Application Note

Z86E21 Transition To Z86E61/E63

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Revision History

Each instance in Table 1 reflects a change to this document from its previous revision. To see more detail, click the appropriate link in the table.

Table 1. Revision History of this Document

Date	Revision Level	Section	Description	Page #
May 2005	01	Original issue. Changed document control number.		All

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Abstract

This Application Note discusses the issues when transitioning from the Z86E21 to either the Z86E61 or Z86E63.

Z8 MCU Overview

ZiLOG's Z86E21, Z86E61, and Z86E63 MicroControllers (MCUs) are members of the Z8 single-chip MicroControllers family with 8K,16K, and 32K bytes of One-Time-Programmable (OTP) EPROM program memory and 236 bytes of general purpose RAM. The Z86E21 is pin compatible version of the Z86E61 and Z86E63.

The Z86E21/E61/E63 are offered in a 40-pin DIP, 44-pin PLCC, or a 44-pin QFP style package with a ROMless pin option available on the 44-pin versions only. The MCUs can address both external memory and pre-programmed OTP EPROM program memory, enabling the Z86E21/E61/E63 to be used in high-volume applications or where code flexibility is required.

With 8K, 16K, and 32K bytes of OTP EPROM and 236 bytes of general –purpose RAM, this low cost, low power consumption CMOS MicroControllers offers fast execution, efficient use of memory, sophisticated interrupts, input/output bit manipulation capabilities, and easy hardware/software system expansion.

The Z86E21/E61/E63 architecture is based on Zilog's 8-bit MicroControllers core. The device offers a flexible I/O scheme, an efficient register and address space structure, multiplexed capabilities between address/data, I/O, and a number of ancillary features that are useful in many industrial and advanced scientific applications.

For applications demanding powerful I/O capabilities, the Z86E21/E61/E63 offer 32 pins dedicated to input and output. These lines are grouped into four ports. Each port consists of eight lines, and is configurable under software control to provide timing, status signals, serial or parallel I/O with or without handshake, and an address/data bus for interfacing external memory. There are three basic address spaces available to support this configuration: Program Memory, Data Memory, and 236 general-purpose registers.

To unburden the program from coping with real-time tasks such as counting/timing and serial data communication, the Z86E21/E61/63 offer two on-chip counter/timers with a large number of user selectable modes, including an on-board UART.

Discussion

The following is a discussion of what is similar and what is different when switching from the Z86E21 MCU to either the Z86E61 or Z86E63 MCU.

Similarities

The 32KB Z86E63 is viewed as the superset of the 16KB Z86E61 and 8KB Z86E21. The architecture, register map of control and general purpose registers, number of registers, number of counter/timers, number of and location of interrupts, UART, PORT I/O, and pin configurations are exactly the same between the three devices. The only differences are the amount of internal Program Memory and the amount of accessible External Memory.

If External Memory is not used, the program code of the Z86E21 can be used transparently in the Z86E61 and Z86E63 with no software changes. Also, if the External Memory is not used for the Z86E61, the program code of the Z86E61 can be used transparently in the Z86E63 with no software changes.

Differences

The Z86E21 has 8K bytes (0000hex-1FFFhex) of internal Program Memory and 56K bytes (2000hex-FFFFhex) of External Memory. The Z86E61 has 16K bytes (0000hex-3FFFhex) of internal Program Memory and 48K bytes (4000hex-FFFFhex) of External Memory. The Z86E63 has 32K bytes (0000hex-7FFFhex) of internal Program Memory and 32K bytes (8000hex-FFFFhex) of External Memory.

Internal Program Memory		
Z86E21	Z86E61	Z86E63
8KB OTP	16KB OTP	32KB OTP
0000H-1FFFH	0000H-3FFFH	0000H-7FFFH

External Memory Starting Address		
Z86E21	Z86E61	Z86E63
56KB MAX	48KB MAX	32KB MAX
2000H-FFFFH	4000H-FFFFH	8000H-FFFFH

If ROM External Memory is used, care must be taken to ensure that any External Memory data used by the Z86E21 that is overlapped by the larger Z86E61/E63 device should be re-mapped to the same address but in the internal Program

Memory to the Z86E61/Z86E63. The User software can still use the same LDE and LDEI instructions to access the data for Data Memory type and LDC and LDCI instructions to access the data for Program Memory type.

If RAM External Memory is used then care must be taken to ensure that any External Memory data used by the Z86E21 that is overlapped by the larger Z86E61/E63 device should be re-mapped to another address but in the accessible External Memory address range for the Z86E61/E63. The user must update their software program to account for this.

There is no work around available in the case where the existing External Memory when used with the Z86E21 is greater than what is available when used with the Z86E61/E63 where all Port I/O's are utilized. If any Port I/O is available then the User could change their software to use this unused Port I/O as an output to manually select another bank of External Memory such that the External Memory could be increased to accommodate the loss in available RAM External Memory. This requires hardware change to the User's application board.

Summary/Conclusion

Since the Z86E61 and Z86E63 are Program Memory super sets of the Z86E21, there should not be any hardware or software changes required when External Memory is not used in an application. If External Memory is used then care must be taken to adjust the software and hardware for the differences in the addressable External Memory that is available with the Z86E61 and Z86E63 if at all.