

Fc | ODYSSEY® Fc



QUANTITATIVE WESTERN BLOTS

HIGH SENSITIVITY

WIDE, LINEAR DYNAMIC RANGE

NO FILM OR DARKROOM

WIDE RANGE OF APPLICATIONS

LI-COR
Experience Excellence

ODYSSEY Fc

Dual-Mode Imaging System



Quantitative Western Blots

The accuracy and linearity of infrared fluorescent detection provides confidence in differences of protein expression

High Sensitivity

Infrared laser technology offers the best detection at the optimum wavelengths

Wide, Linear Dynamic Range

A broad, linear dynamic range accurately detects both strong and weak bands on the same blot, without the uncertainty and inconvenience of multiple exposures

No Film or Darkroom

Save valuable time and money on film and darkroom expenses. Eliminate "blown out" lanes and the need for multiple exposures

Wide Range of Applications

Infrared Western Blots, Chemiluminescent Western Blots, Coomassie-Stained Gels, DNA Gels

The Standard for Western Blot Technology

As a researcher, your goal is to efficiently present the most accurate data possible. For more than 30 years, traditional chemiluminescent detection with film has provided data that have been published by scientists worldwide.

Over the past decade, LI-COR® has provided infrared (IR) fluorescent technology with optimized reagents for IR laser-based instrumentation to revolutionize methods for protein detection. This technology has become the standard for quantitative Western blots and eliminated the need for film. Traditional chemiluminescent detection with film provides proven sensitivity, and LI-COR offers industry-leading technology to maintain that sensitivity and improve your data quality to make it the clearest and most accurate it can be. LI-COR has used its expertise in optical design to provide methods for both chemiluminescent, as well as infrared fluorescence protein detection, without the use of film.

Benefits of Digital Imaging with the Odyssey Fc:

- Save valuable money on film (Table 1)
- Eliminate costs related to darkroom maintenance
- No need for multiple exposures
- A wide, linear dynamic range without saturation or "blown out" lanes
- Accurate detection of strong and weak bands in one exposure
- Sensitivity equal to or greater than that of film
- Eliminate the need for excessive washes and hazardous waste associated with film development
- Reduce the negative environmental impact related to film development. For more information, please visit: www.licor.com/green



Whether you are looking to improve your Western blot data by simply moving to digital chemiluminescent detection or by transitioning to quantitative Western blot technology using infrared fluorescent imaging, we will help you find the best solution for you and your lab.

The Infrared Fluorescence Advantage

Advancing Western Blots with Infrared Fluorescence Detection

LI-COR® pioneered infrared Western blots more than ten years ago. Using infrared detection offers numerous benefits, when used with corresponding infrared fluorescent-labeled secondary antibodies.

- Quantitative analysis and a wide linear dynamic range that is not available with traditional chemiluminescent methods
- Detect strong and weak bands on the same blot, without blowouts or hidden bands (Fig. 1)
- Detect two targets simultaneously on the same membrane to increase quantification accuracy
- At the 700 nm and 800 nm infrared wavelengths, both autofluorescence and light scatter are dramatically reduced (Fig. 4)
- Infrared dyes offer advanced signal stability that allows for convenient and reproducible data that are not time-sensitive – data are not contingent on the lifespan of an enzymatic reaction
- More than 4,000 peer-reviewed publications cite data from Odyssey® Imaging Systems

The dynamic nature of enzyme labels and film allows you to capture only a snapshot of the enzymatic reaction and is highly dependent on timing and exposure, limiting linear range and offering only partially quantitative results (Fig. 2). With the infrared fluorescence method, film and enzyme labels are replaced with infrared fluorescent-labeled antibodies.

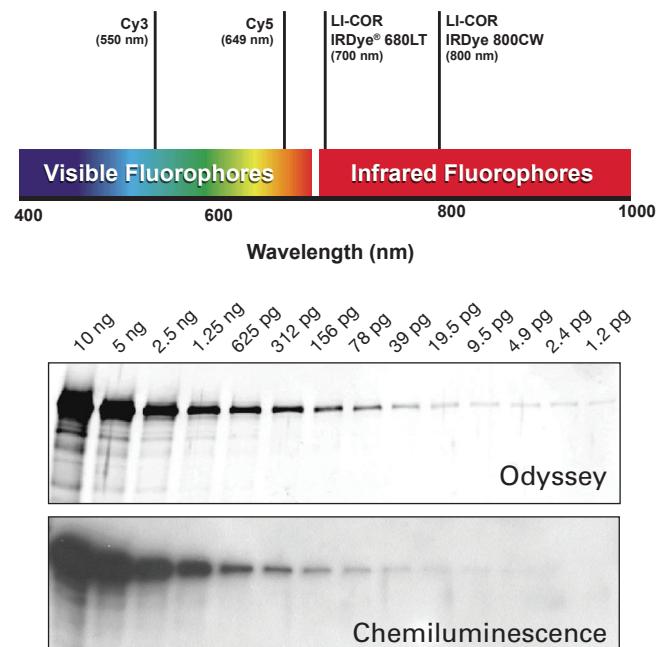


Figure 1. Serial dilutions (10 ng to < 1 pg) of purified human transferrin (Tf) were used to assess Western blot sensitivity. An example of typical results obtained with Odyssey imaging technology. The above data illustrate the detection of 1.2 pg of Tf, while only 4.9–9.5 pg is detected with chemiluminescence. **Infrared fluorescent detection sensitivity is approximately 200-fold greater than other studies with visible fluorophores (Cy³, Cy⁵, or FITC).** (Data generated on Odyssey Classic)

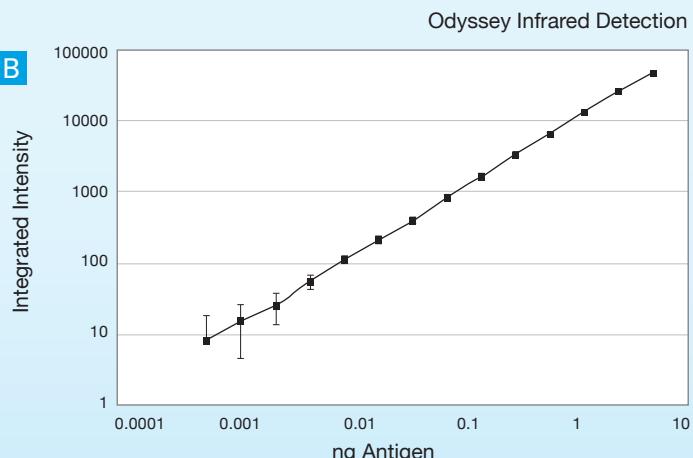
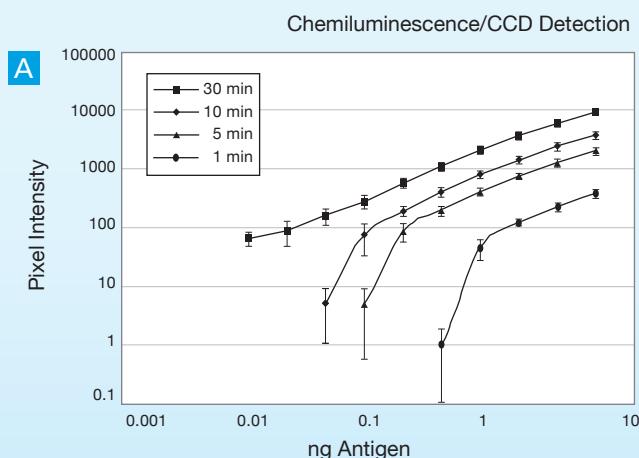


Figure 2. A dot blot assay was used to compare the linear ranges of chemiluminescent and infrared fluorescent detection. Dilutions of mouse antibody were spotted and detected with HRP- or IRDye® infrared dye-labeled goat anti-mouse antibodies. Chemiluminescent data (Panel A) were collected using ECL substrate and a CCD camera with varying exposure times; the infrared image (Panel B) was obtained in a single scan with Odyssey infrared imaging technology. For a 30-minute chemiluminescent exposure, the data set was linear over a 250-fold dynamic range, but not proportional. By contrast, infrared detection displayed a quantitative linear range greater than 4000-fold (3.6 orders of magnitude). A paper detailing this study can be downloaded at www.licor.com/chemiccd. (Data generated on Odyssey Classic)

Sensitivity

The Odyssey Fc platform uses infrared laser excitation that out-performs LED and visible white light systems (Fig. 3) for Western blots. Biological materials, membranes, and plastics produce high background due to light scattering and autofluorescence in the visible wavelength range used by most fluorescent imagers. This limits the sensitivity of visible fluorescent systems and makes it difficult to detect low-abundance proteins at endogenous levels without satu-

ration of stronger bands. Infrared laser excitation results in the highest signal-to-noise ratios, and the best detection sensitivity available with a fluorescent system.

Infrared lasers offer high-speed detection with increased sensitivity when compared to systems that use LED and visible white light. This increased sensitivity offers a clear image of your data that is unmatched by other digital imaging systems.

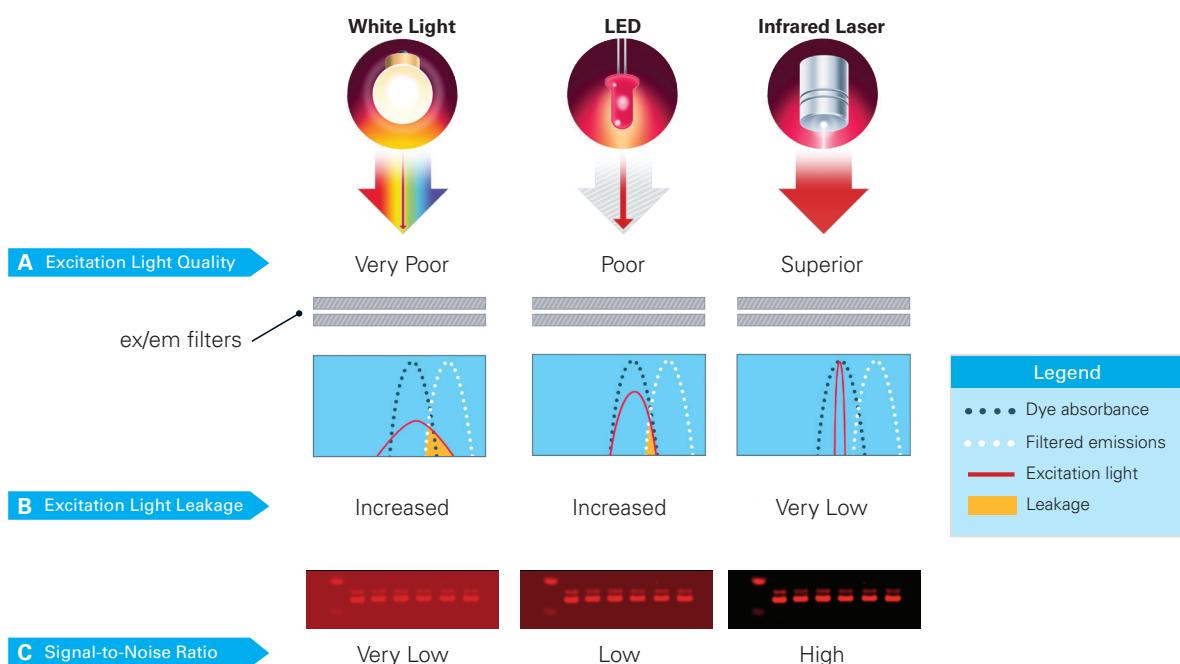


Figure 3. Improved performance using infrared lasers. A) Infrared lasers deliver excitation light in the narrow wavelength band desired, unlike LED or white light sources. B) Leakage of excitation light (yellow shading) increases image background. C) LI-COR filtering technology dramatically reduces excitation light leakage, for decreased image background and sensitive detection of low abundant targets.

LI-COR's laser technology has the best detection at the optimum wavelengths. **When compared to other instruments using infrared fluorescence, the 700 nm and 800 nm channels within the Odyssey family of imagers are always the most sensitive.**

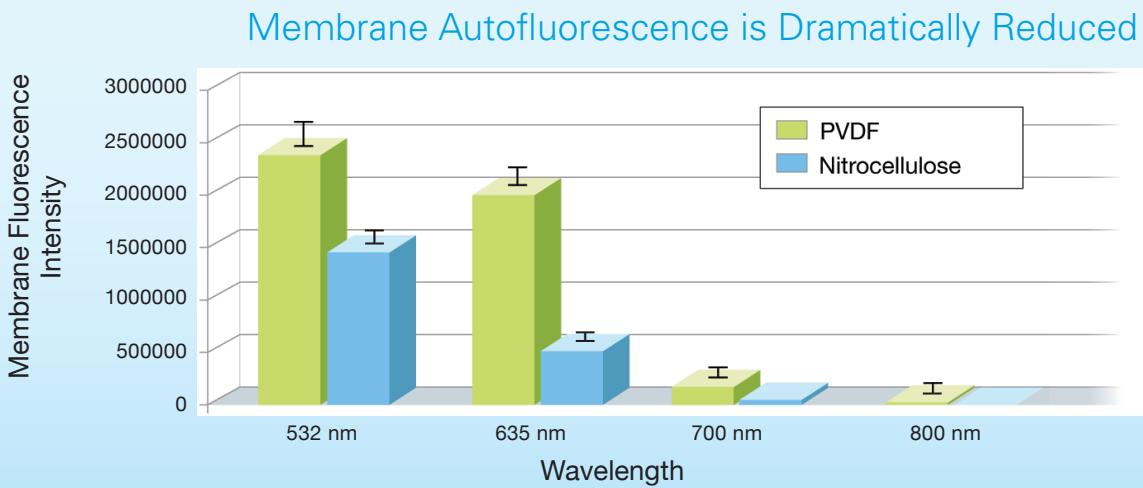


Figure 4. Nitrocellulose and PVDF membranes were imaged with Odyssey infrared imaging technology at Intensity = 5 for both 700 nm and 800 nm wavelengths. The same membranes were scanned at a 532 nm and 635 nm wavelength with a PMT = 500 on a GenePix® 4100A (Molecular Devices). Autofluorescence was much lower at infrared wavelengths.

Wide Dynamic Range

Through the innovative use of infrared fluorescent antibody conjugates, Odyssey imaging systems provide a broad, linear dynamic range to accurately detect both strong and weak bands on the same Western blot. By contrast, the dynamic, enzymatic nature of chemiluminescence allows you to capture only a "snapshot" of the enzymatic reaction and is highly dependent on timing and exposure, limiting linear range and offering only qualitative or partially quantitative results.

Multiplex Detection

The Odyssey Family of Imagers provides simultaneous two-color target analysis with the 700 nm and 800 nm infrared fluorescent detection channels (Fig. 5). Two-color Western blot analysis makes normalization easy by using one channel for normalizing. It also eliminates errors introduced by stripping and reprobing or by comparison of separate blots. Superior image clarity and detail make it easier to detect subtle mobility shifts caused by protein modifications such as phosphorylation.

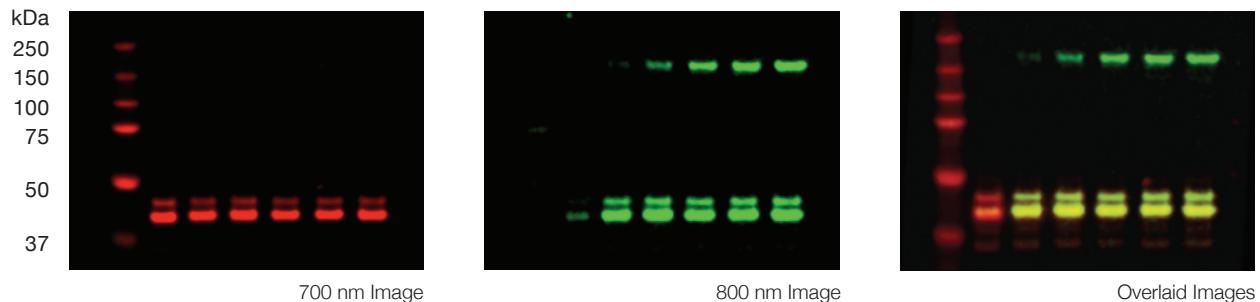


Figure 5. Detect two targets and monitor protein phosphorylation. Lysates (10 µg/well) of A431 cells treated with EGF were separated and transferred to nitrocellulose. The blot was probed with rabbit anti-ERK1 and mouse anti-phospho-ERK primary antibodies (Santa Cruz Biotechnology) and then detected with goat anti-rabbit IRDye 680 (red) and goat anti-mouse IRDye 800CW (green) secondary antibodies, respectively. The blot was imaged with the Odyssey Fc Imager for 2 minutes in each channel. Overlapping ERK (red) and phospho-ERK (green) signals are displayed in yellow. This phospho-ERK antibody cross-reacts with phospho-EGFR (upper green band).

Western Blot Cost Comparison

Infrared Detection vs. Chemiluminescence

Cost Savings			
Reagents	IR Detection (2 Targets)	Chemiluminescence (1 Target)	Chemiluminescence (strip and reprobe for second target) 2-target total
Secondary Antibody (15 mL) Recommended Dilutions: (1:15,000 for IR*; 1:2,500 for Chemi)	\$0.68	\$0.33	\$0.66
Chemiluminescent Substrate (2 mL)	---	\$5.70 (2 mL)	\$11.40 (2 mL)
Film (2-4 pieces of film/blot)	---	\$7.68	\$15.36
Protein Markers Two-color Protein Marker for IR (2 µL) Standard Protein Marker for Chemi (10 µL)	\$1.16	\$4.68	No charge to reuse marker
Cost Extra Cost Per Blot Compared to IR*	\$1.84	\$18.39 (2 mL) \$16.55	\$27.42 (2 mL) \$25.58

*IRDye 800CW and IRDye 680RD were used for IR calculations.
 *Based on GE Healthcare pricing. September 20, 2011. Assumes 10 x 10 cm blot.

Table 1. Moving to digital imaging with Odyssey infrared imaging technology will save money for your lab. Not only will you save money on reagents, all Odyssey imaging systems eliminate the costs related to film and darkroom expenses.

Odyssey® Fc Dual-Mode Imaging System

Over the past decade, LI-COR® has revolutionized Western blot analysis through two-color quantitative Westerns and optimized reagents. Building on this experience, the Odyssey Fc advances Western blot technology by combining the rich history of chemiluminescence with the power and sensitivity of the LI-COR FieldBrite™ XT² optical system for exceptional dual-mode detection for both chemiluminescent and infrared fluorescent imaging. The Odyssey Fc, with its patented FieldBrite XT² optical technology, provides:

Chemiluminescent Advantages:

- One-touch image acquisition every time – no need for multiple exposures
- No “blown out” lanes or saturation
- Publication quality images
- No need for software manipulation post image acquisition
- Save valuable money on film and darkroom expenses

Quantitative Infrared Fluorescent Advantages:

- Accurate quantification over 6 logs of dynamic range
- The only laser-based system on the market that also incorporates the advantages of chemiluminescence
- Superior sensitivity over visible fluorescent detection (Fig. 6)

Nucleic Acid Detection:

- Ethidium bromide & SYBR® family of DNA stains for agarose gel digital imaging
- No harmful UV excitation light – safer alternative for downstream DNA applications
- Disposable imaging tray to avoid instrument contamination

- Offers both chemiluminescent and infrared fluorescent imaging
- Versatile nucleic acid detection
- Economical choice for chemiluminescent and infrared fluorescent users



FieldBrite XT² Optical System

At the heart of the Odyssey Fc is LI-COR's patented FieldBrite XT² optical system (Fig. 7). This CCD camera chip technology, combined with infrared lasers, ensures the highest sensitivity of any CCD camera technology on the market.

Benefits of the FieldBrite XT² optical system include:

- Eliminates the need for image “stacking” and the worry of image saturation. The user selects only the total acquisition time before taking the one, and only, image necessary. No need for multiple exposures.
- Provides uniformity across the entire field of view with a coefficient of variation of less than 3%. This even laser illumination offers an image that is already flat and uniform without additional software corrections.
- Features an optimized resolution and sensitivity for high quality performance and image quality with low background.

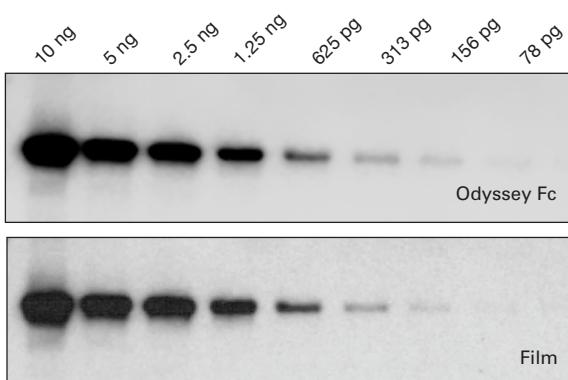


Figure 6. Chemiluminescent detection of purified transferrin, using the Odyssey Fc imager (top) and film exposure (bottom). Detection sensitivity is similar. With Odyssey Fc detection, blowout of stronger bands is reduced and **band resolution is improved**.

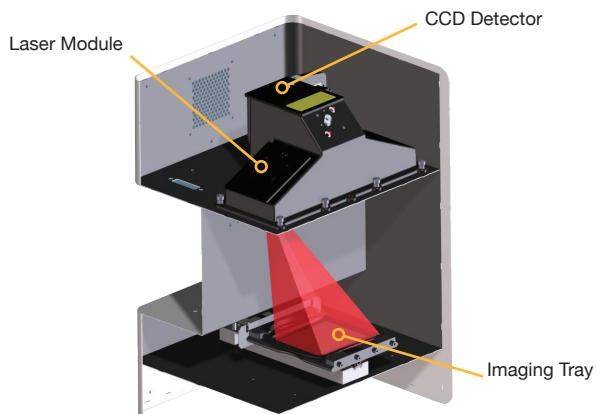


Figure 7. Laser module contains a 700 nm laser and a 800 nm laser.
FieldBrite XT² technology ensures uniform illumination of the sample, low coefficient of variation (%CV), and exceptional reproducibility. Illustration depicts activation of 685 nm channel.

Fc Applications

Western Blots:

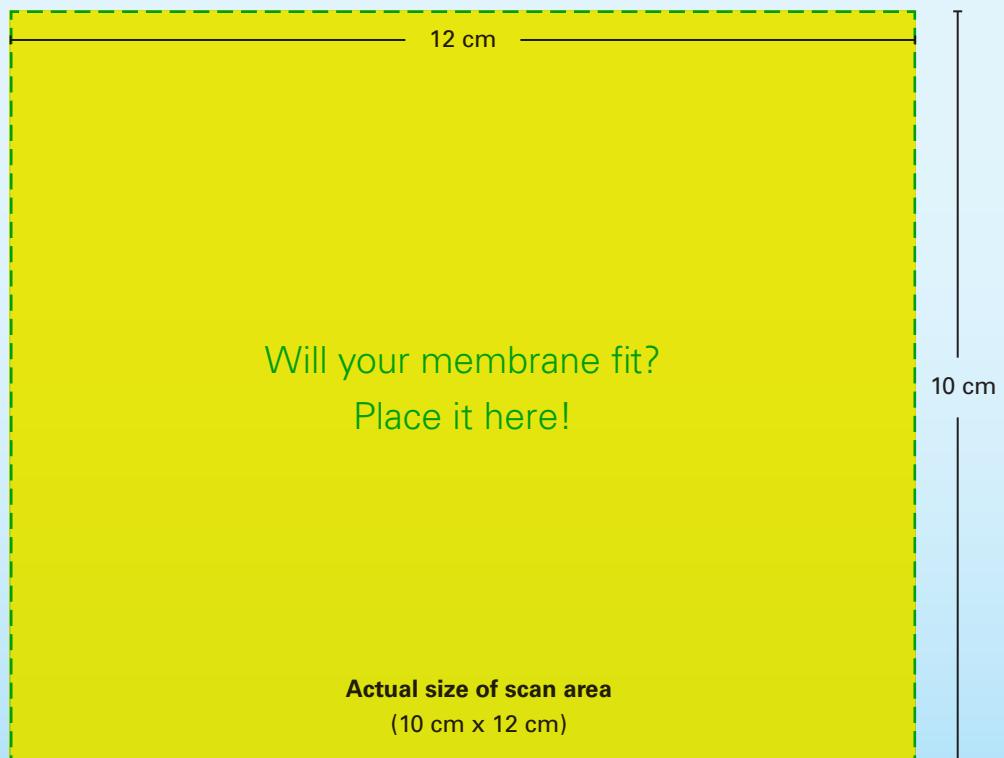
Chemiluminescent, Two-Color Infrared, and In-Gel

Protein Detection:

Coomassie-Stained Gels

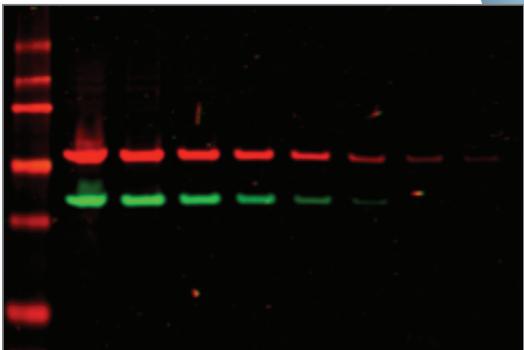
Nucleic Acid Detection:

DNA Gel Staining (EtBr, SYBR[®] Family, and Syto[®] 60)





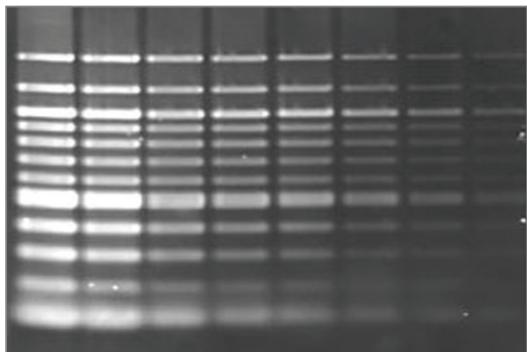
ODYSSEY Fc Applications



IR Fluorescent Western Blots



Chemiluminescent Western Blots



DNA Gel Staining



Coomassie-Stained Gels

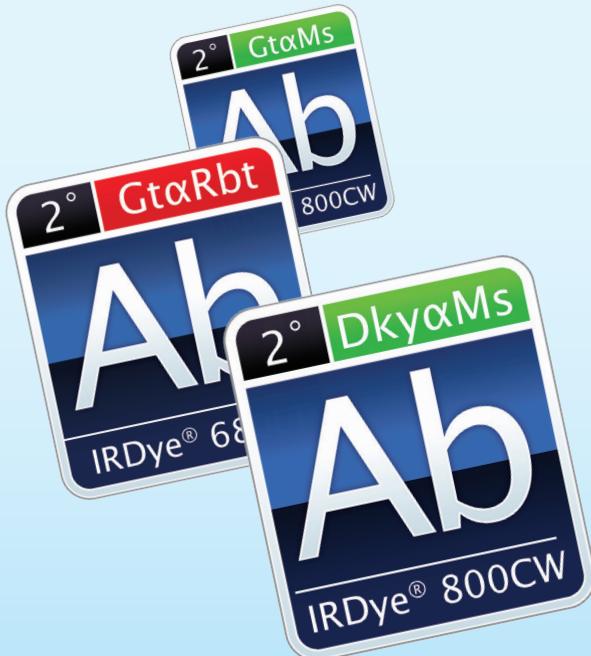
IRDye® Infrared Dyes and Antibodies

Infrared dyes provide a key performance advantage on the Odyssey Family of Imaging Systems. LI-COR's pioneering family of IRDye infrared dyes are synthesized with reactive functional groups that enable easy covalent coupling to antibodies and other biomolecules. IRDye infrared dye secondary antibodies and conjugates are optimized for a wide variety of applications.



Order antibodies on-line at:
www.licor.com/shoponline*

* Ordering on-line available to U.S. customers only





Odyssey Fc



Odyssey CLx



Odyssey Sa



ODYSSEY Fc System Specifications

Image Field Size:

10 cm x 12 cm

Dynamic Range:

> 6 logs

Uniformity of Illumination:

CV <3% across field

Laser Lifetime:

20,000 working hours

600 Channel Light Source:

Diffuse light at 520 nm

700 Channel Laser Source:

Solid-state laser diode at 685 nm

800 Channel Laser Source:

Solid-state laser diode at 785 nm

Detectors:

Low-noise CCD. Thermoelectrically cooled.

Acquisition Times, per Channel:

- Fluorescence (600, 700, and 800 nm) channels: 30 s, 2 min, 10 min, plus variable time feature
- Chemiluminescence channel: 30 s, 2 min, 10 min, 60 min plus variable time feature

Focusing Range:

Automatic

Operating Conditions:

15-35°C and dew point no greater than 22°C

Power Requirements:

Universal input between 100-127 VAC and 200-240 VAC; 4 Amp maximum; 1 Amp typical; 50/60 Hz

Dimensions:

67.3 cm h x 41.4 cm w x 47 cm d (26.5 x 16.3 x 18.5 inches). Depth with imaging drawer open is 59.7 cm (23.5")

Weight:

27 kg (60 lbs)

ETL Listed for US/CAN, CE Marked

Experience Excellence

We know that your time is incredibly valuable, and therefore, the research tools you work with must be reliable, easy to use, and deliver superior results. That's why LI-COR has worked for the past 40 years to innovate in ways that exceed researchers' expectations.

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View a complete list of our international distributors at: www.licor.com/bio/distributors

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The LI-COR board of directors would like to take this opportunity to return thanks to God for His merciful providence in allowing LI-COR to develop and commercialize products, through the collective effort of dedicated employees, that enable the examination of the wonders of His works.

"Trust in the LORD with all your heart and do not lean on your own understanding. In all your ways acknowledge Him, and He will make your paths straight."

—Proverbs 3:5,6



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