Adrienne Electronics Corporation

"AEC-PCIe WARM RESTART FIX"

FIELD APPLICATION NOTE

Introduction:
This document describes how to fix the problem of a PC locking up during warm restarts when an AEC-PCIe board is installed. Note that revisions "E3" and "E4" apply only to AEC-PCIe(EMU) boards (which emulate older PCIe-TC boards).

Background Information:
1) We have never had any complaints about AEC-PCIe boards not working properly following a "cold boot" (power is first applied to a computer).
2) Some customers have reported that their PC hangs up during "warm restart" events, such as when a Windows "restart" operation is performed following a system software update. This never happens on any of the computers at our facility, so until April 2024, we were unable to duplicate or fix the reported problem.
3) In April 2024, a very generous customer loaned us a high-end Windows 11 Professional PC for testing purposes. This PC would hang up every time a warm restart was attempted with an AEC-PCIe "E3" board installed. We discovered that this PC motherboard never sends a normal reset signal to our board during warm restarts, so our board is in an unknown state when Windows attempts to restart, Windows detects that something is wrong and crashes (instead of handling the problem in a graceful manner). This PC does send a PCI Express "hot reset" message to our board during the warm restart process, but that is not the same as a hardware reset signal.
4) In April 2024, under identical test conditions, an HP desktop PC running Windows 11 Professional would always restart perfectly. We were able to confirm that this PC always sends a hardware reset signal to our board during the warm restart process, as it should.
5) The PCI Express specification versions that we have access to are silent on what should happen during a PC "warm restart". It makes no sense to try to boot up a PC when the hardware is in an unknown state, so traditionally all hardware gets reset whenever a PC (or OS) boots up. We consider PC motherboard hardware and/or firmware which doesn't do this to be defective.

The Fix:
We have revised the FPGA design on AEC-PCIe boards to force a full board hardware reset if a PCI Express "hot reset" message is received. The new AEC-PCIe board firmware revision is "E4".

A Word of Caution:
It is possible that some operating systems and/or motherboards will send a PCI Express "hot reset" message to our board during normal operations. We do not expect that to ever happen, but if it ever does, the AEC-PCIe "E4" board will perform a full hardware reset of itself, and that might crash the system. We recommend that you obtain one or more AEC-PCIe "E4" boards for testing purposes, and thoroughly test them in your system(s).

<u>The AEC-PCIe Firmware Update Procedure:</u>
1) There is at present no way to update the firmware on AEC-PCIe boards
   without returning them to the factory for a firmware update.

2) Package multiple (preferably) AEC-PCIe "E3" boards carefully in anti-static
   and padded bags, inside a well padded box, so that they cannot possibly get
   damaged during shipping in both directions.

3) Include in the box a letter which indicates that you want the AEC-PCIe
   firmware update to "E4", plus return shipping instructions. We do not
   consider this problem to be a warranty issue, because your motherboard
   design appears to be defective, so <u>you are responsible for shipping and
   insurance and customs costs in both directions</u>.

4) Ship multiple AEC-PCIe "E3" boards back to us at:
           Adrienne Electronics Corporation
           attn: AEC-PCIe Firmware Update
           1008 York Ranch Rd
           Pie Town, NM 87827   U.S.A.
           (575) 772-2572
   For international shipments, save on customs fees by indicating on the
   shipping documents that the boards are being returned for <u>repair purposes</u>.

5) We will update the firmware for free, then re-test and ship the boards back
   to you (at your expense), at the address indicated, normally within 1 week.

<u>A Free Workaround:</u>
If you do not want to go through all the trouble, expense, and delays of
returning AEC-PCIe boards to us for firmware update purposes, there is a free
workaround. Just shut down your PC's, then turn them back on, instead of
doing warm restarts. We realize that this is not always possible, as some
PC's automatically update and restart themselves. Often the automatic updates
can be disabled, and then the warm restart problems can be avoided.

<u>Going Forward:</u>
Beginning in late April 2024, by default we will ship you AEC-PCIe revision
"E4" (or later) boards which have the PCI Express "hot reset" detection and
reset capability, unless you tell us in advance that you only want older
revision "E3" boards.