COP8FLASH cuts design time, board space

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COP8FLASH cuts design time, board space
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Microcontroller eliminates off board EEPROM with Virtual E^2 routines
One of the major benefits of National Semiconductor s COP8FLASH Microcontroller technology is that it gives a system designer the ability to allocate some of its internal FLASH memory as a non-volatile storage space. Applications of the COP8FLASH Microcontroller range from small and simple, such as toys and remote controls, to the large and complex like washing machines and security systems.

Learning type toys require a microcontroller that is capable of being reprogrammable. Universal remotes store and retrieve control code for specific equipment such as a TV and/or VCR. Washing machines need to have Virtual E^2 so that they can store customized washing cycles, which allows customization and recall of user preferences. Fault tolerant systems such as security systems also benefit from the COP8FLASH Microcontroller s Virtual E^2. Its ability to store and retrieve access codes, dial-up numbers, and zone protection schemes makes it a number one choice for industrial and consumer applications.

The product line of COP8FLASH Microcontrollers accomplishes this task by accessing some memory functions built into the boot ROM. In addition to some of these memory functions, the COP8FLASH Microcontroller has the ability to initiate and control ISP (In System Programming) while under software control. Virtual E^2, although not truly EEPROM, can be used to mimic the behavior of the storage space of an off board E^2.

Another technology feature of the Microcontroller is that the FLASH inside COP8FLASH Microcontroller is "real FLASH" and not just renamed E^2. This has significant implications as the FLASH mC is rated for 100,000 erase/write cycles and 100-year data retention.

The flow chart (see Figure 1) depicts how a designer may allocate a 128-byte Virtual E^2. Although the user may not write over the same byte twice, he or she may modify memory contents (RAM). The figure shows how we "shadow" the FLASH with RAM. If the user wants to modify the Virtual EEPROM contents, then the designer may just execute a "FLUSH routine" to dump the contents of the modified RAM into the FLASH. A system designer may bring up the issue that the "dumping" of the RAM into the COP8FLASH Microcontroller may take too long. This issue is irrelevant if we take into consideration the following: A typical write to the COP8FLASH Microcontroller takes a few microseconds and a page erase takes 8 msec independently of the mC system clock. So, in total, the entire "dumping" process may take less than 10 msec. However, a designer is hard pressed to find an off-board serial E^2 which has less than 100 msec access time.

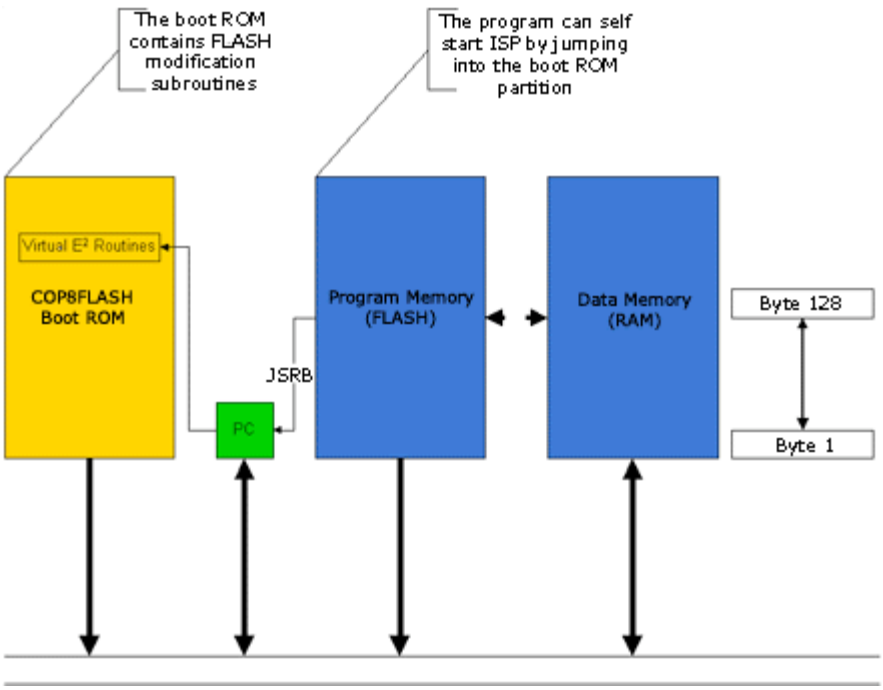

Figure 1. Allocation of a 128 Byte Virtual E^2

Figure 2 shows how the sample Virtual E^2 code is visualized. The RAM shadows the FLASH. Each time the user writes a byte to the RAM, a WRITE_COUNTER decrements. When the WRITE_COUNTER equals 0, then the routine calls the FLUSH subroutine. The entire contents of the RAM are then saved into the FLASH. A system designer may set the WRITE_COUNTER to zero, to immediately flush the content into the FLASH.

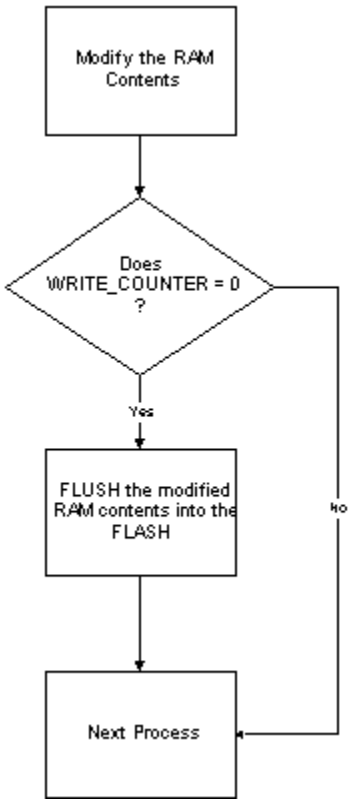

Figure 2. Flow of the use of the Virtual E^2 routine

To view the COP8FLASH microcontroller assembly code, click here.

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