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A broad range of solutions

Today's digital consumer products continually demand ever more flexible, more complex and higher performance Flash memories. At the same time, there is a growing demand for cost-effective, high-quality standard products. ST's leading role in the development of technically advanced, highly competitive solutions is a result not only of the company's massive investment in R&D, but also its close relationships with many of the world's best-known consumer manufacturers. These OEMs benefit from the superb feature-set of ST's Flash portfolio, such as in-production programming, which allows ST to ship devices quickly and competitively. Manufacturers also benefit from the ability of ST Flash to be programmed in the field, offering the opportunity to update user equipment directly.

STMicroelectronics offers a wide range of Flash memories for consumer applications, such as set-top boxes, DVDs, PDAs, camcorders, digital still cameras, games and music players. These Flash products are ideal for today's market in terms of features and performance.

- **Industry Standard Flash memories**
  Featuring densities from 1 to 64Mb, with 3V and 5V single power supply or boot block 3V, single or multiple bank architecture, and access times ranging from 45 to 120ns

- **M58LWxxx family**
  Available in different versions, includes multi-bit cell solutions (M58LWxxxA/B), Industry Standard High Performance Flash memories (M58LWxxxD) and enhanced security features (M58LWxxxC) to prevent piracy in set-top box applications

- **LightFlash™ family**
  A dynamic group of products from 16 to 64Mb, with fast program/erase features, optimized for basic code storage

The ST Flash product portfolio

Industry standard Flash memories

M28Wxxx family

ST's M28W series of Flash memories offers a wide range of densities including 8 to 64Mb, with access times of 70ns and 90ns, boot block and a 3V supply, making them ideal both for code and parameter storage in a wide range of consumer and wireless applications. Manufactured with advanced 0.18μm and 0.15μm technologies, the M28Wxxx product family package options include TSOP48, TFBGA and μBGA.

Size	Reference	Description	Package
8Mb	M28X800CT	8Mb (x16), 70-90ns, top boot	TSOP48, TBGA46
	M28W800CB	8Mb (x16), 70-90ns, bottom boot	TSOP48, TBGA46
16Mb	M28W160CT	16Mb (x16), 70-90ns, top boot	TSOP48, TBGA46
	M28W160CB	16Mb (x16), 70-90ns, bottom boot	TSOP48, TBGA46
32Mb	M28W320ECT	32Mb (x16), 70-90ns, top boot	TSOP48, TFBGA47
	M28W320ECB	32Mb (x16), 70-90ns, bottom boot	TSOP48, TFBGA47
64Mb	M28W640ECT	64Mb (x16), 70-90ns, top boot	TSOP48, TFBGA48
	M28W640ECB	64Mb (x16), 70-90ns, bottom boot	TSOP48, TFBGA48

M29 families

ST's M29 series meets the needs of the most demanding designers looking for 1 to 64Mb density, with the added advantages of ease of use and reliability. The range includes the M29W series of single supply 3V devices, plus the M29F series of single supply 5V products, manufactured in 0.18μm and 0.15μm technology, offering a wide range of package options including PLCC, TSOP, SO and FBGA.

M29Wxxx, 3V, single supply

Size	Reference	Description	Package
1Mb	M29W010B	1Mb (x8), 45-70ns, uniform block	TSOP32, PLCC32
	M29W102BT	1Mb (x8), 45-70ns, top boot	TSOP40
	M29W102BB	1Mb (x8), 45-70ns, bottom boot	TSOP40
2Mb	M29W200BT	2Mb (x8/x16), 55-90ns, top boot	TSOP48, SO44
	M29W200BB	2Mb (x8/x16), 55-90ns, bottom boot	TSOP48, SO44
4Mb	M29W040B	4Mb (x8), 55-90ns, uniform block	TSOP32, PLCC32
	M29W400DT	4Mb (x8/x16), 45-70ns, top boot	TSOP48, SO44, TFBGA48
	M29W400DB	4Mb (x8/x16), 45-70ns, bottom boot	TSOP48, SO44, TFBGA48
8Mb	M29W800DT	8Mb (x8/x16), 55-70ns, top boot	TSOP48, SO44, TFBGA48
	M29W800DB	8Mb (x8/x16), 55-70ns, bottom boot	TSOP48, SO44, TFBGA48
16Mb	M29W160ET	16Mb (x8/x16), 70-90ns, top boot	TSOP48, TFBGA48
	M29W160EB	16Mb (x8/x16), 70-90ns, bottom boot	TSOP48, TFBGA48
	M29W017D	16Mb (x8), 70ns, uniform block	TSOP40, TFBGA48
32Mb	M29W320DT	32Mb (x8/x16), 70-90ns, top boot	TSOP48, TFBGA63
	M29W320DB	32Mb (x8/x16), 70-90ns, bottom boot	TSOP48, TFBGA63
64Mb	M29W641D	64Mb (x16), 70-90ns, uniform block	TSOP48
	M29W640DT	64Mb (x8/x16), 70-90ns, top boot	TSOP48, TFBGA63
	M29W640DB	64Mb (x8/x16), 70-90ns, bottom boot	TSOP48, TFBGA63

M29Fxxx family, 5V, single supply

Size	Reference	Description	Package
1Mb	M29F010B	1Mb (x8), 45-90ns, uniform block	TSOP32, PLCC32
	M29F102BB	1Mb (x16), 35-70ns, bottom boot	TSOP40, PLCC44
2Mb	M29F002BT	2Mb (x8), 45-90ns, top boot	TSOP32, PLCC32
	M29F002BB	2Mb (x8), 45-90ns, bottom boot	TSOP32, PLCC32
	M29F200BT	2Mb (x8/x16), 45-90ns, top boot	TSOP48, SO44
	M29F200BB	2Mb (x8/x16), 45-90ns, bottom boot	TSOP48, SO44
4Mb	M29F040B	4Mb (x8), 45-90ns, uniform block	TSOP32, PLCC32
	M29F400BT	4Mb (x8/x16), 45-90ns, top boot	TSOP48, SO44
	M29F400BB	4Mb (x8/x16), 45-90ns, bottom boot	TSOP48, SO44
8Mb	M29F080D	8Mb (x8), 55-70ns, uniform block	TSOP40, SO44
	M29F800DT	8Mb (x8/16), 55-70ns, top boot	TSOP48, SO44
	M29F800DB	8Mb (x8/16), 55-70ns, bottom boot	TSOP48, SO44
16Mb	M29F016D	16Mb (x8), 55-70ns, uniform block	TSOP40, SO44
	M29F032D	32Mb (x8), 70ns, uniform block	TSOP40

M29DWxxx family, 3V, single supply, multiple bank

Size	Reference	Description	Package
32Mb	M29DW323DT	32Mb (x8/x16), 70-90ns, dual banks: 8:24	TSOP48, TFBGA63
	M29DW323DB	32Mb (x8/x16), 70-90ns, dual banks: 8:24	TSOP48, TFBGA63
	M29DW324DT	32Mb (x8/x16), 70-90ns, dual banks: 16:16	TSOP48, TFBGA63
	M29DW324DB	32Mb (x8/x16), 70-90ns, dual banks: 16:16	TSOP48, TFBGA63
64Mb	M29DW640DT	64Mb (x8/x16), 70-90ns, multiple banks: 8:24:24:8	TSOP48, TFBGA63
	M29DW640DB	64Mb (x8/x16), 70-90ns, multiple banks: 8:24:24:8	TSOP48, TFBGA63

M58LWxxx families

M58LWxxx families from STMicroelectronics are available in different versions, each containing specific enhanced features.
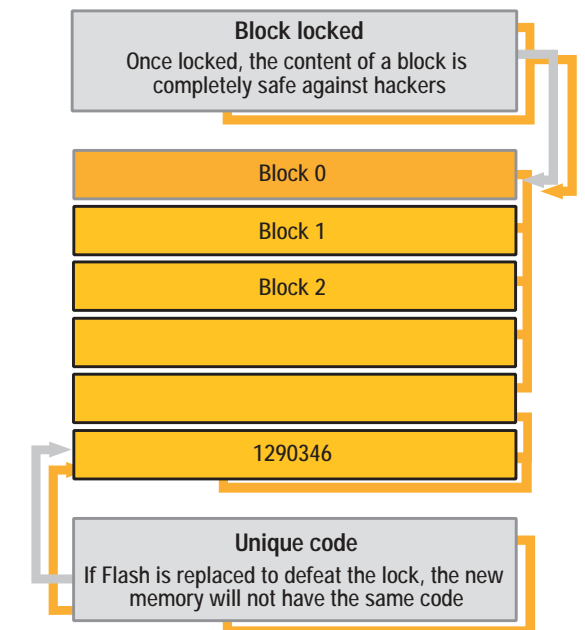
M58LWxxxC

The M58LWxxxC Flash family ranges from 32 to 64Mb. It is developed in 0.15µm process technology and has advanced features such as synchronous burst read mode at up to 56MHz and asynchronous page read mode with an access time of 110/25ns. These products are also available with enhanced security features, such as unique code, smart protection and block protection, which make them ideal for STB applications. These features, described in detail below, provide extremely sophisticated protection against hackers.

Size	Reference	Description	Package
32Mb	M58LW032C	32Mb (x16), uniform block, enhanced security, burst mode	TSOP56, TFBGA64
64Mb	M58LW064C	32Mb (x16), uniform block, enhanced security, burst mode	TSOP56, TFBGA64

Advanced security for set-top box

For consumer application providers today, system performance and efficiency is increasingly important. And, for set-top box manufacturers, security is another major concern. To prevent piracy, they need to ensure that the internal memory of the system is fully protected and, to meet this requirement, STMicroelectronics has further improved its existing family of Flash memories designed for set-top box applications. Now, as well as its advanced functionalities, the M58LWxxxC family has been specifically enhanced to increase the security and protection of applications. Unique code, smart protection, block protection/unprotection and hardware program erase enable are the key features offered. Among these, unique code and smart protection are key tools for set-top box protection against hackers.

Block locked
Once locked, the content of a block is completely safe against hackers

Block 0

Block 1

Block 2

1290346

Unique code
If Flash is replaced to defeat the lock, the new memory will not have the same code

Unique code

Each device has a 64-bit unique code which is written directly by the manufacturer in a specific OTP area and is different for every single chip. This code can be read, but not erased, by the user.

Smart protection

All devices in the M58LWxxxC family feature block protection, so that any block can be individually protected against illegal program/erase operations. This is a two-part process: the use of a block protect/unprotect command, followed by smart protection – a software command used to lock any combination of previously protected blocks. The operation is not reversible: once a block is locked, the content can't be changed. To guard against accidental implementation, a long command sequence is used. The lock status of a block is non-volatile - it is retained at power-down and restored at power-up.

How ST Flash memory increases security

The use of unique code and smart protection will help greatly to increase the security of a set-top box. Without these security features, hackers can change the content of Flash memory to get free access to the service.

However, once a block is locked with smart protection, this is impossible - their only option is to remove and replace the Flash memory. But the new memory won't have the same unique code as the original, so the service provider simply needs to compare the Flash code with the smartcard serial number. If these numbers are inconsistent with its records, service can be denied.

M58LWxxxD

The M58LWxxxD Industry Standard High Performance Flash family is available in densities from 32 to 192Mb and offers the best compromise between performance and value. The family is the ideal single solution for mainstream code execution and data storage applications. When higher densities are required, two 64Mb devices can be stacked into a single package. Products are configurable in both x8 and x16-bit mode for wide bandwidth and the memory array divides into blocks of 1Mb. Industry standard packages include TSOP56, TBGA64 and LFBGA88 for stacked solutions.

Size	Reference	Description	Package
32Mb	M58LW032D	32Mb (x8/x16), 3V, uniform block	TSOP56, TBGA64
64Mb	M58LW064D	64Mb (x8/x16), 3V, uniform block	TSOP56, TBGA64
128Mb	M30LW128D	128Mb (2xM58LW064D), 3V, uniform block	TSOP56, TBGA64, LFBGA88
192Mb	M30LW192D	192Mb (M30LW128+M58LW064D), 3V, uniform block	LFBGA88

M58LW128A/B

A 128Mb high density Flash memory family, the M58LW128A/B is built on multi-bit cell technology. ST is initially offering two versions: the M58LW128A with a 16-bit wide data bus, and the M58LW128B that can be configured with a 16 or 32-bit wide data bus. Both are organized as 128 blocks of 1Mb, allowing one device to store both code and data, therefore improving system performance and saving board space. Each block has its own security mechanism that can be used to protect boot code or data.

Size	Reference	Description	Package
128Mb	M58LW128A	128Mb (x16), 150/25ns, uniform block, burst mode	TSOP56, TBGA64, TBGA80
128Mb	M58LW128B	128Mb (x16/x32), 150/25ns uniform block, burst mode	TSOP56, TBGA64, TBGA80

LightFlash™ is a dynamic group of products particularly suited to digital consumer and peripheral devices, where high-performance combined with cost optimization are key requirements. To increase cost-effectiveness, ST has removed optional features and embedded a fast program and erase algorithm to minimize program and erase time.

Program times are on average 80% lower than that of typical standard Flash memories, a result achieved by using the multiple word program command. This programmes large streams of data at consecutive addresses, which are automatically incremented, thus reducing the number of write cycles required. In fact, the entire memory can be programmed using only one multiple word program command.

Size	Reference	Description	Package
16Mb	M29KW016E	16Mb (x16), 90ns, uniform block	TSOP48, TFBGA48, SO44
32Mb	M29KW032E	32Mb (x16), 90ns, uniform block	TSOP48, TFBGA48
64Mb	M29KW064E	64Mb (x16), 90ns, uniform block	TSOP48, TFBGA48