DESCRIPTION OF FLASH MEMORIES

■ FLASH MEMORIES

①A variety of supply voltages

[SmartVoltage]

Supply voltage can be selected automatically from following combinations;

V_{CC} = 3.3 V, V_{PP} = 3.3 V/V_{CC} = 3.3 V, V_{PP} = 5 V

V_{CC} = 3.3 V, V_{PP} = 12 V/V_{CC} = 5 V, V_{PP} = 5 V

V_{CC} = 5 V, V_{PP} = 12 V

[Smart 3 (For symmetrical block)]

Supply voltage can be selected automatically from following combinations;

V_{CC} = 3.3 V, V_{PP} = 3.3 V/V_{CC} = 3.3 V, V_{PP} = 12 V (readable at 2.7 V, programmable and erasable at 3.0 V.)

[Smart 3 (For boot block)]

Supply voltage can be selected automatically from following combinations;

V_{CC} = 3.3 V, V_{PP} = 3.3 V/V_{CC} = 3.3 V, V_{PP} = 12 V (readable, programmable and erasable at 2.7 V)

[Smart 3 (For fast programming)]

Supply voltage can be selected automatically from following combinations;

V_{CC} = 3.3 V, V_{PP} = 3.3 V/V_{CC} = 3.3 V, V_{PP} = 5 V (readable, programmable and erasable at 2.7 V)

[Smart 5 (For symmetrical block)]

Supply voltage can be selected automatically from following combinations;

V_{CC} = 5 V, V_{PP} = 5 V/V_{CC} = 5 V, V_{PP} = 12 V

②Low-voltage operation

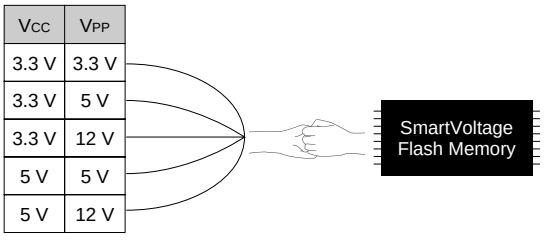
- Operable at V_{CC} = 2.7 V, V_{PP} = 2.7 V (MIN.)

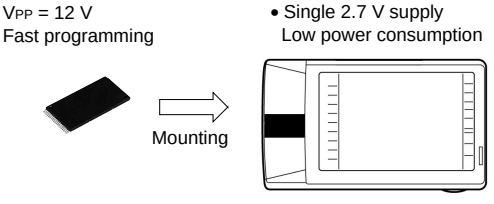
③Fast programming

- Fast programming is possible with 12 V V_{PP} rather than 3.3 V V_{PP} and 5 V V_{PP}.

④Wide application

- Covering a wide range of applications including mobile telecommunication equipment, consumer equipment, e.g. audio, and office automation equipment with its high-flexibility.





VCC \ VPP	3.3 V	5 V	12 V
3.3 V	Single 3.3 V supply Low power portable equipment	Fast programming on low power equipment	
5 V		Single 5 V supply AC powered equipment	Compatible with dual-voltage (5 V/12 V) flash memories

■ BOOT BLOCK FLASH MEMORIES

①Boot block

Optimum memory block for storing small program code and data such as boot program and parameter data.

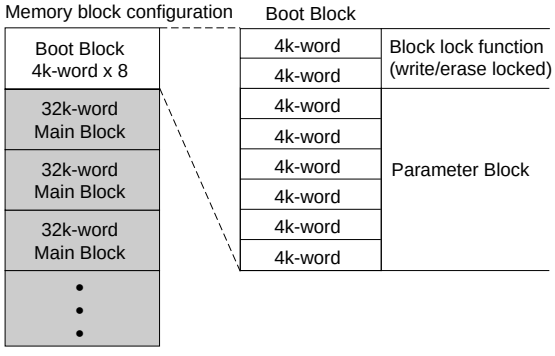
②Structure

The combination of small-sized 4k-word (or 8 k-byte) boot block with 32 k-word (or 64 k-byte) memory block facilitate the system operation.

③Features

Thanks to having 8 blocks of small capacity, user's data can be stored into flash memories instead of external E^2PROM. This architecture is also useful to store a variety of small program data.

Boot Block Flash Memories



System Configuration Example : Cellular Phone

Boot block flash memory

4k-word Boot Block	• Loading program • Management data on the production process
4k-word Boot Block	
4k-word Parameter Block	
4k-word Parameter Block	• User data
4k-word Parameter Block	• Telephone number data
4k-word Parameter Block	• Voice data
4k-word Parameter Block	• System data etc.
4k-word Parameter Block	
4k-word Parameter Block	
32k-word Main Block	• System program etc.
32k-word Main Block	
32k-word Main Block	
• • •	

■ Fast Programming Flash Memories

①Fast programming

Built-in two 32-byte page buffers

(Normal speed operation)

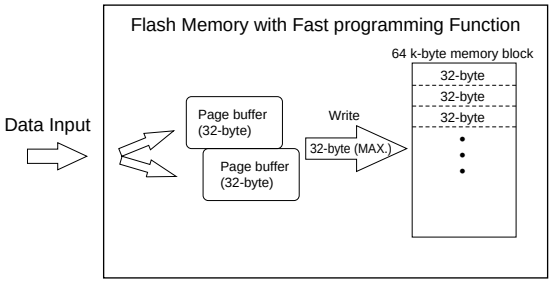
At 5 V : 9.2 µs/byte (TYP.)

At 3 V : 19.5 µs/byte (TYP.)

(High speed operation)

At 5 V : 2.0 µs/byte (TYP.)

At 3 V : 5.6 µs/byte (TYP.)



②Application products

Digital Still Cameras, Memory Cards, Personal Information Tools, Car Navigations, Printers, Network Routers

■ DUAL WORK FLASH MEMORIES

①Dual Work : Dual Work Flash Memory has two symmetrical memory banks which can be used as two flash memories in a single device. (Impossible to perform read from both banks at a time.)

②Minimizing the number of devices
Can be replaced two flash memories with a single flash memory having a code storage and a data storage function.

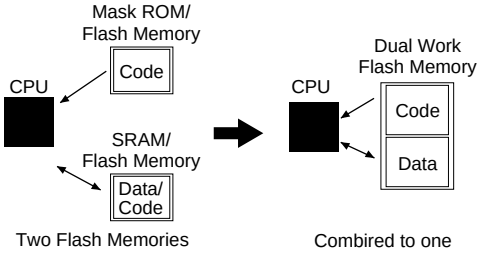
③Simultaneous operation
Read while write, read while erase operations can be executed simultaneously with both banks.

④Parallel operation
Fast write and fast erase operations can be executed separately with both banks.

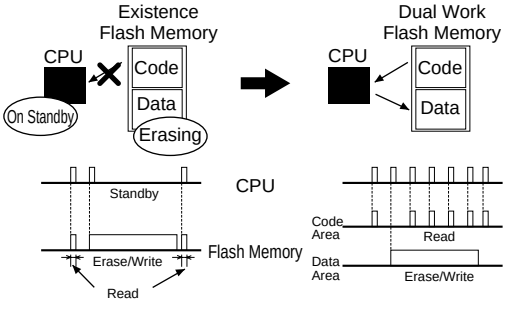
⑤Application products
(For simultaneous operation)
Cellular phones with a voice/image data and a code storage, Personal Information Tools, etc.

(For parallel operation)
Digital Still Cameras with high speed write/erase performance, Facsimiles, Set Top Box, Handy Games, etc.

<Minimizing the number of components>



<Simultaneous Operation>



<Parallel Operation>