

CASCADE LASER CORPORATION

Near IR Display Plate

Product Information



Figure 1: *Near IR Display Plate*

- CW YAG, Pulsed Nd, GaAs
- 200 watts continuous
- 0.7-1.3 μ Response

The IR Display Plate is a versatile instrument that presents clear, high contrast images of all near IR laser beams. These displays are made on infrared sensitive phosphors which offer a variety of unique features, variable image retention times for pulsed lasers, high resolution for CW YAG, and a good response to gallium arsenide light-emitting diodes. All near IR lasers are capable of being displayed over a wide sensitivity range.

Cascade Lasers' Model 24 makes use of three different types of IR-sensitive surfaces to cover the varied near IR laser display requirements.

Surfaces

Surface #1 is primarily designed for use with YAG lasers. When illuminated by an ultraviolet lamp, this surface fluoresces a bright green. Striking the fluorescing surface with near IR light induces a transition which results in a quenching of fluorescence. Therefore, the IR beam is displayed as a dark image on a bright fluorescent background. The sensitivity of this surface can be varied over a wide range by changing the intensity of the UV illumination; i.e., the distance of the UV lamp from the surface. The response time also depends on the UV illumination but is typically less than 10 milliseconds. This fast a response time is well suited for viewing rapidly changing YAG mode patterns; however, such a recovery time is too rapid to view a single pulsed laser.

Surface #2 is designed to be used with pulsed neodymium and other pulsed IR lasers. This surface fluoresces a bright green. Like surface #1, IR quenching produces a dark image display on a bright background. However, this surface has a much longer decay time which is ideally suited for viewing pulsed lasers. Depending on the

illumination conditions, the image retention time can be varied from one tenth of a second to several minutes. The more intense the UV illumination, the shorter the persistence. When no UV illumination is used, and the background illumination is dimmed, the phosphorescence of the surface will retain the laser beam pattern for several minutes.

Surface #3 is used primarily for viewing gallium arsenide light-emitting diodes and for probing CW YAG laser beams. This surface operates on a different principle than previously described. Energy is stored in the phosphor surface when it is exposed to fluorescent room lights or UV light. Near IR radiation stimulates the release of this energy as yellow-orange light. Consequently, the beam appears as a bright image on a dark background. After the phosphors have absorbed a given amount of IR energy, the surface can become depleted. The beam must then be moved to a new area of the surface or the surface recharged.

All plate and imaging surfaces have a matte finish for safe beam displays.



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Near IR Display Characteristics

	CW YAG & High Rep. Rate Nd				Pulsed Nd			GaAs Diode -- .9u		
	Saturated Display (1) w/cm ²	High Resolution Display (2) w/cm ²	Minimum Power Density (4) w/cm ²	Depletion Energy Density (3) J/cm ²	Saturated Display (1) J/cm ²	High Resolution Display (2) J/cm ²	High Resolution Display (2) mW/cm ²	Minimum Power Density (4) mW/cm ²	Minimum Forced Power mW	Depletion Energy (3) mJ/cm ²
Surface 1	1000-8	8-0.1	0.1							
Surface 2					7-3	3-3				
Surface 3			.0003	2	7-3	3-3	50-1	.02	<.001	80

	Spectral Characteristics					Damage Limits			
	Stimulation Wavelengths micrometers	Emission Wavelengths micrometers	Excitation Wavelengths micrometers	Resolution lines/in.	Image Decay Time seconds	CW Damage Threshold w/cm ²	Pulsed Damage Threshold (5) J/cm ²	Maximum Average Power W	Minimum Intermittent Power W
Surface 1	.7-1.6	.5-.6	<.43	>300	.005			200	100
Surface 2	.48-1.6	.48-.57	<.48	>50	.1-200		Display Plate	2000	7
Surface 3	.53-1.6	.54-.62	<.53	>50	.005-.05		Beam Probe	2000	7

- (1) The beam outline is clearly visible, but fine detail of mode patterns is not visible.
- (2) Power densities in this range permit mode patterns and other detail within the beam to be viewed.
- (3) The energy density required to stimulate all the stored energy in the surface.
- (4) The minimum detectable power density is observable only with the room lights dimmed.
- (5) Pulsed neodymium, normal mode of operation.

Model 24-K

The Model 24-K, Near IR Display Kit, consists of the IR Display Plate and two IR Beam Probes.

The IR Display Plate contains three surfaces. Surface #1, used primarily for YAG lasers, measures 3" x 6" and covers one side of the plate. The #2 and #3 surfaces each occupy a 3" x 3" area on the reverse side.

The Beam Probes, one having a surface #1 and the other a surface #3, measures 1-1/2" x 6" x 1/8". They are used primarily for applications where the flexibility of a thin, hand-held display surface is required; e.g., checking the position of an IR beam as it enters an optical aperture.

For many of the IR display applications it would also be necessary to have a long wavelength ultraviolet lamp. Although any long wavelength UV lamp can be used, Cascade Lasers' Model 22-UV offers small size, high light output, and the ability to stand erect for the most uniform illumination of the Display Plate.

Enlarged Beam Display

Sometimes the power densities from a particular laser may fall outside the ranges required for high resolution display of mode patterns. Under these circumstances the power density can be changed, without distorting the image, by passing the beam through a lens and allowing it to expand until the enlarged area produces the desired power density. As long as the divergence (or convergence) of the lens is large compared to the divergence of the laser beam, the enlarged pattern will be an accurate representation of the laser beam at the position of the lens. This technique is especially useful with CW YAG lasers where enlargement of the beam is also desirable to see and photograph the complicated mode patterns.

Ordering Information

Model 24-K (Includes 24, 24-1, 24-3, 22UV in a Hard Plastic Case; Weight: 3 lbs.)

Model 24-K 220V (Near IR Kit, 220V lamp)

Model 24-K 220V-CE (Near IR Kit, 220V CE lamp)

Model 24 Near IR Plate, Surfaces #1, #2, #3; Weight: 2 lbs.

Model 24-1 Near IR Beam Probe, Surface #1

Model 24-2 Near IR Beam Probe, Surface #2

Model 24-3 Near IR Beam Probe, Surface #3

Model 22-UV Ultraviolet Lamp; Weight: 2 lbs.

24BX Hard Plastic Case for Near IR Display Plate



Contact Cascade Laser Corporation for ordering information or to request a quotation on any of these products.

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