI MOSFET	UC Berkeley

# Verilog Linter

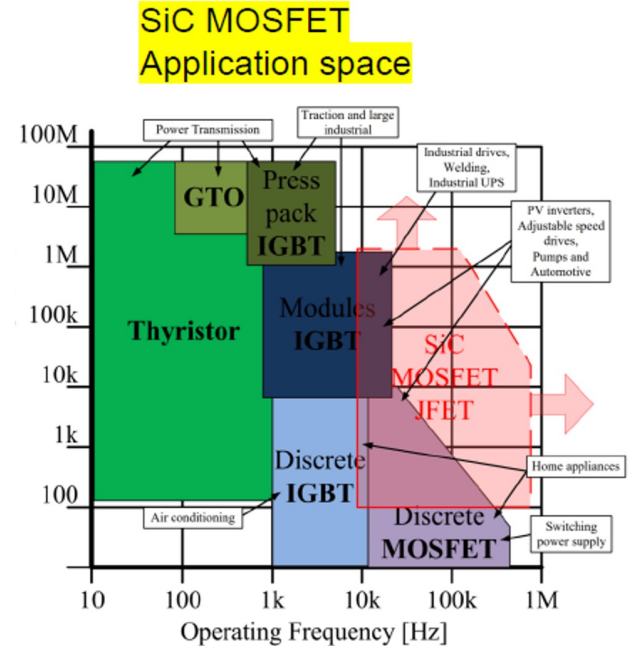
Developer: Geoffrey Coram (Analog Devices)

- Four versions of the VAMPyRE Verilog-A linter program were released.
  - Version 1.9.0      March 14, 2023
  - Version 1.9.1      August 3, 2023
  - Version 1.9.2      September 6, 2023
  - Version 1.9.3      December 5, 2023
- Continuous improvements to incorporate newly approved standards and new checks.
- Now available under Git.

# SiC Phase 1 Evaluations

Work Group Chair: Colin Shaw (Silvaco)

- SiC now has three candidate models from the following model developer organizations:
  - MacQuarie University
  - University of Arkansas
  - India Institute of Technology, Kanpur
- Model code from two developers are now with the CMC for review and evaluation.
- SiC device measurement data to serve as a golden benchmark to evaluate the models are also now available.



(Figure courtesy of MacQuarie University)

# RTN Phase 1 Evaluations

Work Group Chair: Colin Shaw (Silvaco)

- The CMC now has two candidate models for their inspection and evaluation.
  - Peking University
  - IMEC
- Model code from the two developers are now with the CMC for review and evaluation.
- RTN device measurement data to serve as a golden benchmark to evaluate the models is also now available (2 sets).

# Memristor for Memory – **New Work Group**

Work Group Chair: Colin Shaw (Silvaco)

- Presented proposal for Memristor device in ReRAM, OxRAM etc., at the 2023Q4 meeting.
- Many manufacturers and developers interested in this restricted application of Memristor devices being currently fabricated in circuits.  
( Memristors can be used in such a wide set of applications with very different properties)
- Currently working on gathering scope and device data to formulate a requirement for a standard model.



# Self-Heating Model – **New Work Group**

Work Group Chair: Richard Wachnik (IBM)

- Presented proposal to investigate the need to standardize modeling of self heating at the 2023Q4 meeting.
- Group has been formed to study the scope of such a standard, and what features would be desirable.

# Si2 Change in Management

- There has been a change in management at Si2, with the joining of a new CEO, Robert Aslett. Two new staff have also been hired to support the CMC.

Area of Responsibility	Lead
CEO	Robert Aslett
VP Technology: Si2/CMC Management Synchronization	Leigh Anne Clevenger ( <a href="mailto:leighanne.clevenger@si2.org">leighanne.clevenger@si2.org</a> )
Executive Technical Assistant: Model and application release management and QA	Marc Rose ( <a href="mailto:marc.rose@si2.org">marc.rose@si2.org</a> )
Member Relations: Member onboarding, CMC events, member access control	Alan LaRotonda ( <a href="mailto:alan.larotonda@si2.org">alan.larotonda@si2.org</a> )

