

Computer Configuration and Troubleshooting Guidelines for Photometrics Cameras

This tech note outlines known good practices which are likely to improve camera performance. Photometrics' scientific cameras are real-time streaming devices which compete with other computer devices for system resources. The recent environmentally-conscious efforts by hardware and software manufacturers have improved power efficiency in newer computers, with the consequence of limiting performance of the CPU and PCI-express bus. This means that during acquisitions, your CPU will be constantly changing its speed and hence performance. In turn, **this leads to image artifacts, camera timeouts,**

and other unwanted imaging errors. In order to overcome these performance hurdles, certain settings must be adjusted to ensure real-time device performance is not hindered.

Windows Vista and Windows 7 offer advanced control over your computer power options. You can ensure maximum real-time image streaming performance occurs throughout your image acquisitions, by using the recommended power settings below. *See Appendix for visual guide on how to access advanced power options.*

Windows allows some control over CPU speed throttling, which affects real-time image acquisition in the same way as SpeedStep does: producing corrupt images due to random speed changes during the acquisitions. The processor options should instead be set to run at the maximum speed.

In the advanced power options, find and set:

- **Processor power management**
 - **Minimum processor state**
Setting: **100%**
 - **Maximum processor state**
Setting: **100%**

Windows tries to determine which USB devices are not actively in use and temporarily suspends them. This can cause performance degradation for USB cameras and USB storage devices (which a user may use for storing images).

In the advanced power options, find and set:

- **USB settings**
 - **USB selective suspend setting**
Setting: **Disabled**

Wireless LAN devices frequently search for nearby access points, which causes hiccups for all real-time devices. Enabling power saving on wireless LAN is proven to reduce the impact of this polling.

In the advanced power options, find and set:

- **Wireless**
 - **Power Saving Mode**
Setting: **Maximum Power Saving**

Photometrics provides PCI-express interface cards for their cameras. In order to ensure the camera can achieve the full bandwidth required, the PCI-express bus must not be throttled.

In the advanced power options, find and set:

- **PCI Express**
 - **Link State Power Management**
Setting: **Off**

If after using these recommended Windows settings your images still appear incorrectly, your computer is likely still enforcing other power savings options located in the BIOS.

The BIOS on most modern motherboards (especially Intel Core i3/5/7 systems), has enabled CPU speed throttling and power saving by default (called "SpeedStep" and "C State"). These settings do not allow for stable real-time image acquisition because the speed of the CPU is constantly changing.

Follow the suggested settings below to ensure maximum performance. *Note: please consult with your computer/motherboard operating manual or 'boot screen' for instructions about how to access settings in the BIOS.*

- Disable Intel SpeedStep & "CPU C State"
 - **Some BIOS menus have grouped these settings into more generally-named options, set these sorts of power savings options to 'maximum power'/'least savings' if there is any doubt.**
 - Disable or toggle to 'maximum power' all power management/savings settings related to:
 - CPU speed (SpeedStep/throttling/dynamic performance)
 - PCI/PCI-express bus
 - Disable unused onboard devices
 - Modern computer motherboards contain many built-in devices including FireWire controllers, "WiFi", and BlueTooth. These devices use resources even while not in use, if they are enabled in the BIOS. Please manually disable any devices which are not utilized regularly.
 - Built-in FireWire controllers are not supported by Photometrics. Use the provided FireWire card included with the camera.
- Last resort measures** may be necessary if the aforementioned efforts do not remediate the imaging problems you're having. This can be indicative of other hardware competition for real-time resources in your computer. As a last resort, you should try the following:
- Disable onboard sound card (typically an option in the computer BIOS)
 - Uninstall any software that is not required in the same system (such as multimedia programs which constantly run in the background)
 - Avoid using Gigabit Ethernet cards (1000Mbps) unless absolutely necessary. Replace with a 10/100 Mbps Ethernet card if possible.
 - If using a FireWire camera and you encounter many dropped frames, use the Thesycon latency check tool (Found here: http://www.thesycon.com/eng/latency_check.shtml) to check for high yellow or red bars. These bars indicate heavy competition between streaming/real-time devices, which puts a damper on all streaming performance.

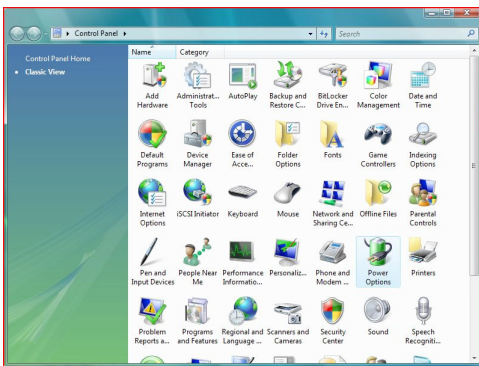
Appendix

How to change power settings in Windows Vista/7

1. Open the **Control Panel**.
2. Open the **Power Options**.

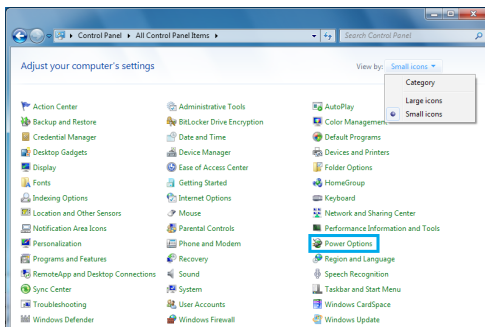
For Windows Vista:

On the left sidebar, click **Classic View**. Then, find **Power Options** in the main set of options and open it.



For Windows 7:

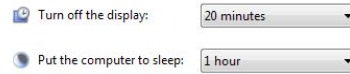
At the top-right portion of the Control Panel screen, there is an option named **"View by."** Change this option from **"Category"** to **Small or Large Icons**. Then, find **Power Options** and open it.



3. Click **Change plan settings** for the active power setting you are using.

Change settings for the plan: **Balanced**

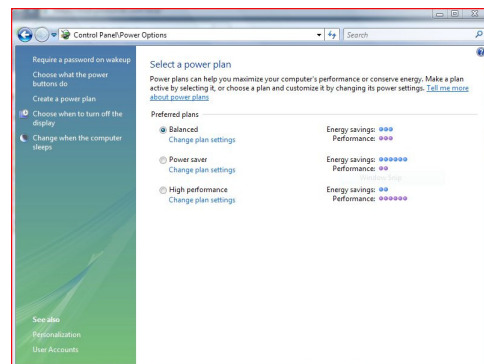
Choose the sleep and display settings that you want your computer to use.



[Change advanced power settings](#)

[Restore default settings for this plan](#)

4. Click **Change advanced power settings**



5. Adjust these advanced power options per the recommendations in the **"Windows Vista and Windows 7"** section.

