Application Note

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Using the MPC8260ADS Board with the MPC8255

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Communication Processors Applications

Systems development for the MPC8255 can be accomplished using the MPC8260ADS board. This document discusses what the user needs to know in order to seemlessly use the board either with an MPC8255 device or in an MPC8255 mode of operation.

1.1 Differences between the MPC8255 and the MPC8260

To arrive at the proper board settings and other system's configurations necessary to use the MPC8260ADS board to develop MPC8255 applications, it is important to understand the differences between the MPC8255 and MPC8260 devices. Since both are based on the same overall design, many aspects of the two are identical. The following is a brief list of features identical to both devices:

- EC603e™ microprocessor (embedded G2 core)
- 280.0 MIPS at 200 MHz (Dhrystone 2.1)
- 2.5V internal and 3.3V I/O
- Power consumption: 2.5 W
- 480 TBGA package (the two devices are completely pin-compatible)
- 2 bus architectures: one 64-bit 60x, one 32-bit local bus
- Memory controller (two GPCM, three UPM, and two SDRAM controllers)
- FCCs supporting:
- Full 155 Mbps ATM SAR
- 10/100 Mbps Ethernet
- 45 Mbps HDLC / Transparent
- UTOPIA level-2 master/slave ports
- Supports up to 128 HDLC channels over 1-4 TDM lines
- Two TDM ports can be glueless to T3/E3

Figure 1 is the MPC8260 Block Diagram. Comparing it to Figure 2, the MPC8255 Block Diagram, the following differences become clear:

- MPC8260 has four FCCs, the MPC8255 has two FCC's
- MPC8260 has two MCCs, the MPC8255 has one MCC

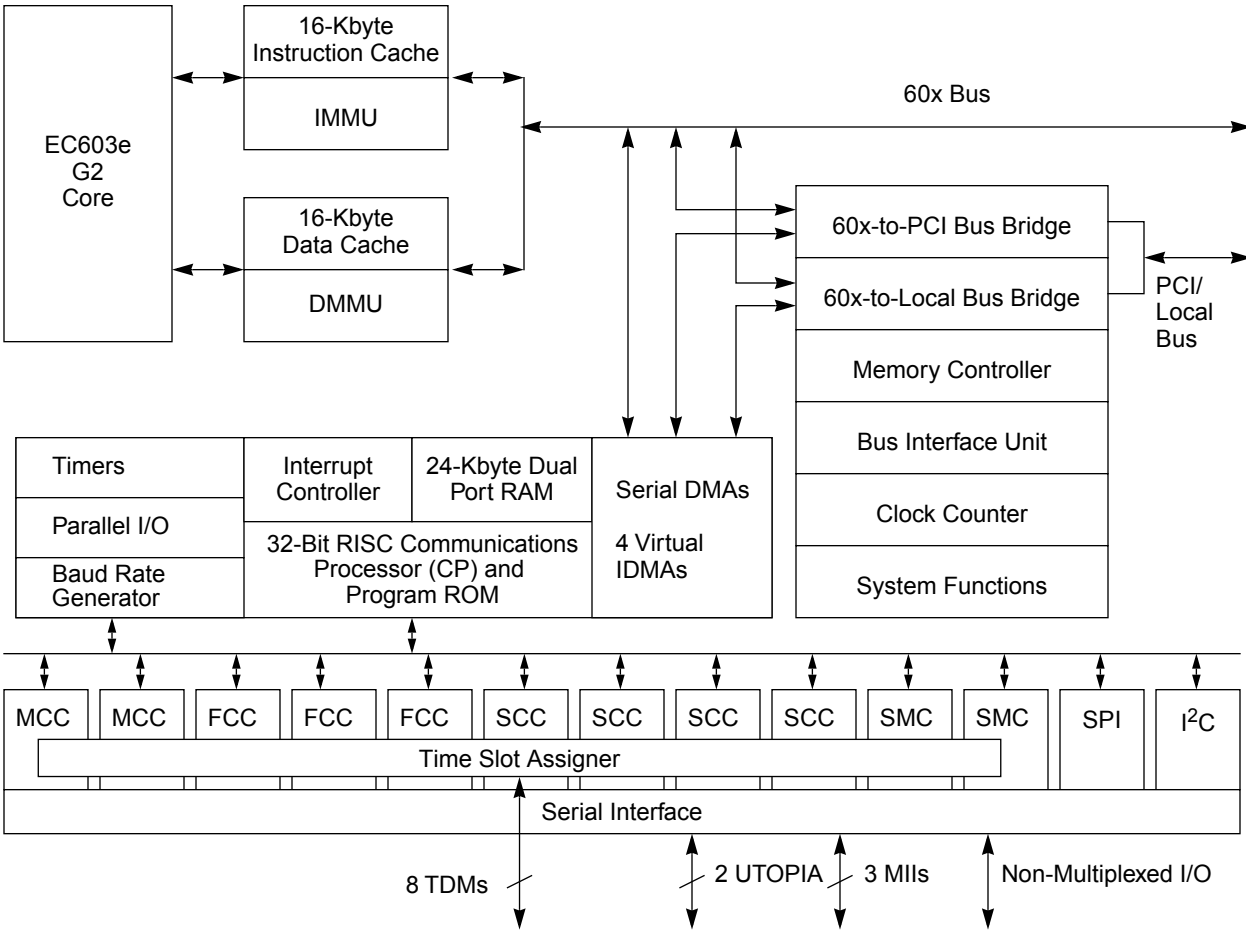

Figure 1. MPC8260 Block Diagram

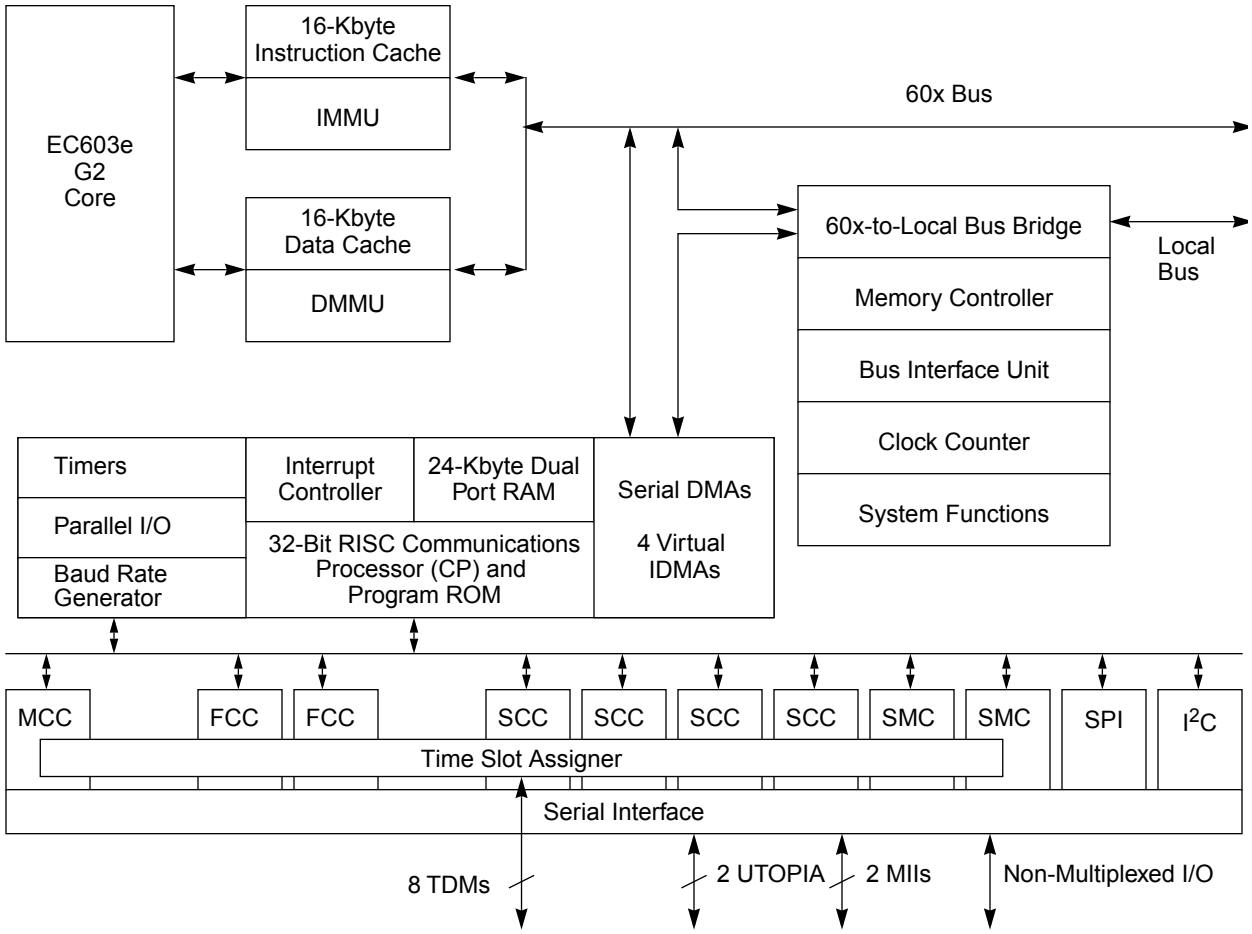

Figure 2. MPC8255 Block Diagram

There are also speed differences, which may be critical when configuring the MPC8260ADS board to use with the MPC8255 processor. The MPC8260's core speed can currently be varied from 100Mhz to greater than 200Mhz. The MPC8255 has a specific core speed range, from 100Mhz to a maximum of 200Mhz. The CPM speed of the MPC8260 can vary from133Mhz to 166Mhz. The MPC8255's CPM speed is limited to 100Mhz. The key difference is the bus speed which also derives the two other speeds. The MPC8260 can run at bus speeds up to 66Mhz. The MPC8255 is limited to 50Mhz.

1.2 Configuring the MPC8260ADS Board for the MPC8255

The MPC8260ADS board comes equipped with an MPC8260 in the processor socket. It is preset to run with a core speed of 133Mhz, a CPM speed of 133Mhz, and a bus speed of 66Mhz (see Note). All of these can be changed to accommodate development for an MPC8255 device.

1.2.1 Changing the ADS Board Bus Speed to 50Mhz

The bus speed currently running on the MPC8260ADS board is determined by the value of the oscillator at location U16. Changing the bus speed, then, requires replacing the clock generator oscillator at U16 with an oscillator of the desired value. The specifications required by a 50Mhz oscillator for the MPC8255 are

that it must use a 3.3 V supply, be 4-pins, on an 8 pin DIP form factor. An example oscillator for this function is the M-TRON M3H16FCD at 50Mhz. Location U16 is socketed, so that changing the oscillator is simply a matter of pulling out the existing oscillator and replacing it with the 50Mhz oscillator, ensuring the correct polarity by matching up the pin one position.

NOTE

At this writing, the MPC8260ADS boards are equipped with a 66Mhz oscillator which must be changed out to a 50Mhz oscillator to provide the 50Mhz bus speed required by the MPC8255. Earlier versions of the MPC8260ADS board were shipped with a 40Mhz oscillator at location U16. These earlier boards then are factory shipped with a bus speed of 40Mhz. A 40Mhz bus speed is adequate for use with an MPC8255, and changing it out is left to the discretion of the user.

1.2.2 Setting the Core and CPM Speed Values

The core and CPM speeds programmed into the processor, are determined only at power-on reset, based on values in the seven MODCK bits (see the MPC8260 Users Manual,MPC8260UM/D, Rev 0, section 9.2. These bits determine the multiplication factors used on the bus speed to feed the core and CPM. The MODCK_H bits 0-3 are programmed into the hard reset config word (HRCW) and the MODCK_L bits 1-3 are taken from the value at their associated device pins being either pulled high or grounded.

The MPC8260ADS board provides two ways of choosing which HRCW it uses, by DS1, switch 1. If this switch is set to OFF, the HRCW is taken from a value programmed into the pal at location U17, which feeds a board control status register, thus called the BCSR configuration word, coupled with the settings at DS1, switches 2-5 for the MODCK_H values. If DS1, switch 1 is ON, then the board will take the HRCW programmed into the FLASH, which provides programmed values for MODCK_H. The MODCK_L bits are set at DS1, switches 6-8, regardless which HRCW configuration is chosen by the user.

The factory default setting is DS1, switch 1 set to OFF, choosing the BCSR values for the HRCW, meaning that the core and CPM speeds can be configured by DS1- switches 2-8, the MODCK_H and MODCK_L values (see the MPC8260ADS Users Manual, Figure 2-4. DS1 Description, Table 2-1, MODCK (1:3) Encoding, and Table 4-1. Hard Reset Configuration Word). The switch values translate to ON=0. These values are factory set to 0101_111, meaning that the core value is three times the bus speed (120Mhz or 200Mhz depending on the factory supplied oscillator/bus speed value of 40Mhz or 66Mhz) and the CPM speed is set to two times the bus speed (80Mhz or 133Mhz depending on the factory supplied oscillator/bus speed value of 40Mhz or 66Mhz).

1.2.2.1 Setting DS1 on the MPC8260ADS Board for the MPC8255 Processor

As covered earlier, the maximum speed settings for the MPC8255 are 50Mhz bus, 100Mhz CPM, and 200Mhz for the core. Also covered earlier, the bus speed provided by the MPC8260ADS board is determined by the value of the clock generator oscillator at location U16 (which will be either 40Mhz or 66Mhz depending on whether the board under consideration was shipped earlier or more recently).

1.2.2.1.1 Optimum Settings for DS1

If the oscillator at U16 is changed to 50Mhz, and DS1, switch 1 is in the OFF position, then the optimum values to achieve 100Mhz CPM and 200Mhz for the core are DS1, switches 2-8 should be 0110_001 (ON, OFF, OFF, ON, ON, ON, OFF).

1.2.2.1.2 Optimum Settings for the HRCW

If the oscillator at U16 is changed to 50Mhz, and DS1, switch 1 is in the ON position, this fetches the values programmed at the bottom of flash, to use as the HRCW, with the final four bits of this being the MODCK_H values. To achieve a 100Mhz CPM and 200Mhz core speed, the final byte of the HRCW programmed into the flash should be 0x06, and DS1, switches 6-8 set to 001 (ON, ON, OFF) (see the MPC8260 Users Manual,MPC8260UM/D, Rev 0, section 9.2).

1.2.3 Changing out the Processor Not Necessary

The processor resides in an Etec socket, at location U12. The MPC8260ADS board is factory shipped with an MPC8260 device in this socket. There is no need to swap this processor for an MPC8255 to do MPC8255 systems development. Using the information in section 1.1 of this application note, paying close attention to Figure 1. the MPC8260 Block Diagram and Figure 2. the MPC8255 Block Diagram, and the differences listed, systems design can proceed with the user ensuring to stay within the MPC8255 boundaries. This simply entails ensuring that only one MCC is used, and two FCCs, in system design.

1.2.3.1 Changing Out the Processor Anyway

If it becomes necessary to change out the processor, these are the necessary steps and tools required. The Etec BPW480-1270-29AD01 is a PGA to BGA translational socket, where the device balls are held against socket cups by a lid secured with four screws at a very specific torque, 7 cN/m or 10 ounce/inches. An example of a suitable torque screwdriver to use is the Stanley Proto Industrial Tools 6104. Put the new device in the socket and move it gently with your fingertips until it settles into the balls. Hold the processor in place while lowering the top down over it. Hold the top gently in place and start the screws in with your fingers and hand-tighten as far as possible. Then, use the torque wrench, preset to 7 cN/m or 10 ounce/inches, and go in criss-cross pattern until all four screws give way to the torque wrench. Try some known good test code on the board to ensure success. NEVER OVER-TORQUE THE SCREWS, AS DAMAGE TO THE SOCKET OR DEVICE MAY RESULT.

1.2.4 Using Third-Party Developer Debuggers with the MPC8260ADS and the MPC8255 Processor

Third party developer debuggers should work fine for systems development with the MPC8255, without modification. Their supplied MPC8260ADS configuration code provides for accesses to SDRAM, FLASH, and other MPC8260ADS board resources for worst-case timing at a 40Mhz bus speed, which was the original board configuration.

1.2.5 Using Freescale Example Code Written for the MPC8260 with the MPC8255

At this writing, all example code written for the MPC8260, on the MPC8260ADS will work for the MPC8255, because only one MCC or one FCC is demonstrated. The remainder of the two devices are identical. Also, these code examples were developed for a 40Mhz bus speed, 80Mhz core, and 80Mhz CPM, which is well within the speed maximum for the MPC8255. This example code is found by going to the URL at http://www.mot.com, then performing a search for the MPC8260 processor

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