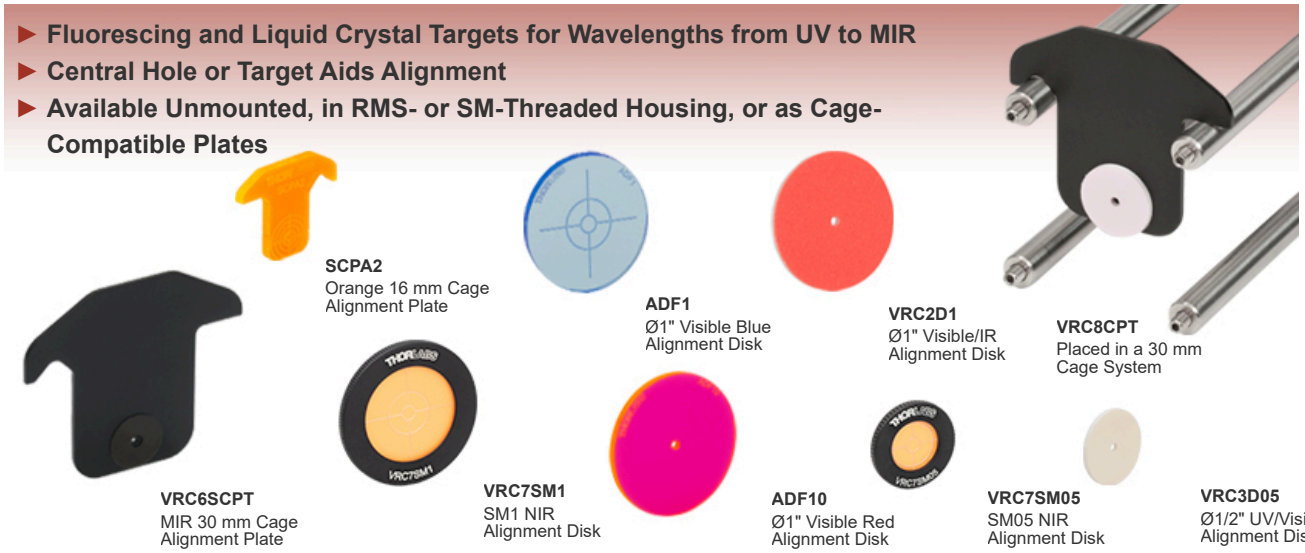
VRC4SM1 - October 30, 2025

Item # VRC4SM1 was discontinued on October 30, 2025. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

FLUORESCING AND LIQUID CRYSTAL ALIGNMENT TARGETS

- Fluorescing and Liquid Crystal Targets for Wavelengths from UV to MIR
- Central Hole or Target Aids Alignment
- Available Unmounted, in RMS- or SM-Threaded Housing, or as Cage-Compatible Plates



Hide Overview

OVERVIEW

Features

- Fluorescing Slow-Fading-Phosphor Disks for UV to IR Alignment
  - Unmounted in Ø1/2" and Ø1" Sizes
  - Mounted in Externally Threaded Housings or on Drop-In Alignment Plates for 30 mm Cage Systems
- 16 mm, 30 mm, and 60 mm Fluorescing, Acrylic Cage Alignment Plates
- Ø1" Fluorescing, Acrylic Disks for UV to IR Alignment
- SM1-Threaded and Cage-Plate-Mounted Liquid Crystal Disks for MIR Alignment

Our alignment disks and plates are made from either fluorescing or liquid crystal material to aid with the alignment of ultraviolet (UV) to mid-infrared (MIR) beams.

Alignment Target Selection Guide			
Spectral Region	**Absorption Band**	**Emission Band**	**Material**
UV/Visible	250 - 540 nm	450 - 750 nm	Fluorescing Slow-Fading Phosphor
UV/Visible	300 - 540 nm	520 - 700 nm	Fluorescing Slow-Fading Phosphor
UV/Visible/NIR	-	Orange	Fluorescing Cast Acrylic (Cage-Mountable Plates)
UV/Visible/NIR	-	Blue, Green, Yellow, Orange, and Red	Fluorescing Cast Acrylic (Unmounted or Threaded Disks)
Visible/IR	400 - 640 nm 800 - 1700 nm	~580 - 750 nm	Fluorescing Slow-Fading Phosphor
NIR	700 -1400 nm	550 - 700 nm	Fluorescing Slow-Fading Phosphor
IR	720 - 820 nm, 890 - 1065 nm, and 1490 - 1590 nm	540 - 560 nm, 650 - 670 nm, 800 - 820 nm, and 950 - 1030 nm	Fluorescing Slow-Fading Phosphor
IR	790 - 840 nm, 870 - 1070 nm, and 1500 - 1590 nm	~520 - 580 nm	Fluorescing Slow-Fading Phosphor
Mid-IR	1500 - 13 200 nm	N/A	Thermochromic Liquid Crystal

We offer fluorescing, slow-fading phosphor disks, which are either unmounted; mounted in an SM05- (0.535"-40), SM1- (1.035"-40), RMS- (0.800"-36), or SM2- (2.035"-40) threaded housing; or mounted to a drop-in cage alignment plate. The unmounted and alignment plate mounted disks feature a centered Ø1.5 mm through hole, while the disks in threaded housings have an alignment target. Figures G1.2, G2.2, G5.2, G6.2, and G7.2 detail the absorption and emission bands of these fluorescing, slow-fading phosphor disks, which are made of the same material as those used in our laser viewing cards and adhesive-backed detector material sheets.

Our Ø1" fluorescing cast acrylic disks are available in five colors: blue, green, yellow, orange, and red. They feature target guide lines or center holes. We also offer orange fluorescing cage alignment plates for 16 mm, 30 mm, and 60 mm cage systems. These disks and plates have fluorescence spectra similar to various fluorophores, making them ideal for use with a variety of lasers used in fluorescence imaging.

Our MIR liquid crystal alignment disks are available mounted to a drop-in cage plate with a Ø10.0 mm active region or a SM1-threaded disk with a Ø20.0 mm active region.

Other Alignment Options
Our fluorescing and liquid crystal alignment targets are based on our alignment targets meant for aligning visible light.

Hide Insights

INSIGHTS

Insights into Aligning a Laser Beam

When installing a laser in an optical setup, it is good practice to start by leveling and orienting its beam so that it travels along a well-defined path. When the beam is prepared this way, not only is it easier to then divert the beam and route it through the optical elements in the system, but the results provided by tuning the system's alignment are more predictable and repeatable. The following sections describe how to:

- Level and Align the Laser Beam's Pointing Angle
- Divert the Beam and Align it to Follow a Desired Path

Click here for more Insights about lab practices and equipment.

Level and Align the Laser Beam's Pointing Angle

Pitch (tip) and yaw (tilt) adjustments provided by a kinematic mount can be used to make fine corrections to a laser beam's angular orientation or pointing angle. This angular tuning capability is convenient when aligning a collimated laser beam to be level with respect to a reference plane, such as the surface of an optical table, and when aligning with respect to a particular direction in that plane, such as along a line of tapped holes in the table.

Video 196A A laser beam from a PL202 collimated laser package is first leveled and aligned to direct it along a row of tapped holes in the table. Two mirrors in KM100 kinematic mounts are then used to route the beam along a different path defined by two ID25 irises. The beam is aligned when halos of laser light surround each iris' aperture and the laser spot is visible on the BHM1 ruler, which was placed behind the second iris to act as a viewing screen.

0:00 - Introduction
1:25 - Level and Align the Laser Beam's Pointing Angle
4:09 - Divert the Beam and Align it to Follow a Desired Path

Before Using the Mount's Adjusters
First, rotate each adjuster on the kinematic mount to the middle of its travel range. This reduces the risk of running out of adjustment range, and the positioning stability is frequently better when at the center of an adjuster's travel range.

Then, make coarse corrections to the laser's height, position, and orientation. This can be done by adjusting the optomechanical components, such as a post and post holder, supporting the laser. Ensure all locking screws are tightened after the adjustments are complete.

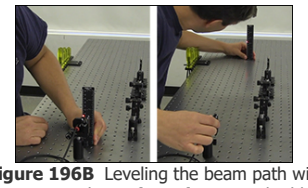


Figure 196B Leveling the beam path with respect to the surface of an optical table requires using the pitch adjustment on the kinematic laser mount (Figure 196C). The beam is parallel to the table's surface when measurements of the beam height near to (left) and far from (right) the laser's front face are equal.

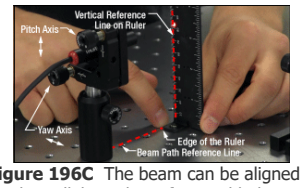


Figure 196C The beam can be aligned to travel parallel to a line of tapped holes in the optical table. The yaw adjustment on the kinematic mount adjusts the beam angle, so that the beam remains incident on the ruler's vertical reference line as the ruler slides along the line of tapped holes.

Level the Beam Parallel to the Table's Surface
Leveling the laser beam is an iterative process that requires an alignment tool and the fine control provided by the mount's pitch adjuster.

Begin each iteration by measuring the height of the beam close to and far from the laser (Figure 196B). A larger distance between the two measurements increases accuracy. If the beam height at the two locations differs, place the ruler in the more distant position. Adjust the pitch on the kinematic mount until the beam height at that location matches the height measured close to the laser. Iterate until the beam height at both positions is the same.

More than one iteration is necessary, because adjusting the pitch of the laser mount adjusts the height of the laser emitter. In Video 196A, for example, the beam height close to the laser was initially 82 mm, but it increased to 83 mm after the pitch was adjusted during the first iteration.

If the leveled beam is at an inconvenient height, the optomechanical components supporting the laser can be adjusted to change its height. Alternatively, two steering mirrors can be placed after the laser and aligned using a different procedure, which is detailed in the section. Steering mirrors are particularly useful for adjusting beam height and orientation of a fixed laser.

Orient the Beam Along a Row of Tapped Holes
Aligning the beam parallel to a row of tapped holes in the table is another iterative process, which requires an alignment tool and tuning of the mount's yaw adjuster.

The alignment tool is needed to translate the reference line provided by the tapped holes into the plane of the laser beam. The ruler can serve as this tool, when an edge on the ruler's base is aligned with the edges of the tapped holes that define the line (Figure 196C).

The relative position of the beam with respect to the reference line on the table can be evaluated by judging the distance between the laser spot and vertical reference feature on the ruler. Vertical features on this ruler include its edges, as well as the columns formed by different-length rulings. If these features are not sufficient and rulings are required, a horizontally oriented ruler can be attached using a BHMA1 mounting bracket.

In Video 196A, when the ruler was aligned to the tapped holes and positioned close to the laser, the beam's edge and the ends of the 1 mm rulings coincided. When the ruler was moved to a farther point on the reference line, the beam's position on the ruler was horizontally shifted. With the ruler at that distant position, the yaw adjustment on the mount was tuned until the beam's edge again coincided with the 1 mm rulings. The ruler was then moved closer to the laser to observe the effect of adjusting the mount on the beam's position. This was iterated as necessary.

Divert the Beam and Align it to Follow a Desired Path

The first steering mirror reflects the beam along a line that crosses the new beam path. A second steering mirror is needed to level the beam and align it along the new path. The procedure of aligning a laser beam with two steering mirrors is sometimes described as walking the beam, and the result can be referred to as a folded beam path. In the example shown in Video 196A, two irises are used to align the beam to the new path, which is parallel to the surface of the optical table and follows a row of tapped holes.

Setting the Heights of the Mirrors

The center of the first mirror should match the height of the input beam path, since the first mirror diverts the beam from this path and relays it to a point on the second mirror. The center of the second mirror should be set at the height of the new beam path.

Iris Setup

The new beam path is defined by the irises, which in Video 196A have matching heights to ensure the path is level with respect to the surface of the table. A ruler or calipers can be used to set the height of the irises in their mounts with modest precision.

When an iris is closed, its aperture may not be perfectly centered. Because of this, switching the side of the iris that faces the beam can cause the position of the aperture to shift. It is good practice to choose one side of the iris to face the beam and then maintain that orientation during setup and use.

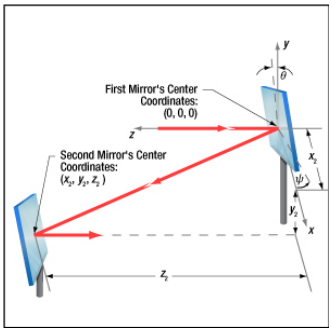


Figure 196D The beam reflected from Mirror 1 will be incident on Mirror 2, if Mirror 1 is rotated around the *x*- and *y*-axes by angles θ and ψ, respectively. Both angles affect each coordinate (x_2, y_2, z_2) of Mirror 2's center. Mirror 1's rotation around the *x*-axis is limited by the travel range of the mount's pitch (tip) adjuster, which limits Mirror 2's position and height options.

Component Placement and Coarse Alignment

Start by rotating the adjusters on both mirrors to the middle of their travel ranges. Place the first mirror in the input beam path, and determine a position for the second mirror in the new beam path (Figure 196D). The options are notably restricted by the travel range of the first mirror mount's pitch (tip) actuator, since it limits the mirror's rotation (θ) around its *x*-axis. In addition to the pitch, the yaw (tilt) of the first mirror must also be considered when choosing a position (x_2, y_2, z_2) for the second mirror. Be sure to place the two mirrors so that neither of the first mirror's adjusters needs to be rotated all the way to either end of its travel range.

After placing the second mirror on the new beam path, position both irises after the second mirror on the desired beam path. Locate the first iris near the second mirror and the second iris as far away as possible.

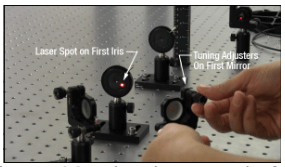


Figure 196E The adjusters on the first kinematic mirror mount are tuned to position the laser spot on the aperture of the first iris.

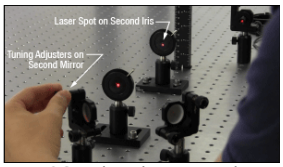


Figure 196F The adjusters on the second kinematic mirror are used to align the beam on the second iris.

While maintaining the two mirrors' heights and without touching the yaw adjusters, rotate the first mirror to direct the beam towards the second mirror. Adjust the pitch adjuster on the first mirror to place the laser spot near the center of the second mirror. Then, rotate the second mirror to direct the beam roughly along the new beam path.

First Hit a Point on the Path, then Orient

The first mirror is used to steer the beam to the point on the second mirror that is in line with the new beam path. To do this, tune the first mirror's adjusters while watching the position of the laser spot on the first iris (Figure 196E). The first step is complete when the laser spot is centered on the iris' aperture.

The second mirror is used to steer the beam into alignment with the new beam path. Tune the adjusters on the second mirror to move the laser spot over the second iris' aperture (Figure 196F). The pitch adjuster levels the beam, and the yaw adjuster shifts it laterally. If the laser spot disappears from the second iris, it is because the laser spot on the second mirror has moved away from the new beam path.

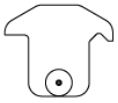
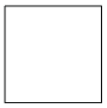
Tune the first mirror's adjusters to reposition the beam on the second mirror so that the laser spot is centered on the first iris' aperture. Resume tuning the adjusters on the second mirror to direct the laser spot over the aperture on the second iris. Iterate until the laser beam passes directly through the center of both irises, as shown in Video 196A. If any adjuster reaches, or approaches, a limit of its travel range, one or both mirrors should be repositioned and the alignment process repeated.

If a yaw axis adjuster has approached a limit, note the required direction of the reflected beam and then rotate the yaw adjuster to the center of its travel range. Turn the mirror in its mount until the direction of the reflected beam is approximately correct. If the mirror cannot be rotated, reposition one or both mirrors to direct the beam roughly along the desired path. Repeat the alignment procedure to finely tune the beam's orientation.

If a pitch axis adjuster has approached a limit, either increase the two mirrors' separation or reduce the height difference between the new and incident beam paths. Both options will result in the pitch adjuster being positioned closer to the center of its travel range after the alignment procedure is repeated.

Hide Selection Guide

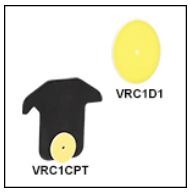
SELECTION GUIDE

Alignment Disks, Laser Viewing Cards, and IR Viewers Selection Guide							
(Click Representative Drawing for Details; Not to Scale)							
Spectral Sensitivity	**Ø1/2" Unmounted Disk**	**Ø1" Unmounted Disk**	**Threaded Disk**	**Alignment Plate with Disk for 30 mm Cage System**	**Viewing Cards**	**Adhesive-Backed Detector Material Sheets**	**IR Viewers**
250 - 540 nm	VRC1D05	VRC1D1	VRC1SM05 (SM05 Threading) VRC1SM2 (SM2 Threading)	VRC1CPT	VRC1	-	-
300 - 540 nm	VRC3D05	VRC3D1	VRC3SM05 (SM05 Threading) VRC3SM1 (SM1 Threading) VRC3SM2 (SM2 Threading)	VRC3CPT	VRC3	VRC3B1 (2" x 2") VRC3B2 (4" x 4") VRC3B3 (8" x 10")	-
350 - 1300 nm	-	-	-	-	-	-	VWR1B
350 - 1700 nm	-	-	-	-	-	-	VWR2B
400 - 640 nm 800 - 1700 nm	VRC2D05	VRC2D1	VRC2SM05 (SM05 Threading) VRC2RMS (RMS Threading) VRC2SM1 (SM1 Threading) VRC2SM2 (SM2 Threading)	VRC2CPT	VRC2	VRC2B1 (2" x 2") VRC2B2 (4" x 4") VRC2B3 (8" x 10")	-
700 - 1400 nm	VRC7D05	VRC7D1	VRC7SM05 (SM05 Threading) VRC7SM1 (SM1 Threading) VRC7SM2 (SM2 Threading)	VRC7CPT	VRC7	VRC7B1 (2" x 2") VRC7B2 (4" x 4") VRC7B3 (8" x 10")	-
700 - 1400 nm	-	-	-	-	VRC5	-	-
720 - 820 nm, 890 - 1065 nm, 1490 - 1590 nm	-	VRC8D1	-	VRC8CPT	-	VRC8B1 (2" x 2") VRC8B2 (4" x 4") VRC8B3 (8" x 10")	-
790 - 840 nm, 870 - 1070 nm, 1500 - 1590 nm	VRC4D05	-	VRC4SM05 (SM05 Threading) VRC4SM1 (SM1 Threading) VRC4SM2 (SM2 Threading)	-	VRC4	-	-
1500 - >13 200 nm	-	-	VRC6SM1 (SM1 Threading)	VRC6SCPT	VRC6S VRC6H	-	-

Hide UV/VIS Alignment Disks: 250 to 540 nm

UV/VIS Alignment Disks: 250 to 540 nm

- Absorption Band: 250 - 540 nm
- Does Not Require Charging
- Disks Available:



- Unmounted
- Mounted in Externally SM-Threaded Housing
- Mounted to a Drop-In 30 mm Cage Alignment Plate

These alignment disks, made from the same slow-fading phosphor material as our VRC1 laser viewing card, are designed to simplify the alignment of UV and visible beams. They are available unmounted in Ø1/2" and Ø1" sizes, mounted in externally SM-threaded housings, or affixed to alignment plates that can be dropped into a 30 mm cage system. See Table G1.3 for a summary of the features of each alignment disk.

Figure G1.1 The back of the VRC1CPT Alignment Plate features an engraved alignment target.

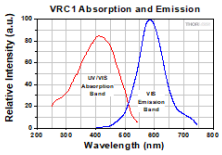


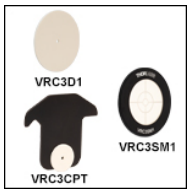
Figure G1.2 Absorption and Emission Bands for the VRC1 Alignment Disks

Table G1.3 Specifications						
Item #	**Description**	**Alignment Features**	**Active Region**	**Absorption Band**	**Emission Band**	**Requires Charging**
VRC1D05	Ø1/2" Disk	Ø1.5 mm Hole in Disk Center	Ø1/2" (Ø12.7 mm)	250 - 540 nm	450 - 750 nm	No
VRC1D1	Ø1" Disk		Ø1" (Ø25.4 mm)			
VRC1SM05	Disk in Externally SM05-Threaded Housing	Target Guide Lines, Ø3 mm and Ø9 mm Concentric Circles (±0.22 mm Concentricity)	Ø0.40" (Ø10.2 mm)			
VRC1SM2	Disk in Externally SM2-Threaded Housing		Ø1.75" (Ø44.5 mm)			
VRC1CPT	Ø1/2" Disk on Drop-In Alignment Plate for 30 mm Cage Systems	Ø0.9 mm Hole in Plate Front: Ø1.5 mm Hole in Disk Center Back: Laser-Engraved Target with Ø4 mm, Ø7 mm, Ø10 mm, and Ø13 mm Concentric Circles	Ø1/2" (Ø12.7 mm)			

Part Number	Description	Price	Availability
VRC1D05	**Ø1/2" UV and Visible Alignment Disk (250 - 540 nm)**	**$27.33**	**Today**
VRC1D1	**Ø1" UV and Visible Alignment Disk (250 - 540 nm)**	**$43.55**	**Today**
VRC1SM05	**SM05-Threaded UV and Visible Alignment Disk (250 - 540 nm)**	**$100.85**	**Today**
VRC1SM2	**SM2-Threaded UV and Visible Alignment Disk (250 - 540 nm)**	**$179.92**	**Today**
VRC1CPT	**30 mm Cage System Alignment Plate with UV and Visible Disk (250 - 540 nm)**	**$38.46**	**Today**

Hide UV/VIS Alignment Disks: 300 to 540 nm

UV/VIS Alignment Disks: 300 to 540 nm



- Absorption Band: 300 - 540 nm
- Does Not Require Charging
- Disks Available:
  - Unmounted
  - Mounted in Externally SM-Threaded Housing
  - Mounted to a Drop-In 30 mm Cage Alignment Plate
- RoHS and REACH Compliant

Figure G2.1 The back of the VRC3CPT Alignment Plate features an engraved alignment target.

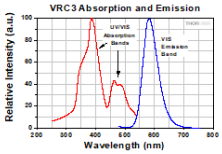


Figure G2.2 Absorption and Emission Bands for the VRC3 Alignment Disks

These alignment disks, made from a slow-fading phosphor material, are designed to simplify the alignment of UV and visible beams. They are available unmounted in Ø1/2" and Ø1" sizes, mounted in externally SM-threaded housings, or affixed to alignment plates that can be dropped into a 30 mm cage system. See Table G2.3 for a summary of the features of each alignment disk.

Table G2.3 Specifications						
Item #	**Description**	**Alignment Features**	**Active Region**	**Absorption Band**	**Emission Band**	**Requires Charging**
VRC3D05	Ø1/2" Disk	Ø1.5 mm Hole in Disk Center	Ø1/2" (Ø12.7 mm)	300 - 540 nm	520 - 700 nm	No
VRC3D1	Ø1" Disk		Ø1" (Ø25.4 mm)			
VRC3SM05	Disk in Externally SM05-Threaded Housing	Target Guide Lines, Ø3 mm and Ø9 mm Concentric Circles	Ø0.40" (Ø10.2 mm)			
VRC3SM1	Disk in Externally SM1-Threaded Housing		Ø0.79" (Ø20.1 mm)			
VRC3SM2	Disk in Externally SM2-Threaded Housing		Ø1.75" (Ø44.5 mm)			

VRC3CPT	Ø1/2" Disk on Drop-In Alignment Plate for 30 mm Cage Systems	Ø0.9 mm Hole in Plate Front: Ø1.5 mm Hole in Disk Center Back: Laser-Engraved Target with Ø4 mm, Ø7 mm, Ø10 mm, and Ø13 mm Concentric Circles	Ø1/2" (Ø12.7 mm)			

Part Number	Description	Price	Availability
VRC3D05	**Ø1/2" UV and Visible Alignment Disk (300 - 540 nm)**	**$27.31**	**Today**
VRC3D1	**Ø1" UV and Visible Alignment Disk (300 - 540 nm)**	**$43.55**	**Today**
VRC3SM05	**SM05-Threaded UV and Visible Alignment Disk (300 - 540 nm)**	**$100.85**	**Today**
VRC3SM1	**SM1-Threaded UV and Visible Alignment Disk (300 nm - 540 nm)**	**$102.32**	**Today**
VRC3SM2	**SM2-Threaded UV and Visible Alignment Disk (300 nm - 540 nm)**	**$179.92**	**Today**
VRC3CPT	**30 mm Cage System Alignment Plate with UV and Visible Disk (300 - 540 nm)**	**$38.46**	**Today**

Hide UV/VIS/NIR Alignment Plate: Orange, Fluorescing Cast Acrylic

UV/VIS/NIR Alignment Plate: Orange, Fluorescing Cast Acrylic

- Orange Fluorescing Cast Acrylic Plates for 16 mm, 30 mm, and 60 mm Cage Systems
- Guide Lines and Ø1 mm or Ø5 mm Through Hole Aligned at Center of Compatible Cage System
- Quick, Drop-In Alignment Tools for Fluorescence Imaging Systems

Figure G3.1 CPA3 Alignment Plate in a 30 mm Cage System

These drop-in alignment plates are convenient tools for spatial calibration and alignment of cage-based fluorescence imaging systems. The cast acrylic substrate produces fluorescence spectra similar to orange fluorescing proteins and dyes. These plates provide a continuous fluorescent field so that the field of view, illumination consistency, and sample alignment may be assessed and adjusted prior to using a sample containing a fluorophore.

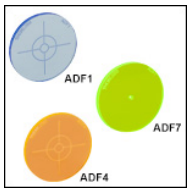
Each plate is cut from cast acrylic material with a thickness of 1.7 mm and has either a Ø1 mm or Ø5 mm through hole aligned at the center of the cage assembly. Each through hole is surrounded by concentric, engraved alignment rings. Options are available for compatibility with our 16 mm, 30 mm, and 60 mm cage systems. For custom colors and sizes up to 1' x 2', please contact Tech Support.

Item #	Color	Through Hole Diameter	Alignment Ring Diameters	Compatible Cage System	Thickness	Transmission (Click for Graph)	Requires Charging
SCPA2	Orange	1 mm (0.04")	3 mm, 5 mm, 7 mm, and 9 mm	16 mm	1.7 mm ± 0.5 mm		No
CPA3		1 mm (0.04")	4 mm, 7 mm, 10 mm, and 13 mm	30 mm			
CPA4		5 mm (0.20")	7 mm, 10 mm, and 13 mm	30 mm			
LCPA2		1 mm (0.04")	7 mm, 12 mm, 17 mm, 22 mm, and 27 mm	60 mm			

Part Number	Description	Price	Availability
SCPA2	**Customer Inspired! 16 mm Cage Fluorescent Alignment Plate, Ø1 mm Hole, Orange**	**$11.75**	**Today**
CPA3	**Customer Inspired! 30 mm Cage Fluorescent Alignment Plate, Ø1 mm Hole, Orange**	**$11.75**	**Today**
CPA4	**Customer Inspired! 30 mm Cage Fluorescent Alignment Plate, Ø5 mm Hole, Orange**	**$11.75**	**Today**
LCPA2	**Customer Inspired! 60 mm Cage Fluorescent Alignment Plate, Ø1 mm Hole, Orange**	**$14.10**	**Today**

Hide UV/VIS/NIR Alignment Disks: Assorted Colors, Fluorescing Cast Acrylic

UV/VIS/NIR Alignment Disks: Assorted Colors, Fluorescing Cast Acrylic



- Fluorescing Cast Acrylic Disks Available in Five Colors: Blue, Green, Yellow, Orange, and Red
  - Each Disk Sold Individually or in Packs of Five
- Ø1" and 1.7 mm Thick
- Feature Target Guide Lines or Center Holes
- Compatible with Our Ø1" Fixed Optic Mounts, Lens Tubes, or 30 mm Cage Plates

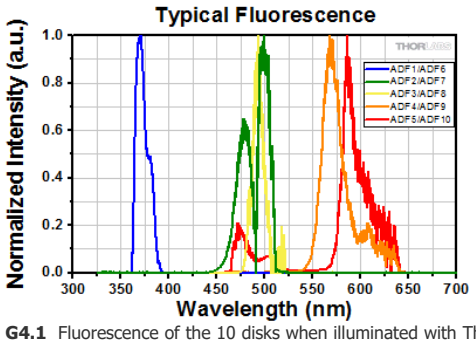


Figure G4.1 Fluorescence of the 10 disks when illuminated with Thorlabs' Fiber-Coupled LEDs. Please see the raw data file for the LEDs used to obtain these fluorescence spectra. This data is typical; performance may vary from lot to lot.

These disks are designed to aid in the alignment of widefield, confocal, or multiphoton fluorescence imaging systems. The cast acrylic substrates provide fluorescence spectra similar to various fluorophores, making the disks ideal for use with a variety of lasers used in fluorescence imaging. These disks provide a continuous fluorescent field so that the field of view, illumination consistency, and sample alignment may be assessed and adjusted prior to using a sample containing a fluorophore.

Each disk is 1" in diameter and is cut from cast acrylic material with a thickness of 1.7 ± 0.5 mm. Each disk features an engraved target with two concentric circles or a Ø1.5 mm center hole. For custom colors, sizes, and shapes up to 1' x 2', please contact Tech Support. For more details, please see the full web presentation.

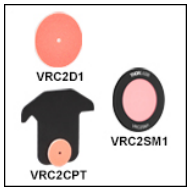
These disks can be mounted with our Ø1" fixed optic mounts, lens tubes, or 30 mm cage plates.

Item #	Color	Alignment Feature	Dimensions	Thickness	Transmission (Click for Graph)	Requires Charging
ADF1(-P5)	Blue	Target Guide Lines, Ø3.4 mm and Ø9.4 mm Concentric Circles	Ø1" (Ø25.4 mm), Unmounted	1.7 mm ± 0.5 mm	Raw Data	No
ADF6 (-P5)		Ø1.5 mm ± 0.1 mm Hole in Disk Center				
ADF2(-P5)	Green	Target Guide Lines, Ø3.4 mm and Ø9.4 mm Concentric Circles				
ADF7(-P5)		Ø1.5 mm ± 0.1 mm Hole in Disk Center				
ADF3(-P5)	Yellow	Target Guide Lines, Ø3.4 mm and Ø9.4 mm Concentric Circles				
ADF8(-P5)		Ø1.5 mm ± 0.1 mm Hole in Disk Center				
ADF4(-P5)	Orange	Target Guide Lines, Ø3.4 mm and Ø9.4 mm Concentric Circles				
ADF9(-P5)		Ø1.5 mm ± 0.1 mm Hole in Disk Center				
ADF5(-P5)	Red	Target Guide Lines, Ø3.4 mm and Ø9.4 mm Concentric Circles				
ADF10(-P5)		Ø1.5 mm ± 0.1 mm Hole in Disk Center				

Part Number	Description	Price	Availability
ADF1	Fluorescent Alignment Disk, Blue	$9.68	Today
ADF1-P5	Fluorescent Alignment Disk, Blue, 5 Pack	$36.29	Today
ADF6	Customer Inspired! Fluorescent Alignment Disk, Ø1.5 mm Hole, Blue	$9.68	Today
ADF6-P5	Customer Inspired! Fluorescent Alignment Disk, Ø1.5 mm Hole, Blue, 5 Pack	$36.29	Today
ADF2	Fluorescent Alignment Disk, Green	$9.68	Today
ADF2-P5	Fluorescent Alignment Disk, Green, 5 Pack	$36.29	Today
ADF7	Customer Inspired! Fluorescent Alignment Disk, Ø1.5 mm Hole, Green	$9.68	Today
ADF7-P5	Customer Inspired! Fluorescent Alignment Disk, Ø1.5 mm Hole, Green, 5 Pack	$36.29	Today
ADF3	Fluorescent Alignment Disk, Yellow	$9.68	Today
ADF3-P5	Fluorescent Alignment Disk, Yellow, 5 Pack	$36.29	Today
ADF8	Customer Inspired! Fluorescent Alignment Disk, Ø1.5 mm Hole, Yellow	$9.68	Today
ADF8-P5	Customer Inspired! Fluorescent Alignment Disk, Ø1.5 mm Hole, Yellow, 5 Pack	$36.29	Today
ADF4	Fluorescent Alignment Disk, Orange	$9.68	Today
ADF4-P5	Fluorescent Alignment Disk, Orange, 5 Pack	$36.29	Today
ADF9	Customer Inspired! Fluorescent Alignment Disk, Ø1.5 mm Hole, Orange	$9.68	Today
ADF9-P5	Customer Inspired! Fluorescent Alignment Disk, Ø1.5 mm Hole, Orange, 5 Pack	$36.29	Today
ADF5	Fluorescent Alignment Disk, Red	$9.68	Today
ADF5-P5	Fluorescent Alignment Disk, Red, 5 Pack	$36.29	Today
ADF10	Customer Inspired! Fluorescent Alignment Disk, Ø1.5 mm Hole, Red	$9.68	Today
ADF10-P5	Customer Inspired! Fluorescent Alignment Disk, Ø1.5 mm Hole, Red, 5 Pack	$36.29	Today

Hide VIS/NIR Alignment Disks: 400 to 640 nm and 800 to 1700 nm

VIS/NIR Alignment Disks: 400 to 640 nm and 800 to 1700 nm



- Absorption Bands: 400 - 640 nm, 800 - 1700 nm
- Requires Charging with 400 - 640 nm Light
- Disks Available:
  - Unmounted
  - Mounted in Externally RMS- or SM-Threaded Housing
  - Mounted to a Drop-In 30 mm Cage Alignment Plate

Figure G5.1 The back of the VRC2CPT Alignment Plate features an engraved alignment target.

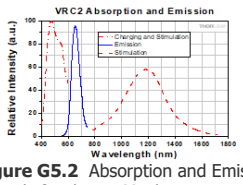


Figure G5.2 Absorption and Emission Bands for the VRC2 Alignment Disks

These alignment disks, made from the same slow-fading phosphor material as our VRC2 laser viewing card, are designed to simplify the alignment of visible and IR beams. They are available unmounted in Ø1/2" and Ø1" sizes, mounted in externally RMS- or SM-threaded housings, or affixed to alignment plates that can be dropped into a 30 mm cage system. See Table G5.3 for a summary of the features of each alignment disk.

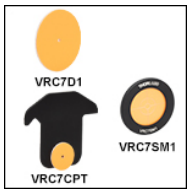
Table G5.3 Specifications

Item #	Description	Alignment Features	Active Region	Absorption Bands	Emission Band	Requires Charging
VRC2D05	Ø1/2" Disk	Ø1.5 mm Hole in Disk Center	Ø1/2" (Ø12.7 mm)	400 - 640 nm 800 - 1700 nm	~580 to 750 nm	Yes
VRC2D1	Ø1" Disk		Ø1" (Ø25.4 mm)			
VRC2SM05	Disk in Externally SM05-Threaded Housing	Target Guide Lines, Ø3 mm and Ø9 mm Concentric Circles (±0.22 mm Concentricity)	Ø0.40" (Ø10.2 mm)			
VRC2RMS	Disk in Externally RMS-Threaded Housing		Ø0.7" (Ø18 mm)			
VRC2SM1	Disk in Externally SM1-Threaded Housing		Ø0.79" (Ø20 mm)			
VRC2SM2	Disk in Externally SM2-Threaded Housing		Ø1.75" (Ø44.5 mm)			
VRC2CPT	Ø1/2" Disk on Drop-In Alignment Plate for 30 mm Cage System	0.9 mm Hole in Plate Front: Ø1.5 mm Hole in Disk Center Back: Laser Engraved Target with Ø4 mm, Ø7 mm, Ø10 mm, and Ø13 mm Concentric Circles	Ø1/2" (Ø12.7 mm)			

Part Number	Description	Price	Availability
VRC2D05	**Ø1/2" Visible and IR Alignment Disk (400 - 640 nm, 800 - 1700 nm)**	**$27.33**	**Today**
VRC2D1	**Ø1" Visible and IR Alignment Disk (400 - 640 nm, 800 - 1700 nm)**	**$43.55**	**Today**
VRC2SM05	**SM05-Threaded Visible and IR Alignment Disk (400 - 640 nm, 800 - 1700 nm)**	**$100.85**	**Today**
VRC2RMS	**RMS-Threaded Visible and IR Alignment Disk (400 - 640 nm, 800 - 1700 nm)**	**$107.10**	**Today**
VRC2SM1	**SM1-Threaded Visible and IR Alignment Disk (400 - 640 nm, 800 - 1700 nm)**	**$102.32**	**Today**
VRC2SM2	**SM2-Threaded Visible and IR Alignment Disk (400 - 640 nm, 800 - 1700 nm)**	**$179.92**	**Today**
VRC2CPT	**30 mm Cage System Alignment Plate with Visible and IR Disk (400 - 640 nm, 800 - 1700 nm)**	**$38.46**	**Today**

Hide NIR Alignment Disks: 700 to 1400 nm

NIR Alignment Disks: 700 to 1400 nm



- Absorption Band: 700 - 1400 nm
- Requires Charging with 440 - 560 nm Light
- Disks Available:
  - Unmounted
  - Mounted in Externally SM-Threaded Housing
  - Mounted to a Drop-In 30 mm Cage Alignment Plate

These alignment disks, made from a slow-fading phosphor material, are designed to simplify the alignment of NIR beams. They are available unmounted in Ø1/2" and Ø1" sizes, mounted in externally SM-threaded housings, or affixed to alignment plates that can be dropped into a 30 mm cage system. See Table G6.3 for a summary of the features of each alignment disk.

Figure G6.1 The back of the VRC7CPT Alignment Plate features an engraved alignment target.

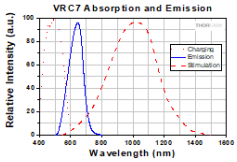


Figure G6.2 Absorption and Emission Bands for the VRC7 Alignment Disks

Table G6.3 Specifications

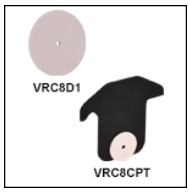
Item #	Description	Alignment Features	Active Region	Absorption Band	Emission Band	Requires Charging
VRC7D05	Ø1/2" Disk	Ø1.5 mm Hole in Disk Center	Ø1/2" (Ø12.7 mm)	700 - 1400 nm	550 - 700 nm	Yes
VRC7D1	Ø1" Disk		Ø1" (Ø25.4 mm)			
VRC7SM05	Disk in Externally SM05-Threaded Housing	Target Guide Lines, Ø3 mm and Ø9 mm Concentric Circles	Ø0.40" (Ø10.2 mm)			
VRC7SM1	Disk in Externally SM1-Threaded Housing		Ø0.79" (Ø20.1 mm)			
VRC7SM2	Disk in Externally SM2-Threaded Housing		Ø1.75" (Ø44.5 mm)			
VRC7CPT	Ø1/2" Disk on Drop-In Alignment Plate for 30 mm Cage Systems	Ø0.9 mm Hole in Plate Front: Ø1.5 mm Hole in Disk Center Back: Laser-Engraved Target with Ø4 mm,	Ø1/2" (Ø12.7 mm)			

		Ø7 mm, Ø10 mm, and Ø13 mm Concentric Circles				

Part Number	Description	Price	Availability
VRC7D05	Ø1/2" NIR Alignment Disk (700 - 1400 nm)	$39.00	Today
VRC7D1	Ø1" NIR Alignment Disk (700 - 1400 nm)	$56.00	Today
VRC7SM05	SM05-Threaded NIR Alignment Disk (700 - 1400 nm)	$134.00	Today
VRC7SM1	SM1-Threaded NIR Alignment Disk (700 - 1400 nm)	$146.00	Today
VRC7SM2	SM2-Threaded NIR Alignment Disk (700 - 1400 nm)	$239.00	Today
VRC7CPT	30 mm Cage System Alignment Plate with NIR Disk (700 - 1400 nm)	$53.00	Today

Hide NIR Alignment Disks: 720 to 820 nm, 890 to 1065 nm, and 1490 to 1590 nm

NIR Alignment Disks: 720 to 820 nm, 890 to 1065 nm, and 1490 to 1590 nm



- Absorption Bands: 720 - 820 nm, 890 - 1065 nm, and 1490 - 1590 nm
- Does Not Require Charging
- Disks Available:
  - Unmounted
  - Mounted to a Drop-In 30 mm Cage Alignment Plate

These alignment disks, made from the same slow-fading phosphor material as our adhesive-backed detector sheets (such as the VRC8B1), are designed to simplify the alignment of IR beams. They are available unmounted as a Ø1" disk or affixed to alignment plates that can be dropped into a 30 mm cage system. See Table G7.3 for a summary of the features.

Figure G7.1 The back of the VRC8CPT Alignment Plate features an engraved alignment target.

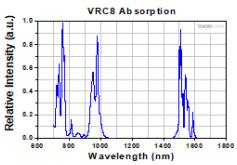


Figure G7.2 Absorption and emission bands for VRC8 alignment disks. Note that although these spectra are shown on the same axis, they were measured independently. The relative intensities are not to scale and depend on both the emission peak measured and incident light intensity.

Table G7.3 Specifications

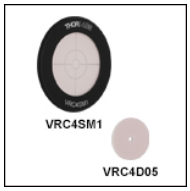
Item #	Description	Alignment Features	Active Region	Absorption Bands	Sensitivity Graphs[a]	Emission Bands	Requires Charging
VRC8D1	Ø1" Disk	Ø1.5 mm Hole in Disk Center	Ø1" (Ø25.4 mm)	720 - 820 nm 890 - 1065 nm 1490 - 1590 nm		540 - 560 nm 650 - 670 nm 800 - 820 nm 950 - 1030 nm	No
VRC8CPT	Ø1/2" Disk on Drop-In Alignment Plate for 30 mm Cage System	0.9 mm Hole in Plate Front: Ø1.5 mm Hole in Disk Center Back: Laser Engraved Target with Ø4 mm, Ø7 mm, Ø10 mm, and Ø13 mm Concentric Circles	Ø1/2" (Ø12.7 mm)				

a. The emission peaks and their relative intensities depend on the excitation wavelength.

Part Number	Description	Price	Availability
VRC8D1	NEW! Ø1" NIR Alignment Disk (720 - 820 nm, 890 - 1065 nm, 1490 - 1590 nm)	$56.00	Today
VRC8CPT	NEW! 30 mm Cage System Alignment Plate with NIR Disk (720 - 820 nm, 890 - 1065 nm, 1490 - 1590 nm)	$53.00	Today

Hide NIR Alignment Disks: 790 to 840 nm, 870 to 1070 nm, and 1500 to 1590 nm

NIR Alignment Disks: 790 to 840 nm, 870 to 1070 nm, and 1500 to 1590 nm



- Absorption Bands: 790 - 840 nm, 870 - 1070 nm, and 1500 - 1590 nm
- Does Not Require Charging
- Disks Available:
  - Unmounted
  - Mounted in Externally SM-Threaded Housing

These alignment disks, made from the same slow-fading phosphor material as our VRC4 laser viewing card, are designed to simplify the alignment of IR beams. They are available unmounted as a Ø1/2" disk or mounted in externally SM-threaded housings. See Table G8.2 for a summary of the features of each alignment disk.

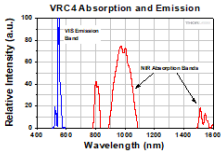


Figure G8.1 Absorption and Emission Bands for VRC4 Alignment Disks

Table G8.2 Specifications

Item #	Description	Alignment Features	Active Region	Absorption Band	Emission Band	Requires Charging
VRC4D05	Ø1/2" Disk	Ø1.5 mm Hole in Disk Center	Ø1/2" (Ø12.7 mm)	790 - 840 nm, 870 - 1070 nm, 1500 - 1590 nm	~520 to 580 nm	No
VRC4SM05	Disk in Externally SM05-Threaded Housing	Target Guide Lines, Ø3 mm and Ø9 mm Concentric Circles (±0.22 mm Concentricity)	Ø0.40" (Ø10.2 mm)			
VRC4SM1	Disk in Externally SM1-Threaded Housing		Ø0.79" (Ø20 mm)			
VRC4SM2	Disk in Externally SM2-Threaded Housing		Ø1.75" (Ø44.5 mm)			

Part Number	Description	Price	Availability
VRC4D05	Ø1/2" Alignment Disk, S,C, & L Bands (790 - 840, 870 - 1070, 1500 - 1590 nm)	$27.33	In Stock Overseas
VRC4SM1	SM1-Threaded IR Alignment Disk (790 - 840 nm, 870 - 1070 nm, 1500 - 1590 nm)	$102.32	Today

Hide MIR Alignment Disks: 1.5 to >13.2 µm

MIR Alignment Disks: 1.5 to >13.2 µm

- Liquid Crystal Film Changes Color When Exposed to Mid-Infrared (MIR) Light
- Does Not Require Charging
- Minimum Detectable Power Density: 0.05 mW/mm^2 @ 1550 nm (22 °C)
- Ambient Operating Temperature: 20 to 24 °C
- Ambient Temperature for Peak Sensitivity and Visibility: 22 °C
- Use with Our 30 mm Cage Components or SM1 Lens Tube System

Figure G9.1 Back View of VRC6SCPT in a 30 mm Cage System

Figure G8.2 The active areas of the VRC6SM1 and VRC6SCPT alignment disks change color above 23° C.

The VRC6SCPT Cage-Plate-Mounted Alignment Disk and VRC6SM1 SM1-Threaded MIR Alignment Disk are made of the same thermochromic liquid crystal material as our VRC6S Detector Card and have been tested with laser sources of wavelengths ranging from 1.5 µm to 13.2 µm.

Item # VRC6SCPT is composed of an alignment disk adhered to an anodized aluminum cage alignment plate. The disk is positioned such that its Ø2.0 mm central hole is concentric with the plate's Ø0.9 mm through hole and aligned with the exact center of a 30 mm cage system. The back side of the plate features a laser-engraved alignment target with Ø4 mm, Ø7 mm, Ø10 mm, and Ø13 mm concentric circles (see Figure G9.1).

In comparison, Item # VRC6SM1 consists of an alignment disk encased within an externally SM1-threaded (1.035"-40) housing and is designed to simplify the alignment of MIR beams when used with an SM1 lens tube system. Its external SM1 threads are 2.3 mm deep. The active region of the VRC6SM1's disk is Ø0.79" with Ø3 mm and Ø9 mm concentric circular target guide lines (see Figure G8.2).

The recommended ambient temperature range for these alignment disks is 20 to 24 °C, with peak sensitivity and responsivity at an ambient temperature of 22 °C. The detector area is black below approximately 23 °C. Above this temperature the detector will turn red, then yellow, then green and finally blue/violet around 28 °C (see Figure G8.2). This color change occurs whether heated by laser exposure or increased ambient temperature. The responsivity will be reduced when used at an ambient temperature below 20 °C since the material will require more time for the area exposed to the laser to reach a temperature above 23 °C, and the alignment disks will exhibit lower sensitivity above 24 °C since the color contrast between the laser-exposed region and the rest of the active region will be reduced.

To restore the VRCS6M1 alignment disk after beam exposure, blow air on the active area with a duster such as the CA4-US or CA6-EU. The active area of the VRC6SCPT cage-plate-mounted alignment disk can be restored by resting the plate face down on a table top (i.e. an optical table with stainless steel surface) for a few minutes. These disks may take longer to recover after exposure to higher laser energy, and sometimes the color change may look permanent at room temperature. If this occurs, place the affected alignment disk in a refrigerator at 0 to 4 °C for a few minutes to accelerate the recovery.

Please Note: The spot size on the disks will vary depending on power density. See the Laser Viewing Cards presentation for more information.

Item #	Absorption Band	Minimum Detectable Power Density	Active Region	Alignment Feature	Requires Charging
VRC6SM1	1.5 to >13.2 µm	0.05 mW/mm^2 @ 1550 nm (22 °C)	Ø0.79" (Ø20.0 mm)	Target Guide Lines, Ø3 mm and Ø9 mm Concentric Circles, (±0.3 mm Concentricity)	No
VRC6SCPT			Ø0.39" (Ø10.0 mm)	Ø0.9 mm Hole in Plate Ø2.0 mm Hole in Disk Center	

Part Number	Description	Price	Availability
VRC6SM1	SM1-Threaded MIR Alignment Disk, 1.5 to >13.2 µm	$48.40	Today
VRC6SCPT	30 mm Cage System Alignment Plate with MIR Disk, 1.5 to >13.2 µm	$44.85	Today