Trouble viewing this email? Click here to view online.

Electrophysics Photonics

IN THIS ISSUE:

FALL 2006 ISSUE www.electrophysics.com

From the Editor

THE INFRARED IMAGING INDUSTRY'S COMING OF AGE

While no "sweet 16" or other traditional celebration of reaching adulthood has been formally held, there is no denying that the infrared imaging industry has entered a more mature segment in its lifecycle. If you draw parallels with other industries here is what you find:

- Market prices for infrared products are falling. Infrared imaging is essentially a semiconductor business, and the industry is following its own "Moore's Law" — in which the price performance ratio of infrared products is changing.
- Competition within the entire supply chain is active and healthy.
- Price elasticity has been broached in markets for uncooled-based systems in automotive night vision, firefighting and industrial inspection — and volumes are growing at greater than 20% per year.
- Application-specific products are offered with unique features that meet the needs of a select customer group.
- Infrared cameras have incorporated industry-standard outputs including USB 2.0, Camera Link® and FireWire.

In the coming years your car will feature thermal night vision, your home will be inspected using infrared cameras, all firemen will be able to see through smoke, and your local police department will be able to track suspects and find lost citizens using thermal imaging technology.

top

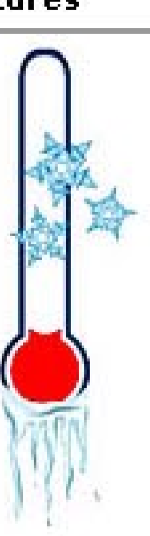
RESOURCE CENTER
Complimentary White Paper Downloads!

How to View Dynamic Scenes That Have Both Hot and Cold Objects

It is often necessary to observe scenes that include both dark and bright areas. Traditionally, these applications have proved difficult for infrared cameras. See how this new capability results in a substantial improvement to a camera's dynamic range performance with impressive results.

How to View Dynamic Scenes That Have Both Hot and Cold Objects

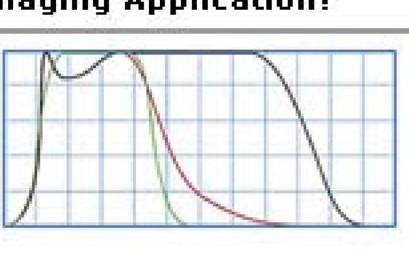
Infrared Imaging of Objects at Very Cold Temperatures



Infrared imaging at very cold temperatures has been extraordinarily challenging in the past. Despite the very low radiance from cold objects, long wave cameras with high quantum efficiency (QE) can be used to produce high quality thermal images, accurate temperature measurement and reveal interesting properties.

Infrared Imaging of Objects at Very Cold Temperatures

Which Spectral Band is Best for Your Infrared Imaging Application?



Performance characteristics in the mid-wave MWIR and long-wave LWIR bands can be quite different. Though similarities do exist, for certain applications, maximizing performance means selecting the correct infrared spectral band.

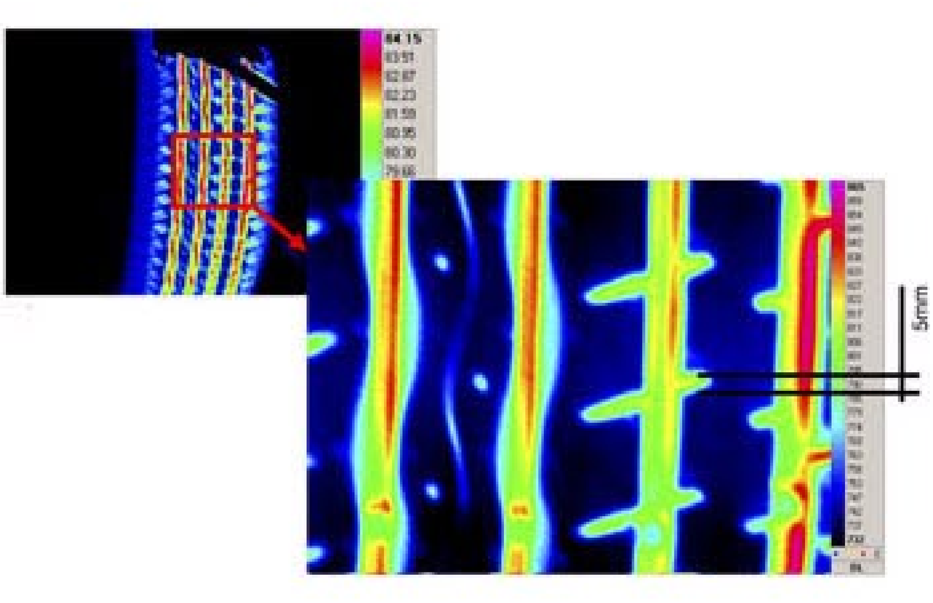
Which Spectral Band is Best for Your Infrared Imaging Application?

top

FOCUS ON APPLICATIONS:
Tire Testing Using High-Speed Infrared Cameras

Electrophysics' infrared cameras are uniquely capable of imaging fast-moving objects and measuring the temperature of any point on an object without the errors associated with motion blur.

A good example of this is studying tires while running on a dynamometer in excess of 150 mph. Researchers can capture detailed temperature data of tires during dynamic testing that simulated turning and braking loads.



Tire imaged while rotating at over 100 mile per hour.

WE BEGIN BY CALCULATING:

- Circumference of the tire (c = π x d)
- The linear velocity of the tire
- The spot size resolution desired
- The camera exposure time and frame rate needed to meet the stop motion spot size requirements
- Will a trigger device be necessary? If so what type?
- The anticipated temperature range
- The thermal sensitivity required
- Which wavelength (3-5µm called mid wave or 8-10µm called long wave) camera to select

Assuming a 16-inch wheel and 4-inch sidewall, the circumference of the tire will be 3.1416 x 24 (16+4+4) = 75.3 inches.

Assuming a speed of 60mph, the linear velocity is 1056 inches (26,822 mm) per second.

Assuming the resolution desired is 0.2 inches (5mm) ±15% for acceptable motion displacement, we can calculate the exposure time necessary. We need to integrate the sensor during the period of time it takes the tire to move 0.03 inches (0.2 x 15%).

The integration time is calculated as 0.03/1056 or 28.4 microseconds (µs).

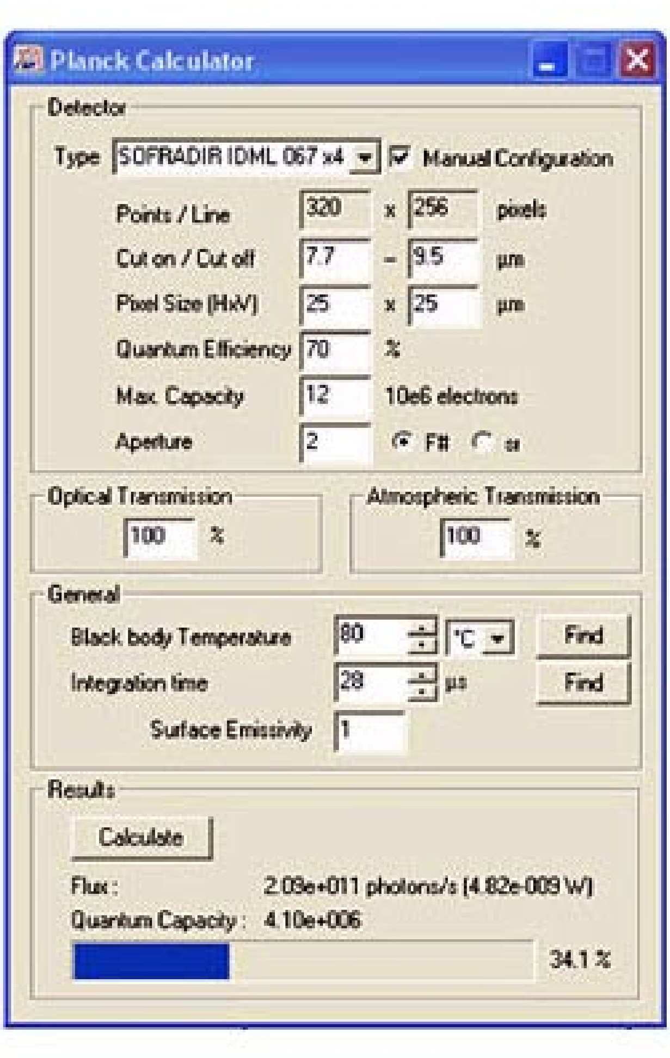
Normal operating temperatures for tires are within the ambient operating specification of a tire, plus a factor for the load-induced heating of the tire under a wide range of load and speed conditions. We will assume that the maximum temperature a tire will be subjected to 100°C or 200°F.

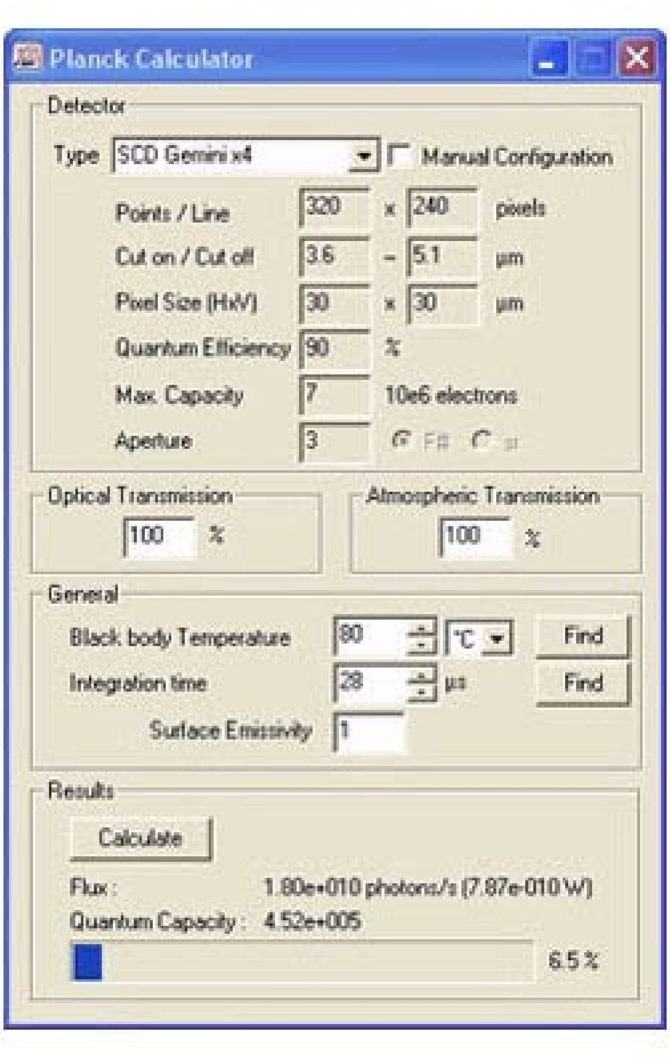
Given the uniform material properties of a tire, we are assuming that the temperature resolution or sensitivity required for proper analysis of the tire under various test conditions will be <0.25°C.

Electrophysics offers cameras with spectral responses in either the mid-IR wavelength region (commonly referred to as MWIR) or long-IR wavelength region (commonly referred to as LWIR). Because of the relatively cold temperature of the tire, an LWIR camera will perform much better due to Planck's Law. Essentially, this states that as a target temperature gets hotter, the peak wavelength associated with that temperature shifts toward shorter wavelengths. An LWIR system has its peak sensitivity around room temperature, while a MWIR system has its peak sensitivity around 400°C. Therefore, an LWIR system can better achieve the short exposure and sensitivity performance objectives.

Electrophysics includes a sophisticated Planck calculator to help users determine the optimal system configuration for an application.

Notice in the calculator results shown below that at an integration period of 28 microseconds and an object temperature of 80°C, the LWIR detector's charge capacitor fills to 34%, while an MWIR camera will only fill the charge capacitor to 6%. The MWIR camera will perform better for higher temperature testing.





CONCLUSIONS

- Infrared imaging in the LWIR band is superior for high speed tire testing since increased object radiance and camera sensitivity enables the use of shorter integration times and higher tire speeds.
- With an integration time of about 30µs, object blur will be smaller than 1mm—yielding high spatial resolution despite the high speed. This level of performance is important in understanding tire pattern's thermal properties.

top

RANGE AND RESOLUTION CALCULATOR
Complimentary Download!

Electrophysics' range and resolution spreadsheet calculator makes it easy to determine typical optical parameters, including IFoV and spot sizes.

Simply enter parameters including sensor size, pixel pitch, focal length and others and automatically calculate IFoV, field of view on the target, detection and recognition ranges.

Click on the link below and follow the instructions.

Download now!

top

IN THE NEWS

Electrophysics Awarded Contract by the Navy for the MANPAD Program

NAVAIR NAVAL AIR SYSTEMS COMMAND

Electrophysics has been awarded a follow on contract by NAVAIR Weapons Division, China Lake, for seven Emerald™ MWIR infrared cameras. The cameras will be integrated into NAVAIR's MANPAD program, designed specifically for force protection.

By arranging the cameras in a circumference, NAVAIR will create a highly advanced measure of force protection from MANPAD systems. With the use of special stitching software, each camera will be used to produce a 360° field of view capable of detecting the infrared signatures of shoulder fired missiles and small arms fire, the most common forms of MANPAD. Upon detection, the information would be immediately data linked to deployed aircraft which can execute appropriate countermeasures.

Electrophysics Achieves ISO 9001:2000 Registration August 21, 2006

Electrophysics is pleased to announce that the company has undergone an assessment audit performed by the European Quality Assurance Limited (EQA) and is granted UKAS, and ANAB/RAB Certification. The company's ISO 9001:2000 registration/accreditation is effective as of August 21, 2006.

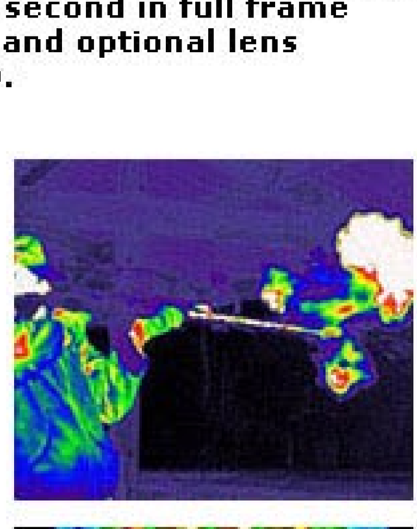
EQA ISO 9001 Registered Firm UKAS QUALITY MANAGEMENT 047

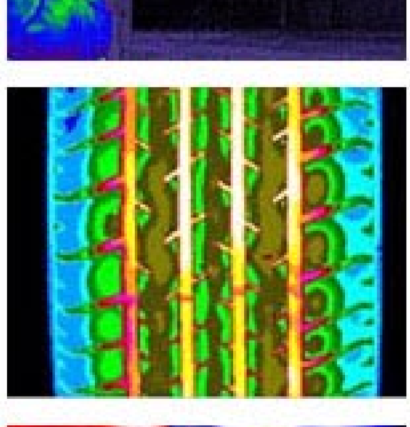
Certificate No. 7096

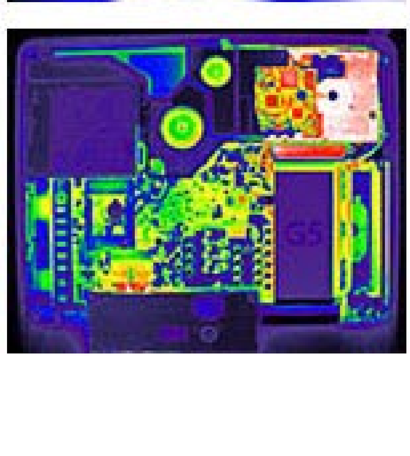
top

PRODUCT SHOWCASE:
Silver 450M High-Speed/High QE Infrared Camera

The Silver 450M incorporates an ultra-sensitive (<20mK typical), 320x256 InSb focal plane array sensor that can operate at up to 400 frames per second in full frame mode. Silver incorporates an integral 25mm motorized lens, and optional lens extenders that provide the application-specific fields of view.







FEATURES:

- Compact and sealed camera housing
- 400Hz (full frame) up to 20,000Hz for sub-window region of interest
- Camera Link® and USB 2.0 real time outputs
- Multiple trigger modes
- Internal 4-position filter wheel option
- Integrated 25mm optic with optional lens extensions for telephoto and microscope fields of view.
- Cascade Integration™ enables users to program up to 3 integration periods between 1µs and 16ms for frame-by-frame control over integration period and NUC file loading. Ideal for wide dynamic range data acquisition.
- Temperature calibration at either the factory or by the user (using their own black body sources)
- ALTAIR data acquisition and analysis software is included
- Highly intuitive user interface

top

MARK YOUR CALENDAR:
Photonics West 2007

As North America's largest commercial exhibition on optics, lasers, biomedical optics, opto-electronic components, and imaging technologies, **Photonics West** brings together more than 1,000 exhibitors—from both the local region and the international optics and photonics community—to come and showcase a wide range of products and services.

Click here for more information and to register for this event.

SPIE Photonics WEST

JANUARY 23RD-25TH, 2007
San Jose Convention Center
San Jose, California
Booth 1746

top

OTHER LINKS

Electrophysics Photonics Product Line

Become a Dealer

See Us at Our Next Trade Show

top

Electrophysics

373 Route 46, Fairfield, NJ 07004 USA | phone: 973-882-0211 | toll free: 800-759-0997 | info@electrophysics.com | www.electrophysics.com

© 2012 Electrophysics Corp. - All Rights Reserved. An ISO 9001 Certified Company.