



## Laser Pointer Safety

### About Laser Pointers

Laser pointers are completely safe when properly used as a visual or instructional aid. However, they can cause serious eye damage when used improperly. There have been enough documented injuries from laser pointers to trigger a warning from the Food and Drug Administration ([Alerts and Safety Notifications](#)). Before deciding to use a laser pointer, presenters are reminded to consider alternate methods of calling attention to specific items. Most presentation software packages offer screen pointer options with the same features, but without the laser hazard.

### Selecting a Safe Laser Pointer

#### 1) Choose low power lasers (Class 2)

Whenever possible, select a Class 2 laser pointer because of the lower risk of eye damage.

#### 2) Choose red-orange lasers (633 to 650 nm wavelength, choose closer to 635 nm)

The National Institute of Standards and Technology (NIST) researchers found that some green laser pointers can emit harmful levels of infrared radiation. The green laser pointers create green light beam in a three step process. A standard laser diode first generates near infrared light with a wavelength of 808nm, and pumps it into a ND:YVO<sub>4</sub> crystal that converts the 808 nm light into infrared with a wavelength of 1064 nm. The 1064 nm light passes into a frequency doubling crystal that emits green light at a wavelength of 532nm finally. In most units, a combination of coatings and filters keeps all the infrared energy confined. But the researchers found that really inexpensive green lasers can lack an infrared filter altogether. One tested unit was so flawed that it released nine times more infrared energy than green light.

Initially, green will appear brighter than red due to the response of the human eye. However, green may actually be too bright and has been found to leave a distracting after-image on the retina, making it difficult to concentrate on the presentation. Safety concerns have been raised about photo-biological effects from blue light laser pointers (400-500 nm) and they should be avoided.

Due to the eye's sensitivity to green light, and also green lasers carry a risk of IR exposure, green laser pointers should not be used. Only red lasers pointers (633-690 nm) should be used.

#### 3) On/Off Switch

Ensure that the on switch is a momentary contact type that is designed to shut off the pointer when released. Use of laser pointed with a locking device to keep the laser beam on is prohibited.





## **Identifying Laser Characteristics**

Identify a laser's class by reading the FDA warning label. Most red laser pointers are Class 2 and radiate less than 1mW of power. Class 2 lasers are safe if the beam accidentally enters the eye for a short period. The aversion response (blinking or turning the head) is fast enough (0.25 seconds) to prevent injury from the laser exposure. Injuries have occurred when the eye was intentionally exposed for a longer period. Class 3R (called 3a before 2008) emit up to 5mW of power and are capable of damaging the eye with a direct exposure of only a few seconds.

Only use laser pointers that have clear warning labels. Many pointers that do not have warning labels have not had a hazard analysis performed and may be more powerful than expected.



The warning label designs may not be the same. But the labels have to include: the starburst insignia, laser classification, maximum output power (in mW), and wavelength (in nm).

## **Laser Safety - Avoid Eye Injury**

- Aim the laser pointer only at the presentation screen. Point only at inanimate objects - never at a person or animal regardless of power.
- Never view a laser beam through the use of an optical instrument (such as binoculars, microscope, etc.) which may concentrate the light energy making it more hazardous.
- Do not aim a laser pointer at a shiny/mirror-like surface. The reflected beam is as hazardous as the direct beam.
- Do not allow children to use a laser pointer unsupervised. The FDA has issued an [advisory](#) warning that laser pointers are not toys and should be used by children only under strict supervision.
- Ensure that the laser pointer is not activated when you are facing the audience
- The laser should turn off immediately when the switch is released. Use of a laser pointer with a locking device that keeps the laser beam on is strictly prohibited.
- Do not purchase or use an unlabeled laser pointer. Contact Radiation Safety Services (617-496-3797) if you have an unlabeled laser pointer.

## **Laser Safety – Avoid Causing Accidents**

Even low power lasers can cause glare, flash-blindness, and afterimage problems when used improperly. Accidents caused by intentionally or unintentionally pointing a laser into the eyes of others are well documented. To minimize the risk of accidental laser pointer related events, follow these guidelines:

- Do not aim laser pointers towards your eyes or the eyes of others.
- Do not aim laser pointers at aircraft, buses or automobiles.
- Do not aim laser pointers within offices or at other buildings.
- Never aim at law enforcement officers or someone who may interpret the pointer as a laser-aimed weapon.