

## Hitachi 1Mb EEPROM – Hitachi Die HN58C1001

### Purpose

Over the last several months several design applications questions have been asked regarding the Hitachi EEPROM. These questions have been to both clarify the datasheet specifications as well as obtain additional information not contained in the datasheet. This application note documents the answers that Maxwell has received from Hitachi.

### Maxwell Technologies Microelectronics Products Affected

- 28C010
- 28C011
- 79C0408
- 79C0832
- 28LV010
- 28LV011
- 79LV0408
- 79LV0832

### QUESTION 1:

The datasheet specifies specific timing and signal requirements for the RESET input to ensure data protection during power up and power down sequencing. This timing is difficult to implement during unexpected power down sequences. What is the minimum requirement to ensure data integrity during an unexpected power down sequence?

### ANSWER 1:

The proper use of the RESET input must be used to ensure data integrity. During an unexpected power down sequence the RESET input must be held  $V_{SS}$ . The RESET input must be less than or equal to 0.5V. If the RESET input is held at the proper level during power down the data will be protected even if the input signals CE and WE are not properly controlled.

**QUESTION 2:**

It is unclear in the datasheet whether or not the software data protection feature provides any protection during a power up or power down sequence.

**ANSWER 2:**

No, the software data protection feature does not provide any protection during a power up or power down sequence. The RESET input must be properly controlled to ensure data integrity.

**QUESTION 3:**

If the input signals CE and WE are properly controlled and the RESET input is not properly controlled during a power up or power down sequence will the data integrity be ensured?

**ANSWER 3:**

No, the RESET input must be properly controlled to ensure data integrity.

**QUESTION 4:**

If the RESET input is not properly controlled during a power up or power down sequence, what memory locations will be affected?

**ANSWER 4:**

There is no way of predicting this under uncontrolled transient conditions.

**QUESTION 5:**

If data are being written to the EEPROM a power down sequence, what memory locations will be affected?

**ANSWER 5:**

It is possible to change a page of memory locations.

**QUESTION 6:**

Are the inputs and outputs of the device protected with clamping diodes and how are they connected?

**ANSWER 6:**

Yes, all inputs and outputs have ESD protection. The outputs are protected with two diodes, one connected to  $V_{SS}$  to provide protection from negative voltages and one connected to  $V_{CC}$  to provide protection from positive voltages. The inputs are protected by a similar combination with the addition of a series resistor between the input and the protection diodes.

**QUESTION 7:**

Are there two different die, one for +5V operation and one for +3.3V operation?

**ANSWER 7:**

No, there is only one die for this product.

**QUESTION 8:**

Is there any additional parametric characterization data available that is not on the datasheet?

**ANSWER 8:**

No, there is no additional characterization data available.

**QUESTION 9:**

Are there any simulation models, such as for PSPICE, available for this product?

**ANSWER 9:**

No, this is an old product for Hitachi before this type of information was normally generated or made