

FLASH Memories

Poznámky fy AMD

Flash memories have revolutionized the way system designers store digital control code and data. Flash memory technology offers a unique combination of features--non-volatility, in-system reprogrammability, and high density--that makes it the fastest growing IC memory type today.

AMD has developed a single-power-supply architecture for Flash memory that has received tremendous acceptance from system designers across a broad range of microprocessor-based applications such as computers, laser printers, and cellular phones. AMD incorporates this architecture into its 5.0 Volt-only Am29Fxxx family and 3.0 Volt-only Am29LVxxx family of Flash memory devices. The Am29Fxxx 5.0 Volt-only family is the current industry standard for flash architecture. The Am29LVxxx 3.0 Volt-only family provides Flash memory devices that are ideal for battery-powered system designs.

AMD is the leader in providing cost-effective Flash memory products. AMD's single-power-supply Flash memory architecture includes such highly desirable features as fast access times, sector organization, simplified program and erase algorithms, and high endurance.

AMD's proprietary Negative Gate Erase technology yields single-power-supply Flash memory devices with negligible impact on die size when compared to dual-power-supply Flash memory devices. Reducing the die size helps control manufacturing costs as demand for higher capacity Flash memory increases. Embedded Algorithms simplify program and erase operations, and provide high endurance and reliability. The Am29Fxxx and Am29LVxxx families comply with the JEDEC (Joint Electron Devices Engineering Council) pinout and software command standards for single-power-supply Flash devices.

In addition to Flash memory devices, AMD offers its C-series and D-Series Flash Memory PC cards, which provide easy interchangeability. These cards contain AMD's Flash memory devices, are PCMCIA compliant, and are ideal for a variety of personal information devices and embedded systems.

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Applications and System-Level Benefits of Flash Memory

Flash memory stores control code and data in a broad range of applications. Users can also store data files in Flash memory configured as resident Flash memory disks or PC memory cards. Some major benefits of using Flash memory to store control code include

- developing a standard hardware platform that can be customized with control code. This results in lower overall inventory levels on systems, more flexible inventory, and shorter customer lead times.
- developing a standard diagnostic code to test the system, and then loading the final control code as the last manufacturing step. This streamlines manufacturing and uses lower density devices, since the final code replaces the diagnostics used only during final test.
- prototyping products. The in-system reprogrammability of Flash memory allows the hardware and software to develop in parallel, reducing the time-to-market and improving the total design cycle time.
- enabling code upgrades in the field. Flash memory eliminates labor cost associated with replacing socketed UV EPROMs, making code updates easier and more reliable.

The Flash Memory Market

The market for Flash memory products--the fastest-growing segment of the semiconductor industry--is expected to grow rapidly for the rest of the decade. By 1999, the Flash memory market is expected to reach over \$4.7 billion, according to Dataquest. At present, control code storage applications consume the majority of Flash memory components. However, the use of Flash components in more consumer-based applications, and the use of Flash memory cards, is expected to rise sharply over the next five years. Annual revenue from Flash memory card sales is estimated to soar from approximately \$80 million in 1994 to over \$1 billion in 2000.

To accommodate increasing demand for Flash memory, AMD entered into a joint venture with Fujitsu, named FASL (Fujitsu-AMD Semiconductor Limited). The joint venture currently

manufactures Flash devices, using 0.5 micron technology, and will migrate to 0.35 and 0.25 micron design rules.

The Am29Fxxx 5.0 Volt-only Flash Memory

The Am29Fxxx family is AMD's line of 5.0 Volt-only Flash memory devices, available in densities ranging from 1 Mbit to 16 Mbits. AMD based the Am29Fxxx feature set on many suggestions from users of first generation, 12.0 Volt Flash memory devices. The table lists the key features and benefits for all of AMD's 5.0 Volt-only single-power-supply devices.

Key Features and Benefits of the Am29Fxxx 5.0 Volt-only Flash

Features	Benefits
5.0 Volt-only, single-power-supply operation	Eliminates DC/DC converter, reducing overall cost per system \$2 to \$4 Achieved through Negative Gate Erase technology, which provides cost efficient manufacturing
Sector erase architecture	Allows quick updates to segments of code
Multiple sector protect	Protects boot code from viruses Reduces cost \$2 to \$3 by eliminating need for separate boot EPROM
	Reduce customer's time-to-market

Embedded Algorithms	Simplifies program/erase software development Reduces program/erase software implementation-related failure
100,000 program/erase cycle endurance (guaranteed minimum)	Provides lowest failure rate on every program/erase cycle Provides the industry's highest reliability
Low VCC lockout, power-up in read mode only, glitch protection, and software write protection	Ensures superior inadvertent write protection
Fast access times	Increases system performance Reduces or eliminates wait states
PLCC, LCC, TSOP, and SO packages	Provides upgrade path within a product family Available in JEDEC-standard packages and pinouts

The Am29LVxxx 3.0 Volt-only Flash Memory

The Am29LVxxx family is AMD's line of 3.0 Volt-only Flash memory devices. These devices offer the advantage of single-power-supply operation, and are ideal for a wide range of battery-powered applications that use Flash memory devices. The densities available range from 2 Mbits to 8 Mbits. In addition to all the advantages of the Am29Fxxx 5.0 Volt-only single-power-supply architecture, the Am29LVxxx family offers the following features and benefits.

Key Features and Benefits of the Am29LVxxx 3.0 Volt-only Family

Features	Benefits
3.0 Volt-only, single-power-supply operation	Eliminates DC/DC converter, reducing overall cost per system \$2 to \$4 Achieved through Negative Gate Erase technology, which provides minimal die size and cost impact
2.7 Volt to 3.6 Volt extended operating range	Allows longer battery life in portable, unregulated battery-powered systems
Low read and write current, low current standby mode, and automatic sleep mode	Provides lower energy consumption and longer battery life without sacrificing read or write performance
Industry-standard architecture, including Embedded Algorithms, sector architecture, and 100,000 program/erase cycle endurance	Offers the same reliability and industry-standard features as the Am29Fxxx family

Am28Fxxx 5.0 Volt/12.0 Volt Flash Memory

AMD continues to provide the Am28Fxxx family line of first generation, 12.0 Volt Flash memory devices. These devices use 12.0 Volts to program and erase data, and 5.0 Volts to read the data. Am28Fxxx devices are bulk erase, which means that the entire memory contents of the device must be erased before reprogramming. All of the devices in the Am28Fxxx family, from 256 Kbits to 2 Mbits,

offer the option of Embedded Algorithms.

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