AMD Geode™ SP4SC30 to SP4SC31 System Platforms Hardware Changes and Software Compatibility

1.0 Scope

This application note discusses the hardware changes and the resulting software compatibility implications between the AMD Geode™ SP4SC30 and SP4SC31 system platforms.

2.0 Discussion

Table 2-1 lists the hardware changes. The following subsection describes each hardware change from the SP4SC30 platform to the SP4SC31 platform and the implications of the change on software written for the SP4SC30 platform. This includes utilization of the additional features of the SP4SC31 platform by new software, and workarounds for previous applications written for SP4SC30 that may be affected by the changes.

Note: All known software written for the SP4SC30 platform is compatible with the SP4SC31 platform.

The only potential issues for software applications written for the SP4SC30 platform are those that made use of the CompactFlash connector (Change #9), PADCard connector (Change #15), 5V ISA cards (Change #20), or the LM82 temperature sensor (Change #13). However, in all development work done to date using the SP4SC30 platform, no software developed by AMD has made use of these items, which is why they have been removed or improved on the SP4SC31 platform without causing any known software incompatibilities. Developers routinely make use of CompactFlash cards. This is accommodated on the SP4SC31 platform by including an IDE to CompactFlash adapter card in the kit, with no affect on software.

Furthermore, the SP4SC31 platform offers additional features over the SP4SC30 platform, such as TV output, additional sound inputs, and is USB v1.1 compliant.

Table 2-1. Hardware Changes

Change #	Description
1	TV output added
2	Additional audio inputs added to the AC97 codec
3	AC97 codec Data and Sync signals available on header
4	27 MHz oscillator option added
5	UDMA LED indicator added
6	Jumpers for V_{SBL} and V_{CORE} added
7	Option added for No Power Sequencing on Power on Reset (POR)
8	3.3V power added to the Video input Port (VIP) header
9	Removed CompactFlash connector
10	Changed resistors values on the IDE data lines for improved UDMA performance
11	Generated new GPIO signals
12	ACCESS.bus2 added to PCI slots
13	Changed temperature sensor from LM82 to LM92 and removed thermal diode header
14	Added push button to generate SMI events
15	Removed PADCard connector
16	USB ports are now v1.1 compliant
17	Changed the National Semiconductor COP8 touchscreen controller daughter card connector Interrupt scheme
18	Diode OR of DOCCS* and ROMCS* added to generate LOG$DOCROMCS*

Table 2-1. Hardware Changes (Continued)

Change #	Description
19	Removed headers for the Cosmonaut tool
20	Removed PCI bus to ISA bus address line buffers

2.1 Hardware Changes

1) TV output added

Description: Page 24 of the SP4SC31 schematic shows three new connectors, J4, J5, and J19. J4 is a 4-pin DIN connector for S-Video out, J5 is an RCA connector for composite video out, and J19 is a 26-pin connector for SCART video out. The video signals originate from the AMD Geode SC3200 processor as shown on page 6 (lower-left) of the schematics, and are filtered as shown on P24 before being routed to the video connectors. Note that J4, J5, J19, and all of the other components on page 24 are designated NL for no-load on the schematics, however, the boards have these parts installed as part of a re-work note.

Implications: The additional video circuitry does not affect software previously written for the SP4SC30 board. To take advantage of the video outputs, the desired hardware must be installed on the board, and software must properly set the video registers in the SC3200. See the *AMD Geode™ SC3200 Processor Data Book* for access to the video registers.

Software Workaround: Not applicable.

2) Additional audio inputs added to the AC97 codec

Description: Page 12 of the SP4SC31 schematic shows the addition of 4-pin headers J14, J13, J15, J21, and J22. These headers are for additional audio inputs to the AC97 codec.

Implications: This additional hardware does not affect software previously written for the SP4SC30 board. To take advantage of the new audio inputs, the AC97 codec must be programmed and operated through the AC97 interface.

Software Workaround: Not applicable.

3) AC97 codec Data and Sync signals available on header

Description: Page 12 of the SP4SC31 schematic shows the AC97 control signals, AUD$DATAOUT and AUD$SYNC, available at header J32.

Implications: This is for debug purposes, and does not affect software previously written for the SP4SC30 board, or offer any new features requiring new software.

Software Workaround: Not applicable.

4) 27 MHz oscillator option added

Description: Page 23 of the SP4SC31 schematic shows the addition of a 27 MHz oscillator. It can be used in place of the 27 MHz crystal circuit shown on page 3 of the schematics by installing R154. Video applications require more stability in the 27 MHz clock for good picture quality. The SP4SC31 boards have R154 installed, connecting the 27 MHz oscillator to the processor, and the crystal circuit removed.

Implications: This does not affect software previously written for the SP4SC30 board, or offer any new features requiring new software.

Software Workaround: Not applicable.

5) UDMA LED indicator added

Description: Page 11 of the SP4SC31 schematic shows a new LED that indicates UDMA activity.

Implications: This is a visual aid and does not affect software.

Software Workaround: Not applicable.

6) Jumpers for V_{SBL} and V_{CORE} added

Description: Page 6 of the SP4SC31 schematic shows two jumpers, J38 and J42, each connected across a 27.4K resistor that is used to adjust V_{CORE} and V_{SBL}. These were added so the user could easily and safely add a resistor in parallel to the 27.4K resistor to adjust the voltage.

Implications: Does not affect software.

Software Workaround: Not applicable.

7) Option added for No Power Sequencing on Power on Reset (POR)

Description: Page 6 of the SP4SC31 schematic shows two zero ohm resistors, R143 and R166, that may be used to select to bypass power sequencing on POR. R143 is a no-load and R166 is loaded. To bypass the normal power sequencing, R143 is loaded and R166 is removed.

Implications: Does not affect software.

Software Workaround: Not applicable.

8) 3.3V power added to the Video Input Port (VIP) header

Description: Page 16 of the SP4SC31 schematic shows the V_{CC3V} power going through a 0.01 ohm resistor, R237, and a 10 µF filter capacitor, C212, to ground providing a filtered version of 3.3V power for the VIP header, named $V_{CC3VVIP}$.

Implications: Does not affect software. VIP pinout for cards plugged into SP4SC31 should be checked for pin compatibility with these new power signals.

Software Workaround: Not applicable.

9) Removed CompactFlash connector

Description: Page 11 of the SP4SC30 schematic shows a CompactFlash connector, that has been removed on the SP4SC31 platform.

Implications: CompactFlash cards cannot be used on SP4SC31 unless a CompactFlash to IDE adapter is used.

Software Workaround: Use a CompactFlash to IDE adapter card (included in kit).

10) Changed resistors values on the IDE data lines for improved UDMA performance

Description: Page 11 of the SP4SC31 schematic shows resistor packs RP1, RP2, RP3, RP4, and RP5 in the upper-left corner of the schematic. The value of these resistors has changed from 33 ohms on SP4SC30 to 68 ohms on SP4SC31 to improve UDMA performance. In addition the values of R184, R183, and R277 have increased from 75 ohms on SP4SC30 to 82 ohms on SP4SC31.

Implications: Does not affect software.

Software Workaround: Not applicable.

11) Generated new GPIO signals

Description: Page 8 of the SP4SC31 schematic shows U39, part # PCA9555DB, which is connected to ACCESS.bus2, and generates 16 GPIO outputs. Eight of them go to header J79, five to header J72, one to the Eel connector J33 on page 18, and the last two are reserved and terminated in a 10K resistor pack.

Implications: This new feature does not affect software previously written for SP4SC30, but new applications wanting to take advantage of the GPIO signals must add software to communicate with U39 using ACCESS.bus2.

Software Workaround: Not applicable.

12) ACCESS.bus2 added to PCI slots

Description: Page 8 of the SP4SC31 schematic shows ACCESS.bus2 being sent to the PCI slots shown on page 7. The signal names are PCI$ABC for PCI ACCESS.bus Clock, and PCI$ABD for PCI ACCESS.bus Data. These are sent to pins A40 and A41 of the PCI connectors. These two pins are listed as SMBus signals in v2.3 of the PCI specification.

Implications: This new feature does not affect software previous written for SP4SC30. New applications for PCI cards wanting to take advantage of the feature must be hardware compatible with the two ACCESS.bus signals on pins A40 and A41, and add software to communicate with the PCI card using ACCESS.bus2.

Software Workaround: Not applicable.

13) Changed temperature sensor from LM82 to LM92 and removed thermal diode header

Description: Page 8 of the SP4SC31 schematic shows an LM92 temperature sensor that was changed from the LM82 on the SP4SC30 board. These sensors are typically capable of monitoring temperature of an external thermal diode and one built into the package itself. On the SP4SC30 board the external thermal diode input was brought out to a header so an external device could be monitored. This function was removed on the SP4SC31 board and only the internal thermal diode is monitored. In addition the LM82 on the SP4SC30 board has the ACCESS.bus address lines wired A1 = 0, A0 = 0, while the LM92 has them wired A1 = 1, A0 = 0.

Implications: This does not affect AMD drivers or XpressROM for the platforms. Only those applications that made use of the LM82 temperature sensor may be affected by the change to the LM92. The main implication is that the address has changed from 0h to 2h. Any internal differences between the parts can be found by reading the LM82 and LM92 datasheets.

Software Workaround: None.

14) Added push button to generate SMI events

Description: Page 4 of the SP4SC31 schematic shows Dowser header J65, which can connect to an external circuit to generate Dowser SMI events for test purposes. A new feature was added to SP4SC31 where a push button switch, SW3, can also generate the SMI events. The intent is that the button generates Sleep or Suspend-to-RAM requests.

Implications: Suspend-to-RAM software must be used to make use of this function.

Software Workaround: Not applicable.

15) Removed PADCard connector

Description: Page 10 of the SP4SC30 schematic shows connector J64 for a PADCard wireless interface. This function has been removed from the SP4SC31 platform.

Implications: Any application software making use of the PADCard interface on SP4SC30 will not function on the SP4SC31 platform.

Software Workaround: None. The PADCard interface will no longer be supported, and the recommended wireless interface is 80211.b.

16) USB ports are now v1.1 compliant

Description: The USB ports shown on page 14 of the SP4SC31 schematic are now v1.1 compliant. The circuit was modified to protect the processor from accidental shorts in the external USB device.

Implications: Does not affect software.

Software Workaround: Not applicable.

17) Changed the National Semiconductor COP8 touchscreen controller daughter card connector interrupt scheme

Description: On the SP4SC30 platform, the COP8 daughter card can interrupt the processor from the signal UC$INT* on pin 1 of the daughter card connector, J63. The signal UC$INT* could then be routed to three different interrupt signals, UC$WKINTR*, PCI$INTA* or PCI$INTB* by changing the jumper setting on J62. The default setting is to UC$WKINTR*. Note that UC$WKINTR* is routed to UC$WKINT* through a zero ohm no-load resistor, R173 on page 15.

Implications: On SP4SC31 the option to jumper to PCI$INTA* or PCI$INTB* is not available. This should not affect any software application previously written for SP4SC30 unless the application specifically called for a change to the jumper J62 default setting, or to install R173 to make use of the UC$WKINTR* interrupt. Any new software application should review the COP8 interrupt scheme and call for installing any zero ohm resistors to make the scheme work.

Software Workaround: If a previous application made use of the PCI$INTA* or PCI$INTB* interrupts for the COP8 card, they will no longer work.

18) Diode OR of DOCCS* and ROMCS* added to generate LOG$DOCROMCS*

Description: Page 10 of the SP4SC30 schematic shows a PAL that can generate the signal LOG$DOCROMCS*, which can then be jumpered to the signal DOC$EN* for the M-Systems DiskOnChip. The LOG$DOCROMCS* signal is the logical OR of the LOG$DOCCS* and ISA$ROMCS*, meaning that the DiskOnChip can boot the system BIOS as well as be used for data storage. Note that the PAL, U29, is a no-load and must be specifically installed to utilize this function.

On the SP4SC31 board, the PAL is still a no-load, but the LOG$DOCROMCS* signal is generated using two diodes in hardware. As a result the SP4SC31 board can generate the LOG$DOCROMCS* signal without the PAL being loaded.

Implications: This change does not affect software. New applications using the SP4SC31 board can now boot BIOS from the DiskOnChip without loading the PAL.

Software Workaround: Not applicable.

19) Removed headers for the Cosmonaut tool

Description: Page 8 of the SP4SC30 schematic shows two headers, J32 and J28, that are available for the Cosmonaut debug tool. These two headers have been removed on the SP4SC31 board.

Implications: This change does not affect software.

Software Workaround: Not applicable.

20) Removed PCI bus to ISA bus address line buffers

Description: Page 8 of the SP4SC30 schematic shows three 74LCX245 buffers between the PCI address lines and ISA bus address lines. These buffers allowed for increased drive strength and allowed use of 5V or 3.3V ISA devices, with the restriction that all ISA devices must use the same supply voltage and cannot be mixed. With the deletion of the PADCard connector, further testing showed the buffers were not required. The SP4SC31 board replaces the buffers with lower-cost resistor packs. This requires that all ISA devices or cards for the SP4SC31 platform are 3.3V. Any application that previously used 5V ISA devices cannot be used on the SP4SC31 board.

Implications: This does not affect software unless specifically written to make use of a 5V ISA device driver.

Software Workaround: Not applicable.

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