Compatibility between 80Cx2 and 8xC154 Microcontrollers

Description

An application based on 80C52/80C32 can be replaced by 83C154/80C154 if some precautions have been taken in order to not activate special features of the 8XC154 contained in one common register. This note gives details about the differences.

Features

The 8XC154 is an enhanced version of the 80C52/80C32. The main differences are mainly due to Internal Program memory, the Power–Down mode, the serial link and the Programmable port impedance.These differences are summarized in Table 1.

Table 1. Main Differences Between Microcontrollers

Features	80C32/80C52	80C154/83C154
ROM (80C52 & 83C154)	8 Kbytes	16 Kbytes
Frame Error Detection	No	Yes
Overrun Error Detection	No	Yes
Recover Mode	No	Yes
Hardware Power–Down Mode	No	Yes
Programmable I/O Port Impedance	No	Yes

Programmable Port Impedance

The impedance of the port 1,2 and 3 can be programmed in one of the three impedance modes through the IOCON register (0F8H) shown in table 2. The impedance can be normal , high or floating .This mode is not supported by the 80C32/80C52 and a program written on 80C32/80C52 never accesses to this register.

Table 2. IOCON register description

I/OCON (0F8h)
I/O Control register

WDT	T32	SERR	IZC	P3HZ	P2HZ	P1HZ	ALF

IZC = 1	Set by software to select High impedance for Port 1, 2 and 3. When cleared, Port 1, 2 and 3 have a normal impedance.
PxHZ = 1	When set by software, the Port (1, 2 and 3) become a floating input. When cleared, the impedance is selected by IZC bit.
ALF = 1	When set by software, all the Ports (1, 2 and 3) become floating when the power–down mode is activated

Power Reduction modes There are basically four power reduction modes in the 8xC154:

- Idle
- Recover
- Software
- Hardware

All these modes are activated with the four bits PD,HPR,RPD and IDL in the PCON register shown in table 3 .

The 80C52/32 has only two power reduction modes : Idle and software power–down modes . All these modes are controlled by the two bits PD and IDL in the PCON register shown in Table 3.

Table 3. PCON register description

PCON (87h) register	SMOD	HPD	RPD	–	GF1	GF0	PD	ID1

IZC = 1 Set by software to select High impedance for Port 1, 2 and 3. When cleared, Port 1, 2 and 3 have a normal impedance.

Power–Down Mode

This software mode is used to reduce to the minimum the power consumption (50 μA) . This mode is activated by software by setting to one the bit PD in the PCON register and the way to cancel it depends on the controller used :

- 80C32/80C52 : Only a hardware reset can cancel this mode.
- 8XC154 : A hardware reset or an external interrupt (INT0 or INT1) can cancel this mode.

Idle Mode

This mode is used to reduces the power consumption down to 25% of the nominal consumption and to maintain a minimum of CPU activities (TIMER/COUNTER, UART). This mode is activated by setting to one the bit IDL in the PCON register.The way to cancel it can be done either by an hardware reset or by all the interrupt request sources .

Recover Mode

This mode is used only on the 8XC154 and is enabled by setting to one the bit RPD in the PCON register. This mode controls the way to cancel the power reduction mode (Power–Down and IDLE) and can be either an hardware reset or external interrupt requests (INT0 and INT1). The RECOVER mode allows two ways of cancelling mode :RPD = 0 , the power reduction mode is cancelled by the external interruptions only if they are enabled (EX0=1, EX1=1 in IE register) , RPD = 1 , the power reduction mode is cancelled even if the external interrupts are disabled and if there is an interrupt request.

This mode is not supported by the 80C52/80C32 part and is an enhancement of the 8XC154.

Hardware Power Down Mode

This mode allows to control the Power–Down mode by an external signal through the T1 pin (P3.5). When a falling is applied on this pin and if the HPD bit of the PCON register is set to one, the controller stops the clock and goes in power–down mode. A rising edge on T1 pin awakes the controller, restarts the oscillator and the execution of the program. This mode works independantly of the software mode. **This mode is not supported by the 80C52/80C32 part and is an enhancement of the 8XC154.**

Overrun and Frame Errors

These errors are detected when a problem has been detected on the serial link. If it is the case , the SERR bit in the IOCON register is set to one. The overrun error occured when a new character is received and overwrites the last one which has not been read. The frame error occurs when the length of the data received is not correct (a stop bit is missing). **This mode is supported by the 80C32/80C52 .**

Conclusions

Replacing a 80C32/80C52 by a 8XC154 can be done easily but the programmer must **take care of the RECOVER mode and the HARDWARE power–down mode, which are not to be set in the program**. If no precautions are taken, the application can be disturbed as detailed below:

- Hardware mode : If a rising edge is applied on pin T1, the controller will enter in power–down.
- Recover mode : If the RPD bit is set to one and if the PD bit is set to one as well, the controller will enter in power–down mode and will be cancelled as soon as an interrupt request will be set. If an interrupt is pending, the power–down will be cancelled immediately. In that case it looks like the power–down mode has never been executed.

All other differences will be transparent for the software.

Additional Information

For additional information on Microcontrollers, and Ordering Information, please refer to the following datasheets available on request.