AMD Geode™ LX DB800 Development Board Specification Update

1.0   Scope

This document discusses known issues of the AMD Geode™ LX DB800 development board. The table below provides a summary of the issues. A detailed description of each issue, its impact and a recommended resolution/fix follow.

Note: This is revision C of this document. The changes between revision B (dated January 2006) are in issue #3 and are non-technical. Minor rewording of the Description and Resolution. In the Resolution, the application note that is referenced changed names. Now called "AMD Geode™ CS5536 Companion Device USB 2.0 Device Linux Workaround" with publication ID remaining the same (40471).

Table 1-1. Issues Summary

Issue #(Note 1)	Description
1	Limited High speed USB 2.0 functionality
2	Suspend-to-RAM non-functional
3	USB 2.0 high speed (HS) device defaults to full speed (FS) after wake from APM Suspend (S3)

Note 1.   Issue numbers may not be sequential since issues are omitted once they are resolved.

2.0   Issues

1)   Limited high speed USB 2.0 functionality

Description: USB high speed data transfers may not complete.

Implications: A signal integrity issue has been identified with the USB 2.0 interface that affects all four USB ports routed through the ETX connector X1. There is coupling between the PCI AD bus and the USB data signal lines. This causes unwanted noise on the USB signal pairs that manifest themselves as spikes in the amplitude of the differential signaling. The USB 2.0 specification states that high speed signaling is to be 400 mVpp, and the EHCI controller must tolerate signaling with differential amplitudes <525 mV. Signals with differential amplitudes >625 mV must reliably activate the Disconnection Envelope Detector. On the LX DB800 spikes caused by the coupling of the PCI bus to the USB signal pairs exceed the EHCI controller's signal amplitude limit for high speed operation causing the disconnection of the USB device. The OS typically will show the device as being disconnected and immediately reconnects the device in Full speed mode. If an application is in the middle of a High Speed data transfer when this occurs, the transfer will be incomplete.

Resolution: Testing and evaluation has shown that the addition of 18 pF to 22 pF capacitors on the USB data signals reduces the amplitude of the unwanted spikes to within the EHCI tolerable level (<625 mVpp) with a margin of approximately 0-25 mV on USB ports 2 and 3. USB ports 0 and 1 signaling is not significantly affected by the addition of capacitance on the data signals. Testing has shown that USB ports 0 and 1 may work at high speed, but could fail with large data transfers. On the LX DB800 ETX SOM, 0402 18 pF to 22 pF ceramic capacitors can be added on the bottom of the PCB directly beneath the AMD Geode™ CS5536 companion device on the resistor pads: R317 – R324.

This has been corrected in the production version of the board.

2)   Suspend-to-RAM non-functional

Description: When suspending to RAM system will not completely power down.

Implications: The CS5536 power management control signal WORKING is currently used to control the ATX power supplies main rails. This signal is intended to be used to control main memory only and the signal WORK_AUX should be used to control main power to the system. The resulting behavior is

that when the system is put in the Suspend-to-RAM state it will not power off the ATX supply.

Resolution: The CS5536 signal WORK_AUX needs to be connected to the inverter at R67 that controls the ATX power supply main rails. This change will cause the system to power up instantly when the ATX power supply is connected for the first time. Power management firmware should configure GPIO24 to be WORK_AUX resulting in correct system behavior for the S5 and S3 states. The power button will then be required to turn on the system.

This has been corrected in the production version of the board.

3   USB 2.0 high speed (HS) device defaults to full speed (FS) after wake from APM Suspend (S3)

Description: In APM Suspend (S3), both the EHC and OHC controllers are switched off on the CS5536 companion device. The EHC spec implies that the CONFIGFLAG and the PORTSC[4:1] registers be auxiliary powered in S3. This is not implemented in our controllers, so the BIOS restores the contents of these registers before the BIOS gives ownership to the operating system during resume from S3.

Implications: The Windows EHCI driver does a full initialization and enumeration after resuming from S3, so no impact was seen.

The Linux EHC driver does not do a full initialization sequence. Therefore, the ConfigFlag is not set and PORTSC.PortPower is cleared. A connected device is then always routed to the OHC.

Resolution: The workaround is to unload/load the driver around the sleep cycle. See the application note titled *AMD Geode™ CS5536 Companion Device USB 2.0 Device Linux Workaround* (publication ID 40471) for details.

AMD◣

www.amd.com