Application Note

Programming the 4 Megabit EEPROM

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Purpose

This application note describes the hardware and software required to program Maxwell Technologies 79C0408 and 79LV0408 family of 4 Megabit EEPROMs.

Programming the 79C0408 EEPROM

Maxwell Technologies family of 4 Megabit EEPROMs are MCMs organized as 512K x 8. The devices use four of the Hitachi 58C1001 1-Megabit EEPROM die. The address, data I/O and control lines, of the four devices, are all paralled except for the chip enables which are brought out to separate pins.

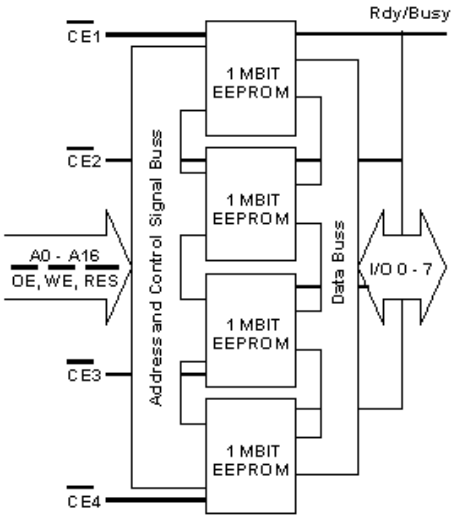

Figure 1. 79C0408 EEPROM Block Diagram

To program the 79C0408 in a commercial programmer, a flat package to DIP adaptor board needs to be constructed. A 32-pin wire wrap socket is used to plug the adaptor into the programmer. The address, data and control lines are wired from the 79C0408 test socket to the programming socket and the four chip enable line are wired to a four-position switch as shown in Figure 3.

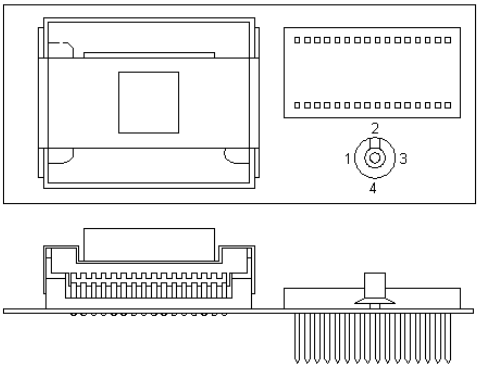

Figure 2. Flat Pack to DIP Adaptor Board

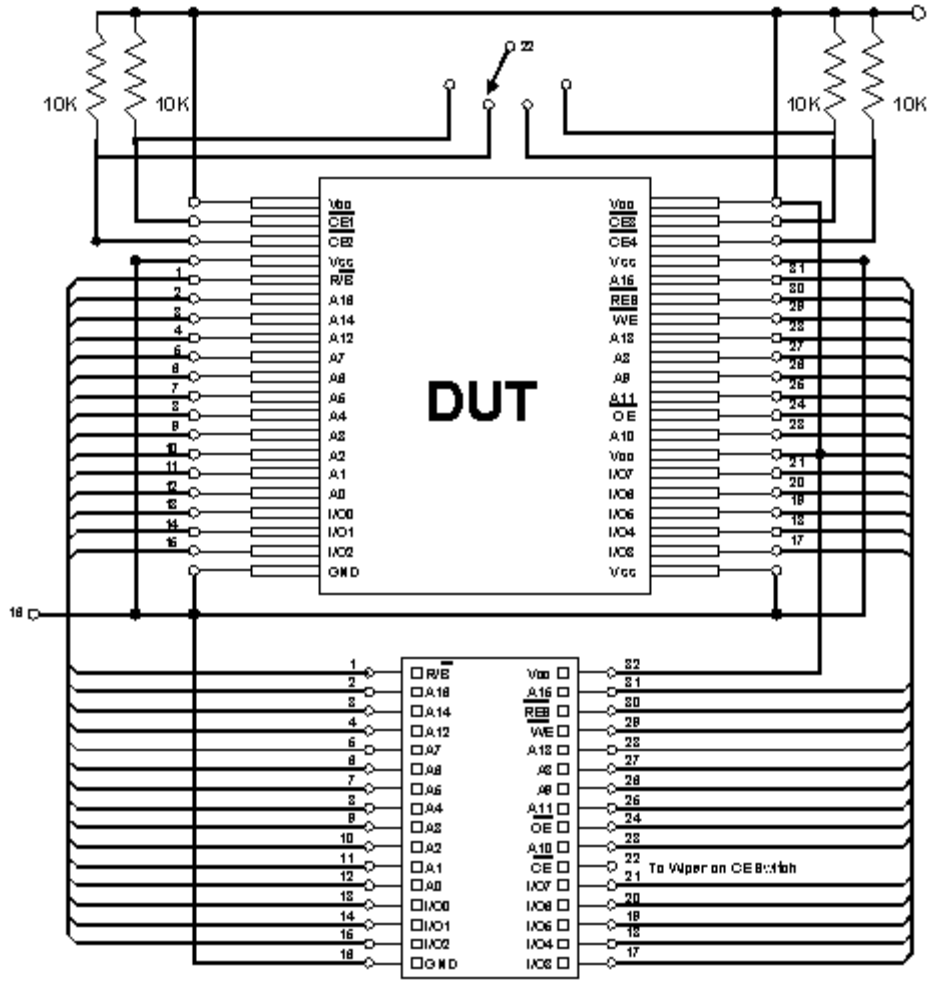

Figure 3. Adaptor Board Schematic Layout

Maxwell Technologies family of EEPROMs utilize the Hitachi HCN58C1001 EEPROM die. Any commercial programmer that supports the Hitachi HCN58C1001 EEPROM can be used to program the 79C0408. To program the 79C0408, each of the four 1-megabit EEPROM die are programmed one at a time.

With the programming adaptor inserted into the programmer the 79C0408 is placed into the test socket. The selector switch is set to CE1 and the associated code is loaded into the programmer select the programming algorithm for the Hitachi HCN58C1001 and start the programming sequence. Once die number 1 has completed programming set the selector switch for CE2, load in the associated code and program die number 2. Repeat for die 3 and die 4.

There is no erase function for Maxwell Technologies family of EEPROMs. The erased state is logic level "1". Devices are shipped to the customer in the erased state; that is, all bits are shipped with a logic level "1".

Conclusion

Maxwell Technologies family of EEPROMs are in-circuit programmable. For applications where the device must be programmed prior to insertion there are a number of programmers that can be used to program Maxwell Technologies' EEPROM devices. Although Maxwell Technologies does not recommend a specific programmer, the user should choose a programmer based on the performance and flexibility required.

Maxwell Technologies 79C0408 EEPROM use four Hitachi HCN58C1001 EEPROM die. A package adaptor needs to be fabricated to be able to program each of the four EEPROM individually. Any commercial programmer that supports the Hitachi HCN58C1001 EEPROM programming algorithm can be used to program the 79C0408. To program the 79C0408, each of the four 1-megabit EEPROM die is programmed one at a time.

Since the 79C0408 has no erase function, the entire device is programmed with logic 1's to return the device to the un-programmed state.

Appendix 1: Software Data Protection

Maxwell's EEPROM devices feature software data protection, which is implemented using a JEDEC standard algorithm. When EEPROM devices are shipped from Maxwell Technologies, software data protection is disabled allowing users to program the devices with commercial EEPROM programmers that do not support this feature. With software protection enabled, unintentional writes to the EEPROM are avoided.

Table 1. Software Protection Sequence

Address	Software Protect Enable	Software Protect Disable
5555	AA	AA
AAAA or 2AAA	55	55
5555	A0	80
5555	N/A[1]	AA
AAAA or 2AAA	N/A	55
5555	N/A	20

1. A byte or page write must follow the three byte software protection sequence.

Software data protection is enabled by writing a three byte sequence followed by a byte or page of data being written anywhere in memory and then allowing the write cycle to complete. With the software data protection enabled the entire memory array is protected from unintentional writes due to noise on the control inputs or minor bus contentions.

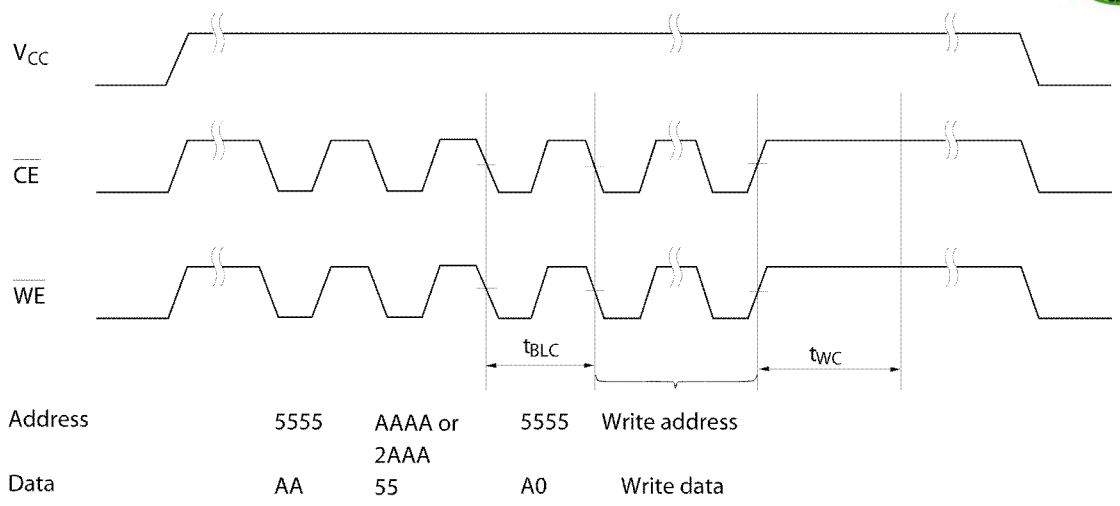

Figure 4. Software Data Protection Enable - Timing Waveform

With software data protection (SDP) enabled there are two methods of writing to the EEPROM. Each byte or page written to memory must be preceded by the 3-byte protection sequence or software data protection must be disabled. The preferred method for writing to the memory is to load the three byte software protection sequence, which temporarily unlocks
software protection, load a byte or page of data and wait for the write cycle to complete. Once the write cycle completes the software protection will then be enabled. The three-byte software protection sequence is not written to memory, only the data that follows. Once enabled, software data protection will not be reset during a power down of the device.

To disable software data protection a six-byte sequence is loaded and the write cycle is allowed to complete. Once software protection is disabled the device can be written to, and the three byte-locking sequence can be loaded to enable software protection.

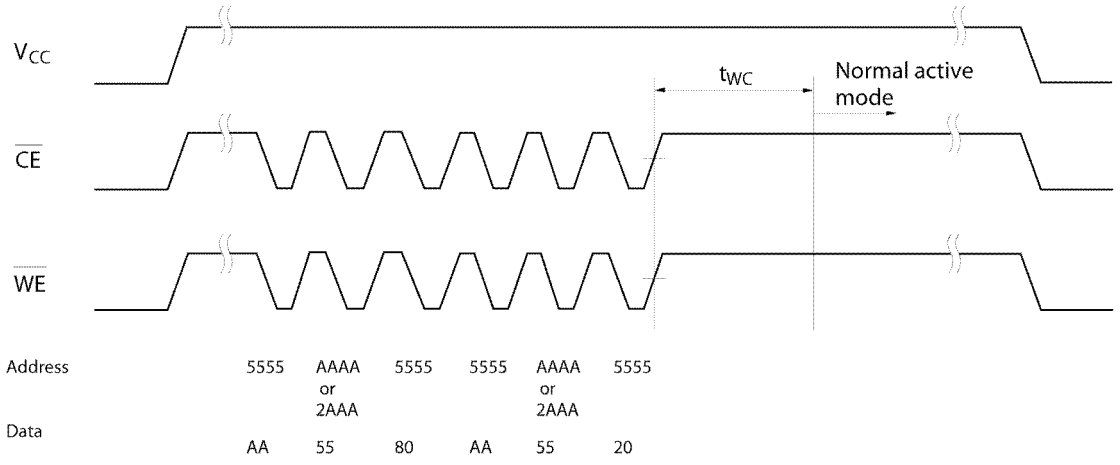

Figure 5. Software Data Protection Disable - Timing Waveform

Maxwell Technologies does not recommend using the six-byte disable code to unlock the protection. By using only the three byte sequence rather than the six byte sequence, the user is assured that the Software Data Protection is always enabled and that inadvertent writes will not corrupt the data in memory.