

Adrienne Electronics Corporation

“PCIe-TC Windows Guide”

For All PCIe-TC Family Boards

Introduction:

This document helps you install, test, and use your PCIe-TC board in a Microsoft “Windows” software environment. This process is not for the faint of heart, so take it step by step. If it makes you feel any better, it is easy to do once you have done it once already.

Preliminary Steps:

Before you proceed with Windows software, it is very important to first install and verify the PCIe-TC board hardware as described in the “PCIe-TC Board User Guide” in the “Documentation” section of this CDROM. There is no point to proceeding with Windows setup if the Host PC and/or your PCIe-TC board hardware aren't working properly. Install and verify first.

Windows Software Overview:

Once you have verified that the PCIe-TC board hardware is OK (see above), it is time to get the board working with Windows. There are many different versions of Windows (more than most people know), and within each version there may be multiple “editions” (Windows 7 has six(6) different editions), and Windows software is continually being updated. So we can only describe here in general terms how to get your board working with Windows. If your version, edition, or revision of Windows is a little bit different from what we describe here, please tough it out as best you can, and send a note to <support@adrielec.com> if you find something which should really be added to this Windows setup document. In general, you will need to (in this order):

- 1) Log onto your Windows PC with “administrator” privileges. This is necessary so that you can install the device driver file.
- 2) Install the “driver software” (a “.sys” file) which allows Windows and its library functions and applications to access the PCIe-TC board hardware.
- 3) Install the “function library” (a “.dll” file) which makes it easy for different PCIe-TC board applications to access the driver software. This is code which could be included within each application, but for software maintenance reasons, it makes more sense to use the separate file. You will typically find dozens (if not hundreds) of DLL files on a Windows PC.
- 4) Launch (execute) the desired Windows “application” (a “.exe” file) which provides the Graphical User Interface (GUI) and functionality which motivated you to purchase your PCIe-TC board in the first place.

32-bit Versus 64-bit PC Notes:

Intel has been making 32-bit “80x86” (more commonly known as “x86”) CPU's since about 1985. AMD began making 64-bit CPU's which could also execute the older 32-bit code (without any changes) around 2003, and Intel soon followed AMD's lead. The 64-bit processors are commonly known as “x64” CPU's. So “x86” indicates 32-bit architecture, and “x64” indicates 64-bit architecture.

A PC which has a 32-bit CPU requires a 32-bit version of Windows.

A PC which has a 64-bit CPU almost always runs 64-bit Windows, but can instead run 32-bit Windows if needed for compatibility with older 32-bit drivers.

A PC with 32-bit Windows requires 32-bit driver software, 32-bit DLL's, and can only execute 32-bit applications.

A PC with 64-bit Windows requires 64-bit driver software (always), but can execute 32-bit applications with a 32-bit DLL, and can execute 64-bit applications with a 64-bit DLL. So you must be careful to get things right.

You will see separate directories on the PCIe-TC CDROM for both 32-bit and 64-bit Windows files.

PCIe-TC Board Quirks:

In an attempt to keep board manufacturing costs reasonable, we decided when migrating from PCI-TC (PCI) board design to the PCIe-TC (PCI Express) board design to use a simple “SDIO” (Secure Digital I/O) chip to interface our existing (PCI) FPGA design to the very high speed PCI Express serial bus. Unfortunately, the chip we selected is a 4-function device, designed to interface to lots of different types of small memory cards. We are only using one of those four functions, which typically shows up in Windows Device Manager as a “SD Host Controller”. The other three functions are not used, and they typically show up in Windows Device Manager as a “Base System Device” (there are three of them). So if you install a PCIe-TC board in your computer, then it attempts to take you through four(4) full iterations of the device installation procedure, that's why. Please be patient.

Device Driver Installation (General):

PCIe-TC boards are generic PCI devices, which means that it is easy for BIOS, our bootable test/demo software, and Windows to find the board in your system. Our bootable test/demo software knows ahead of time how to properly interface to a PCIe-TC board, so you do not have to install any drivers for that case. In contrast, Microsoft and their Windows software have never heard of tiny Adrienne Electronics Corporation or its PCIe-TC boards, so you must explicitly tell Windows what driver software to use in order to access a PCIe-TC board.

In some versions of Windows, a “Found New Hardware” window or balloon will pop up, asking you what driver to use. In other versions of Windows, you have to initiate this task yourself. To make things simpler, just close down all automatic windows and balloons if they appear, then proceed as follows...

Device Driver Installation (Device Manager Startup):

Remember that you must be logged onto your Windows PC with “administrator” privileges in order to install device driver software. All versions of Windows have a “Device Manager” program which is responsible for installing and maintaining a device driver for each device which it automatically finds in the system (such as your PCIe-TC board).

The hard part is finding Device Manager in your system. Each version of Windows does things a little bit differently. Here are some examples...

For Windows XP Device Manager, select...

- Start → Control Panel → System → Hardware (tab)
- Device Manager

For Windows 7 Device Manager, select...

- Start → Control Panel
- Hardware and Sound
- Device Manager (within the Devices and Printers group)

For Windows 8 Device Manager, select (from the main tiled screen)...

- [down arrow in lower left corner] → Control Panel
- Hardware and Sound
- Device Manager (within the Devices and Printers group)

Device Driver Installation (Device Manager Settings):

- 1) First disable the three unwanted (unused) PCI functions on your PCIe-TC board:
 - a) Expand the "Other Devices" category.
You should find three(3) "Base System Device" entries.
 - b) For each "Base System Device" entry, right click on it, then select "Disable". This tells Windows to ignore the unused PCI function.
- 2) Next install the appropriate device driver file for the main PCI function on your PCIe-TC board:
 - a) If no driver has been installed yet, expand the "SD Host Adapters" category (if not done already). You should find one "SDA Standard Compliant SD Host Controller" entry. Right-click on that entry, select "Properties", then proceed to step "c" below.
 - b) If a driver has previously been installed, expand the "AEC Time Code Device" category (if not done already). You should find one "AecPCIeTC Device" entry. Right-click on that entry, select "Properties", then continue to step "c".
 - c) A "<device name> Properties" window will open.
 - d) Below the "General" tab, verify that the device status field says something like "This device is working properly."
 - e) Below the "Details" tab, select the "Device Instance Path" property, then verify that there is a text string present in the "Value" display which says (in part) something like "VEN_AECB" (an AEC board). If that text string is not present, then you have accidentally selected some other (non-AEC) device, and you must select "Cancel" before you install the wrong driver for the wrong device.
 - f) Below the "Driver" tab, select "Update Driver", then select "Browse my computer...", then navigate to the proper directory on the PCIe-TC CDROM. Be very careful to select the "32-bit Win Files" directory for 32-bit Windows, and the "64-bit Win Files" directory for 64-bit Windows.
 - g) If 32-bit Windows displays a message to the effect that "The best driver is already installed...", and then refuses to let you install the Adrienne Electronics driver, then refer to the "Best Driver Override" application note (PDF). Proceed as indicated in step "f" above, but after selecting "Browse my computer...", DO NOT directly select the directory which contains the driver file (that would be too easy). Instead, select "Let me pick from a list...", then select "Have disk...", then select the directory which contains the driver file.
 - h) Follow the driver installation instructions now provided by Windows. It should verify that you are installing a driver written by Adrienne Electronics Corp. Device Manager will show that you now have a PCIe-TC board installed. This concludes driver installation (congratulations)!

NOTE - In the near future we intend to update, clean up, and re-issue Windows 32-bit and 64-bit drivers for all AEC products, including our PCIe-TC boards. In the process, we plan on "signing" our 32-bit driver file set, which should eliminate the need for awkward step "g" above. Thank you for your patience.

Linking and Loading Notes: (optional)

Windows software is very modular, in that there are hundreds of separate software files, each of which must interface to others in order to perform useful work. In addition, each Dynamic Link Library (DLL) file typically contains many separate software functions (subroutines) which may be called and used by Windows application software. So when Windows “executes” (begins running) a “.exe” Windows application program, it must first load said program into memory, then link said program with all the library functions inside other software modules so that they can all properly interact with each other. This is a somewhat simplified account of the way things work, but at least it gives you an idea what a DLL file is and how it is used in your system.

Library (DLL) File Installation:

You don't really have to “install” a library (“.dll”) file. However, Windows does need to know where said file is located then you begin executing a Windows application which uses one or more of the functions contained within said library file. The easiest way to do this is simply:

- 1) Remember to select and use a 32-bit DLL file with a 32-bit application, and use a 64-bit DLL file with a 64-bit application. Navigate to the proper (32-bit or 64-bit) directory on the PCIe-TC CDROM, then navigate further into its “DLL Files” subdirectory.
- 2) Copy and paste the “AEC_NTTC” (“.dll”) file into the same directory as the Windows application which you intend to use.

Alternatively, you can copy and paste the DLL file into the (typically) “C:\Windows\System” directory. That makes the DLL available to all Windows application programs, no matter where they are executed (launched) from.

Run the Windows Test/Demo Program:

Once you have installed the device driver file in your system, you need to make sure that everything is installed and working properly under Windows. The easiest way to do this is by finding and running the “AecMfc32TimeCode” (“.exe”) test/demo Windows application in the “Windows Demo” directory on the CDROM. You can double click on the file name and execute the program directly from the CDROM. Because it is a 32-bit Windows application, we have conveniently provided a proper size (32-bit) DLL file in the same directory. This program should work fine on both 32-bit and 64-bit PC's. If it is running properly, then you know that your Host PC, your PCIe-TC board, and the Windows files are set up properly. If you subsequently have difficulties accessing your PCIe-TC board with some other Windows application, then you know that said application (not the board or the Windows files) is most likely the source of the problem (or the proper sized DLL file is not visible).

Application File Installation:

You don't really have to "install" a Windows application (".exe") file anywhere. If you want to run one of the ".exe" Windows application files provided within the PCIe-TC CDRom, double click on the file name to start running it directly from the CDRom. Alternatively, you may use the Windows "copy" and "paste" functions to copy said file (and the proper sized DLL file) from the CDRom to a location on your PC's hard disk drive (HDD), then double click the file name to start running it from the HDD. Be sure that the proper sized DLL file is in the same directory as the ".exe" file, or is in a Windows system directory which is visible to all Windows applications.

Application File Problems:

For some reason we frequently get technical support calls and/or e-mails from customers who are using another company's Windows application program to interface to our board. In most cases we have never seen or heard of said application program, and thus cannot help you with it even if we wanted to. Please direct such inquiries to the appropriate software or system vendor. If your PCIe-TC board works properly with the bootable test/demo program on the PCIe-TC CDRom, then all the hardware is OK. If your PCIe-TC board works properly with the Windows test/demo program provided on the PCIe-TC CDRom (see above), then the Windows setup is OK (congratulations). We have then done all we can.

In Case of Trouble:

If you have honestly tried all the above, and things aren't working right, contact us at <support@adrielec.com>, or via the phone number found in the "Introduction" file in the root directory of the PCIe-TC CDRom. It is quite possible that the Windows software has changed, or that this document needs to be updated, or perhaps you have discovered a new software "feature" (bug). We want you to be a happy customer who will order more boards and recommend us to your friends, so please give us a chance to fix problems and make improvements if and where needed.