TECHCONNECT

ARIZONA'S TECHNOLOGY MAGAZINE

FALL 2021

THE SEMICONDUCTOR ISSUE

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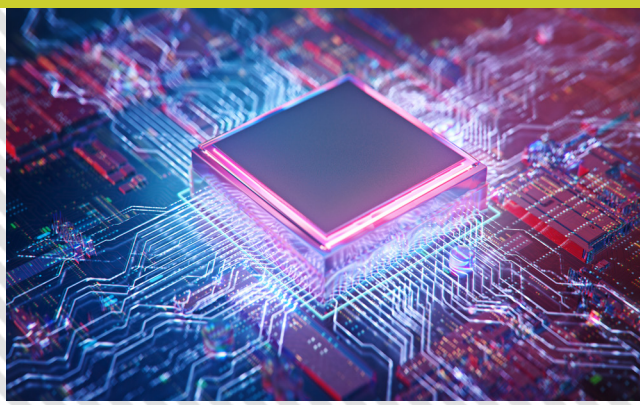
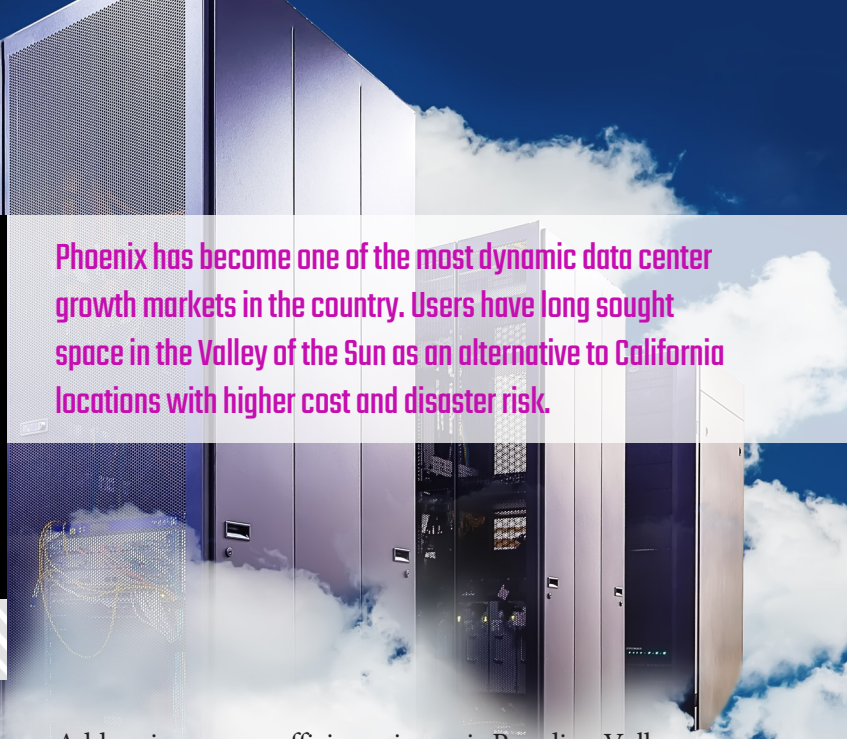


ENERGETIC IDEA

Power semiconductors are critical to data center efficiency

BY RAYMOND WILEY



Phoenix has become one of the most dynamic data center growth markets in the country. Users have long sought space in the Valley of the Sun as an alternative to California locations with higher cost and disaster risk.

According to research from datacenterHawk, Phoenix is home to 1.97 million square feet of commissioned data center space, representing 295 megawatts of power at the end of 2020. That makes it the fifth-largest market for data center capacity in the nation.

Don't expect the ranking to stop at No. 5. In June, Microsoft opened a data center in El Mirage, with plans for at least two more facilities. In August, Facebook announced it intends to build a 960,000 square-foot data center in Arizona—the company's first here.

With this rise in data center capacity comes the rise in energy usage, making energy efficiency critical to data center operators for both controlling costs and being responsible environmental citizens. After the initial investment to build a data center, powering it is the largest operating expense. According to the U.S. Chamber of Commerce, that can range between 40% and 80% of total annual expenditures.

Classic power transistor devices capable of controlling the flow of large amounts of electric current without a significant drop in electric potential along the current path are essential in power electronics. Today's high-power switching devices are dominated by solid state transistor technologies, which include the metal-oxide-semiconductor field-effect transistor (MOSFET). For cloud computing systems, these devices are employed in almost every stage of power distribution, from AC-DC conversion through DC-DC down conversion to the point of load.

IceMOS Technology

Addressing energy efficiency issues is Paradise Valley-based IceMOS Technology Corporation, which is developing a new class of semiconductor power MOSFETs. The current IceMOS portfolio of devices meet the needs of today's data center requirement. However, as the Internet of Things IoT, autonomous vehicles and data centers continue to increase, the path to greater energy efficiency in the future is by improving the high-voltage distributed power systems for voltage and current distribution.

IceMOS made the decision to investigate a new manufacturing process that merges available silicon semiconductor fabrication technologies with other material types. The company's engineers concluded that wide bandgap materials such as silicon-carbide and diamond offered the greatest potential when combined with silicon power semiconductor technologies for both improved device performance and improved thermal performance to address the needs of the high-voltage market, which includes data centers.

The company is so uniquely positioned for making these improvements. In March IceMOS was awarded an SBIR project by NASA's Goddard Space Flight Center for its Moon to Mars campaign.

The innovation of semiconductor companies such as IceMOS will keep the Phoenix market competitive at a global scale and on the list of primary markets with the greatest number of data centers. The improvements that can be made using this merger of technologies is beneficial to the high-voltage power management in data center power supplies but also critical to charging stations for electric vehicles and many more applications. n

Raymond Wiley is general manager, Power MOSFET Business, at IceMOS Technology.