

*Stacked MCP (Multi-Chip Package) FLASH MEMORY & SRAM*  
CMOS

# 16M (×8/×16) FLASH MEMORY & 2M (×8/×16) STATIC RAM

## MB84VD2108X-85/MB84VD2109X-85

### ■ FEATURES

- Power supply voltage of 2.7 to 3.6 V
- High performance  
85 ns maximum access time
- Operating Temperature  
–25 to +85 °C
- Package 61-ball FBGA, 56-pin TSOP(I)

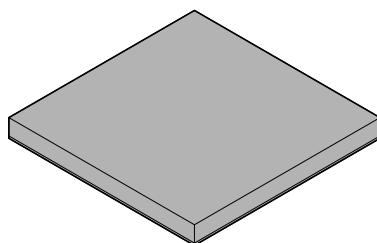
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### ■ PRODUCT LINE UP

|                                       |                                                                   | Flash Memory                  | SRAM |
|---------------------------------------|-------------------------------------------------------------------|-------------------------------|------|
| Ordering Part No.                     | $V_{CCf}, V_{CCS} = 3.0\text{ V}^{+0.6\text{ V}}_{-0.3\text{ V}}$ | MB84VD2108X-85/MB84VD2109X-85 |      |
| Max. Address Access Time (ns)         |                                                                   | 85                            | 85   |
| Max. $\overline{CE}$ Access Time (ns) |                                                                   | 85                            | 85   |
| Max. $\overline{OE}$ Access Time (ns) |                                                                   | 35                            | 45   |

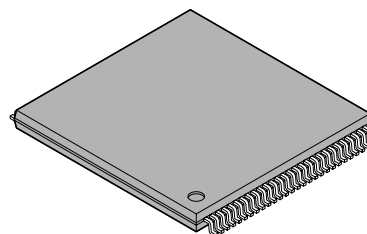
### ■ PACKAGES

61-ball plastic FBGA



(BGA-61P-M02)

56-pin plastic TSOP(I)



(FPT-56P-M04)

# MB84VD2108X-85/MB84VD2109X-85

(Continued)

## 1. FLASH MEMORY

- **Simultaneous Read/Write operations (dual bank)**  
Multiple devices available with different bank sizes  
Host system can program or erase in one bank, then immediately and simultaneously read from the other bank  
Zero latency between read and write operations  
Read-while-erase  
Read-while-program
- **Minimum 100,000 write/erase cycles**
- **Sector erase architecture**  
Eight 4 K words and thirty one 32 K words.  
Any combination of sectors can be concurrently erased. Also supports full chip erase.
- **Boot Code Sector Architecture**  
MB84VD2108X : Top sector  
MB84VD2109X : Bottom sector
- **Embedded Erase™\* Algorithms**  
Automatically pre-programs and erases the chip or any sector
- **Embedded Program™\* Algorithms**  
Automatically writes and verifies data at specified address
- **Data Polling and Toggle Bit feature for detection of program or erase cycle completion**
- **Ready-Busy output (RY/BY)**  
Hardware method for detection of program or erase cycle completion
- **Automatic sleep mode**  
When addresses remain stable, automatically switch themselves to low power mode.
- **Low V<sub>ccf</sub> write inhibit ≤ 2.5 V**
- **Hidden ROM (Hi-ROM) region**  
64K byte of Hi-ROM, accessible through a new “Hi-ROM Enable” command sequence  
Factory serialized and protected to provide a secure electronic serial number (ESN)
- **WPI/ACC input pin**  
At V<sub>IL</sub>, allows protection of boot sectors, regardless of sector protection/unprotection status  
(MB84VD2108X : SA37, SA38 MB84VD2109X : SA0, SA1)  
At V<sub>IH</sub>, allows removal of boot sector protection  
At V<sub>ACC</sub>, program time will reduce by 40%.
- **Erase Suspend/Resume**  
Suspends the erase operation to allow a read in another sector within the same device
- **Please refer to “MBM29DL16XTD/BD” data sheet in detailed function**

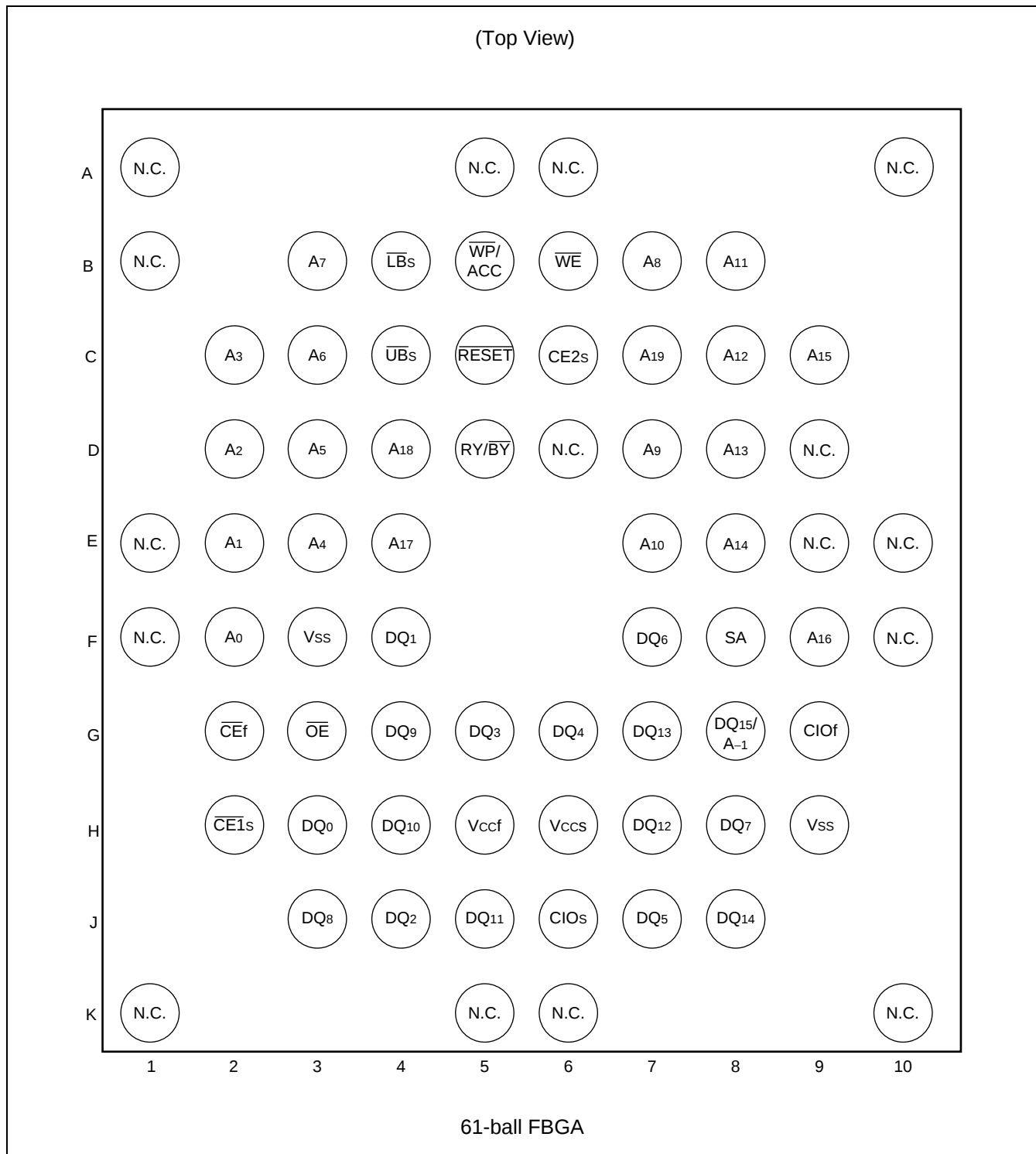
## 2. SRAM

- **Power dissipation**  
Operating: 50 mA max.  
Standby: 7 μA max.
- **Power down features using  $\overline{CE1s}$  and  $CE2s$**
- **Data retention supply voltage : 1.5 V to 3.6 V**
- **$\overline{CE1s}$  and  $CE2s$  Chip Select**
- **Byte data control :  $\overline{LBs}$  (DQ<sub>0</sub> to DQ<sub>7</sub>) ,  $\overline{UBs}$  (DQ<sub>8</sub> to DQ<sub>15</sub>)**

\* : Embedded Erase™ and Embedded Program™ are trademarks of Advanced Micro Devices, Inc.

# MB84VD2108X-85/MB84VD2109X-85

## PIN ASSIGNMENTS



# MB84VD2108X-85/MB84VD2109X-85

(Top View)

|                            |    |    |                          |
|----------------------------|----|----|--------------------------|
| N.C.                       | 1  | 56 | A16                      |
| A15                        | 2  | 55 | CIO <sub>f</sub>         |
| A14                        | 3  | 54 | V <sub>SS</sub>          |
| A13                        | 4  | 53 | SA                       |
| A12                        | 5  | 52 | DQ <sub>15/A-1</sub>     |
| A11                        | 6  | 51 | DQ <sub>7</sub>          |
| A10                        | 7  | 50 | DQ <sub>14</sub>         |
| A9                         | 8  | 49 | DQ <sub>6</sub>          |
| A8                         | 9  | 48 | DQ <sub>13</sub>         |
| A19                        | 10 | 47 | DQ <sub>5</sub>          |
| N.C.                       | 11 | 46 | DQ <sub>12</sub>         |
| $\overline{\text{WE}}$     | 12 | 45 | DQ <sub>4</sub>          |
| CE2 <sub>s</sub>           | 13 | 44 | CIO <sub>s</sub>         |
| $\overline{\text{RESET}}$  | 14 | 43 | V <sub>CCS</sub>         |
| $\overline{\text{WP/ACC}}$ | 15 | 42 | V <sub>CCf</sub>         |
| RY/ $\overline{\text{BY}}$ | 16 | 41 | DQ <sub>11</sub>         |
| $\overline{\text{UBs}}$    | 17 | 40 | DQ <sub>3</sub>          |
| $\overline{\text{LBs}}$    | 18 | 39 | DQ <sub>10</sub>         |
| A18                        | 19 | 38 | DQ <sub>2</sub>          |
| A17                        | 20 | 37 | DQ <sub>9</sub>          |
| A7                         | 21 | 36 | DQ <sub>1</sub>          |
| A6                         | 22 | 35 | DQ <sub>8</sub>          |
| A5                         | 23 | 34 | DQ <sub>0</sub>          |
| A4                         | 24 | 33 | $\overline{\text{OE}}$   |
| A3                         | 25 | 32 | V <sub>SS</sub>          |
| A2                         | 26 | 31 | $\overline{\text{CE1s}}$ |
| A1                         | 27 | 30 | $\overline{\text{CEf}}$  |
| N.C.                       | 28 | 29 | A <sub>0</sub>           |

56-pin TSOP (I)

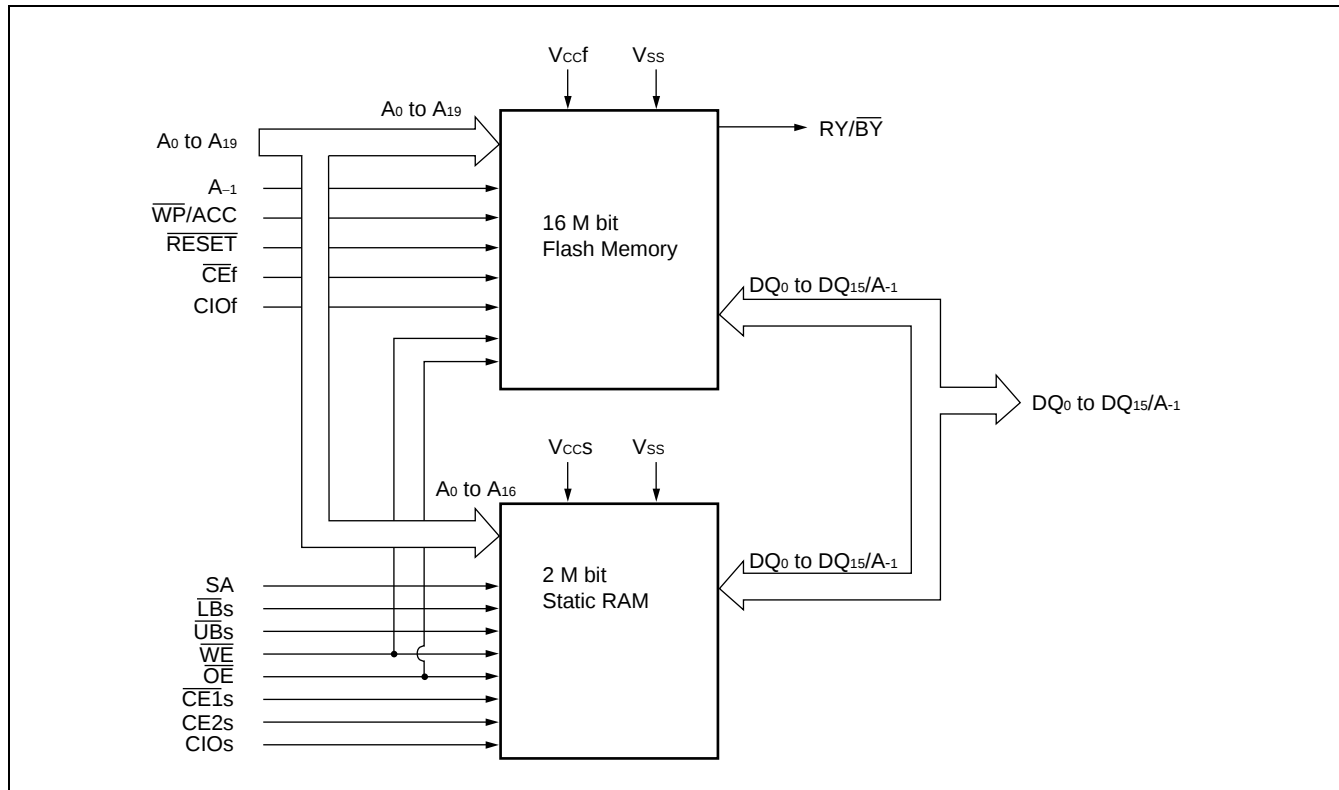
# MB84VD2108X-85/MB84VD2109X-85

## ■ PIN DESCRIPTION

| Pin                                                  | Function                                                                                                                                  | Input/Output |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| A <sub>0</sub> to A <sub>16</sub>                    | Address Inputs (Common)                                                                                                                   | I            |
| A <sub>-1</sub> , A <sub>17</sub> to A <sub>19</sub> | Address Input (Flash)                                                                                                                     | I            |
| SA                                                   | Address Input (SRAM)                                                                                                                      | I            |
| DQ <sub>0</sub> to DQ <sub>15</sub>                  | Data Inputs/Outputs (Common)                                                                                                              | I/O          |
| $\overline{\text{CE}}_{\text{f}}$                    | Chip Enable (Flash)                                                                                                                       | I            |
| $\overline{\text{CE}}_{1\text{s}}$                   | Chip Enable (SRAM)                                                                                                                        | I            |
| CE <sub>2s</sub>                                     | Chip Enable (SRAM)                                                                                                                        | I            |
| $\overline{\text{OE}}$                               | Output Enable (Common)                                                                                                                    | I            |
| $\overline{\text{WE}}$                               | Write Enable (Common)                                                                                                                     | I            |
| RY/ $\overline{\text{BY}}$                           | Ready/Busy Outputs (Flash) Open Drain Output                                                                                              | O            |
| $\overline{\text{UB}}_{\text{s}}$                    | Upper Byte Control (SRAM)                                                                                                                 | I            |
| $\overline{\text{LB}}_{\text{s}}$                    | Lower Byte Control (SRAM)                                                                                                                 | I            |
| CIO <sub>f</sub>                                     | I/O Configuration (Flash)<br>CIO <sub>f</sub> = V <sub>IH</sub> is Word mode (×16) , CIO <sub>f</sub> = V <sub>IL</sub> is Byte mode (×8) | I            |
| CIO <sub>s</sub>                                     | I/O Configuration (SRAM)<br>CIO <sub>s</sub> = V <sub>IH</sub> is Word mode (×16) , CIO <sub>s</sub> = V <sub>IL</sub> is Byte mode (×8)  | I            |
| $\overline{\text{RESET}}$                            | Hardware Reset Pin/Sector Protection Unlock (Flash)                                                                                       | I            |
| $\overline{\text{WP}}/\text{ACC}$                    | Write Protect/Acceleration (Flash)                                                                                                        | I            |
| N.C.                                                 | No Internal Connection                                                                                                                    | —            |
| V <sub>SS</sub>                                      | Device Ground (Common)                                                                                                                    | Power        |
| V <sub>CCf</sub>                                     | Device Power Supply (Flash)                                                                                                               | Power        |
| V <sub>CCS</sub>                                     | Device Power Supply (SRAM)                                                                                                                | Power        |

# MB84VD2108X-85/MB84VD2109X-85

## ■ BLOCK DIAGRAM



# MB84VD2108X-85/MB84VD2109X-85

## ■ DEVICE BUS OPERATIONS

Table 2.1 User Bus Operations (Flash = Word mode; CIO<sub>f</sub> = V<sub>ccf</sub>, SRAM = Word mode; CIO<sub>s</sub> = V<sub>ccs</sub>)

| Operation<br>(Note1, 3)                            | $\overline{CE}_f$ | $\overline{CE}_{1s}$ | CE2s | $\overline{OE}$ | $\overline{WE}$ | SA<br>(Note 6) | $\overline{LB}_s$ | $\overline{UB}_s$ | DQ <sub>0</sub> to<br>DQ <sub>7</sub> | DQ <sub>8</sub> to<br>DQ <sub>15</sub> | $\overline{RESET}$ | $\overline{WP/ACC}$<br>(Note 5) |
|----------------------------------------------------|-------------------|----------------------|------|-----------------|-----------------|----------------|-------------------|-------------------|---------------------------------------|----------------------------------------|--------------------|---------------------------------|
| Full Standby                                       | H                 | H                    | X    | X               | X               | X              | X                 | X                 | HIGH-Z                                | HIGH-Z                                 | H                  | X                               |
|                                                    |                   | X                    | L    |                 |                 |                |                   |                   |                                       |                                        |                    |                                 |
| Output Disable                                     | H                 | L                    | H    | H               | H               | X              | X                 | X                 | HIGH-Z                                | HIGH-Z                                 | H                  | X                               |
|                                                    |                   |                      |      | X               | X               | X              | H                 | H                 | HIGH-Z                                | HIGH-Z                                 |                    |                                 |
|                                                    | L                 | H                    | X    | H               | H               | X              | X                 | X                 | HIGH-Z                                | HIGH-Z                                 |                    |                                 |
|                                                    |                   |                      |      |                 |                 |                |                   |                   |                                       |                                        |                    |                                 |
| Read from Flash<br>(Note 2)                        | L                 | H                    | X    | L               | H               | X              | X                 | X                 | D <sub>OUT</sub>                      | D <sub>OUT</sub>                       | H                  | X                               |
|                                                    |                   | X                    | L    |                 |                 |                |                   |                   |                                       |                                        |                    |                                 |
| Write to Flash                                     | L                 | H                    | X    | H               | L               | X              | X                 | X                 | D <sub>IN</sub>                       | D <sub>IN</sub>                        | H                  | X                               |
|                                                    |                   | X                    | L    |                 |                 |                |                   |                   |                                       |                                        |                    |                                 |
| Read from SRAM                                     | H                 | L                    | H    | L               | H               | X              | L                 | L                 | D <sub>OUT</sub>                      | D <sub>OUT</sub>                       | H                  | X                               |
|                                                    |                   |                      |      |                 |                 |                | H                 | L                 | HIGH-Z                                | D <sub>OUT</sub>                       |                    |                                 |
|                                                    |                   |                      |      |                 |                 |                | L                 | H                 | D <sub>OUT</sub>                      | HIGH-Z                                 |                    |                                 |
| Write to SRAM                                      | H                 | L                    | H    | X               | L               | X              | L                 | L                 | D <sub>IN</sub>                       | D <sub>IN</sub>                        | H                  | X                               |
|                                                    |                   |                      |      |                 |                 |                | H                 | L                 | HIGH-Z                                | D <sub>IN</sub>                        |                    |                                 |
|                                                    |                   |                      |      |                 |                 |                | L                 | H                 | D <sub>IN</sub>                       | HIGH-Z                                 |                    |                                 |
| Temporary Sector<br>Group Unprotection<br>(Note 4) | X                 | X                    | X    | X               | X               | X              | X                 | X                 | X                                     | X                                      | V <sub>ID</sub>    | X                               |
| Flash Hardware Reset                               | X                 | H                    | X    | X               | X               | X              | X                 | X                 | HIGH-Z                                | HIGH-Z                                 | L                  | X                               |
|                                                    |                   | X                    | L    |                 |                 |                |                   |                   |                                       |                                        |                    |                                 |
| Boot Block Sector<br>Write Protection              | X                 | X                    | X    | X               | X               | X              | X                 | X                 | X                                     | X                                      | X                  | L                               |

Legend : L = V<sub>IL</sub>, H = V<sub>IH</sub>, X = V<sub>IL</sub> or V<sub>IH</sub>, See "ELECTRICAL CHARACTERISTICS 1. DC Characteristics" for voltage levels.

- Notes : 1. Other operations except for indicated this column are inhibited.  
 2.  $\overline{WE}$  can be V<sub>IL</sub> if  $\overline{OE}$  is V<sub>IL</sub>,  $\overline{OE}$  at V<sub>IH</sub> initiates the write operations.  
 3. Do not apply  $\overline{CE}_f = V_{IL}$ ,  $\overline{CE}_{1s} = V_{IL}$  and  $CE_{2s} = V_{IH}$  at a time.  
 4. It is also used for the extended sector group protections.  
 5.  $\overline{WP}/ACC = V_{IL}$  ; protection of boot sectors.  
 $\overline{WP}/ACC = V_{IH}$  ; removal of boot sectors protection.  
 $\overline{WP}/ACC = V_{ACC}$  (9 V) ; Program time will reduce by 40%.  
 6. SA ; Don't care or Open.

# MB84VD2108X-85/MB84VD2109X-85

**Table 2.2 User Bus Operations (Flash = Word mode; CIO<sub>f</sub> = V<sub>ccf</sub>, SRAM = Byte mode; CIO<sub>s</sub> = V<sub>ss</sub>)**

| Operation<br>(Note 1, 3)                              | $\overline{CE}_f$ | $\overline{CE}_{1s}$ | CE2s | $\overline{OE}$ | $\overline{WE}$ | SA | $\overline{LB}_s$<br>(Note 6) | $\overline{UB}_s$<br>(Note 6) | DQ <sub>0</sub> to<br>DQ <sub>7</sub> | DQ <sub>8</sub> to<br>DQ <sub>15</sub> | $\overline{RESET}$ | $\overline{WP}/ACC$<br>(Note 5) |
|-------------------------------------------------------|-------------------|----------------------|------|-----------------|-----------------|----|-------------------------------|-------------------------------|---------------------------------------|----------------------------------------|--------------------|---------------------------------|
| Full Standby                                          | H                 | H                    | X    | X               | X               | X  | X                             | X                             | HIGH-Z                                | HIGH-Z                                 | H                  | X                               |
|                                                       |                   | X                    | L    |                 |                 |    |                               |                               |                                       |                                        |                    |                                 |
| Output Disable                                        | H                 | L                    | H    | H               | H               | X  | X                             | X                             | HIGH-Z                                | HIGH-Z                                 | H                  | X                               |
|                                                       |                   |                      |      | X               | X               | X  | X                             | X                             | HIGH-Z                                | HIGH-Z                                 |                    |                                 |
|                                                       | L                 | H                    | X    | H               | H               | X  | X                             | X                             | HIGH-Z                                | HIGH-Z                                 |                    |                                 |
|                                                       |                   |                      |      |                 |                 |    |                               |                               |                                       |                                        |                    |                                 |
| Read from Flash<br>(Note 2)                           | L                 | H                    | X    | L               | H               | X  | X                             | X                             | D <sub>OUT</sub>                      | D <sub>OUT</sub>                       | H                  | X                               |
|                                                       |                   | X                    | L    |                 |                 |    |                               |                               |                                       |                                        |                    |                                 |
| Write to Flash                                        | L                 | H                    | X    | H               | L               | X  | X                             | X                             | D <sub>IN</sub>                       | D <sub>IN</sub>                        | H                  | X                               |
|                                                       |                   | X                    | L    |                 |                 |    |                               |                               |                                       |                                        |                    |                                 |
| Read from SRAM                                        | H                 | L                    | H    | L               | H               | SA | X                             | X                             | D <sub>OUT</sub>                      | HIGH-Z                                 | H                  | X                               |
| Write to SRAM                                         | H                 | L                    | H    | X               | L               | SA | X                             | X                             | D <sub>IN</sub>                       | HIGH-Z                                 | H                  | X                               |
| Temporary<br>Sector Group<br>Unprotection<br>(Note 4) | X                 | X                    | X    | X               | X               | X  | X                             | X                             | X                                     | X                                      | V <sub>ID</sub>    | X                               |
| Flash Hardware<br>Reset                               | X                 | H                    | X    | X               | X               | X  | X                             | X                             | HIGH-Z                                | HIGH-Z                                 | L                  | X                               |
|                                                       |                   | X                    | L    |                 |                 |    |                               |                               |                                       |                                        |                    |                                 |
| Boot Block Sector<br>Write Protection                 | X                 | X                    | X    | X               | X               | X  | X                             | X                             | X                                     | X                                      | X                  | L                               |

Legend : L = V<sub>IL</sub>, H = V<sub>IH</sub>, X = V<sub>IL</sub> or V<sub>IH</sub>. See "ELECTRICAL CHARACTERISTICS 1. DC Characteristics" for voltage levels.

- Notes : 1. Other operations except for indicated this column are inhibited.  
 2.  $\overline{WE}$  can be V<sub>IL</sub> if  $\overline{OE}$  is V<sub>IL</sub>,  $\overline{OE}$  at V<sub>IH</sub> initiates the write operations.  
 3. Do not apply  $\overline{CE}_f = V_{IL}$ ,  $\overline{CE}_{1s} = V_{IL}$  and  $CE_{2s} = V_{IH}$  at a time.  
 4. It is also used for the extended sector group protections.  
 5.  $\overline{WP}/ACC = V_{IL}$  ; protection of boot sectors.  
      $\overline{WP}/ACC = V_{IH}$  ; removal of boot sectors protection.  
      $\overline{WP}/ACC = V_{ACC}$  (9 V) ; Program time will reduce by 40%.  
 6.  $\overline{LB}_s$ ,  $\overline{UB}_s$  ; Don't care or Open.

# MB84VD2108X-85/MB84VD2109X-85

**Table 2.3 User Bus Operations (Flash = Byte mode; CIO<sub>f</sub> = V<sub>SS</sub>, SRAM = Byte mode; CIO<sub>s</sub> = V<sub>SS</sub>)**

| Operation<br>(Note 1, 3)                              | $\overline{CE}_f$ | $\overline{CE}_{1s}$ | CE2s | DQ <sub>15</sub> /<br>A-1 | $\overline{OE}$ | $\overline{WE}$ | SA | $\overline{LB}s$<br>(Note 6) | $\overline{UB}s$<br>(Note 6) | DQ <sub>0</sub> to<br>DQ <sub>7</sub> | DQ <sub>8</sub> to<br>DQ <sub>14</sub> | $\overline{RESET}$ | $\overline{WP}/$<br>ACC<br>(Note 5) |
|-------------------------------------------------------|-------------------|----------------------|------|---------------------------|-----------------|-----------------|----|------------------------------|------------------------------|---------------------------------------|----------------------------------------|--------------------|-------------------------------------|
| Full Standby                                          | H                 | H                    | X    | X                         | X               | X               | X  | X                            | X                            | HIGH-Z                                | HIGH-Z                                 | H                  | X                                   |
|                                                       |                   | X                    | L    |                           |                 |                 |    |                              |                              |                                       |                                        |                    |                                     |
| Output<br>Disable                                     | H                 | L                    | H    | X                         | H               | H               | X  | X                            | X                            | HIGH-Z                                | HIGH-Z                                 | H                  | X                                   |
|                                                       |                   |                      |      | X                         | X               | X               | X  | X                            | X                            | HIGH-Z                                | HIGH-Z                                 |                    |                                     |
|                                                       | L                 | H                    | X    | A-1                       | H               | H               | X  | X                            | X                            | HIGH-Z                                | HIGH-Z                                 |                    |                                     |
|                                                       |                   | X                    | L    |                           |                 |                 |    |                              |                              |                                       |                                        |                    |                                     |
| Read from<br>Flash<br>(Note 2)                        | L                 | H                    | X    | A-1                       | L               | H               | X  | X                            | X                            | D <sub>OUT</sub>                      | X                                      | H                  | X                                   |
|                                                       |                   | X                    | L    |                           |                 |                 |    |                              |                              |                                       |                                        |                    |                                     |
| Write to<br>Flash                                     | L                 | H                    | X    | A-1                       | H               | L               | X  | X                            | X                            | D <sub>IN</sub>                       | X                                      | H                  | X                                   |
|                                                       |                   | X                    | L    |                           |                 |                 |    |                              |                              |                                       |                                        |                    |                                     |
| Read from<br>SRAM                                     | H                 | L                    | H    | X                         | L               | H               | SA | X                            | X                            | D <sub>OUT</sub>                      | HIGH-Z                                 | H                  | X                                   |
| Write to<br>SRAM                                      | H                 | L                    | H    | X                         | X               | L               | SA | X                            | X                            | D <sub>IN</sub>                       | HIGH-Z                                 | H                  | X                                   |
| Temporary<br>Sector Group<br>Unprotection<br>(Note 4) | X                 | X                    | X    | X                         | X               | X               | X  | X                            | X                            | X                                     | X                                      | V <sub>ID</sub>    | X                                   |
| Flash Hard-<br>ware Reset                             | X                 | H                    | X    | X                         | X               | X               | X  | X                            | X                            | HIGH-Z                                | HIGH-Z                                 | L                  | X                                   |
|                                                       |                   | X                    | L    |                           |                 |                 |    |                              |                              |                                       |                                        |                    |                                     |
| Boot Block<br>Sector Write<br>Protection              | X                 | X                    | X    | X                         | X               | X               | X  | X                            | X                            | X                                     | X                                      | X                  | L                                   |

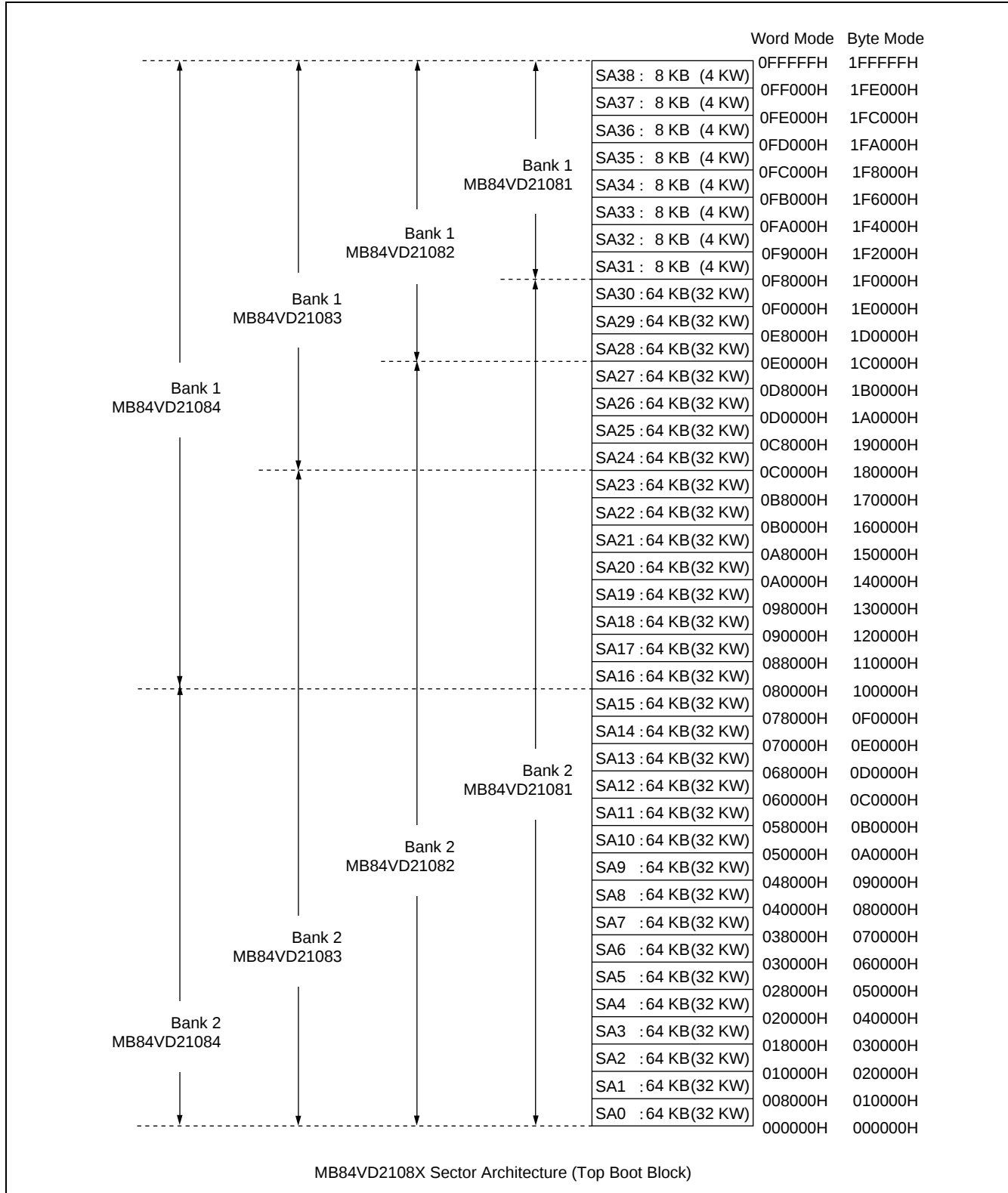
Legend : L = V<sub>IL</sub>, H = V<sub>IH</sub>, X = V<sub>IL</sub> or V<sub>IH</sub>. See "ELECTRICAL CHARACTERISTICS 1. DC Characteristics" for voltage levels.

- Notes : 1. Other operations except for indicated this column are inhibited.  
 2.  $\overline{WE}$  can be V<sub>IL</sub> if  $\overline{OE}$  is V<sub>IL</sub>,  $\overline{OE}$  at V<sub>IH</sub> initiates the write operations.  
 3. Do not apply  $\overline{CE}_f = V_{IL}$ ,  $\overline{CE}_{1s} = V_{IL}$  and  $CE_{2s} = V_{IH}$  at a time.  
 4. It is also used for the extended sector group protections.  
 5.  $\overline{WP}/ACC = V_{IL}$ ; protection of boot sectors.  
 $\overline{WP}/ACC = V_{IH}$ ; removal of boot sectors protection.  
 $\overline{WP}/ACC = V_{ACC}$  (9 V); Program time will reduce by 40%.  
 6.  $\overline{LB}_s$ ,  $\overline{UB}_s$ ; Don't care or Open.

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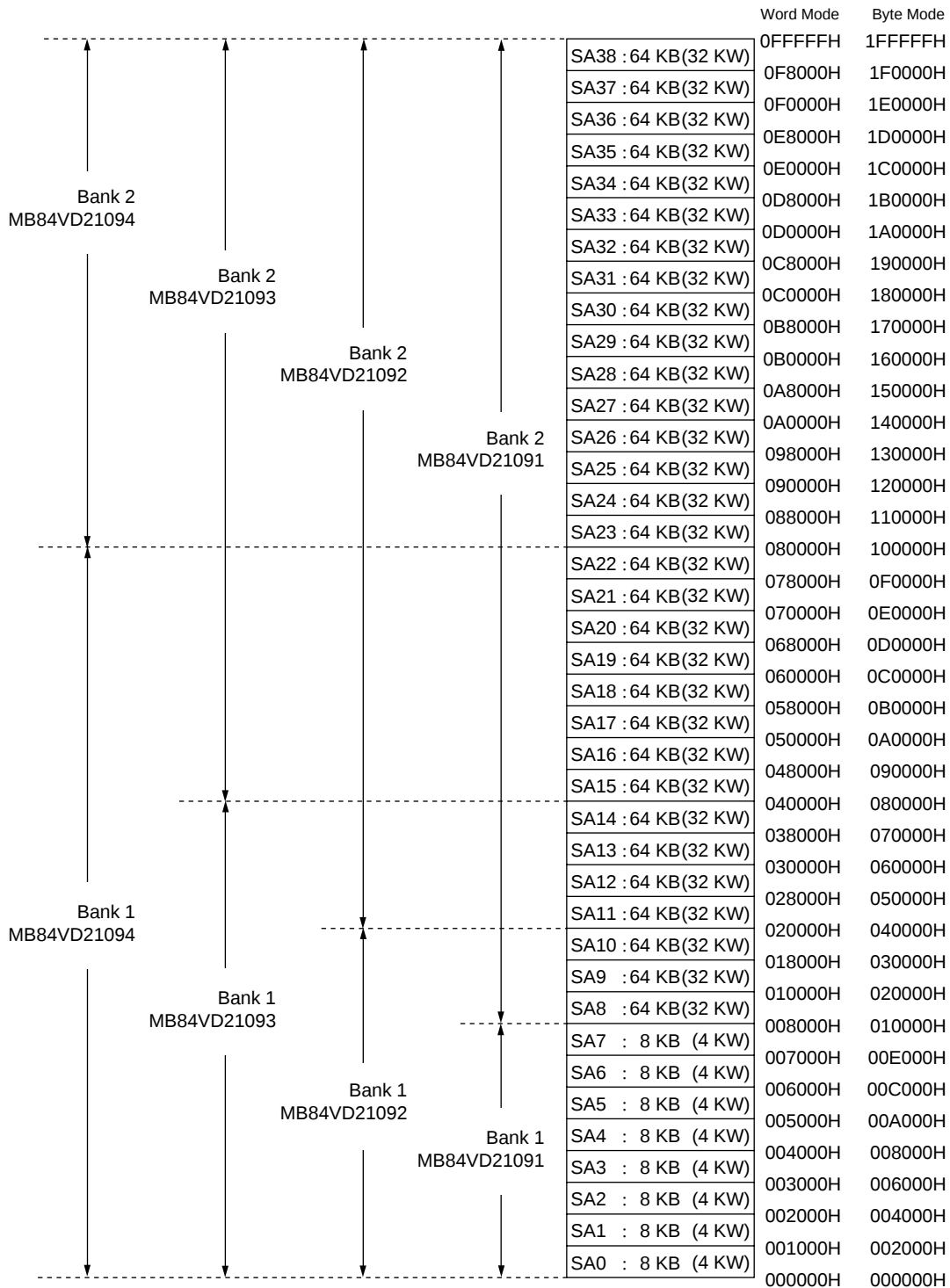
## ■ FLEXIBLE SECTOR-ERASE ARCHITECTURE on FLASH MEMORY

- Eight 4 K words, and thirty one 32 K words.
- Individual-sector, multiple-sector, or bulk-erase capability.



# MB84VD2108X-85/MB84VD2109X-85

- Eight 4 K words, and thirty one 32 K words.
- Individual-sector, multiple-sector, or bulk-erase capability.



MB84VD2109X Sector Architecture (Top Boot Block)

## MB84VD2108X-85/MB84VD2109X-85

Table 3.1 Sector Address Tables (MB84VD21081)

| Bank   | Sector | Sector Address |     |     |     |     |     |     |     | Address Range<br>(Byte mode) | Address Range<br>(Word mode) |
|--------|--------|----------------|-----|-----|-----|-----|-----|-----|-----|------------------------------|------------------------------|
|        |        | Bank Address   |     |     |     |     |     |     |     |                              |                              |
|        |        | A19            | A18 | A17 | A16 | A15 | A14 | A13 | A12 |                              |                              |
| Bank 2 | SA0    | 0              | 0   | 0   | 0   | 0   | X   | X   | X   | 000000H to 00FFFFH           | 000000H to 007FFFH           |
|        | SA1    | 0              | 0   | 0   | 0   | 1   | X   | X   | X   | 010000H to 01FFFFH           | 008000H to 00FFFFH           |
|        | SA2    | 0              | 0   | 0   | 1   | 0   | X   | X   | X   | 020000H to 02FFFFH           | 010000H to 017FFFH           |
|        | SA3    | 0              | 0   | 0   | 1   | 1   | X   | X   | X   | 030000H to 03FFFFH           | 018000H to 01FFFFH           |
|        | SA4    | 0              | 0   | 1   | 0   | 0   | X   | X   | X   | 040000H to 04FFFFH           | 020000H to 027FFFH           |
|        | SA5    | 0              | 0   | 1   | 0   | 1   | X   | X   | X   | 050000H to 05FFFFH           | 028000H to 02FFFFH           |
|        | SA6    | 0              | 0   | 1   | 1   | 0   | X   | X   | X   | 060000H to 06FFFFH           | 030000H to 037FFFH           |
|        | SA7    | 0              | 0   | 1   | 1   | 1   | X   | X   | X   | 070000H to 07FFFFH           | 038000H to 03FFFFH           |
|        | SA8    | 0              | 1   | 0   | 0   | 0   | X   | X   | X   | 080000H to 08FFFFH           | 040000H to 047FFFH           |
|        | SA9    | 0              | 1   | 0   | 0   | 1   | X   | X   | X   | 090000H to 09FFFFH           | 048000H to 04FFFFH           |
|        | SA10   | 0              | 1   | 0   | 1   | 0   | X   | X   | X   | 0A0000H to 0AFFFFH           | 050000H to 057FFFH           |
|        | SA11   | 0              | 1   | 0   | 1   | 1   | X   | X   | X   | 0B0000H to 0BFFFFH           | 058000H to 05FFFFH           |
|        | SA12   | 0              | 1   | 1   | 0   | 0   | X   | X   | X   | 0C0000H to 0CFFFFH           | 060000H to 067FFFH           |
|        | SA13   | 0              | 1   | 1   | 0   | 1   | X   | X   | X   | 0D0000H to 0DFFFFH           | 068000H to 06FFFFH           |
|        | SA14   | 0              | 1   | 1   | 1   | 0   | X   | X   | X   | 0E0000H to 0EFFFFH           | 070000H to 077FFFH           |
|        | SA15   | 0              | 1   | 1   | 1   | 1   | X   | X   | X   | 0F0000H to 0FFFFFH           | 078000H to 07FFFFH           |
|        | SA16   | 1              | 0   | 0   | 0   | 0   | X   | X   | X   | 100000H to 10FFFFH           | 080000H to 087FFFH           |
|        | SA17   | 1              | 0   | 0   | 0   | 1   | X   | X   | X   | 110000H to 11FFFFH           | 088000H to 08FFFFH           |
|        | SA18   | 1              | 0   | 0   | 1   | 0   | X   | X   | X   | 120000H to 12FFFFH           | 090000H to 097FFFH           |
|        | SA19   | 1              | 0   | 0   | 1   | 1   | X   | X   | X   | 130000H to 13FFFFH           | 098000H to 09FFFFH           |
|        | SA20   | 1              | 0   | 1   | 0   | 0   | X   | X   | X   | 140000H to 14FFFFH           | 0A0000H to 0A7FFFH           |
|        | SA21   | 1              | 0   | 1   | 0   | 1   | X   | X   | X   | 150000H to 15FFFFH           | 0A8000H to 0AFFFFH           |
|        | SA22   | 1              | 0   | 1   | 1   | 0   | X   | X   | X   | 160000H to 16FFFFH           | 0B0000H to 0B7FFFH           |
|        | SA23   | 1              | 0   | 1   | 1   | 1   | X   | X   | X   | 170000H to 17FFFFH           | 0B8000H to 0BFFFFH           |
|        | SA24   | 1              | 1   | 0   | 0   | 0   | X   | X   | X   | 180000H to 18FFFFH           | 0C0000H to 0C7FFFH           |
|        | SA25   | 1              | 1   | 0   | 0   | 1   | X   | X   | X   | 190000H to 19FFFFH           | 0C8000H to 0CFFFFH           |
|        | SA26   | 1              | 1   | 0   | 1   | 0   | X   | X   | X   | 1A0000H to 1AFFFFH           | 0D0000H to 0D7FFFH           |
|        | SA27   | 1              | 1   | 0   | 1   | 1   | X   | X   | X   | 1B0000H to 1BFFFFH           | 0D8000H to 0DFFFFH           |
|        | SA28   | 1              | 1   | 1   | 0   | 0   | X   | X   | X   | 1C0000H to 1CFFFFH           | 0E0000H to 0E7FFFH           |
|        | SA29   | 1              | 1   | 1   | 0   | 1   | X   | X   | X   | 1D0000H to 1DFFFFH           | 0E8000H to 0EFFFFH           |
|        | SA30   | 1              | 1   | 1   | 1   | 0   | X   | X   | X   | 1E0000H to 1EFFFFH           | 0F0000H to 0F7FFFH           |
| Bank 1 | SA31   | 1              | 1   | 1   | 1   | 1   | 0   | 0   | 0   | 1F0000H to 1F1FFFH           | 0F8000H to 0F8FFFH           |
|        | SA32   | 1              | 1   | 1   | 1   | 1   | 0   | 0   | 1   | 1F2000H to 1F3FFFH           | 0F9000H to 0F9FFFH           |
|        | SA33   | 1              | 1   | 1   | 1   | 1   | 0   | 1   | 0   | 1F4000H to 1F5FFFH           | 0FA000H to 0FAFFFH           |
|        | SA34   | 1              | 1   | 1   | 1   | 1   | 0   | 1   | 1   | 1F6000H to 1F7FFFH           | 0FB000H to 0FBFFFH           |
|        | SA35   | 1              | 1   | 1   | 1   | 1   | 1   | 0   | 0   | 1F8000H to 1F9FFFH           | 0FC000H to 0FCFFFH           |
|        | SA36   | 1              | 1   | 1   | 1   | 1   | 1   | 0   | 1   | 1FA000H to 1FBFFFH           | 0FD000H to 0FDFFFH           |
|        | SA37   | 1              | 1   | 1   | 1   | 1   | 1   | 1   | 0   | 1FC000H to 1FDFFFH           | 0FE000H to 0FEFFFH           |
|        | SA38   | 1              | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1FE000H to 1FFFFFH           | 0FF000H to 0FFFFFH           |

# MB84VD2108X-85/MB84VD2109X-85

Table 3.2 Sector Address Tables (MB84VD21091)

| Bank   | Sector | Sector Address  |                 |                 |                 |                 |                 |                 |                     | Address Range<br>(BYTE mode) | Address Range<br>(WORD mode) |
|--------|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------------------|------------------------------|------------------------------|
|        |        | Bank Address    |                 |                 |                 |                 |                 |                 |                     |                              |                              |
|        |        | A <sub>19</sub> | A <sub>18</sub> | A <sub>17</sub> | A <sub>16</sub> | A <sub>15</sub> | A <sub>14</sub> | A <sub>13</sub> | A <sub>12</sub>     |                              |                              |
| Bank 1 | SA0    | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 0                   | 000000H to 001FFFFH          | 000000H to 000FFFFH          |
|        | SA1    | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 1                   | 002000H to 003FFFFH          | 001000H to 001FFFFH          |
|        | SA2    | 0               | 0               | 0               | 0               | 0               | 0               | 1               | 0                   | 004000H to 005FFFFH          | 002000H to 002FFFFH          |
|        | SA3    | 0               | 0               | 0               | 0               | 0               | 0               | 1               | 1                   | 006000H to 007FFFFH          | 003000H to 003FFFFH          |
|        | SA4    | 0               | 0               | 0               | 0               | 0               | 1               | 0               | 0                   | 008000H to 009FFFFH          | 004000H to 004FFFFH          |
|        | SA5    | 0               | 0               | 0               | 0               | 0               | 1               | 0               | 1                   | 00A000H to 00BFFFFH          | 005000H to 005FFFFH          |
|        | SA6    | 0               | 0               | 0               | 0               | 0               | 1               | 1               | 0                   | 00C000H to 00DFFFFH          | 006000H to 006FFFFH          |
|        | SA7    | 0               | 0               | 0               | 0               | 0               | 1               | 1               | 1                   | 00E000H to 00FFFFFFH         | 007000H to 007FFFFH          |
| Bank 2 | SA8    | 0               | 0               | 0               | 0               | 1               | X               | X               | X                   | 010000H to 01FFFFFFH         | 008000H to 00FFFFFFH         |
|        | SA9    | 0               | 0               | 0               | 1               | 0               | X               | X               | X                   | 020000H to 02FFFFFFH         | 010000H to 017FFFFH          |
|        | SA10   | 0               | 0               | 0               | 1               | 1               | X               | X               | X                   | 030000H to 03FFFFFFH         | 018000H to 01FFFFFFH         |
|        | SA11   | 0               | 0               | 1               | 0               | 0               | X               | X               | X                   | 040000H to 04FFFFFFH         | 020000H to 027FFFFH          |
|        | SA12   | 0               | 0               | 1               | 0               | 1               | X               | X               | X                   | 050000H to 05FFFFFFH         | 028000H to 02FFFFFFH         |
|        | SA13   | 0               | 0               | 1               | 1               | 0               | X               | X               | X                   | 060000H to 06FFFFFFH         | 030000H to 037FFFFH          |
|        | SA14   | 0               | 0               | 1               | 1               | 1               | X               | X               | X                   | 070000H to 07FFFFFFH         | 038000H to 03FFFFFFH         |
|        | SA15   | 0               | 1               | 0               | 0               | 0               | X               | X               | X                   | 080000H to 08FFFFFFH         | 040000H to 047FFFFH          |
|        | SA16   | 0               | 1               | 0               | 0               | 1               | X               | X               | X                   | 090000H to 09FFFFFFH         | 048000H to 04FFFFFFH         |
|        | SA17   | 0               | 1               | 0               | 1               | 0               | X               | X               | X                   | 0A0000H to 0AFFFFFFH         | 050000H to 057FFFFH          |
|        | SA18   | 0               | 1               | 0               | 1               | 1               | X               | X               | X                   | 0B0000H to 0BFFFFFFH         | 058000H to 05FFFFFFH         |
|        | SA19   | 0               | 1               | 1               | 0               | 0               | X               | X               | X                   | 0C0000H to 0CFFFFFFH         | 060000H to 067FFFFH          |
|        | SA20   | 0               | 1               | 1               | 0               | 1               | X               | X               | X                   | 0D0000H to 0DFFFFFFH         | 068000H to 06FFFFFFH         |
|        | SA21   | 0               | 1               | 1               | 1               | 0               | X               | X               | X                   | 0E0000H to 0EFFFFFFH         | 070000H to 077FFFFH          |
|        | SA22   | 0               | 1               | 1               | 1               | 1               | X               | X               | X                   | 0F0000H to 0FFFFFFH          | 078000H to 07FFFFFFH         |
|        | SA23   | 1               | 0               | 0               | 0               | 0               | X               | X               | X                   | 100000H to 10FFFFFFH         | 080000H to 087FFFFH          |
|        | SA24   | 1               | 0               | 0               | 0               | 1               | X               | X               | X                   | 110000H to 11FFFFFFH         | 088000H to 08FFFFFFH         |
|        | SA25   | 1               | 0               | 0               | 1               | 0               | X               | X               | X                   | 120000H to 12FFFFFFH         | 090000H to 097FFFFH          |
|        | SA26   | 1               | 0               | 0               | 1               | 1               | X               | X               | X                   | 130000H to 13FFFFFFH         | 098000H to 09FFFFFFH         |
|        | SA27   | 1               | 0               | 1               | 0               | 0               | X               | X               | X                   | 140000H to 14FFFFFFH         | 0A0000H to 0A7FFFFH          |
|        | SA28   | 1               | 0               | 1               | 0               | 1               | X               | X               | X                   | 150000H to 15FFFFFFH         | 0A8000H to 0AFFFFFFH         |
|        | SA29   | 1               | 0               | 1               | 1               | 0               | X               | X               | X                   | 160000H to 16FFFFFFH         | 0B0000H to 0B7FFFFH          |
|        | SA30   | 1               | 0               | 1               | 1               | 1               | X               | X               | X                   | 170000H to 17FFFFFFH         | 0B8000H to 0BFFFFFFH         |
|        | SA31   | 1               | 1               | 0               | 0               | 0               | X               | X               | X                   | 180000H to 18FFFFFFH         | 0C0000H to 0C7FFFFH          |
|        | SA32   | 1               | 1               | 0               | 0               | 1               | X               | X               | X                   | 190000H to 19FFFFFFH         | 0C8000H to 0CFFFFFFH         |
|        | SA33   | 1               | 1               | 0               | 1               | 0               | X               | X               | X                   | 1A0000H to 1AFFFFFFH         | 0D0000H to 0D7FFFFH          |
|        | SA34   | 1               | 1               | 0               | 1               | 1               | X               | X               | X                   | 1B0000H to 1BFFFFFFH         | 0D8000H to 0DFFFFFFH         |
|        | SA35   | 1               | 1               | 1               | 0               | 0               | X               | X               | X                   | 1C0000H to 1CFFFFFFH         | 0E0000H to 0E7FFFFH          |
|        | SA36   | 1               | 1               | 1               | 0               | 1               | X               | X               | X                   | 1D0000H to 1DFFFFFFH         | 0E8000H to 0EFFFFFFH         |
|        | SA37   | 1               | 1               | 1               | 1               | 0               | X               | X               | X                   | 1E0000H to 1EFFFFFFH         | 0F0000H to 0F7FFFFH          |
| SA38   | 1      | 1               | 1               | 1               | 1               | X               | X               | X               | 1F0000H to 1FFFFFFH | 0F8000H to 0FFFFFFH          |                              |

## MB84VD2108X-85/MB84VD2109X-85

Table 3.3 Sector Address Tables (MB84VD21082)

| Bank   | Sector | Sector Address  |                 |                 |                 |                 |                 |                 |                 | Address Range<br>(BYTE mode) | Address Range<br>(WORD mode) |
|--------|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------------------|------------------------------|
|        |        | Bank Address    |                 |                 |                 |                 |                 |                 |                 |                              |                              |
|        |        | A <sub>19</sub> | A <sub>18</sub> | A <sub>17</sub> | A <sub>16</sub> | A <sub>15</sub> | A <sub>14</sub> | A <sub>13</sub> | A <sub>12</sub> |                              |                              |
| Bank 2 | SA0    | 0               | 0               | 0               | 0               | 0               | X               | X               | X               | 000000H to 00FFFFH           | 000000H to 007FFFH           |
|        | SA1    | 0               | 0               | 0               | 0               | 1               | X               | X               | X               | 010000H to 01FFFFH           | 008000H to 00FFFFH           |
|        | SA2    | 0               | 0               | 0               | 1               | 0               | X               | X               | X               | 020000H to 02FFFFH           | 010000H to 017FFFH           |
|        | SA3    | 0               | 0               | 0               | 1               | 1               | X               | X               | X               | 030000H to 03FFFFH           | 018000H to 01FFFFH           |
|        | SA4    | 0               | 0               | 1               | 0               | 0               | X               | X               | X               | 040000H to 04FFFFH           | 020000H to 027FFFH           |
|        | SA5    | 0               | 0               | 1               | 0               | 1               | X               | X               | X               | 050000H to 05FFFFH           | 028000H to 02FFFFH           |
|        | SA6    | 0               | 0               | 1               | 1               | 0               | X               | X               | X               | 060000H to 06FFFFH           | 030000H to 037FFFH           |
|        | SA7    | 0               | 0               | 1               | 1               | 1               | X               | X               | X               | 070000H to 07FFFFH           | 038000H to 03FFFFH           |
|        | SA8    | 0               | 1               | 0               | 0               | 0               | X               | X               | X               | 080000H to 08FFFFH           | 040000H to 047FFFH           |
|        | SA9    | 0               | 1               | 0               | 0               | 1               | X               | X               | X               | 090000H to 09FFFFH           | 048000H to 04FFFFH           |
|        | SA10   | 0               | 1               | 0               | 1               | 0               | X               | X               | X               | 0A0000H to 0AFFFFH           | 050000H to 057FFFH           |
|        | SA11   | 0               | 1               | 0               | 1               | 1               | X               | X               | X               | 0B0000H to 0BFFFFH           | 058000H to 05FFFFH           |
|        | SA12   | 0               | 1               | 1               | 0               | 0               | X               | X               | X               | 0C0000H to 0CFFFFH           | 060000H to 067FFFH           |
|        | SA13   | 0               | 1               | 1               | 0               | 1               | X               | X               | X               | 0D0000H to 0DFFFFH           | 068000H to 06FFFFH           |
|        | SA14   | 0               | 1               | 1               | 1               | 0               | X               | X               | X               | 0E0000H to 0EFFFFH           | 070000H to 077FFFH           |
|        | SA15   | 0               | 1               | 1               | 1               | 1               | X               | X               | X               | 0F0000H to 0FFFFFH           | 078000H to 07FFFFH           |
|        | SA16   | 1               | 0               | 0               | 0               | 0               | X               | X               | X               | 100000H to 10FFFFH           | 080000H to 087FFFH           |
|        | SA17   | 1               | 0               | 0               | 0               | 1               | X               | X               | X               | 110000H to 11FFFFH           | 088000H to 08FFFFH           |
|        | SA18   | 1               | 0               | 0               | 1               | 0               | X               | X               | X               | 120000H to 12FFFFH           | 090000H to 097FFFH           |
|        | SA19   | 1               | 0               | 0               | 1               | 1               | X               | X               | X               | 130000H to 13FFFFH           | 098000H to 09FFFFH           |
|        | SA20   | 1               | 0               | 1               | 0               | 0               | X               | X               | X               | 140000H to 14FFFFH           | 0A0000H to 0A7FFFH           |
|        | SA21   | 1               | 0               | 1               | 0               | 1               | X               | X               | X               | 150000H to 15FFFFH           | 0A8000H to 0AFFFFH           |
|        | SA22   | 1               | 0               | 1               | 1               | 0               | X               | X               | X               | 160000H to 16FFFFH           | 0B0000H to 0B7FFFH           |
|        | SA23   | 1               | 0               | 1               | 1               | 1               | X               | X               | X               | 170000H to 17FFFFH           | 0B8000H to 0BFFFFH           |
|        | SA24   | 1               | 1               | 0               | 0               | 0               | X               | X               | X               | 180000H to 18FFFFH           | 0C0000H to 0C7FFFH           |
|        | SA25   | 1               | 1               | 0               | 0               | 1               | X               | X               | X               | 190000H to 19FFFFH           | 0C8000H to 0CFFFFH           |
|        | SA26   | 1               | 1               | 0               | 1               | 0               | X               | X               | X               | 1A0000H to 1AFFFFH           | 0D0000H to 0D7FFFH           |
|        | SA27   | 1               | 1               | 0               | 1               | 1               | X               | X               | X               | 1B0000H to 1BFFFFH           | 0D8000H to 0DFFFFH           |
| Bank 1 | SA28   | 1               | 1               | 1               | 0               | 0               | X               | X               | X               | 1C0000H to 1CFFFFH           | 0E0000H to 0E7FFFH           |
|        | SA29   | 1               | 1               | 1               | 0               | 1               | X               | X               | X               | 1D0000H to 1DFFFFH           | 0E8000H to 0EFFFFH           |
|        | SA30   | 1               | 1               | 1               | 1               | 0               | X               | X               | X               | 1E0000H to 1EFFFFH           | 0F0000H to 0F7FFFH           |
|        | SA31   | 1               | 1               | 1               | 1               | 1               | 0               | 0               | 0               | 1F0000H to 1F1FFFH           | 0F8000H to 0F8FFFH           |
|        | SA32   | 1               | 1               | 1               | 1               | 1               | 0               | 0               | 1               | 1F2000H to 1F3FFFH           | 0F9000H to 0F9FFFH           |
|        | SA33   | 1               | 1               | 1               | 1               | 1               | 0               | 1               | 0               | 1F4000H to 1F5FFFH           | 0FA000H to 0FAFFFH           |
|        | SA34   | 1               | 1               | 1               | 1               | 1               | 0               | 1               | 1               | 1F6000H to 1F7FFFH           | 0FB000H to 0FBFFFH           |
|        | SA35   | 1               | 1               | 1               | 1               | 1               | 1               | 0               | 0               | 1F8000H to 1F9FFFH           | 0FC000H to 0FCFFFH           |
|        | SA36   | 1               | 1               | 1               | 1               | 1               | 1               | 0               | 1               | 1FA000H to 1FBFFFH           | 0FD000H to 0FDFFFH           |
|        | SA37   | 1               | 1               | 1               | 1               | 1               | 1               | 1               | 0               | 1FC000H to 1FDFFFH           | 0FE000H to 0FEFFFH           |
|        | SA38   | 1               | 1               | 1               | 1               | 1               | 1               | 1               | 1               | 1FE000H to 1FFFFFH           | 0FF000H to 0FFFFFH           |

# MB84VD2108X-85/MB84VD2109X-85

Table 3.4 Sector Address Tables (MB84VD21092)

| Bank   | Sector | Sector Address  |                 |                 |                 |                 |                 |                 |                      | Address Range<br>(BYTE mode) | Address Range<br>(WORD mode) |
|--------|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------------|------------------------------|------------------------------|
|        |        | Bank Address    |                 |                 |                 |                 |                 |                 |                      |                              |                              |
|        |        | A <sub>19</sub> | A <sub>18</sub> | A <sub>17</sub> | A <sub>16</sub> | A <sub>15</sub> | A <sub>14</sub> | A <sub>13</sub> | A <sub>12</sub>      |                              |                              |
| Bank 1 | SA0    | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 0                    | 000000H to 001FFFFH          | 000000H to 000FFFFH          |
|        | SA1    | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 1                    | 002000H to 003FFFFH          | 001000H to 001FFFFH          |
|        | SA2    | 0               | 0               | 0               | 0               | 0               | 0               | 1               | 0                    | 004000H to 005FFFFH          | 002000H to 002FFFFH          |
|        | SA3    | 0               | 0               | 0               | 0               | 0               | 0               | 1               | 1                    | 006000H to 007FFFFH          | 003000H to 003FFFFH          |
|        | SA4    | 0               | 0               | 0               | 0               | 0               | 1               | 0               | 0                    | 008000H to 009FFFFH          | 004000H to 004FFFFH          |
|        | SA5    | 0               | 0               | 0               | 0               | 0               | 1               | 0               | 1                    | 00A000H to 00BFFFFH          | 005000H to 005FFFFH          |
|        | SA6    | 0               | 0               | 0               | 0               | 0               | 1               | 1               | 0                    | 00C000H to 00DFFFFH          | 006000H to 006FFFFH          |
|        | SA7    | 0               | 0               | 0               | 0               | 0               | 1               | 1               | 1                    | 00E000H to 00FFFFFFH         | 007000H to 007FFFFH          |
|        | SA8    | 0               | 0               | 0               | 0               | 1               | X               | X               | X                    | 010000H to 01FFFFFFH         | 008000H to 00FFFFFFH         |
|        | SA9    | 0               | 0               | 0               | 1               | 0               | X               | X               | X                    | 020000H to 02FFFFFFH         | 010000H to 017FFFFH          |
| SA10   | 0      | 0               | 0               | 1               | 1               | X               | X               | X               | 030000H to 03FFFFFFH | 018000H to 01FFFFFFH         |                              |
| Bank 2 | SA11   | 0               | 0               | 1               | 0               | 0               | X               | X               | X                    | 040000H to 04FFFFFFH         | 020000H to 027FFFFH          |
|        | SA12   | 0               | 0               | 1               | 0               | 1               | X               | X               | X                    | 050000H to 05FFFFFFH         | 028000H to 02FFFFFFH         |
|        | SA13   | 0               | 0               | 1               | 1               | 0               | X               | X               | X                    | 060000H to 06FFFFFFH         | 030000H to 037FFFFH          |
|        | SA14   | 0               | 0               | 1               | 1               | 1               | X               | X               | X                    | 070000H to 07FFFFFFH         | 038000H to 03FFFFFFH         |
|        | SA15   | 0               | 1               | 0               | 0               | 0               | X               | X               | X                    | 080000H to 08FFFFFFH         | 040000H to 047FFFFH          |
|        | SA16   | 0               | 1               | 0               | 0               | 1               | X               | X               | X                    | 090000H to 09FFFFFFH         | 048000H to 04FFFFFFH         |
|        | SA17   | 0               | 1               | 0               | 1               | 0               | X               | X               | X                    | 0A0000H to 0AFFFFFFH         | 050000H to 057FFFFH          |
|        | SA18   | 0               | 1               | 0               | 1               | 1               | X               | X               | X                    | 0B0000H to 0BFFFFFFH         | 058000H to 05FFFFFFH         |
|        | SA19   | 0               | 1               | 1               | 0               | 0               | X               | X               | X                    | 0C0000H to 0CFFFFFFH         | 060000H to 067FFFFH          |
|        | SA20   | 0               | 1               | 1               | 0               | 1               | X               | X               | X                    | 0D0000H to 0DFFFFFFH         | 068000H to 06FFFFFFH         |
|        | SA21   | 0               | 1               | 1               | 1               | 0               | X               | X               | X                    | 0E0000H to 0EFFFFFFH         | 070000H to 077FFFFH          |
|        | SA22   | 0               | 1               | 1               | 1               | 1               | X               | X               | X                    | 0F0000H to 0FFFFFFFH         | 078000H to 07FFFFFFH         |
|        | SA23   | 1               | 0               | 0               | 0               | 0               | X               | X               | X                    | 100000H to 10FFFFFFH         | 080000H to 087FFFFH          |
|        | SA24   | 1               | 0               | 0               | 0               | 1               | X               | X               | X                    | 110000H to 11FFFFFFH         | 088000H to 08FFFFFFH         |
|        | SA25   | 1               | 0               | 0               | 1               | 0               | X               | X               | X                    | 120000H to 12FFFFFFH         | 090000H to 097FFFFH          |
|        | SA26   | 1               | 0               | 0               | 1               | 1               | X               | X               | X                    | 130000H to 13FFFFFFH         | 098000H to 09FFFFFFH         |
|        | SA27   | 1               | 0               | 1               | 0               | 0               | X               | X               | X                    | 140000H to 14FFFFFFH         | 0A0000H to 0A7FFFFH          |
|        | SA28   | 1               | 0               | 1               | 0               | 1               | X               | X               | X                    | 150000H to 15FFFFFFH         | 0A8000H to 0AFFFFFFH         |
|        | SA29   | 1               | 0               | 1               | 1               | 0               | X               | X               | X                    | 160000H to 16FFFFFFH         | 0B0000H to 0B7FFFFH          |
|        | SA30   | 1               | 0               | 1               | 1               | 1               | X               | X               | X                    | 170000H to 17FFFFFFH         | 0B8000H to 0BFFFFFFH         |
|        | SA31   | 1               | 1               | 0               | 0               | 0               | X               | X               | X                    | 180000H to 18FFFFFFH         | 0C0000H to 0C7FFFFH          |
|        | SA32   | 1               | 1               | 0               | 0               | 1               | X               | X               | X                    | 190000H to 19FFFFFFH         | 0C8000H to 0CFFFFFFH         |
|        | SA33   | 1               | 1               | 0               | 1               | 0               | X               | X               | X                    | 1A0000H to 1AFFFFFFH         | 0D0000H to 0D7FFFFH          |
|        | SA34   | 1               | 1               | 0               | 1               | 1               | X               | X               | X                    | 1B0000H to 1BFFFFFFH         | 0D8000H to 0DFFFFFFH         |
|        | SA35   | 1               | 1               | 1               | 0               | 0               | X               | X               | X                    | 1C0000H to 1CFFFFFFH         | 0E0000H to 0E7FFFFH          |
|        | SA36   | 1               | 1               | 1               | 0               | 1               | X               | X               | X                    | 1D0000H to 1DFFFFFFH         | 0E8000H to 0EFFFFFFH         |
|        | SA37   | 1               | 1               | 1               | 1               | 0               | X               | X               | X                    | 1E0000H to 1EFFFFFFH         | 0F0000H to 0F7FFFFH          |
|        | SA38   | 1               | 1               | 1               | 1               | 1               | X               | X               | X                    | 1F0000H to 1FFFFFFFH         | 0F8000H to 0FFFFFFFH         |

## MB84VD2108X-85/MB84VD2109X-85

Table 3.5 Sector Address Tables (MB84VD21083)

| Bank   | Sector | Sector Address  |                 |                 |                 |                 |                 |                 |                 | Address Range<br>(BYTE mode) | Address Range<br>(WORD mode) |
|--------|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------------------|------------------------------|
|        |        | Bank Address    |                 |                 |                 |                 |                 |                 |                 |                              |                              |
|        |        | A <sub>19</sub> | A <sub>18</sub> | A <sub>17</sub> | A <sub>16</sub> | A <sub>15</sub> | A <sub>14</sub> | A <sub>13</sub> | A <sub>12</sub> |                              |                              |
| Bank 2 | SA0    | 0               | 0               | 0               | 0               | 0               | X               | X               | X               | 000000H to 00FFFFH           | 000000H to 007FFFH           |
|        | SA1    | 0               | 0               | 0               | 0               | 1               | X               | X               | X               | 010000H to 01FFFFH           | 008000H to 00FFFFH           |
|        | SA2    | 0               | 0               | 0               | 1               | 0               | X               | X               | X               | 020000H to 02FFFFH           | 010000H to 017FFFH           |
|        | SA3    | 0               | 0               | 0               | 1               | 1               | X               | X               | X               | 030000H to 03FFFFH           | 018000H to 01FFFFH           |
|        | SA4    | 0               | 0               | 1               | 0               | 0               | X               | X               | X               | 040000H to 04FFFFH           | 020000H to 027FFFH           |
|        | SA5    | 0               | 0               | 1               | 0               | 1               | X               | X               | X               | 050000H to 05FFFFH           | 028000H to 02FFFFH           |
|        | SA6    | 0               | 0               | 1               | 1               | 0               | X               | X               | X               | 060000H to 06FFFFH           | 030000H to 037FFFH           |
|        | SA7    | 0               | 0               | 1               | 1               | 1               | X               | X               | X               | 070000H to 07FFFFH           | 038000H to 03FFFFH           |
|        | SA8    | 0               | 1               | 0               | 0               | 0               | X               | X               | X               | 080000H to 08FFFFH           | 040000H to 047FFFH           |
|        | SA9    | 0               | 1               | 0               | 0               | 1               | X               | X               | X               | 090000H to 09FFFFH           | 048000H to 04FFFFH           |
|        | SA10   | 0               | 1               | 0               | 1               | 0               | X               | X               | X               | 0A0000H to 0AFFFFH           | 050000H to 057FFFH           |
|        | SA11   | 0               | 1               | 0               | 1               | 1               | X               | X               | X               | 0B0000H to 0BFFFFH           | 058000H to 05FFFFH           |
|        | SA12   | 0               | 1               | 1               | 0               | 0               | X               | X               | X               | 0C0000H to 0CFFFFH           | 060000H to 067FFFH           |
|        | SA13   | 0               | 1               | 1               | 0               | 1               | X               | X               | X               | 0D0000H to 0DFFFFH           | 068000H to 06FFFFH           |
|        | SA14   | 0               | 1               | 1               | 1               | 0               | X               | X               | X               | 0E0000H to 0EFFFFH           | 070000H to 077FFFH           |
|        | SA15   | 0               | 1               | 1               | 1               | 1               | X               | X               | X               | 0F0000H to 0FFFFFH           | 078000H to 07FFFFH           |
|        | SA16   | 1               | 0               | 0               | 0               | 0               | X               | X               | X               | 100000H to 10FFFFH           | 080000H to 087FFFH           |
|        | SA17   | 1               | 0               | 0               | 0               | 1               | X               | X               | X               | 110000H to 11FFFFH           | 088000H to 08FFFFH           |
|        | SA18   | 1               | 0               | 0               | 1               | 0               | X               | X               | X               | 120000H to 12FFFFH           | 090000H to 097FFFH           |
|        | SA19   | 1               | 0               | 0               | 1               | 1               | X               | X               | X               | 130000H to 13FFFFH           | 098000H to 09FFFFH           |
|        | SA20   | 1               | 0               | 1               | 0               | 0               | X               | X               | X               | 140000H to 14FFFFH           | 0A0000H to 0A7FFFH           |
|        | SA21   | 1               | 0               | 1               | 0               | 1               | X               | X               | X               | 150000H to 15FFFFH           | 0A8000H to 0AFFFFH           |
|        | SA22   | 1               | 0               | 1               | 1               | 0               | X               | X               | X               | 160000H to 16FFFFH           | 0B0000H to 0B7FFFH           |
|        | SA23   | 1               | 0               | 1               | 1               | 1               | X               | X               | X               | 170000H to 17FFFFH           | 0B8000H to 0BFFFFH           |
| Bank 1 | SA24   | 1               | 1               | 0               | 0               | 0               | X               | X               | X               | 180000H to 18FFFFH           | 0C0000H to 0C7FFFH           |
|        | SA25   | 1               | 1               | 0               | 0               | 1               | X               | X               | X               | 190000H to 19FFFFH           | 0C8000H to 0CFFFFH           |
|        | SA26   | 1               | 1               | 0               | 1               | 0               | X               | X               | X               | 1A0000H to 1AFFFFH           | 0D0000H to 0D7FFFH           |
|        | SA27   | 1               | 1               | 0               | 1               | 1               | X               | X               | X               | 1B0000H to 1BFFFFH           | 0D8000H to 0DFFFFH           |
|        | SA28   | 1               | 1               | 1               | 0               | 0               | X               | X               | X               | 1C0000H to 1CFFFFH           | 0E0000H to 0E7FFFH           |
|        | SA29   | 1               | 1               | 1               | 0               | 1               | X               | X               | X               | 1D0000H to 1DFFFFH           | 0E8000H to 0EFFFFH           |
|        | SA30   | 1               | 1               | 1               | 1               | 0               | X               | X               | X               | 1E0000H to 1EFFFFH           | 0F0000H to 0F7FFFH           |
|        | SA31   | 1               | 1               | 1               | 1               | 1               | 0               | 0               | 0               | 1F0000H to 1F1FFFH           | 0F8000H to 0F8FFFH           |
|        | SA32   | 1               | 1               | 1               | 1               | 1               | 0               | 0               | 1               | 1F2000H to 1F3FFFH           | 0F9000H to 0F9FFFH           |
|        | SA33   | 1               | 1               | 1               | 1               | 1               | 0               | 1               | 0               | 1F4000H to 1F5FFFH           | 0FA000H to 0FAFFFH           |
|        | SA34   | 1               | 1               | 1               | 1               | 1               | 0               | 1               | 1               | 1F6000H to 1F7FFFH           | 0FB000H to 0FBFFFH           |
|        | SA35   | 1               | 1               | 1               | 1               | 1               | 1               | 0               | 0               | 1F8000H to 1F9FFFH           | 0FC000H to 0FCFFFH           |
|        | SA36   | 1               | 1               | 1               | 1               | 1               | 1               | 0               | 1               | 1FA000H to 1FBFFFH           | 0FD000H to 0FDFFFH           |
|        | SA37   | 1               | 1               | 1               | 1               | 1               | 1               | 1               | 0               | 1FC000H to 1FDFFFH           | 0FE000H to 0FEFFFH           |
|        | SA38   | 1               | 1               | 1               | 1               | 1               | 1               | 1               | 1               | 1FE000H to 1FFFFFH           | 0FF000H to 0FFFFFH           |

## MB84VD2108X-85/MB84VD2109X-85

Table 3.6 Sector Address Tables (MB84VD21093)

| Bank   | Sector | Sector Address  |                 |                 |                 |                 |                 |                 |                 | Address Range<br>(BYTE mode) | Address Range<br>(WORD mode) |
|--------|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------------------|------------------------------|
|        |        | Bank Address    |                 |                 |                 |                 |                 |                 |                 |                              |                              |
|        |        | A <sub>19</sub> | A <sub>18</sub> | A <sub>17</sub> | A <sub>16</sub> | A <sub>15</sub> | A <sub>14</sub> | A <sub>13</sub> | A <sub>12</sub> |                              |                              |
| Bank 1 | SA0    | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 000000H to 001FFFFH          | 000000H to 000FFFFH          |
|        | SA1    | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 1               | 002000H to 003FFFFH          | 001000H to 001FFFFH          |
|        | SA2    | 0               | 0               | 0               | 0               | 0               | 0               | 1               | 0               | 004000H to 005FFFFH          | 002000H to 002FFFFH          |
|        | SA3    | 0               | 0               | 0               | 0               | 0               | 0               | 1               | 1               | 006000H to 007FFFFH          | 003000H to 003FFFFH          |
|        | SA4    | 0               | 0               | 0               | 0               | 0               | 1               | 0               | 0               | 008000H to 009FFFFH          | 004000H to 004FFFFH          |
|        | SA5    | 0               | 0               | 0               | 0               | 0               | 1               | 0               | 1               | 00A000H to 00BFFFFH          | 005000H to 005FFFFH          |
|        | SA6    | 0               | 0               | 0               | 0               | 0               | 1               | 1               | 0               | 00C000H to 00DFFFFH          | 006000H to 006FFFFH          |
|        | SA7    | 0               | 0               | 0               | 0               | 0               | 1               | 1               | 1               | 00E000H to 00FFFFFFH         | 007000H to 007FFFFH          |
|        | SA8    | 0               | 0               | 0               | 0               | 1               | X               | X               | X               | 010000H to 01FFFFFFH         | 008000H to 00FFFFFFH         |
|        | SA9    | 0               | 0               | 0               | 1               | 0               | X               | X               | X               | 020000H to 02FFFFFFH         | 010000H to 017FFFFH          |
|        | SA10   | 0               | 0               | 0               | 1               | 1               | X               | X               | X               | 030000H to 03FFFFFFH         | 018000H to 01FFFFFFH         |
|        | SA11   | 0               | 0               | 1               | 0               | 0               | X               | X               | X               | 040000H to 04FFFFFFH         | 020000H to 027FFFFH          |
|        | SA12   | 0               | 0               | 1               | 0               | 1               | X               | X               | X               | 050000H to 05FFFFFFH         | 028000H to 02FFFFFFH         |
|        | SA13   | 0               | 0               | 1               | 1               | 0               | X               | X               | X               | 060000H to 06FFFFFFH         | 030000H to 037FFFFH          |
|        | SA14   | 0               | 0               | 1               | 1               | 1               | X               | X               | X               | 070000H to 07FFFFFFH         | 038000H to 03FFFFFFH         |
| Bank 2 | SA15   | 0               | 1               | 0               | 0               | 0               | X               | X               | X               | 080000H to 08FFFFFFH         | 040000H to 047FFFFH          |
|        | SA16   | 0               | 1               | 0               | 0               | 1               | X               | X               | X               | 090000H to 09FFFFFFH         | 048000H to 04FFFFFFH         |
|        | SA17   | 0               | 1               | 0               | 1               | 0               | X               | X               | X               | 0A0000H to 0AFFFFFFH         | 050000H to 057FFFFH          |
|        | SA18   | 0               | 1               | 0               | 1               | 1               | X               | X               | X               | 0B0000H to 0BFFFFFFH         | 058000H to 05FFFFFFH         |
|        | SA19   | 0               | 1               | 1               | 0               | 0               | X               | X               | X               | 0C0000H to 0CFFFFFFH         | 060000H to 067FFFFH          |
|        | SA20   | 0               | 1               | 1               | 0               | 1               | X               | X               | X               | 0D0000H to 0DFFFFFFH         | 068000H to 06FFFFFFH         |
|        | SA21   | 0               | 1               | 1               | 1               | 0               | X               | X               | X               | 0E0000H to 0EFFFFFFH         | 070000H to 077FFFFH          |
|        | SA22   | 0               | 1               | 1               | 1               | 1               | X               | X               | X               | 0F0000H to 0FFFFFFFH         | 078000H to 07FFFFFFH         |
|        | SA23   | 1               | 0               | 0               | 0               | 0               | X               | X               | X               | 100000H to 10FFFFFFH         | 080000H to 087FFFFH          |
|        | SA24   | 1               | 0               | 0               | 0               | 1               | X               | X               | X               | 110000H to 11FFFFFFH         | 088000H to 08FFFFFFH         |
|        | SA25   | 1               | 0               | 0               | 1               | 0               | X               | X               | X               | 120000H to 12FFFFFFH         | 090000H to 097FFFFH          |
|        | SA26   | 1               | 0               | 0               | 1               | 1               | X               | X               | X               | 130000H to 13FFFFFFH         | 098000H to 09FFFFFFH         |
|        | SA27   | 1               | 0               | 1               | 0               | 0               | X               | X               | X               | 140000H to 14FFFFFFH         | 0A0000H to 0A7FFFFH          |
|        | SA28   | 1               | 0               | 1               | 0               | 1               | X               | X               | X               | 150000H to 15FFFFFFH         | 0A8000H to 0AFFFFFFH         |
|        | SA29   | 1               | 0               | 1               | 1               | 0               | X               | X               | X               | 160000H to 16FFFFFFH         | 0B0000H to 0B7FFFFH          |
|        | SA30   | 1               | 0               | 1               | 1               | 1               | X               | X               | X               | 170000H to 17FFFFFFH         | 0B8000H to 0BFFFFFFH         |
|        | SA31   | 1               | 1               | 0               | 0               | 0               | X               | X               | X               | 180000H to 18FFFFFFH         | 0C0000H to 0C7FFFFH          |
|        | SA32   | 1               | 1               | 0               | 0               | 1               | X               | X               | X               | 190000H to 19FFFFFFH         | 0C8000H to 0CFFFFFFH         |
|        | SA33   | 1               | 1               | 0               | 1               | 0               | X               | X               | X               | 1A0000H to 1AFFFFFFH         | 0D0000H to 0D7FFFFH          |
|        | SA34   | 1               | 1               | 0               | 1               | 1               | X               | X               | X               | 1B0000H to 1BFFFFFFH         | 0D8000H to 0DFFFFFFH         |
|        | SA35   | 1               | 1               | 1               | 0               | 0               | X               | X               | X               | 1C0000H to 1CFFFFFFH         | 0E0000H to 0E7FFFFH          |
|        | SA36   | 1               | 1               | 1               | 0               | 1               | X               | X               | X               | 1D0000H to 1DFFFFFFH         | 0E8000H to 0EFFFFFFH         |
|        | SA37   | 1               | 1               | 1               | 1               | 0               | X               | X               | X               | 1E0000H to 1EFFFFFFH         | 0F0000H to 0F7FFFFH          |
|        | SA38   | 1               | 1               | 1               | 1               | 1               | X               | X               | X               | 1F0000H to 1FFFFFFFH         | 0F8000H to 0FFFFFFFH         |

## MB84VD2108X-85/MB84VD2109X-85

Table 3.7 Sector Address Tables (MB84VD21084)

| Bank   | Sector | Sector Address  |                 |                 |                 |                 |                 |                 |                 | Address Range<br>(BYTE mode) | Address Range<br>(WORD mode) |
|--------|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------------------|------------------------------|
|        |        | Bank Address    |                 |                 |                 |                 |                 |                 |                 |                              |                              |
|        |        | A <sub>19</sub> | A <sub>18</sub> | A <sub>17</sub> | A <sub>16</sub> | A <sub>15</sub> | A <sub>14</sub> | A <sub>13</sub> | A <sub>12</sub> |                              |                              |
| Bank 2 | SA0    | 0               | 0               | 0               | 0               | 0               | X               | X               | X               | 000000H to 00FFFFH           | 000000H to 007FFFH           |
|        | SA1    | 0               | 0               | 0               | 0               | 1               | X               | X               | X               | 010000H to 01FFFFH           | 008000H to 00FFFFH           |
|        | SA2    | 0               | 0               | 0               | 1               | 0               | X               | X               | X               | 020000H to 02FFFFH           | 010000H to 017FFFH           |
|        | SA3    | 0               | 0               | 0               | 1               | 1               | X               | X               | X               | 030000H to 03FFFFH           | 018000H to 01FFFFH           |
|        | SA4    | 0               | 0               | 1               | 0               | 0               | X               | X               | X               | 040000H to 04FFFFH           | 020000H to 027FFFH           |
|        | SA5    | 0               | 0               | 1               | 0               | 1               | X               | X               | X               | 050000H to 05FFFFH           | 028000H to 02FFFFH           |
|        | SA6    | 0               | 0               | 1               | 1               | 0               | X               | X               | X               | 060000H to 06FFFFH           | 030000H to 037FFFH           |
|        | SA7    | 0               | 0               | 1               | 1               | 1               | X               | X               | X               | 070000H to 07FFFFH           | 038000H to 03FFFFH           |
|        | SA8    | 0               | 1               | 0               | 0               | 0               | X               | X               | X               | 080000H to 08FFFFH           | 040000H to 047FFFH           |
|        | SA9    | 0               | 1               | 0               | 0               | 1               | X               | X               | X               | 090000H to 09FFFFH           | 048000H to 04FFFFH           |
|        | SA10   | 0               | 1               | 0               | 1               | 0               | X               | X               | X               | 0A0000H to 0AFFFFH           | 050000H to 057FFFH           |
|        | SA11   | 0               | 1               | 0               | 1               | 1               | X               | X               | X               | 0B0000H to 0BFFFFH           | 058000H to 05FFFFH           |
|        | SA12   | 0               | 1               | 1               | 0               | 0               | X               | X               | X               | 0C0000H to 0CFFFFH           | 060000H to 067FFFH           |
|        | SA13   | 0               | 1               | 1               | 0               | 1               | X               | X               | X               | 0D0000H to 0DFFFFH           | 068000H to 06FFFFH           |
|        | SA14   | 0               | 1               | 1               | 1               | 0               | X               | X               | X               | 0E0000H to 0EFFFFH           | 070000H to 077FFFH           |
|        | SA15   | 0               | 1               | 1               | 1               | 1               | X               | X               | X               | 0F0000H to 0FFFFFH           | 078000H to 07FFFFH           |
| Bank 1 | SA16   | 1               | 0               | 0               | 0               | 0               | X               | X               | X               | 100000H to 10FFFFH           | 080000H to 087FFFH           |
|        | SA17   | 1               | 0               | 0               | 0               | 1               | X               | X               | X               | 110000H to 11FFFFH           | 088000H to 08FFFFH           |
|        | SA18   | 1               | 0               | 0               | 1               | 0               | X               | X               | X               | 120000H to 12FFFFH           | 090000H to 097FFFH           |
|        | SA19   | 1               | 0               | 0               | 1               | 1               | X               | X               | X               | 130000H to 13FFFFH           | 098000H to 09FFFFH           |
|        | SA20   | 1               | 0               | 1               | 0               | 0               | X               | X               | X               | 140000H to 14FFFFH           | 0A0000H to 0A7FFFH           |
|        | SA21   | 1               | 0               | 1               | 0               | 1               | X               | X               | X               | 150000H to 15FFFFH           | 0A8000H to 0AFFFFH           |
|        | SA22   | 1               | 0               | 1               | 1               | 0               | X               | X               | X               | 160000H to 16FFFFH           | 0B0000H to 0B7FFFH           |
|        | SA23   | 1               | 0               | 1               | 1               | 1               | X               | X               | X               | 170000H to 17FFFFH           | 0B8000H to 0BFFFFH           |
|        | SA24   | 1               | 1               | 0               | 0               | 0               | X               | X               | X               | 180000H to 18FFFFH           | 0C0000H to 0C7FFFH           |
|        | SA25   | 1               | 1               | 0               | 0               | 1               | X               | X               | X               | 190000H to 19FFFFH           | 0C8000H to 0CFFFFH           |
|        | SA26   | 1               | 1               | 0               | 1               | 0               | X               | X               | X               | 1A0000H to 1AFFFFH           | 0D0000H to 0D7FFFH           |
|        | SA27   | 1               | 1               | 0               | 1               | 1               | X               | X               | X               | 1B0000H to 1BFFFFH           | 0D8000H to 0DFFFFH           |
|        | SA28   | 1               | 1               | 1               | 0               | 0               | X               | X               | X               | 1C0000H to 1CFFFFH           | 0E0000H to 0E7FFFH           |
|        | SA29   | 1               | 1               | 1               | 0               | 1               | X               | X               | X               | 1D0000H to 1DFFFFH           | 0E8000H to 0EFFFFH           |
|        | SA30   | 1               | 1               | 1               | 1               | 0               | X               | X               | X               | 1E0000H to 1EFFFFH           | 0F0000H to 0F7FFFH           |
|        | SA31   | 1               | 1               | 1               | 1               | 1               | 0               | 0               | 0               | 1F0000H to 1F1FFFH           | 0F8000H to 0F8FFFH           |
|        | SA32   | 1               | 1               | 1               | 1               | 1               | 0               | 0               | 1               | 1F2000H to 1F3FFFH           | 0F9000H to 0F9FFFH           |
|        | SA33   | 1               | 1               | 1               | 1               | 1               | 0               | 1               | 0               | 1F4000H to 1F5FFFH           | 0FA000H to 0FAFFFH           |
|        | SA34   | 1               | 1               | 1               | 1               | 1               | 0               | 1               | 1               | 1F6000H to 1F7FFFH           | 0FB000H to 0FBFFFH           |
|        | SA35   | 1               | 1               | 1               | 1               | 1               | 1               | 0               | 0               | 1F8000H to 1F9FFFH           | 0FC000H to 0FCFFFH           |
|        | SA36   | 1               | 1               | 1               | 1               | 1               | 1               | 0               | 1               | 1FA000H to 1FBFFFH           | 0FD000H to 0FDFFFH           |
|        | SA37   | 1               | 1               | 1               | 1               | 1               | 1               | 1               | 0               | 1FC000H to 1FDFFFH           | 0FE000H to 0FEFFFH           |
|        | SA38   | 1               | 1               | 1               | 1               | 1               | 1               | 1               | 1               | 1FE000H to 1FFFFFH           | 0FF000H to 0FFFFFH           |

## MB84VD2108X-85/MB84VD2109X-85

Table 3.8 Sector Address Tables (MB84VD21094)

| Bank   | Sector | Sector Address  |                 |                 |                 |                 |                 |                 |                     | Address Range<br>(BYTE mode) | Address Range<br>(WORD mode) |
|--------|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------------------|------------------------------|------------------------------|
|        |        | Bank Address    |                 |                 |                 |                 |                 |                 |                     |                              |                              |
|        |        | A <sub>19</sub> | A <sub>18</sub> | A <sub>17</sub> | A <sub>16</sub> | A <sub>15</sub> | A <sub>14</sub> | A <sub>13</sub> | A <sub>12</sub>     |                              |                              |
| Bank 1 | SA0    | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 0                   | 000000H to 001FFFFH          | 000000H to 000FFFFH          |
|        | SA1    | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 1                   | 002000H to 003FFFFH          | 001000H to 001FFFFH          |
|        | SA2    | 0               | 0               | 0               | 0               | 0               | 0               | 1               | 0                   | 004000H to 005FFFFH          | 002000H to 002FFFFH          |
|        | SA3    | 0               | 0               | 0               | 0               | 0               | 0               | 1               | 1                   | 006000H to 007FFFFH          | 003000H to 003FFFFH          |
|        | SA4    | 0               | 0               | 0               | 0               | 0               | 1               | 0               | 0                   | 008000H to 009FFFFH          | 004000H to 004FFFFH          |
|        | SA5    | 0               | 0               | 0               | 0               | 0               | 1               | 0               | 1                   | 00A000H to 00BFFFFH          | 005000H to 005FFFFH          |
|        | SA6    | 0               | 0               | 0               | 0               | 0               | 1               | 1               | 0                   | 00C000H to 00DFFFFH          | 006000H to 006FFFFH          |
|        | SA7    | 0               | 0               | 0               | 0               | 0               | 1               | 1               | 1                   | 00E000H to 00FFFFFFH         | 007000H to 007FFFFH          |
|        | SA8    | 0               | 0               | 0               | 0               | 1               | X               | X               | X                   | 010000H to 01FFFFFFH         | 008000H to 00FFFFFFH         |
|        | SA9    | 0               | 0               | 0               | 1               | 0               | X               | X               | X                   | 020000H to 02FFFFFFH         | 010000H to 017FFFFH          |
|        | SA10   | 0               | 0               | 0               | 1               | 1               | X               | X               | X                   | 030000H to 03FFFFFFH         | 018000H to 01FFFFFFH         |
|        | SA11   | 0               | 0               | 1               | 0               | 0               | X               | X               | X                   | 040000H to 04FFFFFFH         | 020000H to 027FFFFH          |
|        | SA12   | 0               | 0               | 1               | 0               | 1               | X               | X               | X                   | 050000H to 05FFFFFFH         | 028000H to 02FFFFFFH         |
|        | SA13   | 0               | 0               | 1               | 1               | 0               | X               | X               | X                   | 060000H to 06FFFFFFH         | 030000H to 037FFFFH          |
|        | SA14   | 0               | 0               | 1               | 1               | 1               | X               | X               | X                   | 070000H to 07FFFFFFH         | 038000H to 03FFFFFFH         |
|        | SA15   | 0               | 1               | 0               | 0               | 0               | X               | X               | X                   | 080000H to 08FFFFFFH         | 040000H to 047FFFFH          |
|        | SA16   | 0               | 1               | 0               | 0               | 1               | X               | X               | X                   | 090000H to 09FFFFFFH         | 048000H to 04FFFFFFH         |
|        | SA17   | 0               | 1               | 0               | 1               | 0               | X               | X               | X                   | 0A0000H to 0AFFFFFFH         | 050000H to 057FFFFH          |
|        | SA18   | 0               | 1               | 0               | 1               | 1               | X               | X               | X                   | 0B0000H to 0BFFFFFFH         | 058000H to 05FFFFFFH         |
|        | SA19   | 0               | 1               | 1               | 0               | 0               | X               | X               | X                   | 0C0000H to 0CFFFFFFH         | 060000H to 067FFFFH          |
|        | SA20   | 0               | 1               | 1               | 0               | 1               | X               | X               | X                   | 0D0000H to 0DFFFFFFH         | 068000H to 06FFFFFFH         |
|        | SA21   | 0               | 1               | 1               | 1               | 0               | X               | X               | X                   | 0E0000H to 0EFFFFFFH         | 070000H to 077FFFFH          |
| SA22   | 0      | 1               | 1               | 1               | 1               | X               | X               | X               | 0F0000H to 0FFFFFFH | 078000H to 07FFFFFFH         |                              |
| Bank 2 | SA23   | 1               | 0               | 0               | 0               | 0               | X               | X               | X                   | 100000H to 10FFFFFFH         | 080000H to 087FFFFH          |
|        | SA24   | 1               | 0               | 0               | 0               | 1               | X               | X               | X                   | 110000H to 11FFFFFFH         | 088000H to 08FFFFFFH         |
|        | SA25   | 1               | 0               | 0               | 1               | 0               | X               | X               | X                   | 120000H to 12FFFFFFH         | 090000H to 097FFFFH          |
|        | SA26   | 1               | 0               | 0               | 1               | 1               | X               | X               | X                   | 130000H to 13FFFFFFH         | 098000H to 09FFFFFFH         |
|        | SA27   | 1               | 0               | 1               | 0               | 0               | X               | X               | X                   | 140000H to 14FFFFFFH         | 0A0000H to 0A7FFFFH          |
|        | SA28   | 1               | 0               | 1               | 0               | 1               | X               | X               | X                   | 150000H to 15FFFFFFH         | 0A8000H to 0AFFFFFFH         |
|        | SA29   | 1               | 0               | 1               | 1               | 0               | X               | X               | X                   | 160000H to 16FFFFFFH         | 0B0000H to 0B7FFFFH          |
|        | SA30   | 1               | 0               | 1               | 1               | 1               | X               | X               | X                   | 170000H to 17FFFFFFH         | 0B8000H to 0BFFFFFFH         |
|        | SA31   | 1               | 1               | 0               | 0               | 0               | X               | X               | X                   | 180000H to 18FFFFFFH         | 0C0000H to 0C7FFFFH          |
|        | SA32   | 1               | 1               | 0               | 0               | 1               | X               | X               | X                   | 190000H to 19FFFFFFH         | 0C8000H to 0CFFFFFFH         |
|        | SA33   | 1               | 1               | 0               | 1               | 0               | X               | X               | X                   | 1A0000H to 1AFFFFFFH         | 0D0000H to 0D7FFFFH          |
|        | SA34   | 1               | 1               | 0               | 1               | 1               | X               | X               | X                   | 1B0000H to 1BFFFFFFH         | 0D8000H to 0DFFFFFFH         |
|        | SA35   | 1               | 1               | 1               | 0               | 0               | X               | X               | X                   | 1C0000H to 1CFFFFFFH         | 0E0000H to 0E7FFFFH          |
|        | SA36   | 1               | 1               | 1               | 0               | 1               | X               | X               | X                   | 1D0000H to 1DFFFFFFH         | 0E8000H to 0EFFFFFFH         |
|        | SA37   | 1               | 1               | 1               | 1               | 0               | X               | X               | X                   | 1E0000H to 1EFFFFFFH         | 0F0000H to 0F7FFFFH          |
|        | SA38   | 1               | 1               | 1               | 1               | 1               | X               | X               | X                   | 1F0000H to 1FFFFFFH          | 0F8000H to 0FFFFFFH          |

# MB84VD2108X-85/MB84VD2109X-85

**Table 4.1 Sector Group Addresses (MB84VD2108X)  
(Top Boot Block)**

| Sector Group | A <sub>19</sub> | A <sub>18</sub> | A <sub>17</sub> | A <sub>16</sub> | A <sub>15</sub> | A <sub>14</sub> | A <sub>13</sub> | A <sub>12</sub> | Sectors      |
|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------|
| SGA0         | 0               | 0               | 0               | 0               | 0               | X               | X               | X               | SA0          |
| SGA1         | 0               | 0               | 0               | 0               | 1               | X               | X               | X               | SA1 to SA3   |
|              | 0               | 0               | 0               | 1               | 0               | X               | X               | X               |              |
|              | 0               | 0               | 0               | 1               | 1               | X               | X               | X               |              |
| SGA2         | 0               | 0               | 1               | X               | X               | X               | X               | X               | SA4 to SA7   |
| SGA3         | 0               | 1               | 0               | X               | X               | X               | X               | X               | SA8 to SA11  |
| SGA4         | 0               | 1               | 1               | X               | X               | X               | X               | X               | SA12 to SA15 |
| SGA5         | 1               | 0               | 0               | X               | X               | X               | X               | X               | SA16 to SA19 |
| SGA6         | 1               | 0               | 1               | X               | X               | X               | X               | X               | SA20 to SA23 |
| SGA7         | 1               | 1               | 0               | X               | X               | X               | X               | X               | SA24 to SA27 |
| SGA8         | 1               | 1               | 1               | 0               | 0               | X               | X               | X               | SA28 to SA30 |
|              | 1               | 1               | 1               | 0               | 1               | X               | X               | X               |              |
|              | 1               | 1               | 1               | 1               | 0               | X               | X               | X               |              |
| SGA9         | 1               | 1               | 1               | 1               | 1               | 0               | 0               | 0               | SA31         |
| SGA10        | 1               | 1               | 1               | 1               | 1               | 0               | 0               | 1               | SA32         |
| SGA11        | 1               | 1               | 1               | 1               | 1               | 0               | 1               | 0               | SA33         |
| SGA12        | 1               | 1               | 1               | 1               | 1               | 0               | 1               | 1               | SA34         |
| SGA13        | 1               | 1               | 1               | 1               | 1               | 1               | 0               | 0               | SA35         |
| SGA14        | 1               | 1               | 1               | 1               | 1               | 1               | 0               | 1               | SA36         |
| SGA15        | 1               | 1               | 1               | 1               | 1               | 1               | 1               | 0               | SA37         |
| SGA16        | 1               | 1               | 1               | 1               | 1               | 1               | 1               | 1               | SA38         |

# MB84VD2108X-85/MB84VD2109X-85

**Table 4.2 Sector Group Addresses (MB84VD2109X)  
(Bottom Boot Block)**

| Sector Group | A <sub>19</sub> | A <sub>18</sub> | A <sub>17</sub> | A <sub>16</sub> | A <sub>15</sub> | A <sub>14</sub> | A <sub>13</sub> | A <sub>12</sub> | Sectors      |
|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------|
| SGA0         | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 0               | SA0          |
| SGA1         | 0               | 0               | 0               | 0               | 0               | 0               | 0               | 1               | SA1          |
| SGA2         | 0               | 0               | 0               | 0               | 0               | 0               | 1               | 0               | SA2          |
| SGA3         | 0               | 0               | 0               | 0               | 0               | 0               | 1               | 1               | SA3          |
| SGA4         | 0               | 0               | 0               | 0               | 0               | 1               | 0               | 0               | SA4          |
| SGA5         | 0               | 0               | 0               | 0               | 0               | 1               | 0               | 1               | SA5          |
| SGA6         | 0               | 0               | 0               | 0               | 0               | 1               | 1               | 0               | SA6          |
| SGA7         | 0               | 0               | 0               | 0               | 0               | 1               | 1               | 1               | SA7          |
| SGA8         | 0               | 0               | 0               | 0               | 1               | X               | X               | X               | SA8 to SA10  |
|              | 0               | 0               | 0               | 1               | 0               | X               | X               | X               |              |
|              | 0               | 0               | 0               | 1               | 1               | X               | X               | X               |              |
| SGA9         | 0               | 0               | 1               | X               | X               | X               | X               | X               | SA11 to SA14 |
| SGA10        | 0               | 1               | 0               | X               | X               | X               | X               | X               | SA15 to SA18 |
| SGA11        | 0               | 1               | 1               | X               | X               | X               | X               | X               | SA19 to SA22 |
| SGA12        | 1               | 0               | 0               | X               | X               | X               | X               | X               | SA23 to SA26 |
| SGA13        | 1               | 0               | 1               | X               | X               | X               | X               | X               | SA27 to SA30 |
| SGA14        | 1               | 1               | 0               | X               | X               | X               | X               | X               | SA31 to SA34 |
| SGA15        | 1               | 1               | 1               | 0               | 0               | X               | X               | X               | SA35 to SA37 |
|              | 1               | 1               | 1               | 0               | 1               | X               | X               | X               |              |
|              | 1               | 1               | 1               | 1               | 0               | X               | X               | X               |              |
| SGA16        | 1               | 1               | 1               | 1               | 1               | X               | X               | X               | SA38         |

# MB84VD2108X-85/MB84VD2109X-85

Table 5 Flash Memory Autoselect Codes

| Type                 |             |      | A <sub>12</sub> to A <sub>19</sub> | A <sub>6</sub>  | A <sub>1</sub>  | A <sub>0</sub>  | A <sub>-1</sub> *1 | Code (HEX) |
|----------------------|-------------|------|------------------------------------|-----------------|-----------------|-----------------|--------------------|------------|
| Manufacturer's Code  |             |      | X                                  | V <sub>IL</sub> | V <sub>IL</sub> | V <sub>IL</sub> | V <sub>IL</sub>    | 04H        |
| Device Code          | MB84VD21081 | Byte | X                                  | V <sub>IL</sub> | V <sub>IL</sub> | V <sub>IH</sub> | V <sub>IL</sub>    | 36H        |
|                      |             | Word |                                    |                 |                 |                 | X                  | 2236H      |
|                      | MB84VD21091 | Byte | X                                  | V <sub>IL</sub> | V <sub>IL</sub> | V <sub>IH</sub> | V <sub>IL</sub>    | 39         |
|                      |             | Word |                                    |                 |                 |                 | X                  | 2239H      |
|                      | MB84VD21082 | Byte | X                                  | V <sub>IL</sub> | V <sub>IL</sub> | V <sub>IH</sub> | V <sub>IL</sub>    | 2D         |
|                      |             | Word |                                    |                 |                 |                 | X                  | 222DH      |
|                      | MB84VD21092 | Byte | X                                  | V <sub>IL</sub> | V <sub>IL</sub> | V <sub>IH</sub> | V <sub>IL</sub>    | 2E         |
|                      |             | Word |                                    |                 |                 |                 | X                  | 222EH      |
|                      | MB84VD21083 | Byte | X                                  | V <sub>IL</sub> | V <sub>IL</sub> | V <sub>IH</sub> | V <sub>IL</sub>    | 28H        |
|                      |             | Word |                                    |                 |                 |                 | X                  | 2228H      |
|                      | MB84VD21093 | Byte | X                                  | V <sub>IL</sub> | V <sub>IL</sub> | V <sub>IH</sub> | V <sub>IL</sub>    | 2BH        |
|                      |             | Word |                                    |                 |                 |                 | X                  | 222BH      |
|                      | MB84VD21084 | Byte | X                                  | V <sub>IL</sub> | V <sub>IL</sub> | V <sub>IH</sub> | V <sub>IL</sub>    | 33H        |
|                      |             | Word |                                    |                 |                 |                 | X                  | 2233H      |
|                      | MB84VD21094 | Byte | X                                  | V <sub>IL</sub> | V <sub>IL</sub> | V <sub>IH</sub> | V <sub>IL</sub>    | 35         |
|                      |             | Word |                                    |                 |                 |                 | X                  | 2235H      |
| Sector Group protect |             |      | Sector Group Address               | V <sub>IL</sub> | V <sub>IH</sub> | V <sub>IL</sub> | V <sub>IL</sub>    | 01H*2      |

\*1 : A<sub>-1</sub> is for Byte mode.

\*2 : Output 01H at protected sector address and output 00H at unprotected sector address.

## MB84VD2108X-85/MB84VD2109X-85

Table 6 Flash Memory Command Definitions

| Command Sequence                          |      | Bus Write Cycles Req'd | First Bus Write Cycle |      | Second Bus Write Cycle |             | Third Bus Write Cycle |      | Fourth Bus Read/Write Cycle |      | Fifth Bus Write Cycle |      | Sixth Bus Write Cycle |      |
|-------------------------------------------|------|------------------------|-----------------------|------|------------------------|-------------|-----------------------|------|-----------------------------|------|-----------------------|------|-----------------------|------|
|                                           |      |                        | Addr.                 | Data | Addr.                  | Data        | Addr.                 | Data | Addr.                       | Data | Addr.                 | Data | Addr.                 | Data |
| Read/Reset (Note 1)                       |      | 1                      | XXXH                  | F0H  | —                      | —           | —                     | —    | —                           | —    | —                     | —    | —                     | —    |
| Read/Reset (Note 1)                       | Word | 3                      | 555H                  | AAH  | 2AAH                   | 55H         | 555H                  | F0H  | RA                          | RD   | —                     | —    | —                     | —    |
|                                           | Byte |                        | AAAH                  |      | 555H                   |             | AAAH                  |      |                             |      |                       |      |                       |      |
| Autoselect                                | Word | 3                      | 555H                  | AAH  | 2AAH                   | 55H         | (BA) 555H             | 90H  | —                           | —    | —                     | —    | —                     | —    |
|                                           | Byte |                        | AAAH                  |      | 555H                   |             | (BA) AAAH             |      |                             |      |                       |      |                       |      |
| Program                                   | Word | 4                      | 555H                  | AAH  | 2AAH                   | 55H         | 555H                  | A0H  | PA                          | PD   | —                     | —    | —                     | —    |
|                                           | Byte |                        | AAAH                  |      | 555H                   |             | AAAH                  |      |                             |      |                       |      |                       |      |
| Chip Erase                                | Word | 6                      | 555H                  | AAH  | 2AAH                   | 55H         | 555H                  | 80H  | 555H                        | AAH  | 2AAH                  | 55H  | 555H                  | 10H  |
|                                           | Byte |                        | AAAH                  |      | 555H                   |             | AAAH                  |      | AAAH                        |      | 555H                  |      | AAAH                  |      |
| Sector Erase                              | Word | 6                      | 555H                  | AAH  | 2AAH                   | 55H         | 555H                  | 80H  | 555H                        | AAH  | 2AAH                  | 55H  | SA                    | 30H  |
|                                           | Byte |                        | AAAH                  |      | 555H                   |             | AAAH                  |      | AAAH                        |      | 555H                  |      |                       |      |
| Sector Erase Suspend                      |      | 1                      | BA                    | B0H  | —                      | —           | —                     | —    | —                           | —    | —                     | —    | —                     | —    |
| Sector Erase Resume                       |      | 1                      | BA                    | 30H  | —                      | —           | —                     | —    | —                           | —    | —                     | —    | —                     | —    |
| Set to Fast Mode                          | Word | 3                      | 555H                  | AAH  | 2AAH                   | 55H         | 555H                  | 20H  | —                           | —    | —                     | —    | —                     | —    |
|                                           | Byte |                        | AAAH                  |      | 555H                   |             | AAAH                  |      |                             |      |                       |      |                       |      |
| Fast Program (Note 2)                     | Word | 2                      | XXXH                  | A0H  | PA                     | PD          | —                     | —    | —                           | —    | —                     | —    | —                     | —    |
|                                           | Byte |                        | —                     |      | —                      |             | —                     |      |                             |      |                       |      |                       |      |
| Reset from Fast Mode (Note 2)             | Word | 2                      | BA                    | 90H  | XXXH                   | F0H (Note6) | —                     | —    | —                           | —    | —                     | —    | —                     | —    |
|                                           | Byte |                        |                       |      |                        |             |                       |      |                             |      |                       |      |                       |      |
| Extended Sector Group Protection (Note 3) | Word | 4                      | XXXH                  | 60H  | SPA                    | 60H         | SPA                   | 40H  | SPA                         | SD   | —                     | —    | —                     | —    |
|                                           | Byte |                        | —                     |      | —                      |             | —                     |      | —                           |      |                       |      |                       |      |
| Query (Note 4)                            | Word | 1                      | 55H                   | 98H  | —                      | —           | —                     | —    | —                           | —    | —                     | —    | —                     | —    |
|                                           | Byte |                        | AAH                   |      |                        |             |                       |      |                             |      |                       |      |                       |      |
| Hi-ROM Entry                              | Word | 3                      | 555H                  | AAH  | 2AAH                   | 55H         | 555H                  | 88H  | —                           | —    | —                     | —    | —                     | —    |
|                                           | Byte |                        | AAAH                  |      | 555H                   |             | AAAH                  |      |                             |      |                       |      |                       |      |
| Hi-ROM Program (Note 5)                   | Word | 4                      | 555H                  | AAH  | 2AAH                   | 55H         | 555H                  | A0H  | PA                          | PD   | —                     | —    | —                     | —    |
|                                           | Byte |                        | AAAH                  |      | 555H                   |             | AAAH                  |      |                             |      |                       |      |                       |      |
| Hi-ROM Erase (Note 5)                     | Word | 6                      | 555H                  | AAH  | 2AAH                   | 55H         | 555H                  | 80H  | 555H                        | AAH  | 2AAH                  | 55H  | HRA                   | 30H  |
|                                           | Byte |                        | AAAH                  |      | 555H                   |             | AAAH                  |      | AAAH                        |      | 555H                  |      |                       |      |
| Hi-ROM Exit (Note 5)                      | Word | 4                      | 555H                  | AAH  | 2AAH                   | 55H         | (HRBA) 555H           | 90H  | XXXH                        | 00H  | —                     | —    | —                     | —    |
|                                           | Byte |                        | AAAH                  |      | 555H                   |             | (HRBA) AAAH           |      |                             |      |                       |      |                       |      |

# MB84VD2108X-85/MB84VD2109X-85

- 1 : Both Read/Reset commands are functionally equivalent, resetting the device to the read mode.
- 2 : This command is valid while Fast Mode.
- 3 : This command is valid while RESET = V<sub>DD</sub>.
- 4 : The valid Address is A<sub>0</sub> to A<sub>6</sub>.
- 5 : This command is valid while Hi-ROM mode.
- 6 : The data "00H" is also acceptable.

Address bits A<sub>12</sub> to A<sub>19</sub> = X = "H" or "L" for all address commands except for Program Address (PA) , Sector Address (SA) , and Bank Address (BA) .

Bus operations are defined in Table 2 "User Bus Operations".

RA = Address of the memory location to be read.

PA = Address of the memory location to be programmed.

Addresses are latched on the falling edge of the write pulse.

SA = Address of the sector to be erased. The combination of A<sub>19</sub>, A<sub>18</sub>, A<sub>17</sub>, A<sub>16</sub>, A<sub>15</sub>, A<sub>14</sub>, A<sub>13</sub>, and A<sub>12</sub> will uniquely select any sector.

BA = Bank address (A<sub>15</sub> to A<sub>19</sub>)

SPA = Sector group address to be protected. Set sector group address (SGA) and (A<sub>6</sub>, A<sub>1</sub>, A<sub>0</sub>) = (0, 1, 0) .

HRA = Address of the Hidden-ROM area.

MB84VD2108X (Top Boot Type)      Word mode : 0F8000H to 0FFFFFFH

Byte mode : 1F0000H to 1FFFFFFH

MB84VD2109X (Bottom Boot Type) Word mode : 000000H to 007FFFH

Byte mode : 000000H to 00FFFFFFH

HRBA = Bank address of the Hidden-ROM area.

MB84VD2108X (Top Boot Type)      : A<sub>15</sub> = A<sub>16</sub> = A<sub>17</sub> = A<sub>18</sub> = A<sub>19</sub> = A<sub>20</sub> = 1

MB84VD2109X (Bottom Boot Type) : A<sub>15</sub> = A<sub>16</sub> = A<sub>17</sub> = A<sub>18</sub> = A<sub>19</sub> = A<sub>20</sub> = 0

RD = Data read from location RA during read operation.

PD = Data to be programmed at location PA.

SD = Sector protection verify data. Output 01H at protected sector addresses and output 00H at unprotected sector addresses.

The system should generate the following address patterns;

Word mode : 555H or 2AAH to addresses A<sub>0</sub> to A<sub>10</sub>

Byte mode : AAH or 55H to addresses A<sub>-1</sub> and A<sub>0</sub> to A<sub>10</sub>

# MB84VD2108X-85/MB84VD2109X-85

## ■ ABSOLUTE MAXIMUM RATINGS

| Parameter                                                                                                                                                | Symbol                              | Rating |                       | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------|-----------------------|------|
|                                                                                                                                                          |                                     | Min.   | Max.                  |      |
| Storage Temperature                                                                                                                                      | Tstg                                | −55    | +125                  | °C   |
| Ambient Temperature with Power Applied                                                                                                                   | T <sub>A</sub>                      | −25    | +85                   | °C   |
| Voltage with Respect to Ground All pins except A <sub>9</sub> , $\overline{\text{OE}}$ , $\overline{\text{RESET}}$ , $\overline{\text{WP/ACC}}$ (Note 1) | V <sub>IN</sub> , V <sub>OUT</sub>  | −0.3   | V <sub>ccf</sub> +0.4 | V    |
|                                                                                                                                                          |                                     |        | V <sub>ccs</sub> +0.4 |      |
| V <sub>ccf</sub> /V <sub>ccs</sub> Supply (Note 1)                                                                                                       | V <sub>ccf</sub> , V <sub>ccs</sub> | −0.3   | +4.0                  | V    |
| A <sub>9</sub> and $\overline{\text{OE}}$ (Note 2)                                                                                                       | V <sub>IN</sub>                     | −0.3   | +13.0                 | V    |
| $\overline{\text{RESET}}$ (Note 2)                                                                                                                       | V <sub>IN</sub>                     | −0.5   | +13.0                 | V    |
| $\overline{\text{WP/ACC}}$ (Note 3)                                                                                                                      | V <sub>IN</sub>                     | −0.5   | +10.5                 | V    |

**WARNING:** Semiconductor devices can be permanently damaged by application of stress (voltage, current, temperature, etc.) in excess of absolute maximum ratings. Do not exceed these ratings.

- Notes
1. Minimum DC voltage on input or I/O pins is −0.3 V. During voltage transitions, input or I/O pins may undershoot V<sub>ss</sub> to −2.0 V for periods of up to 20 ns. Maximum DC voltage on input or I/O pins is V<sub>ccf</sub> +0.4 V or V<sub>ccs</sub> +0.4 V. During voltage transitions, input or I/O pins may overshoot to V<sub>ccf</sub> +2.0 V or V<sub>ccs</sub> +2.0 V for periods of up to 20 ns.
  2. Minimum DC input voltage on A<sub>9</sub> and  $\overline{\text{OE}}$  pin is −0.3 V. Minimum DC input voltage on  $\overline{\text{RESET}}$  pin is −0.5 V. During voltage transitions, A<sub>9</sub>,  $\overline{\text{OE}}$ , and  $\overline{\text{RESET}}$  pins may undershoot V<sub>ss</sub> to −2.0 V for periods of up to 20 ns.  
Voltage difference between input and supply voltage (V<sub>IN</sub>−V<sub>ccf</sub> or V<sub>ccs</sub>) does not exceed 9.0 V.  
Maximum DC input voltage on A<sub>9</sub>,  $\overline{\text{OE}}$ , and  $\overline{\text{RESET}}$  pins is +13.0 V which may overshoot to 14.0 V for periods of up to 20 ns.
  3. Minimum DC input voltage on  $\overline{\text{WP/ACC}}$  pin is −0.5 V. During voltage transitions,  $\overline{\text{WP/ACC}}$  pin may undershoot V<sub>ss</sub> to −2.0 V for periods of up to 20 ns. Maximum DC input voltage on  $\overline{\text{WP/ACC}}$  pin is +10.5 V which may overshoot to 12.0 V for periods of up to 20 ns, when V<sub>ccf</sub> is applied.

## ■ RECOMMENDED OPERATING RANGES

| Parameter                                          | Symbol                              | Value |      | Unit |
|----------------------------------------------------|-------------------------------------|-------|------|------|
|                                                    |                                     | Min.  | Max. |      |
| Ambient Temperature                                | T <sub>A</sub>                      | −25   | +85  | °C   |
| V <sub>ccf</sub> /V <sub>ccs</sub> Supply Voltages | V <sub>ccf</sub> , V <sub>ccs</sub> | +2.7  | +3.6 | V    |

Operating ranges define those limits between which the functionality of the device is guaranteed.

**WARNING:** The recommended operating conditions are required in order to ensure the normal operation of the semiconductor device. All of the device's electrical characteristics are warranted when the device is operated within these ranges.

Always use semiconductor devices within their recommended operating condition ranges. Operation outside these ranges may adversely affect reliability and could result in device failure.

No warranty is made with respect to uses, operating conditions, or combinations not represented on the data sheet. Users considering application outside the listed conditions are advised to contact their FUJITSU representatives beforehand.

# MB84VD2108X-85/MB84VD2109X-85

## ■ ELECTRICAL CHARACTERISTICS

### 1. DC Characteristics

| Parameter Symbol | Parameter Description                                       | Test Conditions                                                                                                                                                                                                                                                   |                                  | Min. | Typ. | Max. | Unit    |
|------------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|------|------|---------|
| $I_{LI}$         | Input Leakage Current                                       | $V_{IN} = V_{SS}$ to $V_{CCf}$ , $V_{CCS}$                                                                                                                                                                                                                        |                                  | -1.0 | —    | +1.0 | $\mu A$ |
| $I_{LO}$         | Output Leakage Current                                      | $V_{OUT} = V_{SS}$ to $V_{CCf}$ , $V_{CCS}$                                                                                                                                                                                                                       |                                  | -1.0 | —    | +1.0 | $\mu A$ |
| $I_{LIT}$        | $\overline{RESET}$ Inputs Leakage Current                   | $V_{CCf} = V_{CCf} \text{ Max.}$ , $V_{CCS} = V_{CCS} \text{ Max.}$ ,<br>$\overline{RESET} = 12.5 \text{ V}$                                                                                                                                                      |                                  | —    | —    | 35   | $\mu A$ |
| $I_{LIA}$        | ACC Input Leakage Current                                   | $V_{CCf} = V_{CCf} \text{ Max.}$ , $V_{CCS} = V_{CCS} \text{ Max.}$ ,<br>$\overline{WP}/\text{ACC} = V_{ACC} \text{ Max.}$                                                                                                                                        |                                  | —    | —    | 20   | mA      |
| $I_{CC1f}$       | Flash $V_{CC}$ Active Current (Read) (Note 1)               | $\overline{CEf} = V_{IL}$ ,<br>$\overline{OE} = V_{IH}$                                                                                                                                                                                                           | $t_{CYCLE} = 5 \text{ MHz}$ Byte | —    | —    | 13   | mA      |
|                  |                                                             |                                                                                                                                                                                                                                                                   | $t_{CYCLE} = 5 \text{ MHz}$ Word | —    | —    | 15   |         |
|                  |                                                             |                                                                                                                                                                                                                                                                   | $t_{CYCLE} = 1 \text{ MHz}$ Byte | —    | —    | 7    | mA      |
|                  |                                                             |                                                                                                                                                                                                                                                                   | $t_{CYCLE} = 1 \text{ MHz}$ Word | —    | —    | 7    |         |
| $I_{CC2f}$       | Flash $V_{CC}$ Active Current (Program/Erase) (Note 2)      | $\overline{CEf} = V_{IL}$ , $\overline{OE} = V_{IH}$                                                                                                                                                                                                              |                                  | —    | —    | 35   | mA      |
| $I_{CC3f}$       | Flash $V_{CC}$ Active Current (Read-While-Program) (Note 5) | $\overline{CEf} = V_{IL}$ , $\overline{OE} = V_{IH}$                                                                                                                                                                                                              | Byte                             | —    | —    | 48   | mA      |
|                  |                                                             |                                                                                                                                                                                                                                                                   | Word                             | —    | —    | 50   |         |
| $I_{CC4f}$       | Flash $V_{CC}$ Active Current (Read-While-Erase) (Note 5)   | $\overline{CEf} = V_{IL}$ , $\overline{OE} = V_{IH}$                                                                                                                                                                                                              | Byte                             | —    | —    | 48   | mA      |
|                  |                                                             |                                                                                                                                                                                                                                                                   | Word                             | —    | —    | 50   |         |
| $I_{CC5f}$       | Flash $V_{CC}$ Active Current (Erase-Suspend-Program)       | $\overline{CEf} = V_{IL}$ , $\overline{OE} = V_{IH}$                                                                                                                                                                                                              |                                  | —    | —    | 35   | mA      |
| $I_{CC1S}$       | SRAM $V_{CC}$ Active Current                                | $V_{CCS} = V_{CC} \text{ Max.}$ ,<br>$\overline{CE1s} = V_{IL}$ ,<br>$\overline{CE2s} = V_{IH}$                                                                                                                                                                   | $t_{CYCLE} = 10 \text{ MHz}$     | —    | —    | 50   | mA      |
| $I_{CC2S}$       | SRAM $V_{CC}$ Active Current                                | $\overline{CE1s} = 0.2 \text{ V}$ ,<br>$\overline{CE2s} = V_{CCS} - 0.2 \text{ V}$                                                                                                                                                                                | $t_{CYCLE} = 10 \text{ MHz}$     | —    | —    | 40   | mA      |
|                  |                                                             |                                                                                                                                                                                                                                                                   | $t_{CYCLE} = 1 \text{ MHz}$      | —    | —    | 8    | mA      |
| $I_{SB1f}$       | Flash $V_{CC}$ Standby Current                              | $V_{CCf} = V_{CC} \text{ Max.}$ , $\overline{CEf} = V_{CCf} \pm 0.3 \text{ V}$<br>$\overline{RESET} = V_{CCf} \pm 0.3 \text{ V}$ ,<br>$\overline{WP}/\text{ACC} = V_{CCf} \pm 0.3 \text{ V}$                                                                      |                                  | —    | 1    | 5    | $\mu A$ |
| $I_{SB2f}$       | Flash $V_{CC}$ Standby Current ( $\overline{RESET}$ )       | $V_{CCf} = V_{CC} \text{ Max.}$ , $\overline{RESET} = V_{SS} \pm 0.3 \text{ V}$ ,<br>$\overline{WP}/\text{ACC} = V_{CCf} \pm 0.3 \text{ V}$                                                                                                                       |                                  | —    | 1    | 5    | $\mu A$ |
| $I_{SB3f}$       | Flash $V_{CC}$ Current (Automatic Sleep Mode) (Note 3)      | $V_{CCf} = V_{CC} \text{ Max.}$ , $\overline{CEf} = V_{SS} \pm 0.3 \text{ V}$<br>$\overline{RESET} = V_{CCf} \pm 0.3 \text{ V}$ ,<br>$\overline{WP}/\text{ACC} = V_{CCf} \pm 0.3 \text{ V}$<br>$V_{IN} = V_{CCf} \pm 0.3 \text{ V}$ or $V_{SS} \pm 0.3 \text{ V}$ |                                  | —    | 1    | 5    | $\mu A$ |
| $I_{SB1S}$       | SRAM $V_{CC}$ Standby Current                               | $\overline{CE1s} \geq V_{CCS} - 0.2 \text{ V}$ , $\overline{CE2s} \geq V_{CCS} - 0.2 \text{ V}$                                                                                                                                                                   |                                  | —    | 0.2  | 7    | $\mu A$ |
| $I_{SB2S}$       | SRAM $V_{CC}$ Standby Current                               | $\overline{CE2s} \leq 0.2 \text{ V}$                                                                                                                                                                                                                              |                                  | —    | 0.2  | 7    | $\mu A$ |

(Continued)

# MB84VD2108X-85/MB84VD2109X-85

(Continued)

| Parameter Symbol | Parameter Description                                                                                   | Test Conditions                                                                                                  | Min. | Typ. | Max.                  | Unit |
|------------------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------|------|-----------------------|------|
| V <sub>IL</sub>  | Input Low Level                                                                                         | —                                                                                                                | −0.3 | —    | 0.5                   | V    |
| V <sub>IH</sub>  | Input High Level                                                                                        | —                                                                                                                | 2.4  | —    | V <sub>CC</sub> +0.3* | V    |
| V <sub>ID</sub>  | Voltage for Sector Protection, and Temporary Sector Unprotection ( $\overline{\text{RESET}}$ ) (Note 4) | —                                                                                                                | 11.5 | —    | 12.5                  | V    |
| V <sub>ACC</sub> | Voltage for Program Acceleration ( $\overline{\text{WP/ACC}}$ ) (Note4)                                 | —                                                                                                                | 8.5  | 9.0  | 9.5                   | V    |
| V <sub>OL</sub>  | Output Low Voltage Level                                                                                | V <sub>ccf</sub> = V <sub>ccf</sub> Min., V <sub>ccs</sub> = V <sub>ccs</sub> Min.,<br>I <sub>OL</sub> = 1.0 mA  | —    | —    | 0.4                   | V    |
| V <sub>OH</sub>  | Output High Voltage Level                                                                               | V <sub>ccf</sub> = V <sub>ccf</sub> Min., V <sub>ccs</sub> = V <sub>ccs</sub> Min.,<br>I <sub>OH</sub> = −0.5 mA | 2.4  | —    | —                     | V    |
| V <sub>LKO</sub> | Flash Low V <sub>ccf</sub> Lock-Out Voltage                                                             | —                                                                                                                | 2.3  | —    | 2.5                   | V    |

\*: V<sub>CC</sub> indicates lower of V<sub>ccf</sub> or V<sub>ccs</sub>

- Notes :
1. The I<sub>CC</sub> current listed includes both the DC operating current and the frequency dependent component.
  2. I<sub>CC</sub> active while Embedded Algorithm (program or erase) is in progress.
  3. Automatic sleep mode enables the low power mode when address remain stable for 150 ns.
  4. Applicable for only V<sub>ccf</sub> applying.
  5. Embedded Algorithm (program or erase) is in progress. (@5 MHz)

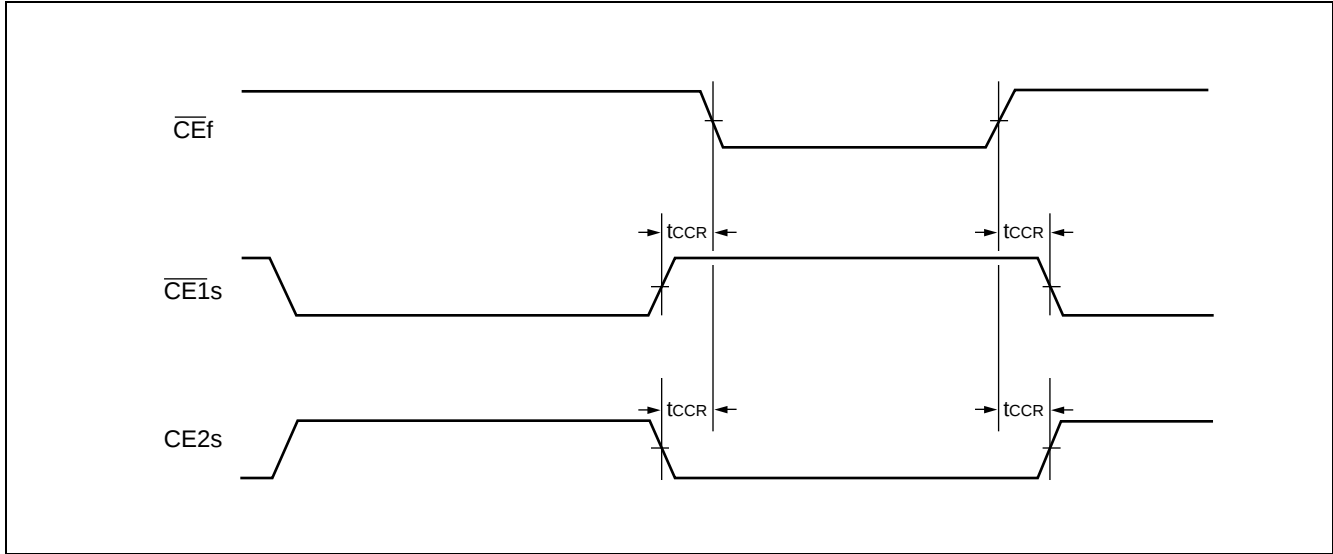
# MB84VD2108X-85/MB84VD2109X-85

## 2. AC Characteristics

### • $\overline{\text{CE}}$ Timing

| Parameter Symbols |                  | Description                         | Test Setup |      | -85 | Unit |
|-------------------|------------------|-------------------------------------|------------|------|-----|------|
| JEDEC             | Standard         |                                     |            |      |     |      |
| —                 | $t_{\text{CCR}}$ | $\overline{\text{CE}}$ Recover Time | —          | Min. | 0   | ns   |

### • Timing Diagram for alternating SRAM to Flash



# MB84VD2108X-85/MB84VD2109X-85

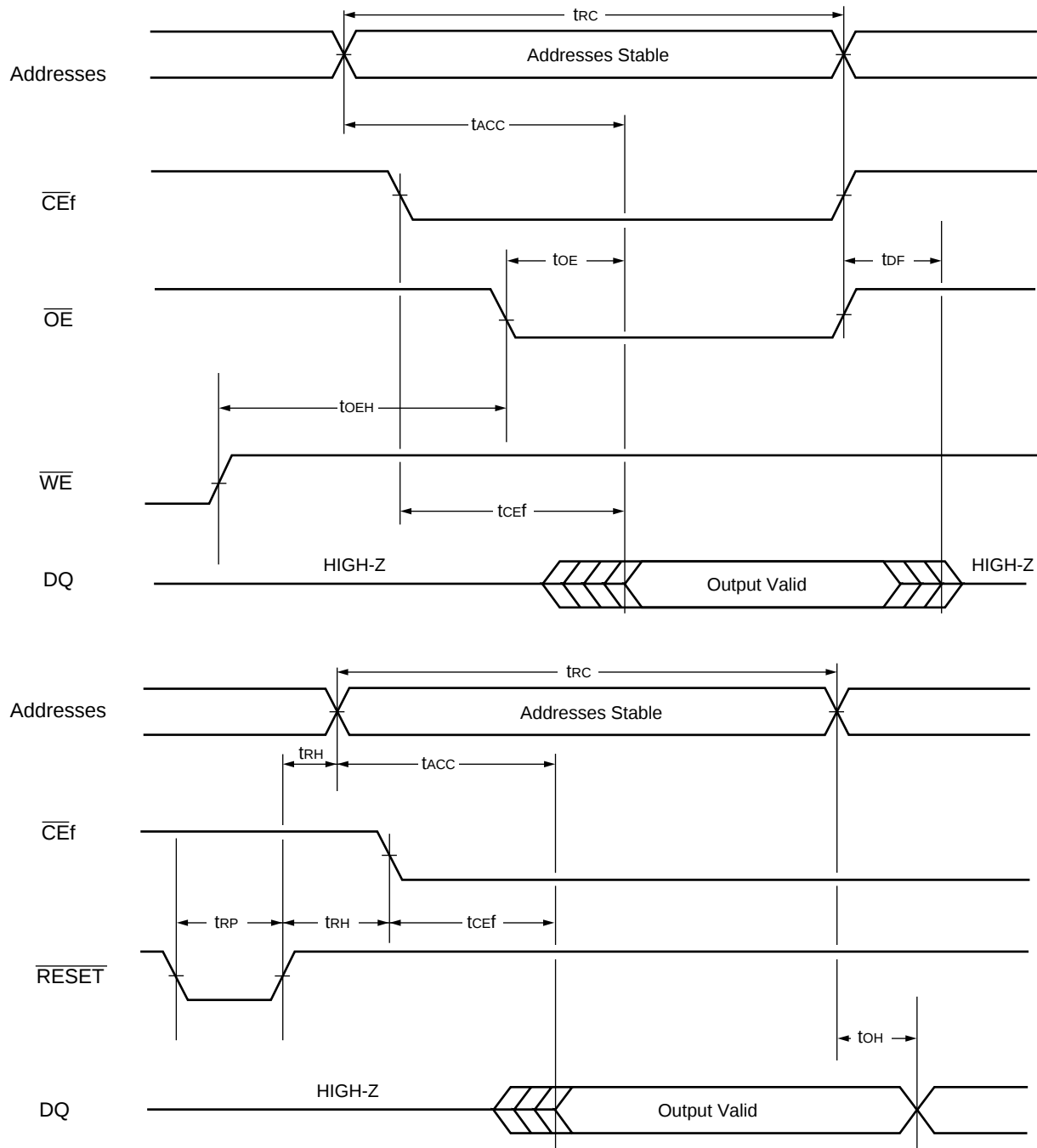
## • Read Only Operations Characteristics (Flash)

| Parameter Symbols |             | Description                                                                                   | Test Setup                                            | -85 (Note) |      | Unit    |
|-------------------|-------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------|------------|------|---------|
| JEDEC             | Standard    |                                                                                               |                                                       | Min.       | Max. |         |
| $t_{AVAV}$        | $t_{RC}$    | Read Cycle Time                                                                               | —                                                     | 85         | —    | ns      |
| $t_{AVQV}$        | $t_{ACC}$   | Address to Output Delay                                                                       | $\overline{CE}f = V_{IL}$<br>$\overline{OE} = V_{IL}$ | —          | 85   | ns      |
| $t_{ELQV}$        | $t_{CEf}$   | Chip Enable to Output Delay                                                                   | $\overline{OE} = V_{IL}$                              | —          | 85   | ns      |
| $t_{GLQV}$        | $t_{OE}$    | Output Enable to Output Delay                                                                 | —                                                     | —          | 35   | ns      |
| $t_{EHQZ}$        | $t_{DF}$    | Chip Enable to Output High-Z                                                                  | —                                                     | —          | 30   | ns      |
| $t_{GHQZ}$        | $t_{DF}$    | Output Enable to Output High-Z                                                                | —                                                     | —          | 30   | ns      |
| $t_{AXQX}$        | $t_{OH}$    | Output Hold Time From Addresses, $\overline{CE}f$ or $\overline{OE}$ , Whichever Occurs First | —                                                     | 0          | —    | ns      |
| —                 | $t_{READY}$ | $\overline{RESET}$ Pin Low to Read Mode                                                       | —                                                     | —          | 20   | $\mu s$ |

Note : Test Conditions-Output Load : 1 TTL gate and 30 pF  
 Input rise and fall times : 5 ns  
 Input pulse levels : 0.0 V to 3.0 V  
 Timing measurement reference level  
 Input : 1.5 V  
 Output : 1.5 V

# MB84VD2108X-85/MB84VD2109X-85

## • Read Cycle (Flash)



## MB84VD2108X-85/MB84VD2109X-85

## • Erase/Program Operations (Flash)

| Parameter Symbols |             | Description                                                                               | -85  |      |      | Unit    |
|-------------------|-------------|-------------------------------------------------------------------------------------------|------|------|------|---------|
| JEDEC             | Standard    |                                                                                           | Min. | Typ. | Max. |         |
| $t_{AVAV}$        | $t_{WC}$    | Write Cycle Time                                                                          | 85   | —    | —    | ns      |
| $t_{AVWL}$        | $t_{AS}$    | Address Setup Time ( $\overline{WE}$ to Addr.)                                            | 0    | —    | —    | ns      |
| —                 | $t_{ASO}$   | Address Setup Time to $\overline{CEf}$ Low During Toggle Bit Polling                      | 15   | —    | —    | ns      |
| $t_{WLAX}$        | $t_{AH}$    | Address Hold Time ( $\overline{WE}$ to Addr.)                                             | 45   | —    | —    | ns      |
| —                 | $t_{AHT}$   | Address Hold Time from $\overline{CEf}$ or $\overline{OE}$ High During Toggle Bit Polling | 0    | —    | —    | ns      |
| $t_{DVWH}$        | $t_{DS}$    | Data Setup Time                                                                           | 35   | —    | —    | ns      |
| $t_{WHDX}$        | $t_{DH}$    | Data Hold Time                                                                            | 0    | —    | —    | ns      |
| —                 | $t_{OES}$   | Output Enable Setup Time                                                                  | 0    | —    | —    | ns      |
| —                 | $t_{OEh}$   | Output Enable Hold Time                                                                   | 0    | —    | —    | ns      |
|                   |             | Read<br>Toggle and Data Polling                                                           | 10   | —    | —    | ns      |
| —                 | $t_{CEPH}$  | $\overline{CEf}$ High During Toggle Bit Polling                                           | 20   | —    | —    | ns      |
| —                 | $t_{OEPh}$  | $\overline{OE}$ High During Toggle Bit Polling                                            | 20   | —    | —    | ns      |
| $t_{GHEL}$        | $t_{GHEL}$  | Read Recover Time Before Write ( $\overline{OE}$ to $\overline{CEf}$ )                    | 0    | —    | —    | ns      |
| $t_{GHWL}$        | $t_{GHWL}$  | Read Recover Time Before Write ( $\overline{OE}$ to $\overline{WE}$ )                     | 0    | —    | —    | ns      |
| $t_{WLEL}$        | $t_{WS}$    | $\overline{WE}$ Setup Time ( $\overline{CEf}$ to $\overline{WE}$ )                        | 0    | —    | —    | ns      |
| $t_{ELWL}$        | $t_{CS}$    | $\overline{CEf}$ Setup Time ( $\overline{WE}$ to $\overline{CEf}$ )                       | 0    | —    | —    | ns      |
| $t_{EHWH}$        | $t_{WH}$    | $\overline{WE}$ Hold Time ( $\overline{CEf}$ to $\overline{WE}$ )                         | 0    | —    | —    | ns      |
| $t_{WHEH}$        | $t_{CH}$    | $\overline{CEf}$ Hold Time ( $\overline{WE}$ to $\overline{CEf}$ )                        | 0    | —    | —    | ns      |
| $t_{WLWH}$        | $t_{WP}$    | Write Pulse Width                                                                         | 35   | —    | —    | ns      |
| $t_{ELEH}$        | $t_{CP}$    | $\overline{CEf}$ Pulse Width                                                              | 35   | —    | —    | ns      |
| $t_{WHWL}$        | $t_{WPH}$   | Write Pulse Width High                                                                    | 30   | —    | —    | ns      |
| $t_{EHEL}$        | $t_{CPH}$   | $\overline{CEf}$ Pulse Width High                                                         | 30   | —    | —    | ns      |
| $t_{WHWH1}$       | $t_{WHWH1}$ | Byte Programming Operation                                                                | —    | 8    | —    | $\mu s$ |
|                   |             | Word Programming Operation                                                                | —    | 16   | —    | $\mu s$ |
| $t_{WHWH2}$       | $t_{WHWH2}$ | Sector Erase Operation (Note 1)                                                           | —    | 1    | —    | s       |

(Continued)

# MB84VD2108X-85/MB84VD2109X-85

(Continued)

| Parameter Symbols |                    | Description                                             | -85  |      |      | Unit |
|-------------------|--------------------|---------------------------------------------------------|------|------|------|------|
| JEDEC             | Standard           |                                                         | Min. | Typ. | Max. |      |
| —                 | t <sub>VCS</sub>   | V <sub>CCf</sub> Setup Time                             | 50   | —    | —    | μs   |
| —                 | t <sub>VLHT</sub>  | Voltage Transition Time (Note 2)                        | 4    | —    | —    | μs   |
| —                 | t <sub>VIDR</sub>  | Rise Time to V <sub>ID</sub> (Note 2)                   | 500  | —    | —    | ns   |
| —                 | t <sub>VACCR</sub> | Rise Time to V <sub>ACC</sub>                           | 500  | —    | —    | ns   |
| —                 | t <sub>RB</sub>    | Recover Time from RY/ $\overline{\text{BY}}$            | 0    | —    | —    | ns   |
| —                 | t <sub>RP</sub>    | $\overline{\text{RESET}}$ Pulse Width                   | 500  | —    | —    | ns   |
| —                 | t <sub>EOE</sub>   | Delay Time from Embedded Output Enable                  | —    | —    | 85   | ns   |
| —                 | t <sub>RH</sub>    | $\overline{\text{RESET}}$ High Level Period Before Read | 200  | —    | —    | ns   |
| —                 | t <sub>BUSY</sub>  | Program/Erase Valid to RY/ $\overline{\text{BY}}$ Delay | —    | —    | 90   | ns   |
| —                 | t <sub>TOW</sub>   | Erase Time-out Time (Note 3)                            | 50   | —    | —    | μs   |
| —                 | t <sub>SPD</sub>   | Erase Suspend Transition Time (Note 4)                  | —    | —    | 20   | μs   |

Notes : 1.This does not include the preprogramming time.

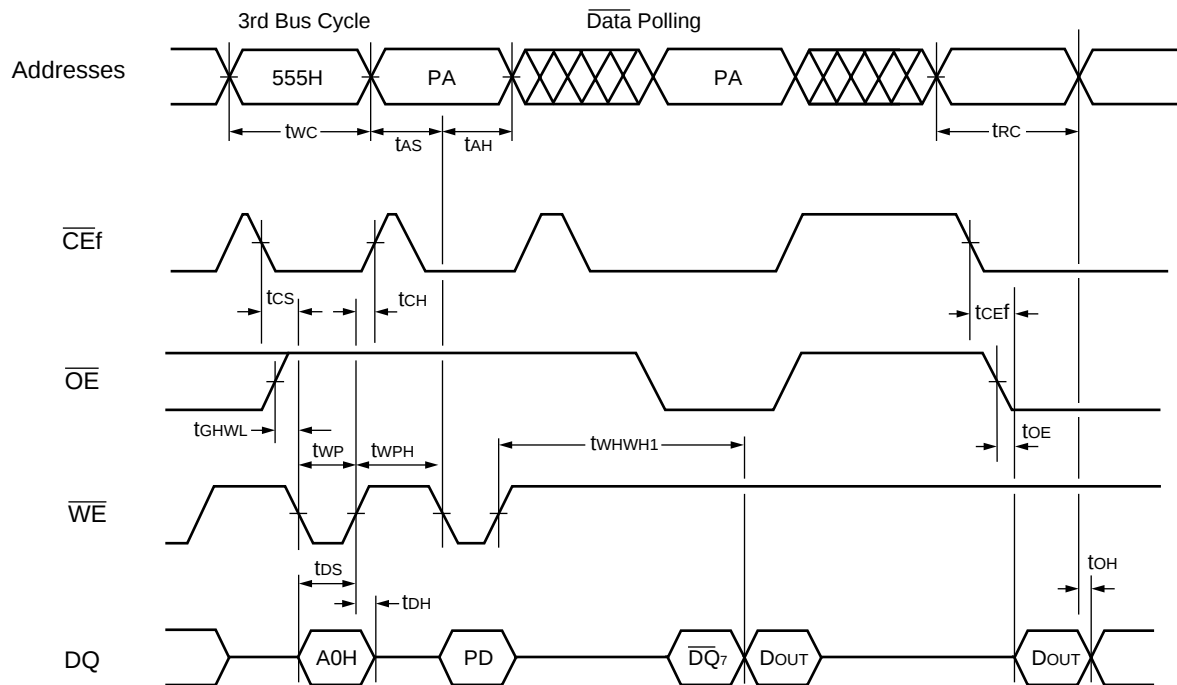
2.This timing is for Sector Protection Operation.

3.The time between writes must be less than “t<sub>TOW</sub>” otherwise that command will not be accepted and erasure will start. A time-out or “t<sub>TOW</sub>” from the rising edge of last  $\overline{\text{CEf}}$  or  $\overline{\text{WE}}$  whichever happens first will initiate the execution of the Sector Erase command (s) .

4.When the Erase Suspend command is written during the Sector Erase operation, the device will take a maximum of “t<sub>SPD</sub>” to suspend the erase operation.

# MB84VD2108X-85/MB84VD2109X-85

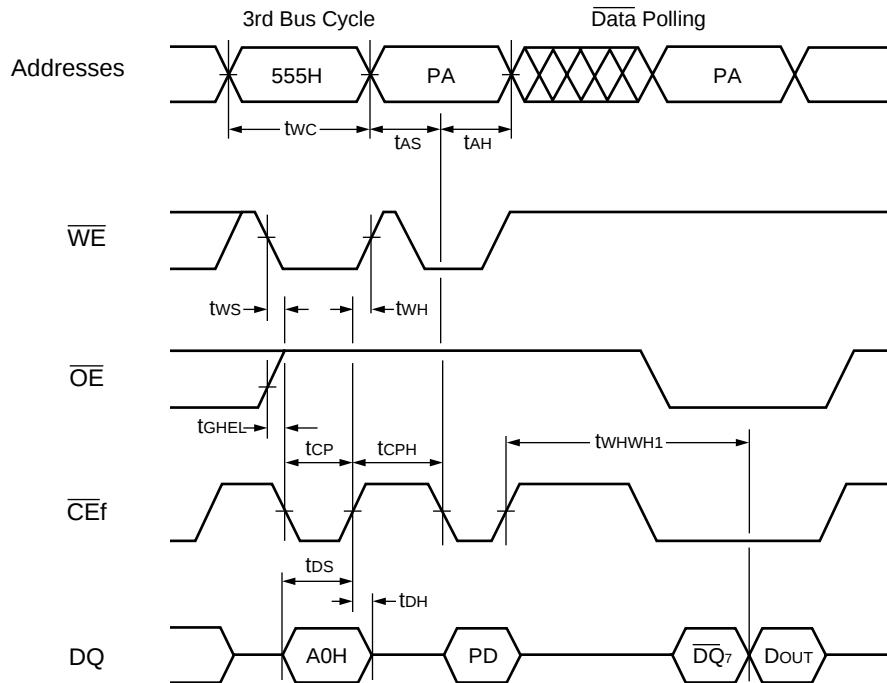
## • Write Cycle ( $\overline{\text{WE}}$ control) (Flash)



- Notes :
1. PA is address of the memory location to be programmed.
  2. PD is data to be programmed at byte address.
  3.  $\overline{\text{DQ}}_7$  is the output of the complement of the data written to the device.
  4. DOUT is the output of the data written to the device.
  5. Figure indicates last two bus cycles out of four bus cycle sequence.
  6. These waveforms are for the  $\times 16$  mode. (The addresses differ from  $\times 8$  mode.)

# MB84VD2108X-85/MB84VD2109X-85

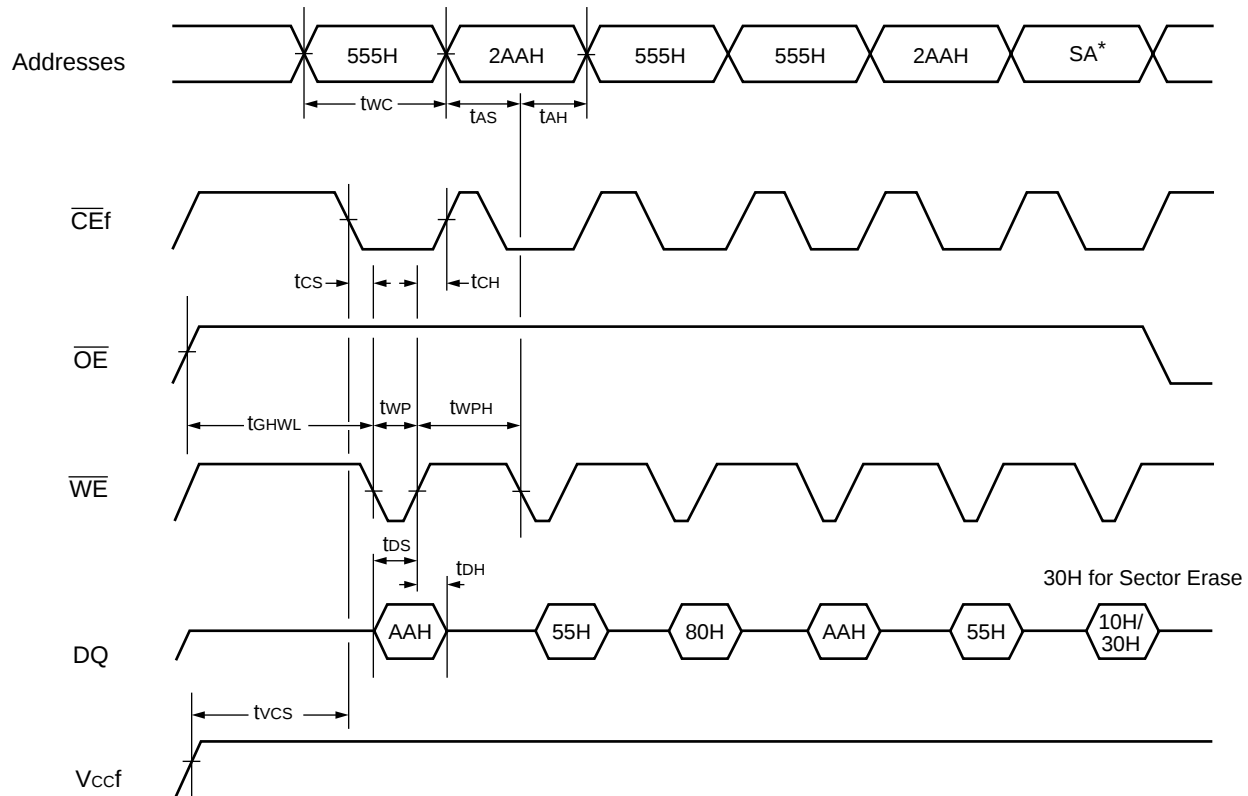
## • Write Cycle ( $\overline{\text{CEf}}$ control) (Flash)



- Notes :
1. PA is address of the memory location to be programmed.
  2. PD is data to be programmed at byte address.
  3.  $\overline{\text{DQ}}_7$  is the output of the complement of the data written to the device.
  4.  $\text{DOUT}$  is the output of the data written to the device.
  5. Figure indicates last two bus cycles out of four bus cycle sequence.
  6. These waveforms are for the  $\times 16$  mode. (The addresses differ from  $\times 8$  mode.)

# MB84VD2108X-85/MB84VD2109X-85

## • AC Waveforms Chip/Sector Erase Operations (Flash)

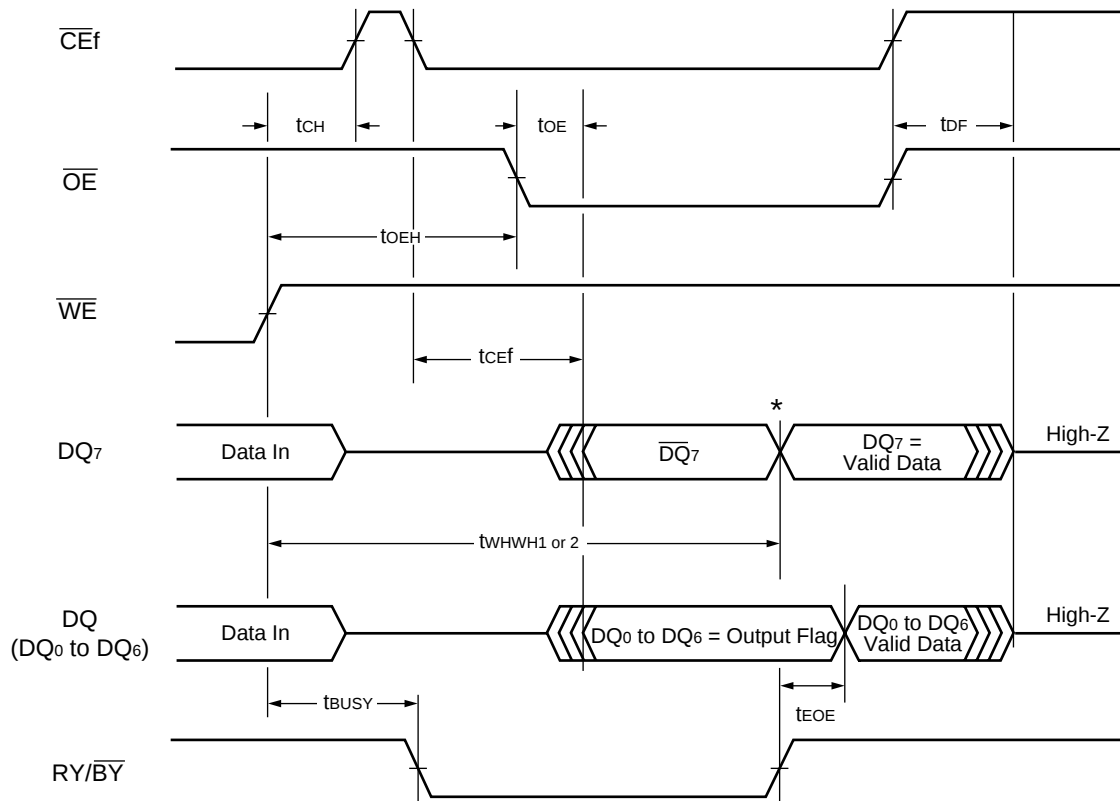


\* : SA is the sector address for Sector Erase. Addresses = 555H for Chip Erase.

Note : These waveforms are for the  $\times 16$  mode. (The addresses differ from  $\times 8$  mode.)

# MB84VD2108X-85/MB84VD2109X-85

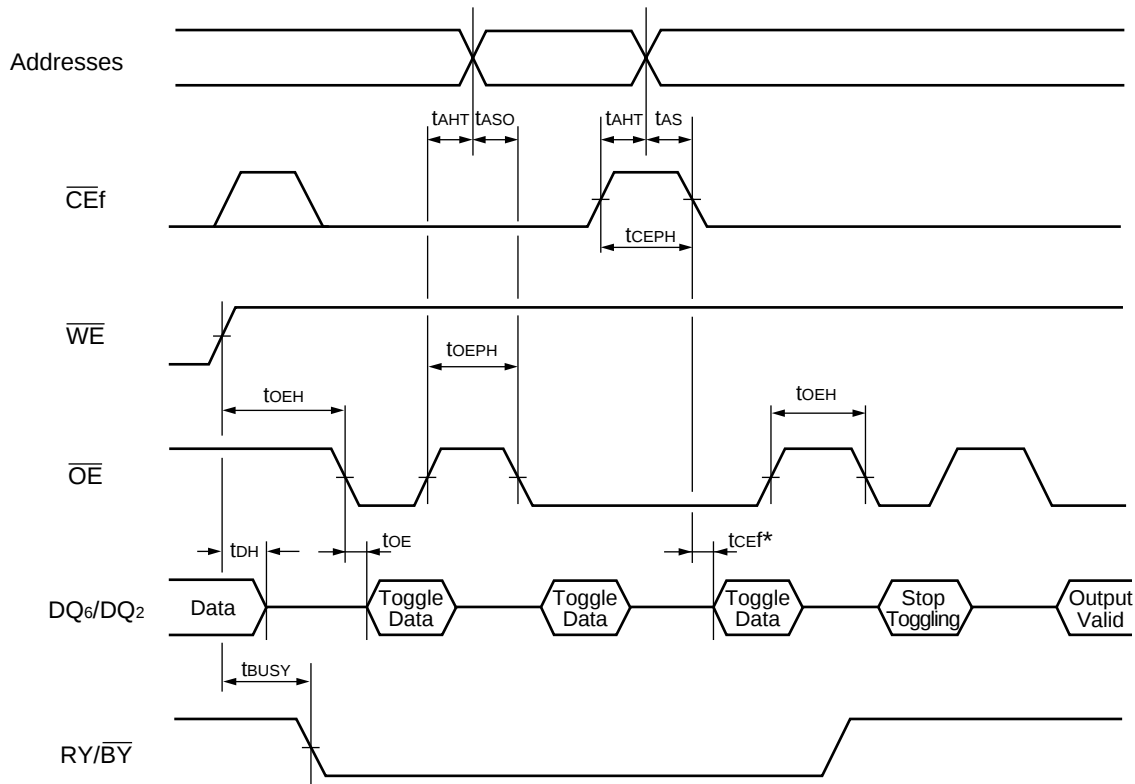
## • AC Waveforms for Data Polling during Embedded Algorithm Operations (Flash)



\* : DQ<sub>7</sub> = Valid Data (The device has completed the Embedded operation.)

# MB84VD2108X-85/MB84VD2109X-85

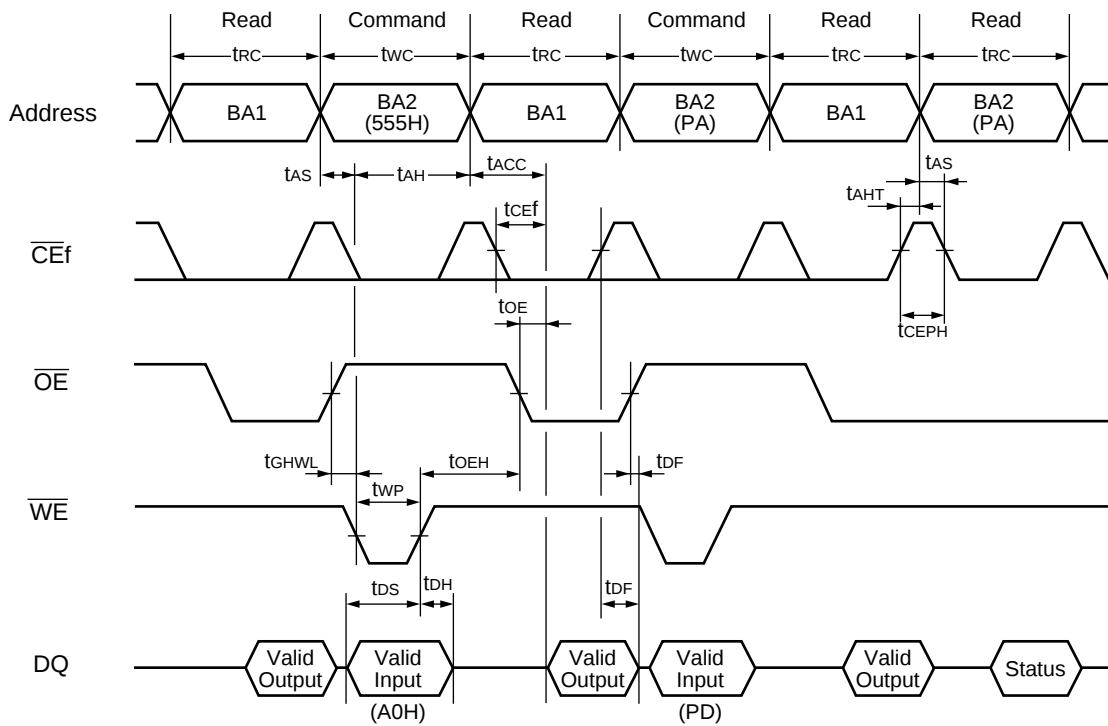
## • AC Waveforms for Toggle Bit during Embedded Algorithm Operations (Flash)



\* :  $DQ_6$  stops toggling (The device has completed the Embedded operation) .

# MB84VD2108X-85/MB84VD2109X-85

## • Back-to-back Read/Write Timing Diagram (Flash)



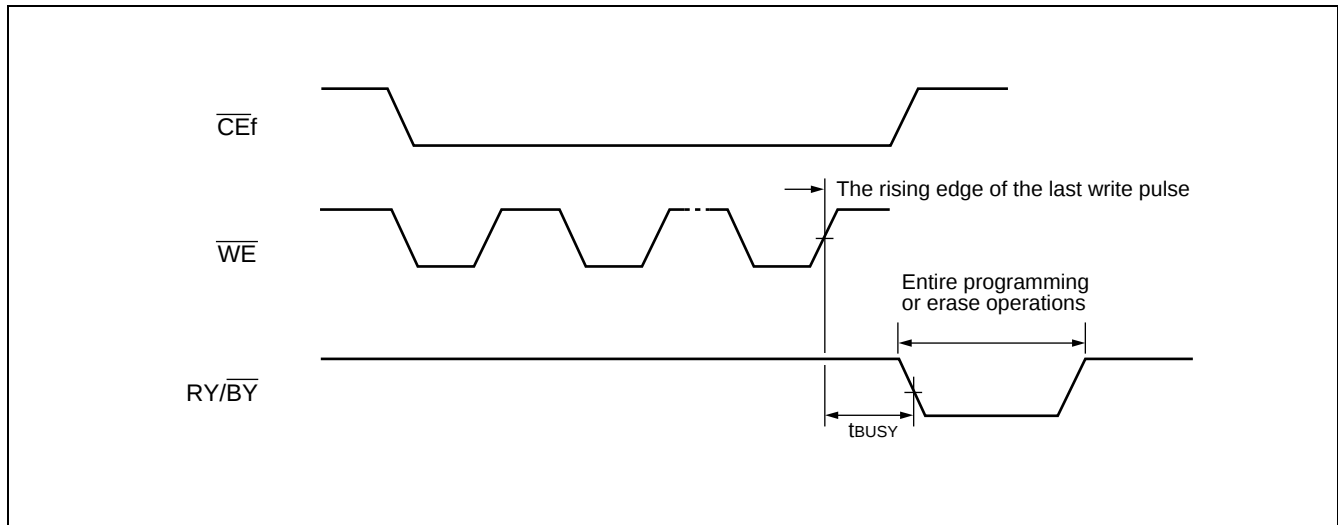
Note : This is example of Read for Bank 1 and Embedded Algorithm (program) for Bank 2.

BA1 : Address of Bank 1.

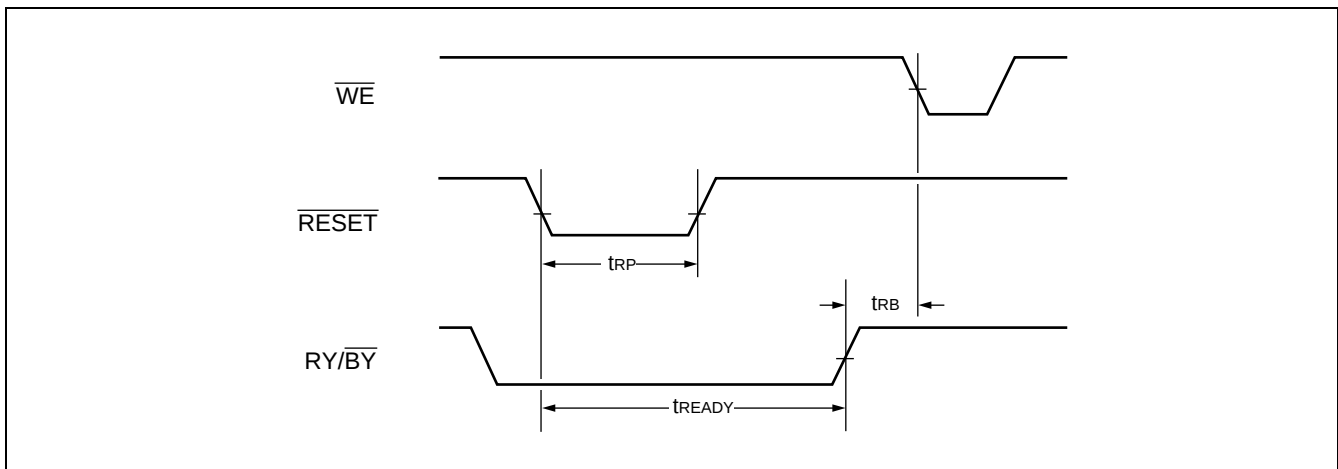
BA2 : Address of Bank 2.

# MB84VD2108X-85/MB84VD2109X-85

## • $\overline{RY}/\overline{BY}$ Timing Diagram during Write/Erase Operations (Flash)

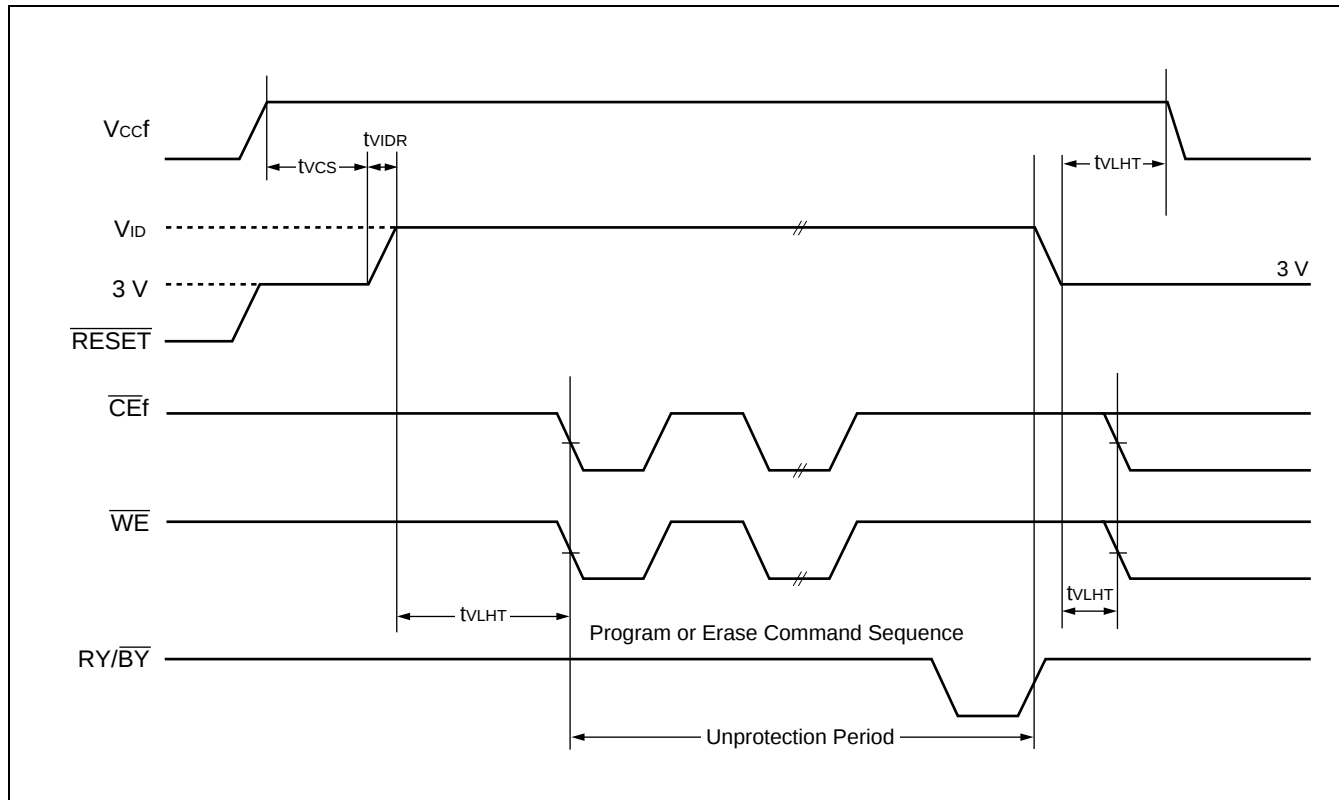


## • $\overline{RESET}$ , $\overline{RY}/\overline{BY}$ Timing Diagram (Flash)



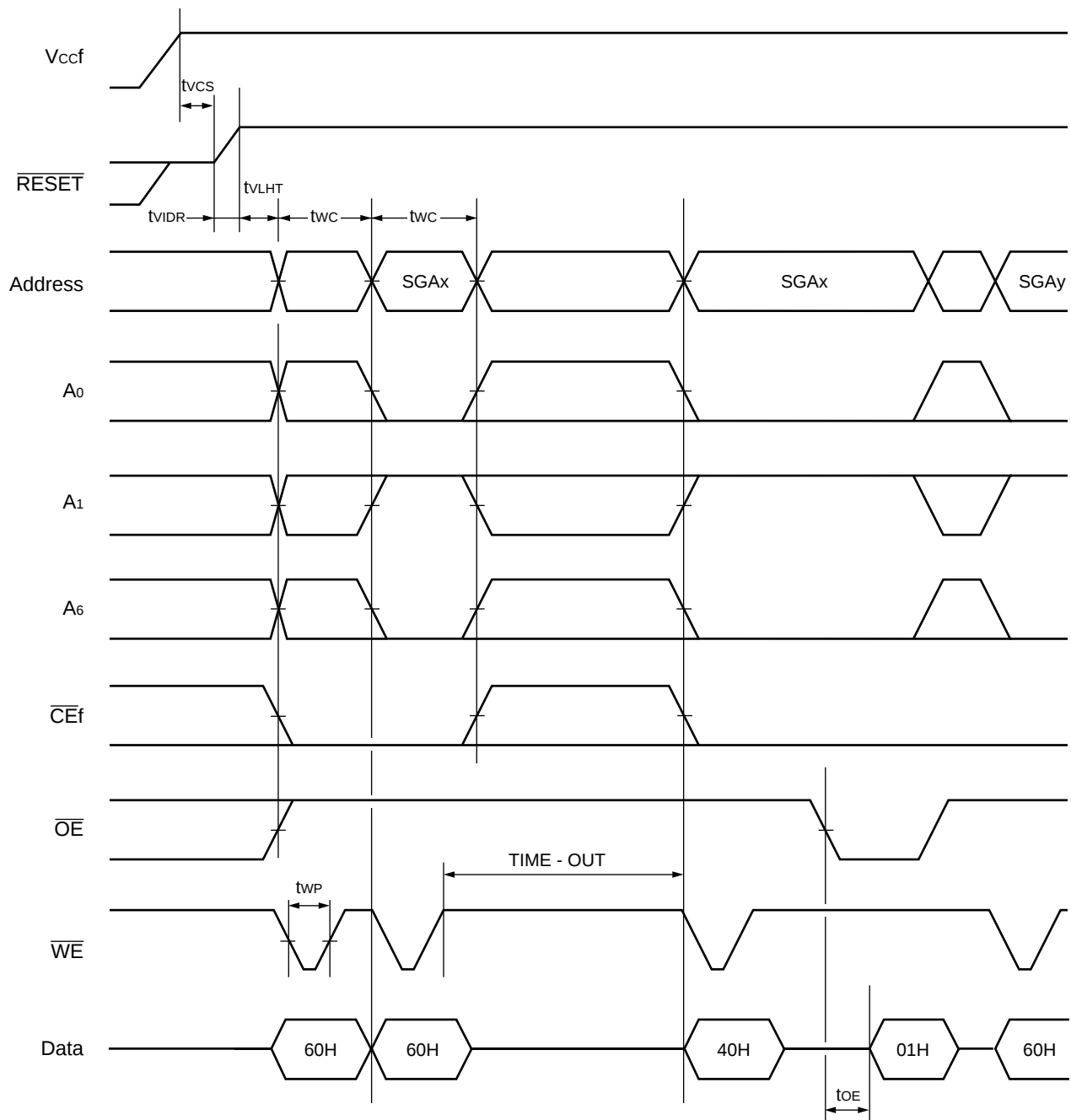
# MB84VD2108X-85/MB84VD2109X-85

## • Temporary Sector Unprotection (Flash)



# MB84VD2108X-85/MB84VD2109X-85

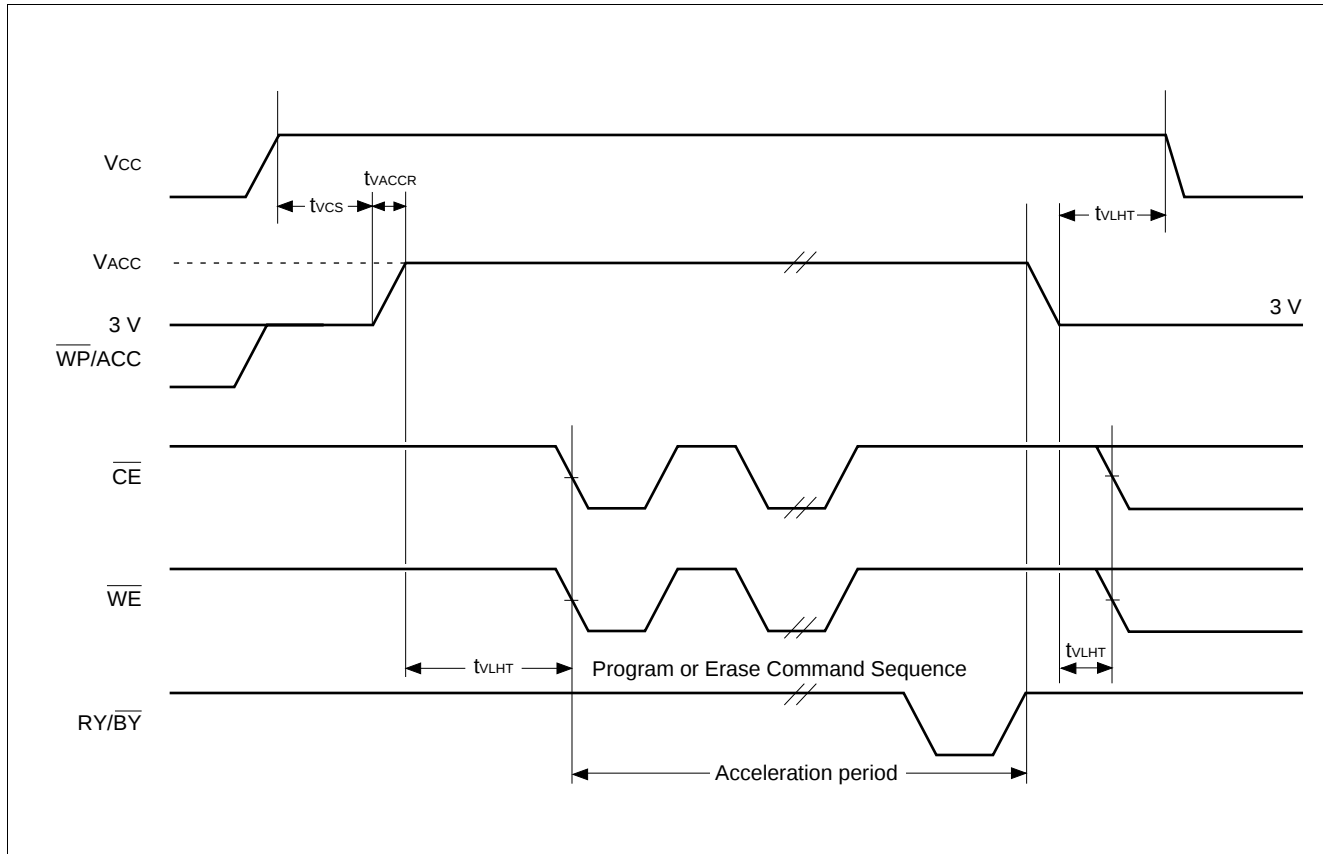
## • Extended Sector Protection (Flash)



SGAx : Sector Group Address to be protected  
 SGAy : Next Group Sector Address to be protected  
 TIME-OUT : Time-Out window = 250  $\mu$ s (min.)

# MB84VD2108X-85/MB84VD2109X-85

## • Accelerated Program (Flash)



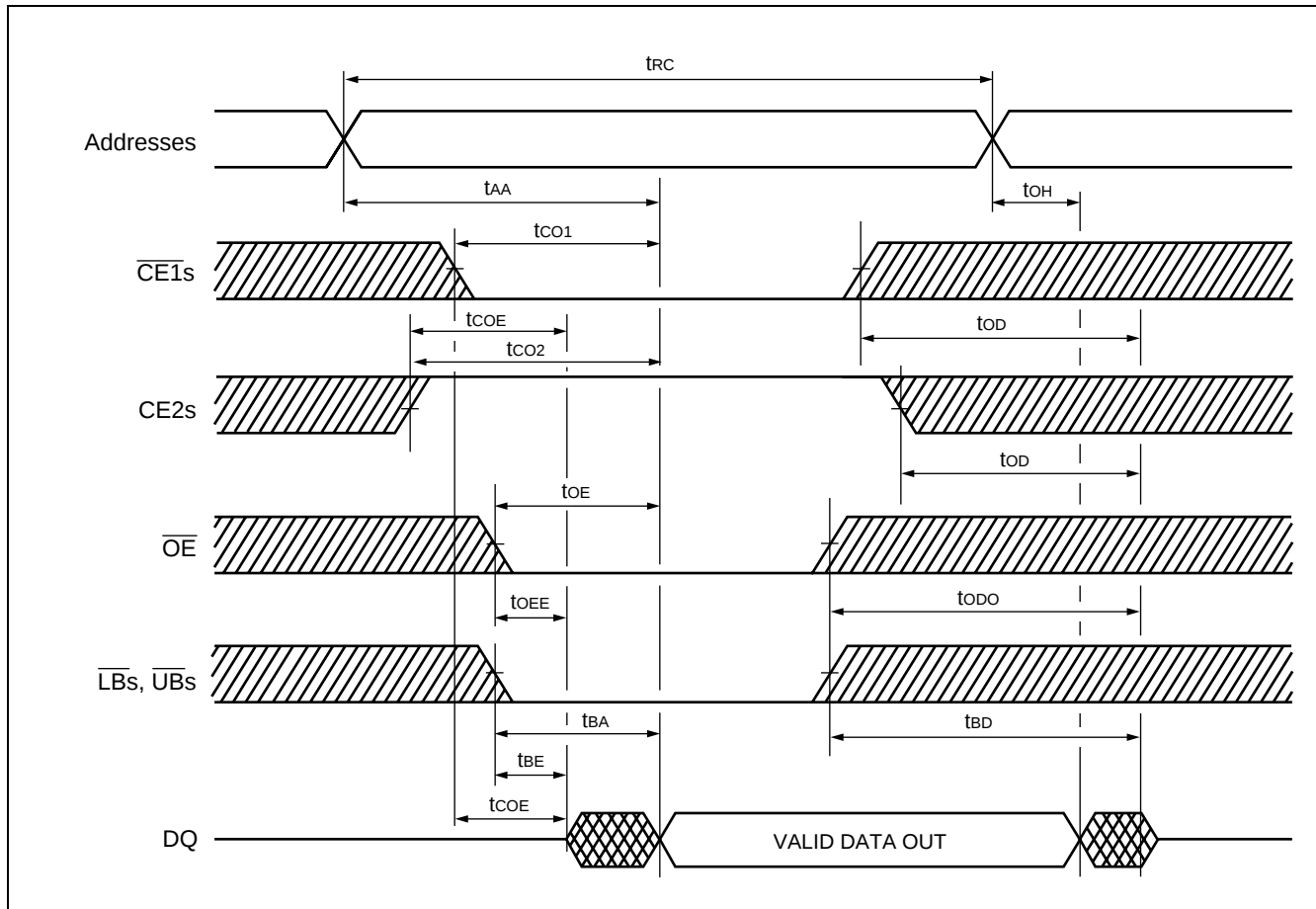
# MB84VD2108X-85/MB84VD2109X-85

## • Read Cycle (SRAM)

| Parameter Symbol | Parameter Description                                               | Min. | Max. | Unit |
|------------------|---------------------------------------------------------------------|------|------|------|
| $t_{RC}$         | Read Cycle Time                                                     | 85   | —    | ns   |
| $t_{AA}$         | Address Access Time                                                 | —    | 85   | ns   |
| $t_{CO1}$        | Chip Enable ( $\overline{CE1s}$ ) Access Time                       | —    | 85   | ns   |
| $t_{CO2}$        | Chip Enable (CE2s) Access Time                                      | —    | 85   | ns   |
| $t_{OE}$         | Output Enable Access Time                                           | —    | 45   | ns   |
| $t_{BA}$         | $\overline{UBs}$ , $\overline{LBs}$ to Output Valid                 | —    | 85   | ns   |
| $t_{COE}$        | Chip Enable ( $\overline{CE1s}$ Low and CE2s High) to Output Active | 5    | —    | ns   |
| $t_{OEE}$        | Output Enable Low to Output Active                                  | 0    | —    | ns   |
| $t_{BE}$         | $\overline{UBs}$ , $\overline{LBs}$ Enable Low to Output Active     | 0    | —    | ns   |
| $t_{OD}$         | Chip Enable ( $\overline{CE1s}$ High or CE2s Low) to Output High-Z  | —    | 35   | ns   |
| $t_{ODO}$        | Output Enable High to Output High-Z                                 | —    | 35   | ns   |
| $t_{BD}$         | $\overline{UBs}$ , $\overline{LBs}$ Output Enable to Output High-Z  | —    | 35   | ns   |
| $t_{OH}$         | Output Data Hold Time                                               | 10   | —    | ns   |

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## • Read Cycle (Note) (SRAM)



Note :  $\overline{WE}$  remains HIGH for the read cycle.

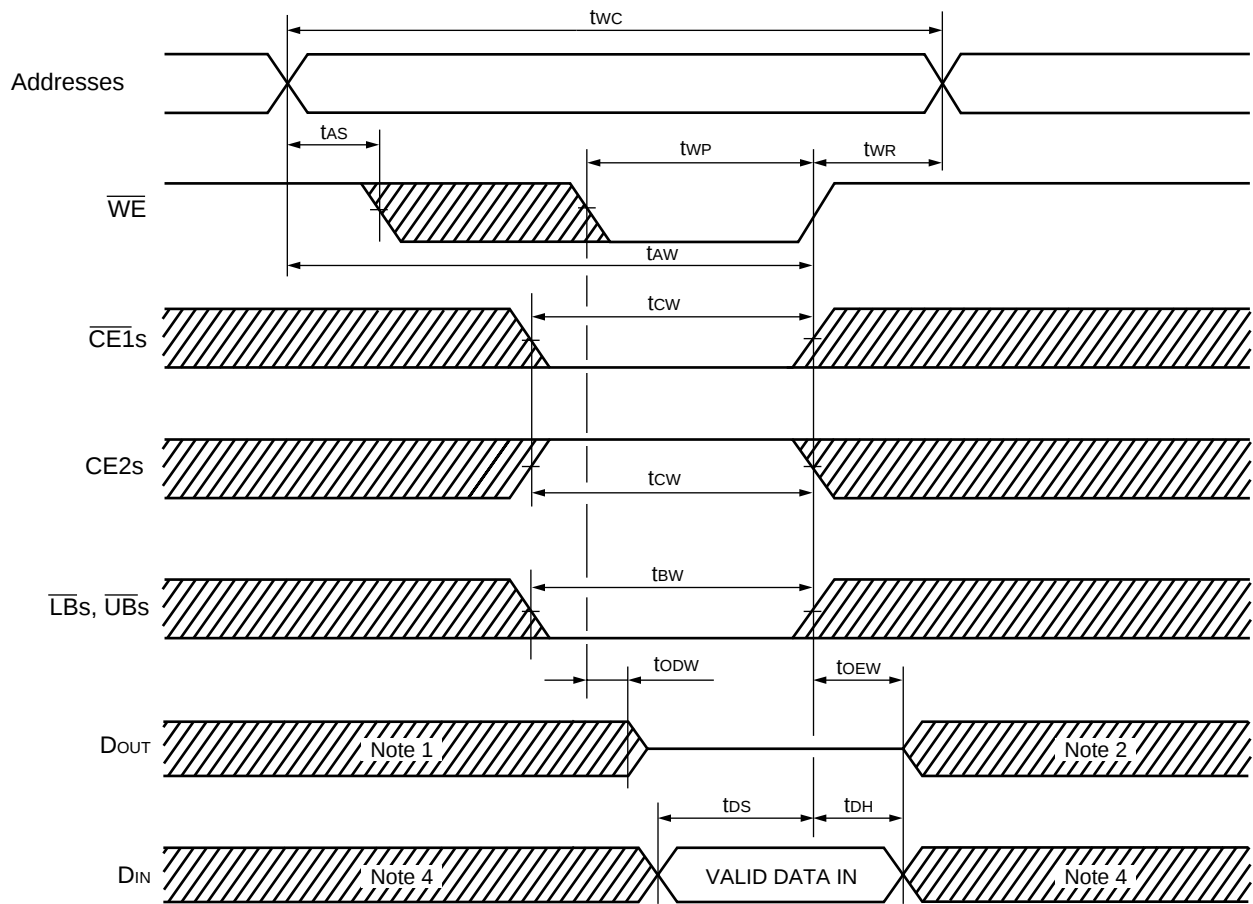
# MB84VD2108X-85/MB84VD2109X-85

## • Write Cycle (SRAM)

| Parameter Symbol | Parameter Description                                 | Min. | Max. | Unit |
|------------------|-------------------------------------------------------|------|------|------|
| $t_{WC}$         | Write Cycle Time                                      | 85   | —    | ns   |
| $t_{WP}$         | Write Pulse Width                                     | 55   | —    | ns   |
| $t_{CW}$         | Chip Enable to End of Write                           | 70   | —    | ns   |
| $t_{AW}$         | Address valid to End of Write                         | 70   | —    | ns   |
| $t_{BW}$         | $\overline{UB}_s$ , $\overline{LB}_s$ to End of Write | 55   | —    | ns   |
| $t_{AS}$         | Address Setup Time                                    | 0    | —    | ns   |
| $t_{WR}$         | Write Recovery Time                                   | 0    | —    | ns   |
| $t_{ODW}$        | $\overline{WE}$ Low to Output High-Z                  | —    | 35   | ns   |
| $t_{OEW}$        | $\overline{WE}$ High to Output Active                 | 0    | —    | ns   |
| $t_{DS}$         | Data Setup Time                                       | 35   | —    | ns   |
| $t_{DH}$         | Data Hold Time                                        | 0    | —    | ns   |

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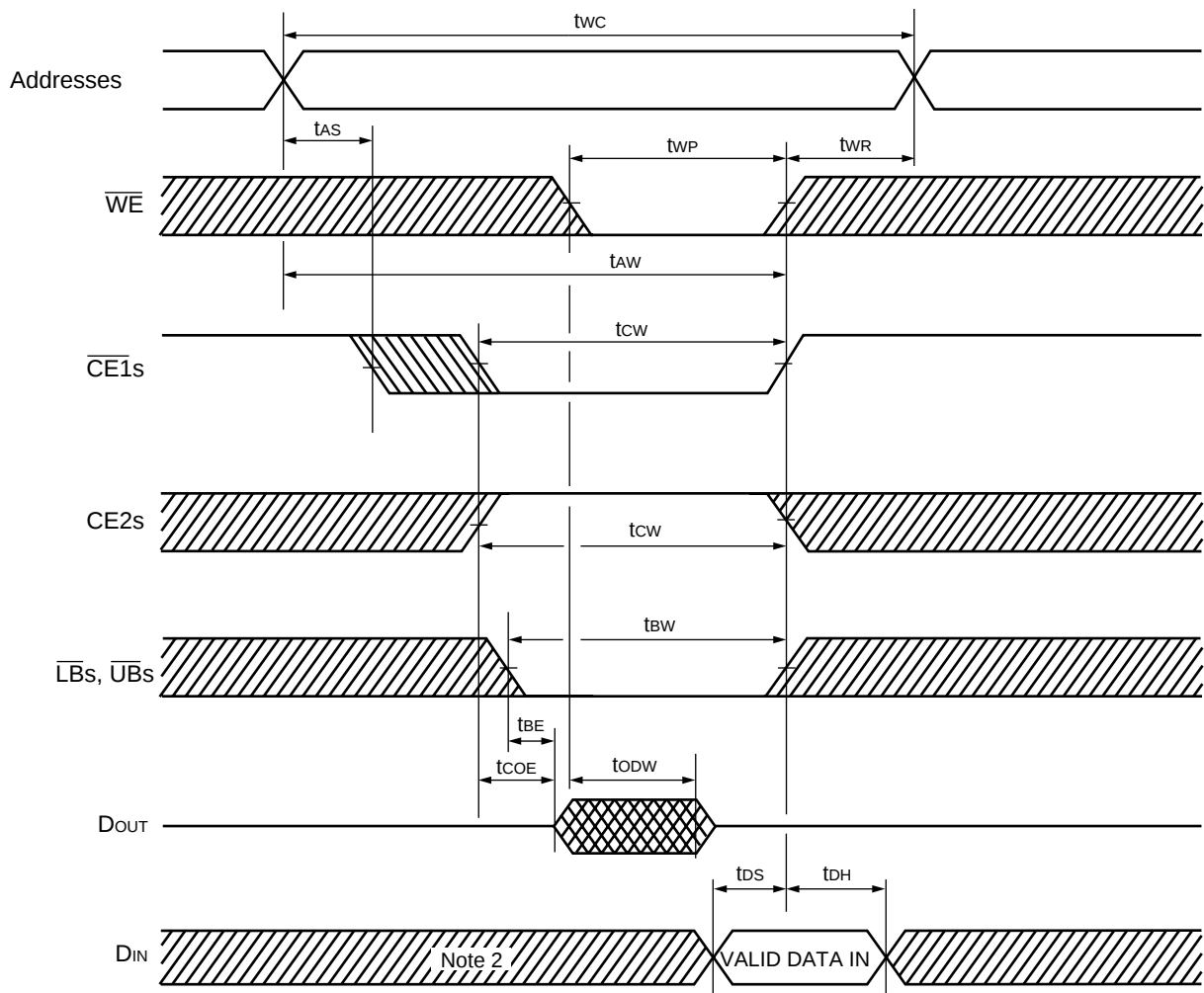
## • Write Cycle (Note 3) ( $\overline{\text{WE}}$ control) (SRAM)



- Notes :
- 1.If  $\overline{\text{CE1s}}$  goes LOW (or  $\text{CE2s}$  goes HIGH) coincident with or after  $\overline{\text{WE}}$  goes LOW, the output will remain at high impedance.
  - 2.If  $\overline{\text{CE1s}}$  goes HIGH (or  $\text{CE2s}$  goes LOW) coincident with or before  $\overline{\text{WE}}$  goes HIGH, the output will remain at high impedance.
  - 3.If  $\overline{\text{OE}}$  is HIGH during the write cycle, the outputs will remain at high impedance.
  - 4.Because I/O signals may be in the output state at this time, input signals of reverse polarity must not be applied.

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## • Write Cycle (Note 1) ( $\overline{\text{CE1s}}$ control) (SRAM)

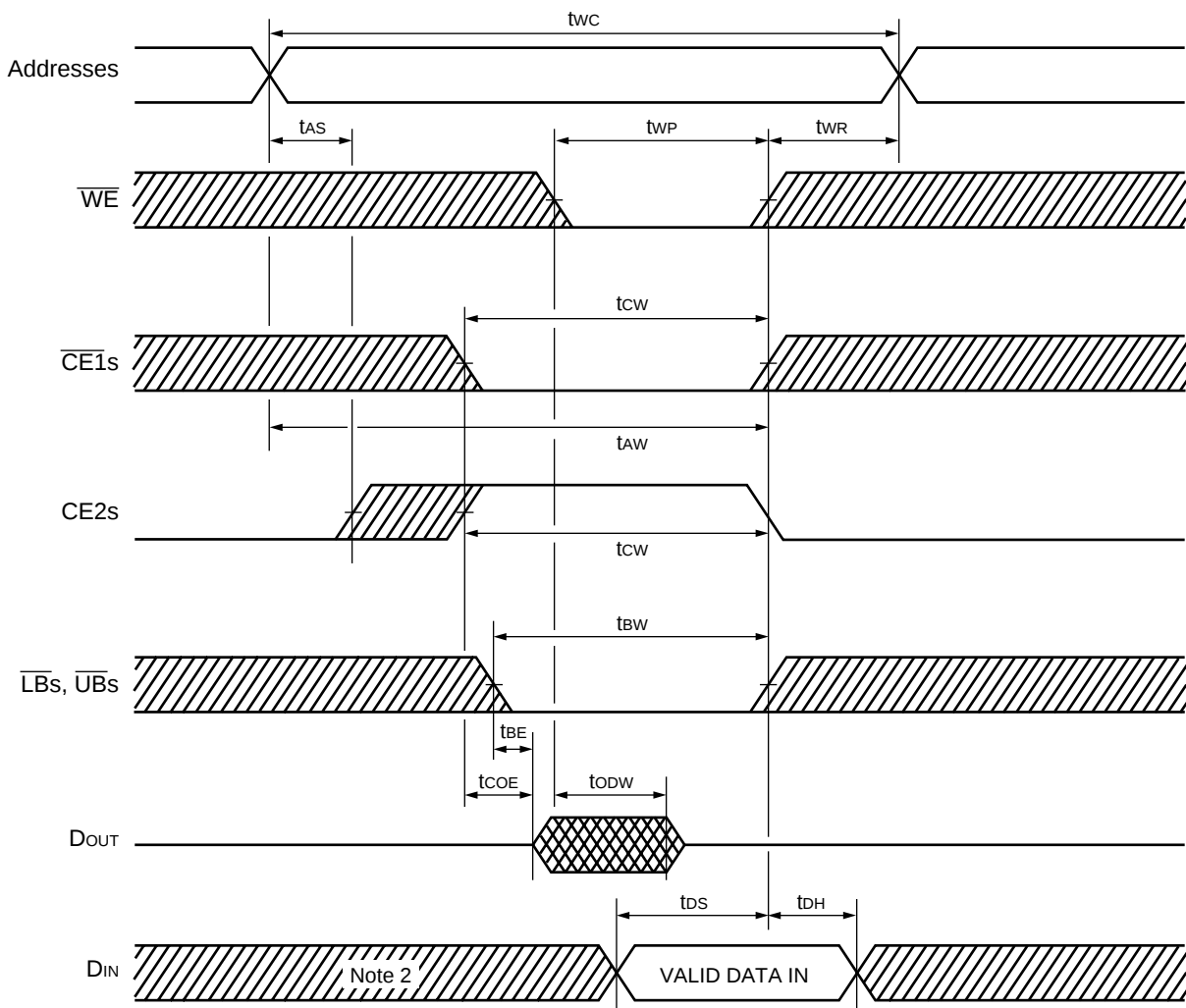


Notes : 1.If  $\overline{\text{OE}}$  is HIGH during the write cycle, the outputs will remain at high impedance.

2.Because I/O signals may be in the output state at this time, input signals of reverse polarity must not be applied.

# MB84VD2108X-85/MB84VD2109X-85

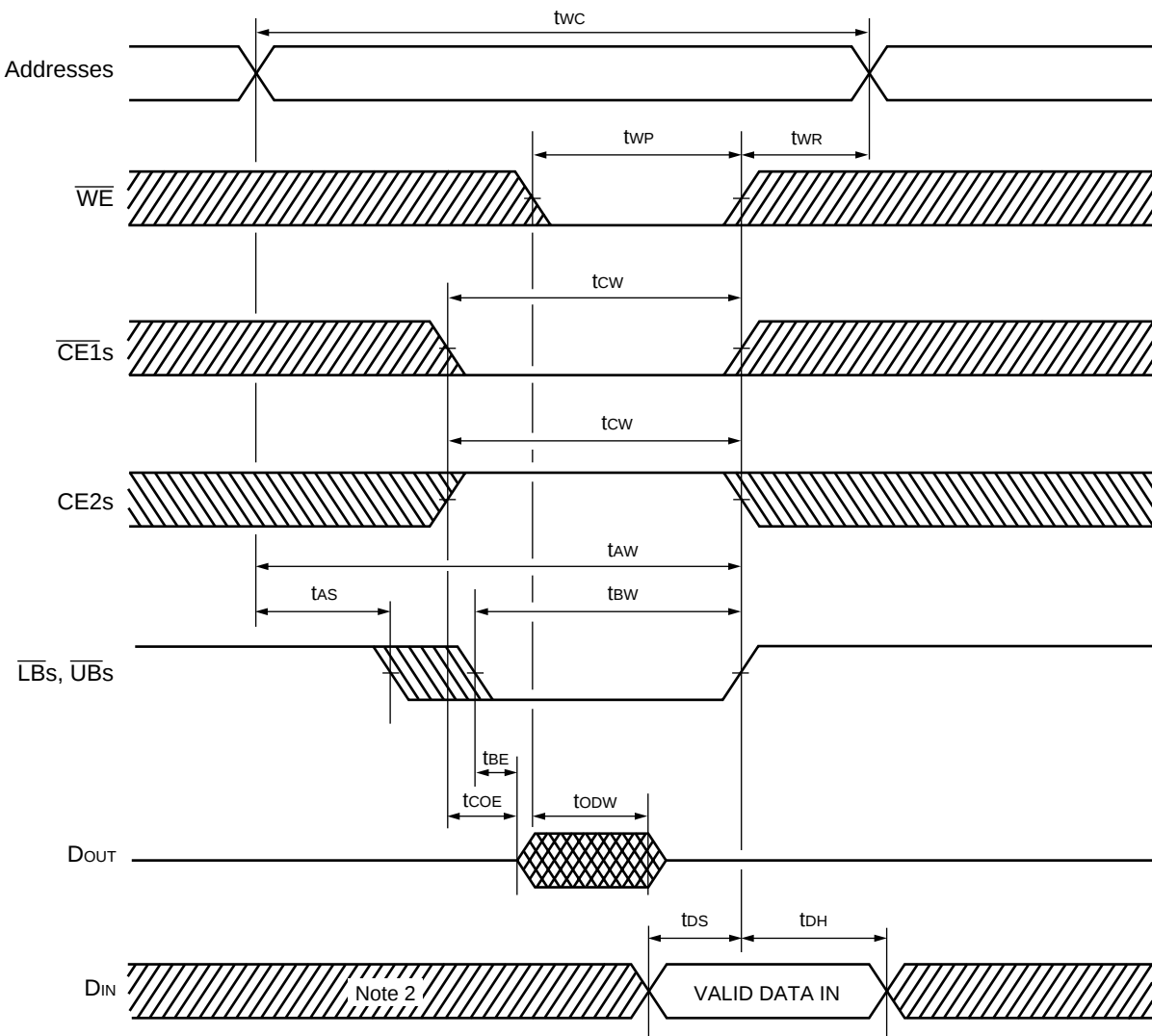
## • Write Cycle (Note 1) (CE2s Control) (SRAM)



- Notes :
- 1.If  $\overline{OE}$  is HIGH during the write cycle, the outputs will remain at high impedance.
  - 2.Because I/O signals may be in the output state at this time, input signals of reverse polarity must not be applied.

# MB84VD2108X-85/MB84VD2109X-85

## • Write Cycle (Note 1) ( $\overline{\text{LB}}_s$ , $\overline{\text{UB}}_s$ Control) (SRAM)



Notes : 1.If  $\overline{\text{OE}}$  is HIGH during the write cycle, the outputs will remain at high impedance.  
 2.Because I/O signals may be in the output state at this time, input signals of reverse polarity must not be applied.

# MB84VD2108X-85/MB84VD2109X-85

## ■ ERASE AND PROGRAMMING PERFORMANCE (Flash)

| Parameter             | Limits  |      |      | Unit  | Comment                                    |
|-----------------------|---------|------|------|-------|--------------------------------------------|
|                       | Min.    | Typ. | Max. |       |                                            |
| Sector Erase Time     | —       | 1    | 10   | s     | Excludes programming time prior to erasure |
| Byte Programming Time | —       | 8    | 300  | μs    | Excludes system-level overhead             |
| Word Programming Time | —       | 16   | 360  | μs    | Excludes system-level overhead             |
| Chip Programming Time | —       | —    | 50   | s     | Excludes system-level overhead             |
| Erase/Program Cycle   | 100,000 | —    | —    | cycle |                                            |

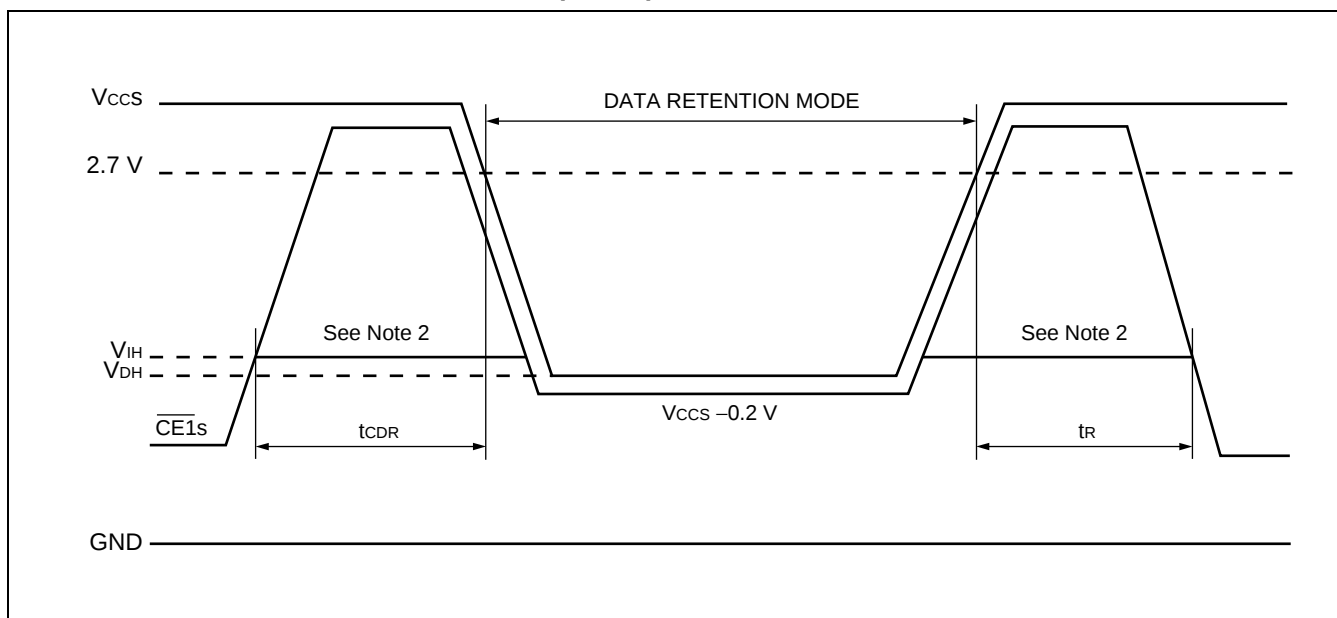
## ■ DATA RETENTION CHARACTERISTICS (SRAM)

| Parameter Symbol  | Parameter Description                     |                         | Min.            | Typ. | Max. | Unit |
|-------------------|-------------------------------------------|-------------------------|-----------------|------|------|------|
| V <sub>DH</sub>   | Data Retention Supply Voltage             |                         | 1.5             | —    | 3.6  | V    |
| I <sub>DDS2</sub> | Standby Current                           | V <sub>DH</sub> = 3.0 V | —               | 0.2  | 5*   | μA   |
| t <sub>CDR</sub>  | Chip Deselect to Data Retention Mode Time |                         | 0               | —    | —    | ns   |
| t <sub>R</sub>    | Recovery Time                             |                         | t <sub>RC</sub> | —    | —    | ns   |

Note : t<sub>RC</sub> : Read cycle time

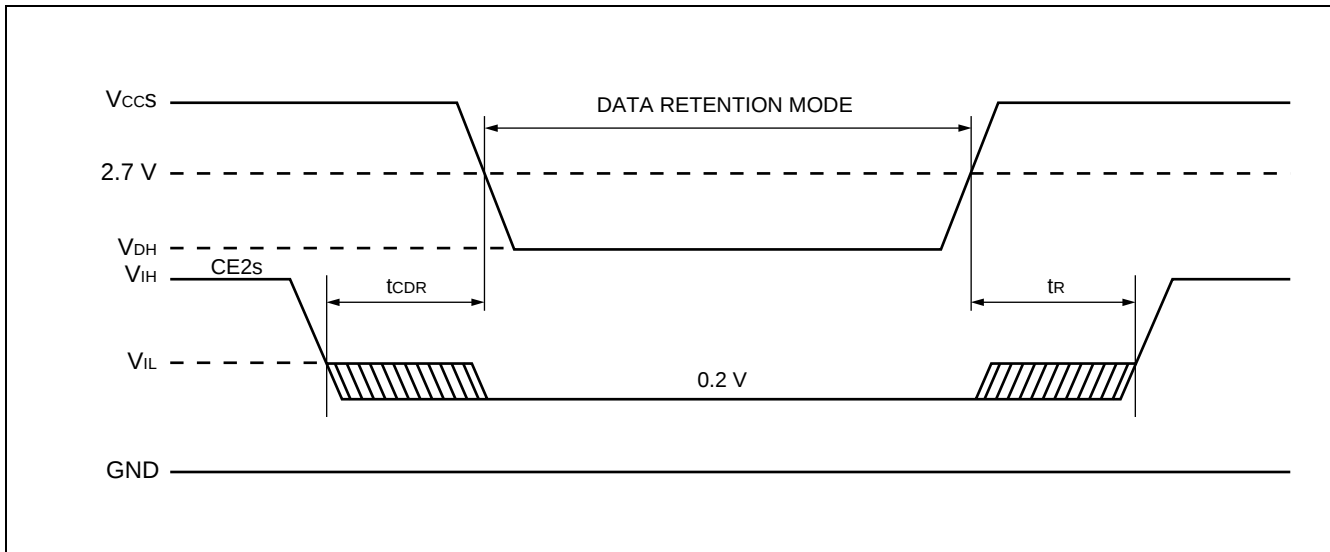
\* : 1 μA Max. at T<sub>A</sub> ≤ 40 °C

### • $\overline{\text{CE1s}}$ Controlled Data Retention Mode (Note 1)



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## • CE2s Controlled Data Retention Mode (Note 3)



- Notes :
1. In  $\overline{\text{CE1s}}$  controlled data retention mode, input level of CE2s should be fixed  $V_{\text{CCS}}$  to  $V_{\text{CCS}} - 0.2 \text{ V}$  or  $V_{\text{SS}}$  to  $0.2 \text{ V}$  during data retention mode. Other input and input/output pins can be used between  $-0.3 \text{ V}$  and  $V_{\text{CCS}} + 0.3 \text{ V}$ .
  2. When  $\overline{\text{CE1s}}$  is operating at the  $V_{\text{IH}}$  min. level ( $2.2 \text{ V}$ ), the standby current is given by  $I_{\text{SB1S}}$  during the transition of  $V_{\text{CCS}}$  from  $3.6$  to  $2.2 \text{ V}$ .
  3. In CE2s controlled data retention mode, input and input/output pins can be used between  $-0.3 \text{ V}$  and  $V_{\text{CCS}} + 0.3 \text{ V}$ .

## ■ PIN CAPACITANCE

| Parameter Symbol | Parameter Description                      | Test Setup           | Typ. | Max. | Unit |
|------------------|--------------------------------------------|----------------------|------|------|------|
| $C_{\text{IN}}$  | Input Capacitance                          | $V_{\text{IN}} = 0$  | 11   | 14   | pF   |
| $C_{\text{OUT}}$ | Output Capacitance                         | $V_{\text{OUT}} = 0$ | 12   | 16   | pF   |
| $C_{\text{IN2}}$ | Control Pin Capacitance                    | $V_{\text{IN}} = 0$  | 14   | 16   | pF   |
| $C_{\text{IN3}}$ | $\overline{\text{WP/ACC}}$ Pin Capacitance | $V_{\text{IN}} = 0$  | 17   | 20   | pF   |

Note : Test conditions  $T_{\text{A}} = 25 \text{ }^{\circ}\text{C}$ ,  $f = 1.0 \text{ MHz}$

## ■ HANDLING OF PACKAGE

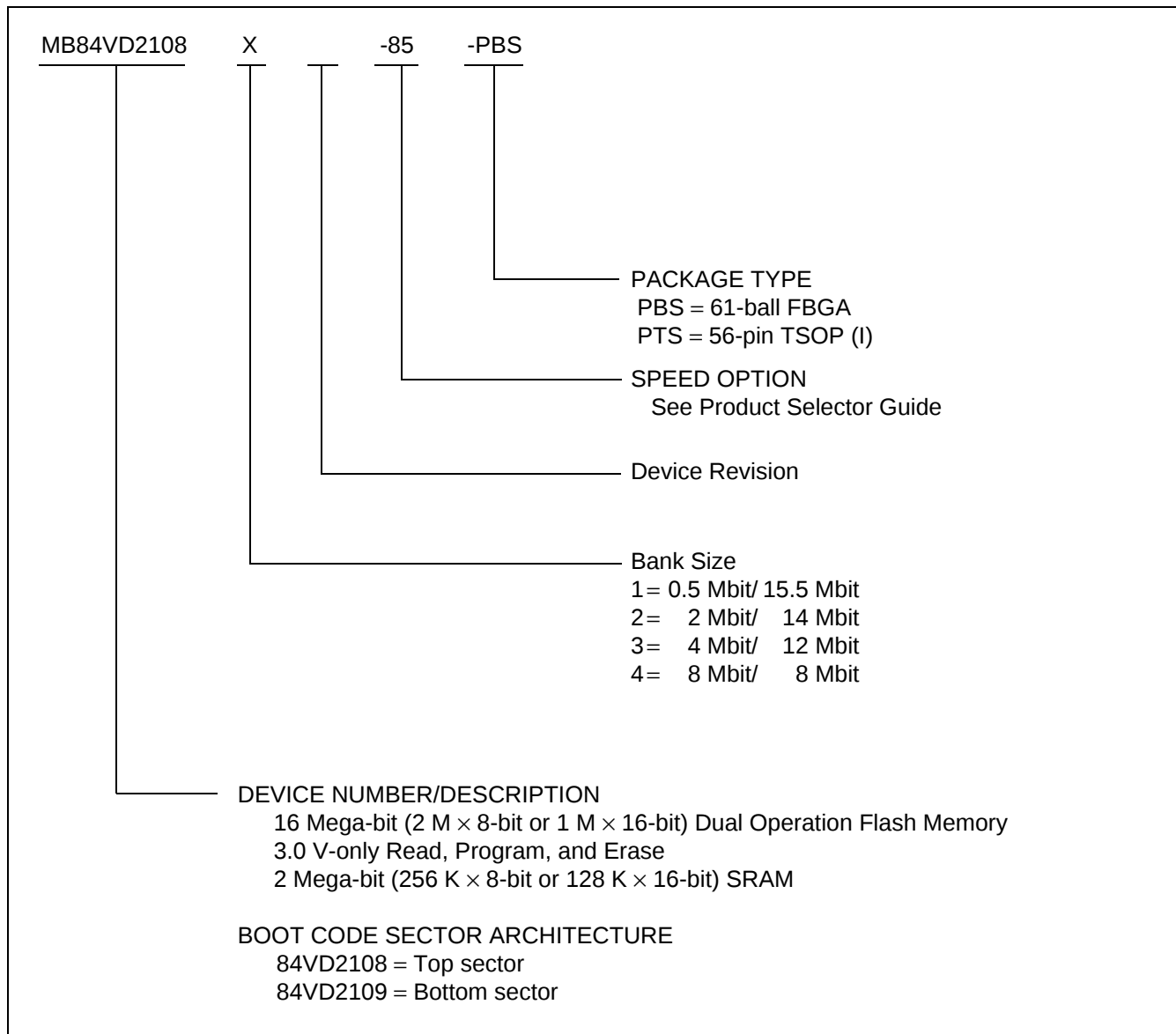
Please handle this package carefully since the sides of packages are right angle.

## ■ CAUTION

1. The high voltage ( $V_{\text{ID}}$ ) can not apply to address pins and control pins except  $\overline{\text{RESET}}$ . Therefore, it can not use autoselect and sector protect function by applying the high voltage ( $V_{\text{ID}}$ ) to specific pins.
2. For the sector protection, since the high voltage ( $V_{\text{ID}}$ ) can be applied to the  $\overline{\text{RESET}}$ , it can be protected the sector using "Extended sector protect" command.

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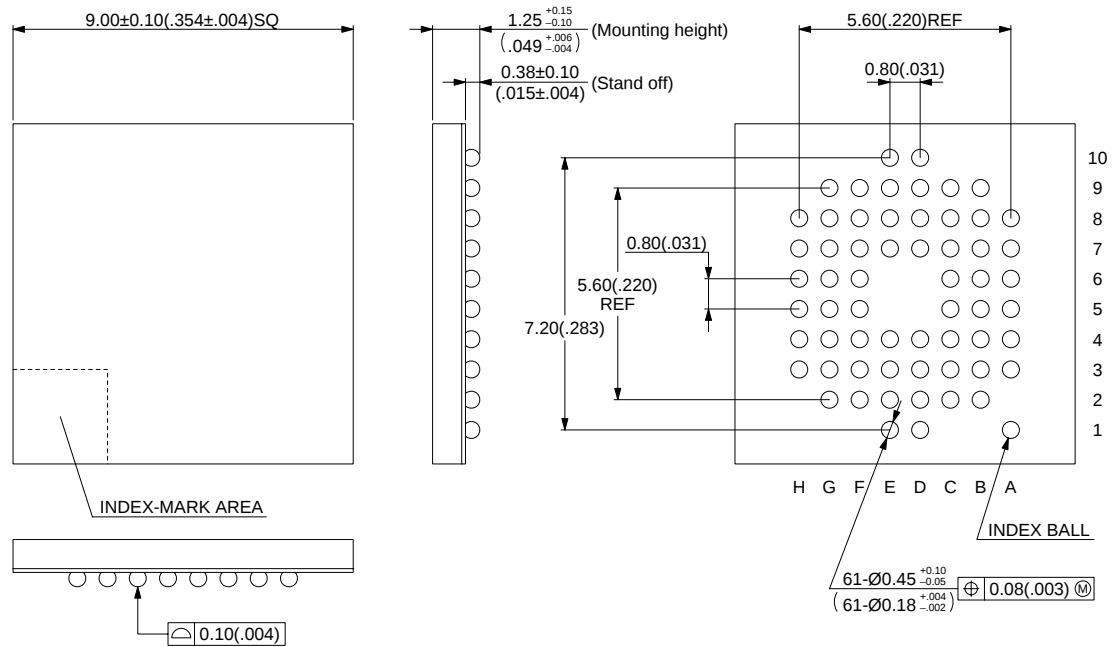
## ■ ORDERING INFORMATION



# MB84VD2108X-85/MB84VD2109X-85

## ■ PACKAGE DIMENSIONS

61-ball plastic FBGA  
(BGA-61P-M02)



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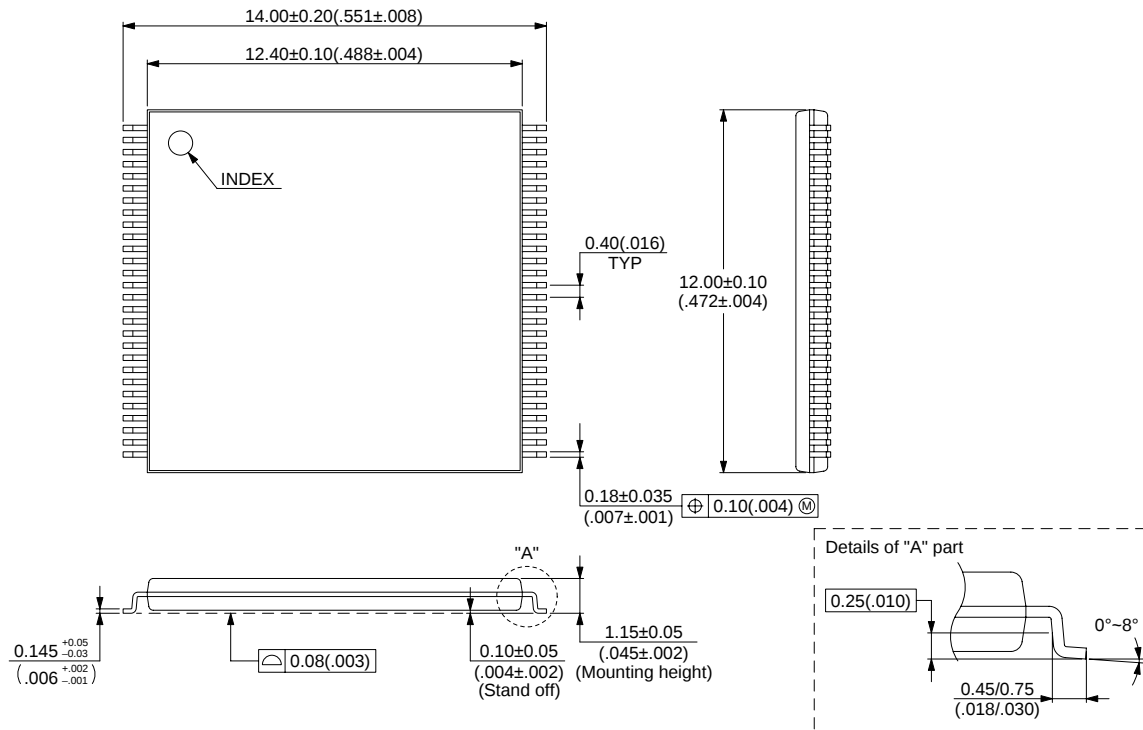
Dimensions in mm (inches)

(Continued)

# MB84VD2108X-85/MB84VD2109X-85

(Continued)

56-pin plastic TSOP(I)  
(FPT-56P-M04)



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Dimensions in mm (inches)

# MB84VD2108X-85/MB84VD2109X-85

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