

# VISUAL PLANNING Product Datasheet

## Altair Focus-Adjustable Laser Pointer V.P. Part Number: GAL5 ALTAIR



**VISUAL PLANNING Corp.**  
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Toll-Free: Tel: 800-361-1192 Fax:888-563-8730  
E-mail: [info@visualplanning.com](mailto:info@visualplanning.com)  
URL: [www.visualplanning.com](http://www.visualplanning.com)

### Similar Lasers:

For information about the other lasers in this product family visit:

<http://www.visualplanning.com>

### Ordering:

Order Online Now or Request Quotation:

<http://www.visualplanning.com>

### Series Specifications:

Nominal Wavelength	532 nm
Output Type	CW
Laser Source Type	DPSS



### Overview:

An Altair laser is the perfect tool for professionals and laser hobbyists who need full control over the size of the projected beam. The projected spot size can be easily adjusted using the focusing ring at the front of the laser pointer.

The combination of this added functionality with improved green laser pointer technology makes the Altair the perfect choice for dozens of applications from being used at personnel check-points to demonstrating the properties of light in educational applications.

The Altair is also ideal for presentations on a variety of viewing screens.

All of Laserglow's green laser pointers are IR-filtered for safety and employ APC technology to maintain constant output power. APC (Automatic Power Control) is a system that uses an optical feedback loop to ensure stable laser output.

### Specifications:

This spec sheet has been generated specifically for part number GAL005XXX, per your request, and data for the entire series is also displayed for your reference. The specs which are specific to GAL005XXX have been highlighted below in **red + bold**.

Laser Form Factor	<b>GAL</b>
Output Power (mW)	<b>&lt;3, &lt;5</b>
FDA Safety Class	<b>IIIa</b>
Central Wavelength (nm)	<b>531.65</b>
Divergence (mrad, full angle)	<b>&lt;1.2</b>
Beam Diameter (mm, 1/e <sup>2</sup> )	<b>1.5</b>
Transverse Mode	<b>TEM00</b>
Longitudinal Modes	<b>Multiple</b>
Operating Temperature Range (°C)	<b>+15 to +35</b>
Storage Temperature Range (°C)	<b>-10 to +50</b>
Total Power Consumption (W)	<b>2</b>
Duty Cycle	<b>90 sec. on/20 sec. off</b>
Cooling Method	<b>Passive Air</b>
Standard Warranty (months)	<b>6</b>
MTTF (operational hours)	<b>5000</b>
Weight of Laser Head (kg)	<b>0.06</b>
Laser Head Dimensions (mm)	<b>155 (l) x 13.5 (d)</b>
Power Supply	<b>2 x AAA Batteries</b>



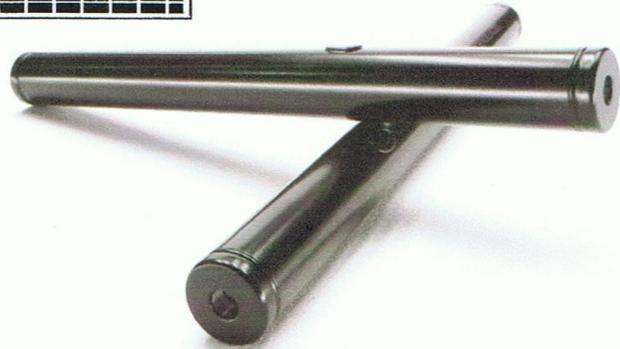
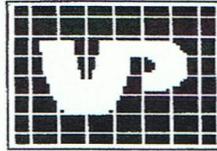
All specifications are based on performance at full output power and after the specified warmup period. Laser may not meet some of the specifications listed herein if operated at reduced output power.

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## Anser Laser Pointer V.P. Part Number: VPGAN5 ANSER



### Similar Lasers:

For information about the other lasers in this product family visit:

<http://www.visualplanning.com>, check under

TACTICAL/Government Section

### Ordering:

To order please Phone or Fax us, or by

E-mail [ottawa@visualplanning.com](mailto:ottawa@visualplanning.com)

### Series Specifications:

Nominal Wavelength	532 nm
Output Type	CW
Laser Source Type	DPSS

### Overview:

The Anser is Laserglow's latest addition to the green laser pointer line-up. The pointer does not include a pocket clip or any glossy finishes, the flat black finish gives the Anser a tactical, utilitarian look and feel. The Anser is our lowest-priced green laser pointer and comes in one power level, a guaranteed 3 to 5m W.

All of Laserglow's green laser pointers are IR-filtered for safety and employ APC technology to maintain constant output power. APC (Automatic Power Control) is a system that uses an optical feedback loop to ensure stable laser output.

### Specifications:

This spec sheet has been generated specifically for part number GAN005XXX, per your request, and data for the entire series is also displayed for your reference. The specs which are specific to GAN005XXX have been highlighted below in **red + bold**.

Laser Form Factor	<b>GAN</b>
Output Power (mW)	<b>&lt;5</b>
FDA Safety Class	<b>IIIa</b>
Central Wavelength (nm)	<b>531.65</b>
Divergence (mrad, full angle)	<b>&lt;1.2</b>
Beam Diameter (mm, 1/e <sup>2</sup> )	<b>1.5</b>
Transverse Mode	<b>TEM00</b>
Longitudinal Modes	<b>Multiple</b>
Operating Temperature Range (°C)	<b>+15 to +35</b>
Storage Temperature Range (°C)	<b>-10 to +50</b>
Total Power Consumption (W)	<b>2</b>
Duty Cycle	<b>90 sec. on/20 sec. off</b>
Cooling Method	<b>Passive Air</b>
Standard Warranty (months)	<b>6</b>
MTTF (operational hours)	<b>5000</b>
Weight of Laser Head (kg)	<b>0.04</b>
Laser Head Dimensions (mm)	<b>136 (l) x 13 (d)</b>
Power Supply	<b>2 x AAA Batteries</b>



All specifications are based on performance at full output power and after the specified warmup period. Laser may not meet some of the specifications listed herein if operated at reduced output power.

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## Aquarius Laser Pointer V.P. Part Number: VPGAP5 AQUARIUS



### Similar Lasers:

For information about the other lasers in this product family visit:

<http://www.visualplanning.com>

### Ordering:

Order Online Now or Request Quotation:

<http://www.visualplanning.com>

### Series Specifications:

Nominal Wavelength	473 nm
Output Type	Pulsed (700 Hz)
Laser Source Type	DPSS



### Overview:

This blue laser pointer will captivate audiences wherever you take it, whether at home with friends or at a presentation conference with colleagues. Blue laser pointers are still so rare that few have ever seen one. Be one of the first to own this unique product but don't blame us if you keep getting asked how you got one!

### Specifications:

This spec sheet has been generated specifically for part number GAP005XXX, per your request, and data for the entire series is also displayed for your reference. The specs which are specific to GAP005XXX have been highlighted below in **red + bold**.

Laser Form Factor	<b>GAP</b>
Output Power (mW)	<b>&lt;2,&lt;5</b>
FDA Safety Class	<b>IIIa</b>
Central Wavelength (nm)	<b>472.58</b>
Divergence (mrad, full angle)	<b>&lt;1.0</b>
Beam Diameter (mm, 1/e <sup>2</sup> )	<b>1.0</b>
Transverse Mode	<b>Multi</b>
Longitudinal Modes	<b>Multiple</b>
Approximate Peak Power (W)	<b>3,5</b>
Operating Temperature Range (°C)	<b>+20 to +35</b>
Storage Temperature Range (°C)	<b>-10 to +50</b>
Total Power Consumption (W)	<b>3,4</b>
Duty Cycle	<b>90 sec. on/20 sec. off</b>
Cooling Method	<b>Passive Air</b>
Standard Warranty (months)	<b>6</b>
MTTF (operational hours)	<b>5000</b>
Weight of Laser Head (kg)	<b>0.1</b>
Laser Head Dimensions (mm)	<b>150 (l) x 16.5 (d)</b>
Power Supply	<b>1 x CR2 Battery</b>



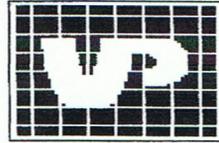
All specifications are based on performance at full output power and after the specified warmup period. Laser may not meet some of the specifications listed herein if operated at reduced output power.

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## Aquarius Laser Pointer V.P. Part Number: VPGAP5 AQUARIUS



### Similar Lasers:

For information about the other lasers in this product family visit:

<http://www.visualplanning.com>

### Ordering:

Order Online Now or Request Quotation:

<http://www.visualplanning.com>

### Series Specifications:

Nominal Wavelength	473 nm
Output Type	Pulsed (700 Hz)
Laser Source Type	DPSS



### Overview:

This blue laser pointer will captivate audiences wherever you take it, whether at home with friends or at a presentation conference with colleagues. Blue laser pointers are still so rare that few have ever seen one. Be one of the first to own this unique product but don't blame us if you keep getting asked how you got one!

### Specifications:

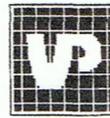
This spec sheet has been generated specifically for part number GAP005XXX, per your request, and data for the entire series is also displayed for your reference. The specs which are specific to GAP005XXX have been highlighted below in **red + bold**.

Laser Form Factor	<b>GAP</b>
Output Power (mW)	<b>&lt;2,-5</b>
FDA Safety Class	<b>IIIa</b>
Central Wavelength (nm)	<b>472.58</b>
Divergence (mrad, full angle)	<b>&lt;1.0</b>
Beam Diameter (mm, 1/e <sup>2</sup> )	<b>1.0</b>
Transverse Mode	<b>Multi</b>
Longitudinal Modes	<b>Multiple</b>
Approximate Peak Power (W)	<b>3,5</b>
Operating Temperature Range (°C)	<b>+20 to +35</b>
Storage Temperature Range (°C)	<b>-10 to +50</b>
Total Power Consumption (W)	<b>3,4</b>
Duty Cycle	<b>90 sec. on/20 sec. off</b>
Cooling Method	<b>Passive Air</b>
Standard Warranty (months)	<b>6</b>
MTTF (operational hours)	<b>5000</b>
Weight of Laser Head (kg)	<b>0.1</b>
Laser Head Dimensions (mm)	<b>150 (l) x 16.5 (d)</b>
Power Supply	<b>1 x CR2 Battery</b>



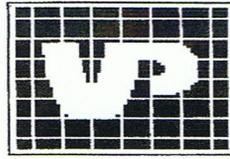
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## Electra Portable Laser Module V.P. Part Number: VPGE P5 ELECTRA



### Similar Lasers:

For information about the other lasers in this product family visit:

<http://www.visualplanning.com>

### Ordering:

Order Online Now or Request Quotation:

<http://www.visualplanning.com>

### Series Specifications:

Nominal Wavelength	405 nm
Output Type	CW
Laser Source Type	Diode



### Overview:

The shortest wavelength available in a laser pointer, the Electra produces laser light very close to the ultraviolet part of the visible spectrum at 405 nm. The unique properties of this laser include the ability to excite fluorescent and phosphorescent materials. The Electra can be a useful educational tool in the classroom as well as a reliable near-UV portable light source for field work.

### Specifications:

This spec sheet has been generated specifically for part number GEP005XXX, per your request, and data for the entire series is also displayed for your reference. The specs which are specific to GEP005XXX have been highlighted below in **red + bold**.

Laser Form Factor	<b>GAP</b>
Output Power (mW)	<b>&lt;5</b>
FDA Safety Class	<b>IIIa</b>
Central Wavelength (nm)	<b>405</b>
Divergence (mrad, full angle)	<b>&lt;0.5</b>
Beam Diameter (mm, 1/e <sup>2</sup> )	<b>3.5</b>
Transverse Mode	<b>Near TEM00</b>
Longitudinal Modes	<b>Multiple</b>
Approximate Peak Power (W)	<b>5</b>
Operating Temperature Range (°C)	<b>+20 to +35</b>
Storage Temperature Range (°C)	<b>-10 to +50</b>
Total Power Consumption (W)	<b>3</b>
Duty Cycle	<b>100%</b>
Cooling Method	<b>Passive Air</b>
Standard Warranty (months)	<b>6</b>
MTTF (operational hours)	<b>5000</b>
Weight of Laser Head (kg)	<b>0.1</b>
Laser Head Dimensions (mm)	<b>150 (l) x 16.5 (d)</b>
Power Supply	<b>2 x CR2 Batteries</b>

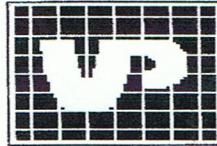


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## Galileo Laser Pointer V.P. Part Number: VPGA5 GALILEO

### Similar Lasers:

For information about the other lasers in this product family visit:

<http://www.visualplanning.com>

### Ordering:

Order Online Now or Request Quotation:

<http://www.visualplanning.com>



### Series Specifications:

Nominal Wavelength	532 nm
Output Type	CW
Laser Source Type	DPSS

### Overview:

The Galileo is the latest in functionality, reliability and output power stability. The click-on, click-off switch allows hands-free operation and easy use when continuous operation is required. The miniature heat sink means that the output will not drop during long operating periods. A fresh, high-capacity single lithium battery will keep this unit running for up to 2 hours! The Galileo is ideal for alignment, astronomy, and all other continuous use applications.

All of Laserglow's green laser pointers are IR-filtered for safety and employ APC technology to maintain constant output power. APC (Automatic Power Control) is a system that uses an optical feedback loop to ensure stable laser output.

### Specifications:

This spec sheet has been generated specifically for part number GGA005XXX, per your request, and data for the entire series is also displayed for your reference. The specs which are specific to GGA005XXX have been highlighted below in **red + bold**.

Laser Form Factor	<b>GGA</b>
Output Power (mW)	<b>&lt;3, &lt;5</b>
FDA Safety Class	<b>IIIa</b>
Central Wavelength (nm)	<b>531.65</b>
Divergence (mrad, full angle)	<b>&lt;1.2</b>
Beam Diameter (mm, 1/e <sup>2</sup> )	<b>1.5</b>
Transverse Mode	<b>TEM00</b>
Longitudinal Modes	<b>Multiple</b>
Operating Temperature Range (°C)	<b>+15 to +35</b>
Storage Temperature Range (°C)	<b>-10 to +50</b>
Total Power Consumption (W)	<b>2</b>
Duty Cycle	<b>100%</b>
Cooling Method	<b>Passive Air</b>
Standard Warranty (months)	<b>6</b>
MTTF (operational hours)	<b>5000</b>
Weight of Laser Head (kg)	<b>0.08</b>
Laser Head Dimensions (mm)	<b>118 (l) x 20 (d)</b>
Power Supply	<b>1 x CR123A Battery</b>

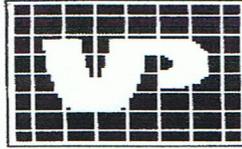


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URL: [www.visualplanning.com](http://www.visualplanning.com)

## Libra Laser Pointer V.P. Part Number: VPGLI5 LIBRA



### Similar Lasers:

For information about the other lasers in this product family visit:

<http://www.visualplanning.com>

### Ordering:

Order Online Now or Request Quotation:

<http://www.visualplanning.com>



### Series Specifications:

Nominal Wavelength	635 nm
Output Type	CW
Laser Source Type	Diode

### Overview:

The Libra is Laserglow's entry into the red laser pointer market. The flat black finish gives the Libra a tactical, utilitarian look and feel.

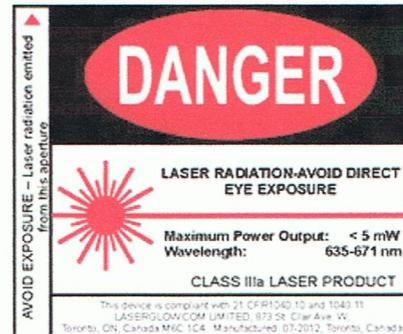
With a 635 nm wavelength the Libra is approximately 2 times brighter than most other red pointers - which normally use a 650 nm or 660 nm diode, making the Libra the brightest Class IIIa red laser pointer available.

As with all Laserglow products the Libra employs the highest level of quality and craftsmanship to make this simply the best Class IIIa red laser pointer on the market.

### Specifications:

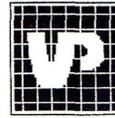
This spec sheet has been generated specifically for part number GLI005XXX, per your request, and data for the entire series is also displayed for your reference. The specs which are specific to GLI005XXX have been highlighted below in **red + bold**.

Laser Form Factor	<b>GLI</b>
Output Power (mW)	<b>&lt;5</b>
FDA Safety Class	<b>IIIa</b>
Central Wavelength (nm)	<b>635</b>
Divergence (mrad, full angle)	<b>&lt;1.5</b>
Beam Diameter (mm, 1/e <sup>2</sup> )	<b>5.0</b>
Transverse Mode	<b>TEM00</b>
Longitudinal Modes	<b>Multiple</b>
Operating Temperature Range (°C)	<b>0 to + 40</b>
Storage Temperature Range (°C)	<b>-10 to +50</b>
Total Power Consumption (W)	<b>1</b>
Duty Cycle	<b>100%</b>
Cooling Method	<b>Passive Air</b>
Standard Warranty (months)	<b>6</b>
MTTF (operational hours)	<b>5000</b>
Weight of Laser Head (kg)	<b>0.04</b>
Laser Head Dimensions (mm)	<b>124 (l) x 13 (d)</b>
Power Supply	<b>2 x AAA Batteries</b>



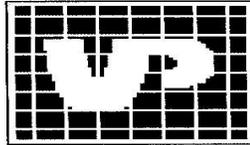
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## Lyra Laser Pointer V.P. Part Number: VPGLY5 LYRA



### Similar Lasers:

For information about the other lasers in this product family visit:

<http://www.visualplanning.com>

### Ordering:

Order Online Now or Request Quotation:

<http://www.visualplanning.com>

### Series Specifications:

Nominal Wavelength	532 nm
Output Type	CW
Laser Source Type	DPSS



### Overview:

The Lyra series green laser pointers are a perfect choice for business meetings, classroom presentations and safe home laser experimentation. Five to ten times more visible than common red laser pointers, the Lyra series are ideal for maximizing visibility, even on bright projection screens, while not compromising safety. Available in three carefully selected finishes to match any style. With the look of a high end fountain pen and the function of a quality timepiece the Lyra is great to own and even better to give as a gift!

All of Laserglow's green laser pointers are IR-filtered for safety and employ APC technology to maintain constant output power. APC (Automatic Power Control) is a system that uses an optical feedback loop to ensure stable laser output.

### Key Features:

- *Starting at: \$49* Includes **free** shipping on orders of **\$50** or more! See pricing and ordering tab.
- *Output Power:* 1 mW - 5 mW (model dependant)
- *Wavelength:* 532 nm (green)
- *Key Feature:* High Quality Build, All AR-coated optics, Available in 3 finishes
- *Casing:* Solid Brass with pocket clip
- *Package Includes:* Portable laser, batteries, instructions/warranty.
- *Safety Info:* Complies with Class IIIa regulations, contains high quality IR filter
- *Duty Cycle:* 90 sec. on/20 sec. off

Quality, safety, unique features and range make Laserglow the leader in green pointers. [Learn more here.](#)

See **VISUAL PLANNING CORP.** at [www.visualplanning.com](http://www.visualplanning.com); Email @ [info@visualplanning.com](mailto:info@visualplanning.com) and/or [ottawa@visualplanning.com](mailto:ottawa@visualplanning.com), and :

**MONTREAL, QC** 6805 Decarie Blvd. H3W 3E4 , Tel.514-739-3116 Toll-Free:800-361-1192 Fax: 514-739-0085, Toll-Free:888-563-8730

**OTTAWA, ON.** 1716 Woodward Drive, Ste.106, Tel.613-563-8727 Toll-Free:888-884-5444 Fax: 613-563-8730 Toll-Free: 888-563-8730

**MISSISSAUGA , ON.** Tel:905-629-7397 Toll-Free: 888-884-5444 Fax: 888-563-8730

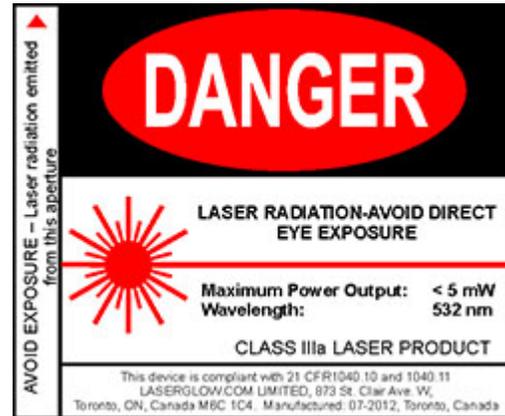
**VANCOUVER, BC.** Call Toll-Free Tel: 800-361-1192 Toll-Free Fax: 888-563-8730



## Specifications:

This spec sheet has been generated specifically for part number GLY005BXX, per your request, and data for the entire series is also displayed for your reference. The specs which are specific to GLY005BXX have been highlighted below in **red + bold**.

Laser Form Factor	<b>GLY</b>
Output Power (mW)	<b>&lt;1, &lt;3, &lt;5</b>
FDA Safety Class	<b>II, IIIa</b>
Central Wavelength (nm)	<b>531.65</b>
Divergence (mrad, full angle)	<b>&lt;1.5</b>
Beam Diameter (mm, 1/e <sup>2</sup> )	<b>5.0</b>
Transverse Mode	<b>TEM00</b>
Longitudinal Modes	<b>Multiple</b>
Operating Temperature Range (°C)	<b>+15 to +35</b>
Storage Temperature Range (°C)	<b>-10 to +50</b>
Total Power Consumption (W)	<b>2</b>
Duty Cycle	<b>90 sec. on/20 sec. off</b>
Cooling Method	<b>Passive Air</b>
Standard Warranty (months)	<b>6</b>
MTTF (operational hours)	<b>5000</b>
Weight of Laser Head (kg)	<b>0.04</b>
Laser Head Dimensions (mm)	<b>136 (l) x 13 (d)</b>
Power Supply	<b>2 x AAA Batteries</b>



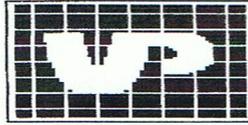
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URL: [www.visualplanning.com](http://www.visualplanning.com)

## Precious Metal Series Laser Pointer V.P. Part Number: VPGAU5 Prec.Metal



### Similar Lasers:

For information about the other lasers in this product family visit:

<http://www.visualplanning.com>

### Ordering:

Order Online Now or Request Quotation:

<http://www.visualplanning.com>

### Series Specifications:

Nominal Wavelength	532 nm
Output Type	CW
Laser Source Type	DPSS



### Overview:

These laser pointers are the ultimate in style for any presentation or lecture. True 18k gold or platinum plating gives these green laser pointers an unforgettable shine, and the laser itself is as impressive and reliable as any Laserglow pointer. The highly focused green beam will be visible against projection or HDTV screens where other less powerful lasers can get washed out. These special limited edition lasers make a great gift for the person on your list who enjoys a little bit of flash in their wardrobe and wants their accessories to look as good as they do!

All of Laserglow's green laser pointers are IR-filtered for safety and employ APC technology to maintain constant output power. APC (Automatic Power Control) is a system that uses an optical feedback loop to ensure stable laser output.

### Specifications:

This spec sheet has been generated specifically for part number GAU005PXX, per your request, and data for the entire series is also displayed for your reference. The specs which are specific to GAU005PXX have been highlighted below in **red + bold**.

Laser Form Factor	<b>GLY</b>
Output Power (mW)	<b>&lt;3,&lt;5</b>
FDA Safety Class	<b>IIIa</b>
Central Wavelength (nm)	<b>531.65</b>
Divergence (mrad, full angle)	<b>&lt;1.2</b>
Beam Diameter (mm, 1/e <sup>2</sup> )	<b>1.5</b>
Transverse Mode	<b>TEM00</b>
Longitudinal Modes	<b>Multiple</b>
Operating Temperature Range (°C)	<b>+15 to +35</b>
Storage Temperature Range (°C)	<b>-10 to +50</b>
Total Power Consumption (W)	<b>2</b>
Duty Cycle	<b>90 sec. on/20 sec. off</b>
Cooling Method	<b>Passive Air</b>
Standard Warranty (months)	<b>6</b>
MTTF (operational hours)	<b>5000</b>
Weight of Laser Head (kg)	<b>0.04</b>
Laser Head Dimensions (mm)	<b>136 (l) x 13 (d)</b>
Power Supply	<b>2 x AAA Batteries</b>



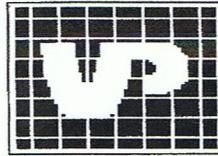
All specifications are based on performance at full output power and after the specified warmup period. Laser may not meet some of the specifications listed herein if operated at reduced output power.

# VISUAL PLANNING Product Datasheet



**VISUAL PLANNING Corp.**  
Montreal, QC-Ottawa-Mississauga, On.  
Burlington, NC, Champlain, NY  
Toll-Free: Tel: 800-361-1192 Fax: 888-563-8730  
E-mail: [info@visualplanning.com](mailto:info@visualplanning.com)  
URL: [www.visualplanning.com](http://www.visualplanning.com)

## Rigel HV Portable Laser Module V.P. Part Number: VPGR15 RIGEL



### Similar Lasers:

For information about the other lasers in this product family visit:

<http://www.visualplanning.com>

### Ordering:

Order Online Now or Request Quotation:

<http://www.visualplanning.com>

### Series Specifications:

Nominal Wavelength	589 nm
Output Type	Pulsed (720 Hz)
Laser Source Type	DPSS

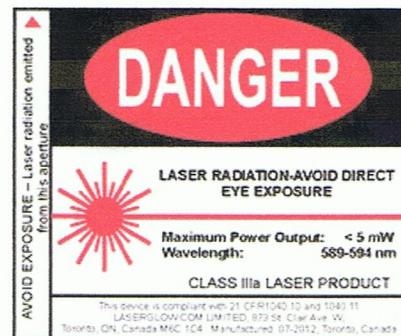
### Overview:

The new 589 nm bright yellow pointer from Laserglow is noticeably brighter and more "yellow" than the original 593.5 nm Rigel series yellow lasers. (The regular Rigel is often described as "amber-yellow".) This wavelength is closer to the middle of the spectrum, making it brighter to the human eye and more suitable for presentations on bright projection screens or long-range pointing applications. This is really the brightest and "yellowest" yellow pointer on the market!

### Specifications:

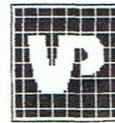
This spec sheet has been generated specifically for part number #VPGR15 RIGEL, per your request, and data for the entire series is also displayed for your reference. The specs which are specific to VPGR15 RIGEL have been highlighted below in **red + bold**.

Laser Form Factor	<b>GAP</b>
Output Power (mW)	<b>&lt;2, &lt;5</b>
FDA Safety Class	<b>IIIa</b>
Central Wavelength (nm)	<b>588.6</b>
Divergence (mrad, full angle)	<b>&lt;1.5</b>
Beam Diameter (mm, 1/e <sup>2</sup> )	<b>1.5</b>
Transverse Mode	<b>TEM00</b>
Longitudinal Modes	<b>Multiple</b>
Operating Temperature Range (°C)	<b>+15 to +35</b>
Storage Temperature Range (°C)	<b>-10 to +50</b>
Total Power Consumption (W)	<b>2</b>
Duty Cycle	<b>30 sec. on/15 sec. off</b>
Cooling Method	<b>Passive Air</b>
Standard Warranty (months)	<b>6</b>
MTTF (operational hours)	<b>5000</b>
Weight of Laser Head (kg)	<b>0.1</b>
Laser Head Dimensions (mm)	<b>150 (l) x 16.5 (d)</b>
Power Supply	<b>1 x CR2 Battery</b>



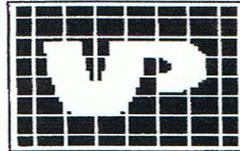
All specifications are based on performance at full output power and after the specified warmup period. Laser may not meet some of the specifications listed herein if operated at reduced output power.

# VISUAL PLANNING Product Datasheet



**VISUAL PLANNING Corp.**  
Montreal, QC-Ottawa-Mississauga, On.  
Burlington, NC, Champlain, NY  
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E-mail: [info@visualplanning.com](mailto:info@visualplanning.com)  
URL: [www.visualplanning.com](http://www.visualplanning.com)

## Taurus Laser Pointer V.P. Part Number #VPGTA5 TAURUS



### Similar Lasers:

For information about the other lasers in this product family visit:

<http://www.visualplanning.com>

### Ordering:

Order Online Now or Request Quotation:

<http://www.visualplanning.com>

### Series Specifications:

Nominal Wavelength	635 nm
Output Type	CW
Laser Source Type	Diode



### Overview:

The Taurus is the latest in functionality, reliability, portability and output power stability. The click-on, click-off switch allows hands-free operation and easy use when continuous operation is required. The miniature heat sink means that the output will not drop during long operating periods, and the single lithium battery will keep the unit running for up to 36 hours! The Taurus is ideal for alignment and a wide range of other continuous use applications.

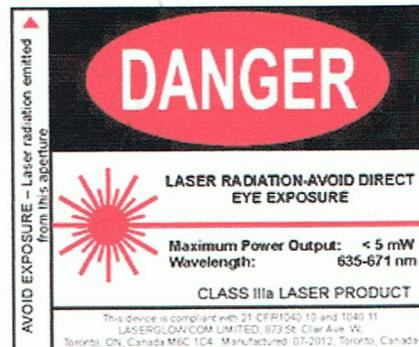
With a 635 nm wavelength the Taurus is approximately 2 times brighter than other less expensive red pointers - which normally use a 650 nm or 660 nm diode, making the Taurus the brightest Class IIIa red laser pointer available.

As with all Laserglow products the Taurus employs the highest level of quality and craftsmanship to make this simply the best Class IIIa red laser pointer on the market.

### Specifications:

This spec sheet has been generated specifically for part number GTA005XXX, per your request, and data for the entire series is also displayed for your reference. The specs which are specific to GTA005XXX have been highlighted below in **red + bold**.

Laser Form Factor	<b>GTA</b>
Output Power (mW)	<b>&lt;5</b>
FDA Safety Class	<b>IIIa</b>
Central Wavelength (nm)	<b>635</b>
Divergence (mrad, full angle)	<b>&lt;1.2</b>
Beam Diameter (mm, 1/e <sup>2</sup> )	<b>2.5x1.5</b>
Transverse Mode	<b>TEM00</b>
Longitudinal Modes	<b>Multiple</b>
Operating Temperature Range (°C)	<b>0 to +40</b>
Storage Temperature Range (°C)	<b>-10 to +50</b>
Total Power Consumption (W)	<b>1</b>
Duty Cycle	<b>100%</b>
Cooling Method	<b>Passive Air</b>
Standard Warranty (months)	<b>6</b>
MTTF (operational hours)	<b>5000</b>
Weight of Laser Head (kg)	<b>0.04</b>
Laser Head Dimensions (mm)	<b>85 (l) x 20 (d)</b>
Power Supply	<b>1 x CR123A Battery</b>



All specifications are based on performance at full output power and after the specified warmup period. Laser may not meet some of the specifications listed herein if operated at reduced output power.

# Laser pointer

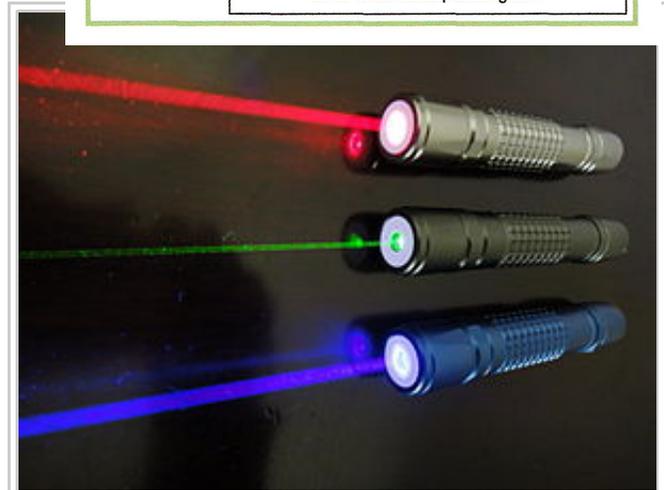
From Wikipedia, the free encyclopedia

A **laser pointer** or **laser pen** is a small handheld device with a power source (usually a battery) and a laser diode emitting a very narrow coherent low-powered laser beam of visible light, intended to be used to highlight something of interest by illuminating it with a small bright spot of colored light. Power is restricted in most jurisdictions not to exceed 5 mW.

The small width of the beam and low power of typical laser pointers make the beam itself invisible in a reasonably clean atmosphere, only showing a point of light when striking an opaque surface. Some higher-powered laser pointers project a visible beam via scattering from dust particles or water droplets along the beam path. Higher-power and higher-frequency green or blue lasers may produce a beam visible even in clean air because of Rayleigh scattering from air molecules, especially when viewed in moderately-to-dimly lit conditions. The intensity of such scattering increases when these beams are viewed from angles near the beam axis. Such pointers, particularly in the green-light output range, are used as astronomical-object pointers for teaching purposes. The recent low-cost availability of infrared (IR) diode laser modules of up to 1000 mW (1 watt) output has created a generation of IR-pumped frequency-doubled (DPSS) laser pointers in green, blue, and violet, of higher visible power, typically up to 300 mW. Because the IR-laser component in the beams of these visible lasers is difficult to filter out, and also because filtering it contributes extra heat which is difficult to dissipate in a small pocket "laser pointer" package, it is often left as a beam component in cheaper high-power pointers. This invisible laser light component causes a degree of extra potential hazard in these devices when pointed at nearby objects and people.

Laser pointers make a potent signaling tool, even in daylight, and are able to produce a bright signal for potential search and rescue vehicles using an inexpensive, small and lightweight device of the type that could be routinely carried in an emergency kit.

Laser pointers if aimed at a person's eyes can cause temporary disturbances to vision. There is some evidence of rare minor permanent harm, but low-powered laser pointers are not seriously hazardous to health. They may be a major annoyance in some circumstances. A dot of light from a red laser pointer may be thought to be due to a laser gunsight, causing outrage and possible danger.<sup>[1]</sup> When pointed at aircraft at night, laser pointers may dazzle and distract pilots, and increasingly strict laws have been passed to ban this.



Red (635 nm), green (532 nm) and blue (445 nm) laser pointers

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## Colors and wavelengths

Early laser pointers were helium–neon (HeNe) gas lasers and generated laser radiation at 633 nanometer (nm), usually designed to produce a laser beam with an output power under 1 milliwatt (mW). The least expensive laser pointers use a deep red laser diode near the 650 nanometers (nm) wavelength. Slightly more expensive ones use a red-orange 635 nm diode, more easily visible because of the greater sensitivity of the human eye at 635 nm. Other colors are possible too, with the 532 nm green laser being the most common alternative. Yellow-orange laser pointers, at 593.5 nm, later became available. In September 2005 handheld blue laser pointers at 473 nm became available. In early 2010 "Blu-ray" (actually violet) laser pointers at 405 nm went on sale.

The apparent brightness of a spot from a laser beam depends on the optical power of the laser, the reflectivity of the surface, and the chromatic response of the human eye. For the same optical power, green laser light will seem brighter than other colors because the human eye is most sensitive at low light levels in the green region of the spectrum (wavelength 520–570 nm). Sensitivity decreases for redder or bluer wavelengths.

The output power of a laser pointer is usually stated in milliwatts (mW). In the U.S. lasers are classified by the American National Standards Institute<sup>[2]</sup> and Food and Drug Administration (FDA). Visible laser pointers (400–700 nm) operating at less than 1 mW power are Class 2 or II, and visible laser pointers operating with 1–5 mW

power are Class 3A or IIIa. Class 3B or IIIb lasers generate between 5 and 500 mW; Class 4 or IV lasers generate more than 500 mW. The US FDA Code of Federal Regulations stipulates that "demonstration laser products" such as pointers must comply with applicable requirements for Class I, IIa, II, or IIIa devices.<sup>[3]</sup>

## Red and red-orange

These are the simplest pointers, as laser diodes are available in these wavelengths. The pointer is nothing more than a battery-powered laser diode. The first red laser pointers released in the early 1980s were large, unwieldy devices that sold for hundreds of dollars.<sup>[4]</sup> Today, they are much smaller and generally cost very little. In the 21st century, diode-pumped solid-state (DPSS) red laser pointers emitting at 671 nm became available. Although this wavelength can be obtained directly with an inexpensive laser diode, higher beam quality and narrower spectral bandwidth are achieved through DPSS versions.

## Yellow

Yellow laser pointers emitting at 593.5 nm became available in the last few years. Although they are based on the DPSS process, in this case two lasing lines of the ND:YVO<sub>4</sub>, 1064 nm and 1342 nm, are summed together with a nonlinear crystal. The complexity of this process makes these laser pointers inherently unstable and inefficient, with their outputs ranging from 1 mW to about 10 mW, greatly varying with temperature and usually mode-hopping if they get too hot or too cold. That is because such a complex process may require temperature stabilizers and active cooling, which can't be mounted into a small sized host. Also, most smaller 593.5 nm pointers work in pulsed mode so they can use smaller and less powerful pumping diodes. New 589 nm yellow laser pointers have been introduced using a more robust and secretive method of harmonic generation from a DPSS laser system. This 'sodium' wavelength, although only 4.5 nm away from the older 593.5 nm, appears more gold in colour compared to the more amber appearance of the 593.5 nm wavelength. Astronomical observatories use a specially tuned dye laser at 589.2nm (yellow) to create a laser guide star for use with astronomical adaptive optics. Laser Guide Star

## Green

Green laser pointers<sup>[5]</sup> appeared on the market circa 2000, and are the most common type of DPSS lasers (also called DPSSFD for "diode pumped solid state frequency-doubled"). They are more complicated than standard red laser pointers, because laser diodes are not commonly available in this wavelength range. The green light is generated in an indirect process, beginning with a high-power (typically 100–300 mW) infrared AlGaAs laser diode operating at 808 nm. The 808 nm light pumps a crystal of neodymium-doped yttrium aluminum vanadate (Nd:YVO<sub>4</sub>) (or Nd:YAG or less common Nd:YLF), which lases deeper in the infrared at 1064 nm. This lasing action is due to an electronic transition in the fluorescent neodymium ion, Nd(III), which is present in all of these crystals.

The Nd:YVO<sub>4</sub> or other Nd-doped crystal is coated on the diode side with a dielectric mirror that reflects at 808 nm and transmits at 1064 nm. The crystal is mounted on a copper block, acting as a heat sink; its 1064 nm output is fed into a crystal of potassium titanyl phosphate (KTP), mounted on a heat sink in the laser cavity resonator. The orientation of the crystals must be matched, as they are both anisotropic and the Nd:YVO<sub>4</sub> outputs polarized light. This unit acts as a frequency doubler, and halves the wavelength to the desired 532 nm. The resonant cavity is terminated by a dielectric mirror that reflects at 1064 nm and transmits at 532 nm. An infrared filter behind the mirror removes IR radiation from the output beam (this may be omitted or inadequate in less-expensive "pointer-style" green lasers), and the assembly ends in a collimator lens.



High-powered green laser pointer

Nd:YVO<sub>4</sub> is replacing other Nd-doped materials such as Nd:YAG and Nd:YLF in such systems because of lower dependency on the exact parameters of the pump diode (therefore allowing for higher tolerances), wider absorption band, lower lasing threshold, higher slope efficiency, linear

polarization of output light, and single mode output. For frequency doubling of higher power lasers, LBO is used instead of KTP. Newer lasers use a composite Nd:YVO<sub>4</sub>/KTP crystal instead of two discrete ones.

Some green lasers operate in pulse or quasi-continuous wave (QCW) mode, to reduce cooling problems and prolong battery life.

An announcement in 2009<sup>[6]</sup> of a direct green laser (which does not require doubling) promises much higher efficiencies and could foster the development of new color video projectors.

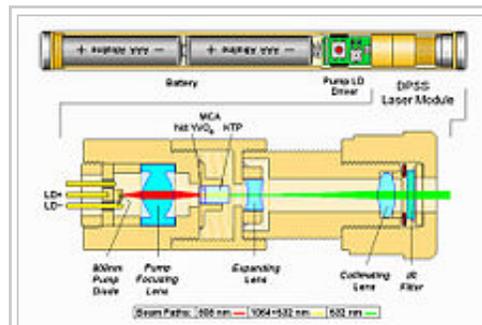
Because even a low-powered green laser is visible at night through Rayleigh scattering from air molecules, this type of pointer is used by astronomers to easily point out stars and constellations. Green laser pointers can come in a variety of different output powers. The 5 mW green laser pointers (class IIIa) are the safest to use, and anything more powerful is usually not necessary for pointing purposes since the beam is still visible in dark lighting conditions.<sup>[*citation needed*]</sup>

The United States Coast Guard requires their air crews to return to base if a green laser is pointed at them, and have their eyes examined for eye damage. People have been given up to five years in jail for aiming a green laser at an aircraft.<sup>[7]</sup>

## Blue

*Main article: Blue laser*

Blue laser pointers in specific wavelengths such as 473 nm usually have the same basic construction as DPSS green lasers. In 2006 many factories began production of blue laser modules for mass storage devices, and these were used in laser pointers too. These were DPSS type frequency-doubled devices. They most commonly emit a beam at 473 nm, which is produced by frequency doubling of 946 nm laser radiation from a diode-pumped Nd:YAG or Nd:YVO<sub>4</sub> crystal (Nd-doped crystals usually produce a principal wavelength of 1064 nm, but with the proper reflective coating mirrors can be also made to lase at other "higher harmonic" non-principal neodymium wavelengths). For high output power BBO crystals are used as frequency doublers; for lower powers, KTP is used. The Japanese company Nichia controlled 80% of the blue laser diode market in 2006.<sup>[8]</sup>



A frequency-doubled green laser pointer, showing internal construction. Cells and electronics lead to a laser head module (see lower diagram) This contains a powerful 808 nm IR diode laser that pumps a Nd:YVO<sub>4</sub> laser crystal, that in turn outputs 1064 nm light. This immediately is doubled inside a non-linear KTP crystal, resulting in green light at the half-wavelength of 532 nm. This beam is expanded and infrared-filtered. In inexpensive lasers the IR filter is inadequate, or is omitted.



Trails by a 15 mW green laser pointer in a time exposure of a living room at night.

Some vendors are now selling collimated diode blue laser pointers with measured powers exceeding 1,500 mW. However, since the claimed-power of "laser pointer" products also includes the IR power (in DPSS technology only) still present in the beam (for reasons discussed below), comparisons on the basis of strictly visual-blue component from DPSS-type lasers remain problematic, and the information is often not available. Because of the higher neodymium harmonic used, and the lower efficiency of frequency-doubling conversion, the fraction of IR power converted to 473 nm blue laser light in optimally configured DPSS modules is typically 10–13%, about half that typical for green lasers (20–30%).<sup>[*citation needed*]</sup>

Blue lasers can also be fabricated directly with InGaN semiconductors, which produce blue light without frequency-doubling. 450 nm (447 nm plus/minus 5 nm) blue laser diodes are currently available on the open market. The devices are brighter for the same power than 405 nm violet laser diodes, since the longer wavelength is closer to the peak sensitivity of the human eye. Mass production of laser diodes for commercial devices like laser projectors have driven down prices. Recent popularity of the high power (>1 W) version of these 447 nm pointers, which also have improved optics for better collimation and lower divergence, rivals the hazards associated with the use of these portable devices by persons of questionable intention and cost has diminished to be competitive with DPSS green lasers wavelengths.

## Violet

*Main article: Blue laser*

Lasers emitting a violet light beam at 405 nm may be constructed with GaN (gallium nitride) semiconductors. This is close to ultraviolet, bordering on the very extreme of human vision, and can cause bright blue fluorescence, and thus a blue rather than violet spot, on many white surfaces, including white clothing, white paper, and projection screens, due to the widespread use of optical brighteners in the manufacture of products intended to appear brilliantly white. On ordinary non-fluorescent materials, and also on fog or dust, the color appears as a shade of deep violet that cannot be reproduced on monitors and print. A GaN laser emits 405 nm directly without a frequency doubler, eliminating the possibility of accidental dangerous infrared emission<sup>[*citation needed*]</sup>. These laser diodes are mass-produced for the reading and writing of data in Blu-ray drives (although the light emitted by the diodes is not blue, but distinctly violet). As of September 2011, 405 nm blue-violet laser diode modules with an optical power of 250 mW, based on GaN violet laser diodes made for Blu-ray disc readers, had reached the market from Chinese sources for prices of about US\$60 including delivery.<sup>[9]</sup>

At the same time, a few higher-powered (120 mW) 404–405 nm "violet" laser pointers have become available which are not based on GaN, but use DPSS frequency-doubler technology from 1 watt 808 nm GaAlAs infrared diode lasers. As with infrared-driven green laser pointers above, such devices are able to pop balloons and light matches, but this is as a result of an unfiltered high-power infrared component in the beam.

## Applications

### Pointing

Laser pointers are often used in educational and business presentations and visual demonstrations as an eye-catching pointing device. Red laser pointers can be used in almost any indoor or low-light situation where pointing out details by hand may be inconvenient, such as in construction work or interior decorating. Green laser pointers can be used for similar purposes as well as outdoors in daylight or for longer distances.

Laser pointers are used in a wide range of applications. Green laser pointers can also be used for amateur astronomy. On a moonless night, a green laser pointer beam can often be clearly seen,<sup>[*citation needed*]</sup> allowing someone to accurately point out individual stars to others nearby. Also, these green laser pointers are commonly used by astronomers worldwide at star parties or for conducting lectures in astronomy. Astronomy laser pointers are also commonly mounted on telescopes in order to align the telescope to a specific star or location. Laser alignment is much easier than aligning through using the eyepiece.

## Industrial and research use

Laser pointers are used in industry. For instance, construction companies may use high quality laser pointers to enhance the accuracy of showing specific distances, while working on large-scale projects. They proved to be useful in this type of business because of their accuracy, which made them significant time-savers. What is essentially a laser pointer may be built into an infrared thermometer to identify where it is pointing, or be part of a laser level or other apparatus.

They may also be helpful in scientific research in fields such as photonics, chemistry, physics, and medicine.<sup>[*citation needed*]</sup>

## Leisure and entertainment

Entertainment is one of the other applications that have been found for lasers. The most common use of lasers in entertainment can be seen in special effects used in laser shows. Clubs, parties and outdoor concerts all use high-power lasers, with safety precautions, as a spectacle. Laser shows are often extravagant, using lenses, mirrors and smoke.

However, laser *pointers* have few applications beyond actual pointing in the wider entertainment industry, and many venues ban entry to those in possession of pointers as a potential hazard. Very occasionally laser gloves, which are sometimes mistaken for pointers, are seen being worn by professional dancers on stage at shows. Unlike pointers, these usually produce low-power highly divergent beams to ensure eye safety. On one or two occasions pointers have been used as props by magicians during magic shows.

As an example of the potential dangers of laser pointers brought in by audience members, at the Tomorrow Land Festival in Belgium in 2009, laser pointers brought in by members of the audience of 200 mW or greater were found to be the cause of eye damage suffered by several other members of the audience according to reports about the incident filed on the ILDA (International Laser Display Association's) Web site.<sup>[10]</sup> The report says that the incident was investigated by several independent authorities, including the Belgium police, and that those authorities concluded that pointers brought in by the audience were the cause of the injuries.

Laser pointers can be used in hiking or outdoor activities. Higher-powered laser pointers are bright enough to scare away large wild animals which makes them useful for hiking and camping.<sup>[*citation needed*]</sup> In these circumstances a laser pointer can also serve as a handy survival tool, as it can be used as a rescue signal in emergencies which is visible to aircraft and other parties, during both day and night conditions, at extreme distances. For example, during the night in August 2010 two men and a boy were rescued from marshland after their red laser pen was spotted by rescue teams.<sup>[11]</sup>



A 5 mW green laser pointer directed at a palm tree at night. Note that the beam itself is visible through Rayleigh scattering.

## Weapons systems

Accurately aligned laser pointers are used as laser gunsights to aim a firearm.

Some militaries use lasers to mark targets at night for aircraft. This is done to ensure that "friendly" and "enemy" targets are not mistaken. A friendly target may wear an IR emitting device that is only visible to those utilizing night vision (such as pilots.) To pinpoint the exact location of an enemy combatant, they would simply illuminate the target with a laser beam detectable by the attacking aircraft. This can be one of the most accurate ways of marking targets.

## Hazards

Laser pointers can cause eye injuries directly, and dangerous situations by distraction. As of 2011, in spite of the very large number of pointers, and many incidents of malicious or careless use, no very serious and permanent eye injuries have been reported from low-power pointers, nor have any aviation or other accidents actually been reported to be caused by them, although the risk is clearly real.

## Malicious use

*Main articles: Laser safety and Lasers and aviation safety*

Laser pointers, with their very long range, are often maliciously shone at people to distract or annoy them. This is considered particularly hazardous in the case of aircraft pilots, who may be dazzled or distracted at critical times. According to an MSNBC report there were over 2,836 incidents logged in the US by the FAA in 2010.<sup>[12]</sup> Illumination by handheld green lasers is particularly serious, as the wavelength (532 nm) is near peak sensitivity of the dark-adapted eye and may appear to be 35 times brighter than a red laser of identical power output.<sup>[13]</sup>

Irresponsible use of laser pointers is often frowned upon by members of the laser projector community who fear that their misuse may result in legislation affecting lasers designed to be placed within projectors and used within the entertainment industry.<sup>[14]</sup> Others involved in activities where dazzling or distraction are dangerous are also a concern.

Another distressing and potentially dangerous misuse of laser pointers is to use them when the dot may reasonably be mistaken for that of a laser gunsight. Armed police have drawn their weapons in such circumstances.<sup>[1]</sup>

These situations can, of course, occur unintentionally when a laser pointer is held in the hand.

## Eye injury

The output of laser pointers available to the general public is limited (and varies by country) in order to prevent accidental damage to the retina of human eyes. The U.K. Health Protection Agency recommended that "laser pointers generally available to the public should be restricted to less than 1 milliwatt as no injuries [like the one reported below to have caused retinal damage] have been reported at this power".<sup>[15][16]</sup> In the U.S., regulatory authorities allow lasers up to 5 mW.

Studies have found that even low-power laser beams of not more than 5 mW can cause permanent retinal damage if gazed at for several seconds; however, the eye's blink reflex makes this highly unlikely. Such laser pointers have reportedly caused afterimage, flashblindness and glare,<sup>[1]</sup> but not permanent damage, and are generally safe when used as intended.

A high-powered green laser pointer bought over the Internet was reported in 2010 to have caused a decrease of visual acuity from 6/6 to 6/12 (20/20 to 20/40); after two months acuity recovered to 6/6, but some retinal damage remained.<sup>[15][16]</sup> The US FDA issued a warning after two anecdotal reports it received of eye injury from laser pointers.<sup>[1]</sup>

Laser pointers available for purchase online can be capable of significantly higher power output than the pointers typically available in stores. Dubbed "Burning Lasers", these are designed to burn through light plastics and paper, and can have very similar external appearances to their low-power counterparts.<sup>[17][18]</sup>

Studies in the early twentyfirst century found that the risk to the human eye from accidental exposure to light from commercially available class IIIa laser pointers having powers up to 5 mW seemed rather small; however, prolonged viewing, such as deliberate staring into the beam for 10 or more seconds, can cause damage.<sup>[19][20][21][22]</sup>

The UK Health Protection Agency warns against the higher-power typically green laser pointers available over the Internet, with power output of up to a few hundred milliwatts, as "extremely dangerous and not suitable for sale to the public."<sup>[23]</sup>

## Infrared hazards of DPSS laser pointers

Lasers classified as *pointers* are intended to have outputs less than 5 mW total power (Class 3R). At such power levels, an IR filter for a DPSS laser may not be required as the infrared (IR) output is relatively low and the brightness of the visible wavelength of the laser will cause the eye to react (blink reflex). However, higher-powered (> 5 mW) DPSS-type laser pointers have recently become available, usually through sources that do not follow laser safety regulations for laser packaging and labeling. These higher-powered lasers are often packaged in the same pointer-style housings as regular laser pointers, and usually lack the IR filters found in professional high-powered DPSS lasers, because of costs and additional efforts needed to accommodate them.

Though the IR from a DPSS laser is less collimated, the typical neodymium-doped crystals in such lasers do produce a true IR laser beam. The eye will usually react to the higher-powered visible light; however in higher power DPSS lasers the IR laser output can be significant. What poses a special hazard for this unfiltered IR output is its presence in conjunction with laser safety goggles designed to only block the visible wavelengths of the laser. Red goggles, for example, will block most green light from entering the eyes, but will pass IR light. The reduced light behind the goggles may also cause the pupils to dilate, increasing the hazard to the invisible IR light. Dual-frequency so-called YAG laser eye-wear is significantly more expensive than single frequency laser eye-wear, and is often not supplied with unfiltered DPSS pointer style lasers, which output 1064 nm IR laser light as well. These potentially hazardous lasers produce little or no visible beam when shown through the eye-wear supplied with them, yet their IR-laser output can still be easily seen when viewed with an IR-sensitive video camera.

In addition to the safety hazards of unfiltered IR from DPSS lasers, the IR component maybe inclusive of total output figures in some laser pointers.

Though green (532 nm) lasers are most common, IR filtering problems may also exist in other DPSS lasers, such as DPSS red (671 nm), yellow (589 nm) and blue (473 nm) lasers. These DPSS laser wavelengths are usually more exotic, more expensive, and generally manufactured with higher quality components, including filters, unless they are put into laser pointer style pocket-pen packages. Most red (635 nm, 660 nm), violet (405 nm) and darker blue (445 nm) lasers are generally built using dedicated laser diodes at the output frequency, not as DPSS lasers. These diode-based visible lasers do not produce IR light.

## Regulations and misuse

Since laser pointers became readily available, they have been misused, leading to the development of laws and regulations specifically addressing use of such lasers. Their very long range makes it difficult to find the source of a laser spot. In some circumstances they make people fear they are being targeted by weapons, as they are indistinguishable from dot type laser reticles. The very bright, small spot makes it possible to dazzle and distract drivers and aircraft pilots, and they can be dangerous to sight if aimed at the eyes.

In January 2005 a New Jersey man named David Banach was arrested for pointing a green laser pointer at a small jet flying overhead.<sup>[24]</sup>

In 2008 laser pointers were aimed at players' eyes in a number of sport matches worldwide. Olympique Lyonnais was fined by UEFA because of a laser pointer beam aimed by a Lyon fan at Cristiano Ronaldo.<sup>[25]</sup> In a World Cup final qualifier match held in Riyadh, Saudi Arabia between the home team and the South Korean team, South Korean goalkeeper Lee Woon-Jae was hit in the eye with a green laser beam.<sup>[26]</sup>

In 2009 police in the United Kingdom began tracking the sources of lasers being shone at helicopters at night, logging the source using GPS, using thermal imaging cameras to see the suspect, and even the warm pointer if discarded, and calling in police dog teams. As of 2010 the penalty could be five years' imprisonment.<sup>[27]</sup>

Despite legislation limiting the output of laser pointers in some countries, higher-power devices are currently produced in other regions (especially China and Hong Kong)<sup>[citation needed]</sup>, and are frequently imported by customers who purchase them directly via Internet mail order. The legality of such transactions is not always clear; typically, the lasers are sold as research or OEM devices (which are not subject to the same power restrictions), with a disclaimer that they are not to be used as pointers. DIY videos are also often posted on Internet video sharing sites like YouTube which explain how to make a high-power laser pointer using the diode from an optical disc burner. As the popularity of these devices increased, manufacturers began manufacturing similar high-powered pointers. Warnings have been published on the dangers of such high-powered lasers.<sup>[28]</sup> Despite the disclaimers, such lasers are frequently sold in packaging resembling that for laser pointers. Lasers of this type may not include safety features sometimes found on laser modules sold for research purposes.

There have been many incidents regarding, in particular, aircraft, and the authorities in many countries take them extremely seriously. Many people have been convicted and sentenced, sometimes to several years' imprisonment.<sup>[29]</sup>

### Australia

In April 2008, citing a series of coordinated attacks on passenger jets in Sydney, the Australian government announced that it would restrict the sale and importation of certain laser items. The government had yet to determine which classes of laser pointers to ban.<sup>[30]</sup> After some debate, the government voted to ban importation

of lasers that emit a beam stronger than 1 mW, effective from July 1, 2008. Those whose professions require the use of a laser can apply for an exemption.<sup>[31]</sup> In Victoria and the Australian Capital Territory a laser pointer with an accessible emission limit greater than 50 mW is classified as a prohibited weapon and any sale of such items must be recorded.<sup>[32][33]</sup> In Western Australia, regulatory changes have classified laser pointers as controlled weapons and demonstration of a lawful reason for possession is required.<sup>[34]</sup> The WA state government has also banned as of 2000 the manufacture, sale and possession of laser pointers higher than class 2.<sup>[35]</sup> In New South Wales and the Australian Capital Territory the product safety standard for laser pointers prescribes that they must be a Class 1 or a Class 2 laser product.<sup>[36][37]</sup> In February 2009 South African cricketer Wayne Parnell had a laser pointer directed at his eyes when attempting to take a catch, which he dropped. He denied that it was a reason for dropping the ball, but despite this the MCG decided to keep an eye out for the laser pointers. The laser pointer ban only applies to hand-held battery-powered laser devices and not laser modules.<sup>[38]</sup>

## Canada

New regulations controlling the importation and sale of laser pointers (portable, battery powered) have been established in Canada in 2011 and are governed by Health Canada using the Consumer Protection Act for the prohibition of sale of Class 3B (IEC) or higher power lasers to "consumers" as defined in the Consumer Protection Act (<http://laws-lois.justice.gc.ca/eng/acts/C-1.68/index.html>) . Canadian federal regulation follows FDA (US Food & Drug Administration) CDRH (<http://www.fda.gov/Radiation-EmittingProducts/default.htm>), and IEC (International Electrotechnical Commission (<http://www.iec.ch/>)) hazard classification methods where manufacturers comply with the Radiation Emitting Devices Act. As of July 2011 three people<sup>[39]</sup> had been charged under the federal Aeronautics Act, which carries a maximum penalty of \$100,000 and five years in prison, for attempting to dazzle a pilot with a laser. Other charges that could be laid include mischief and assault.<sup>[40]</sup>

## Netherlands

Before 1998 Class 3A lasers were allowed. In 1998 it became illegal to trade Class 2 laser pointers that are "gadgets" (e.g. ball pens, key chains, business gifts, devices that will end up in children's possession, etc.). It is still allowed to trade Class 2 (< 1 mW) laser pointers proper, but they have to meet requirements regarding warnings and instructions for safe use in the manual. Trading of Class 3 and higher laser pointers is not allowed.<sup>[41]</sup>

## Sweden

The use of pointers with output power > 5 mW is regulated in public areas and school yards.<sup>[42]</sup>

## United Kingdom

UK and most of Europe are now harmonized on Class 2 (<1 mW) for General presentation use laser pointers or laser pens. Anything above 1 mW is illegal for sale in the UK (import is unrestricted). Health and Safety regulation insists on use of Class 2 anywhere the public can come in contact with indoor laser light, and the DTI have urged Trading Standards authorities to use their existing powers under the General Product Safety Regulations 2005 to remove lasers above class 2 from the general market.<sup>[43]</sup>

## United States

Laser pointers are Class II or Class IIIa devices, with output beam power less than 5 milliwatts (<5 mW). According to U.S. Food and Drug Administration (FDA) regulations, more powerful lasers may not be sold or promoted as laser pointers.<sup>[44]</sup> Also, any laser with class higher than IIIa (more than 5 milliwatts) requires a key-switch interlock and other safety features.<sup>[45]</sup> Shining a laser pointer of any class at an aircraft is illegal and punishable by a fine of up to \$11,000.<sup>[46]</sup>

All laser products offered in commerce in the US must be registered with the FDA, regardless of output power.<sup>[47]</sup>

In Utah it is a class C misdemeanor to point a laser pointer at a law enforcement officer and is an infraction to point a laser pointer at a moving vehicle.<sup>[48]</sup>

In Arizona it is a Class 1 misdemeanor if a person "aims a laser pointer at a police officer if the person intentionally or knowingly directs the beam of light from an operating laser pointer at another person and the person knows or reasonably should know that the other person is a police officer." (Arizona Revised Statutes §13-1213)<sup>[49]</sup>

On April 30, 2010, Clint Jason Brenner, 36, of Prescott, AZ was found guilty of two counts of endangerment, each a class 6 felony, and it was also found that each was a dangerous offense, for shining a handheld laser pointer at an Arizona Department of Public Safety helicopter in December 2009. He was given a sentence of two years in prison for each count, to run concurrently.<sup>[50][51]</sup>

On November 2, 2009, Dana Christian Welch of Southern California was sentenced to 2.5 years in a federal prison after being found guilty of shining a hand-held laser light into the eyes of two pilots landing Boeing jets at John Wayne Airport.<sup>[52][53]</sup>

## Michigan

Public act 257 of 2003 makes it a felony for a person to "manufacture, deliver, possess, transport, place, use, or release" a "harmful electronic or electromagnetic device" for "an unlawful purpose"; also made into a felony is the act of causing "an individual to falsely believe that the individual has been exposed to a... harmful electronic or electromagnetic device."<sup>[54]</sup>

Public act 328 of 1931 makes it a felony for a person to "sell, offer for sale, or possess" a "portable device or weapon from which an electrical current, impulse, wave, or beam may be directed" and is designed "to incapacitate temporarily, injure, or kill".<sup>[55]</sup>

## Maine

Public law 264, H.P. 868 - L.D. 1271 criminalizes the knowing, intentional, and/or reckless use of an electronic weapon on another person, defining an electronic weapon as a portable device or weapon emitting an electrical current, impulse, beam, or wave with disabling effects on a human being.<sup>[56]</sup>

## Massachusetts

Chapter 170 of the Acts of 2004, Section 140 of the General Laws, section 131J states: "No person shall possess a portable device or weapon from which an electrical current, impulse, wave or beam may be directed, which current, impulse, wave or beam is designed to incapacitate temporarily, injure or kill, except ... Whoever violates