

# OPTICAL GAS IMAGING

HANDHELD GF-SERIES  
INFRARED CAMERAS

DETECT GAS LEAKS  
INCREASE  
PROFITABILITY  
ENHANCE WORKER  
SAFETY  
PROTECT THE  
ENVIRONMENT



The World's **Sixth Sense**®

# MAKE INVISIBLE GASES VISIBLE

## SAVE LIVES, REVENUE, AND THE DAY

Optical gas imaging cameras give you the power to spot invisible gases escaping into the environment faster and more reliably than traditional “sniffer” detectors. With a FLIR GF-Series camera, you can document gas leaks that lead to lost product, lost revenue, fines, and safety hazards.



SEE HYDROCARBON LEAKS CLEARLY



FIND SF<sub>6</sub> LEAKS EASILY

## METHANE AND HYDROCARBONS

Scan thousands of connections for natural gas (methane) and other hydrocarbon leaks quickly and from a safe distance to avoid regulatory violations, fines, and lost revenue.



DETECT LEAKS FROM HYDROGEN-COOLED GENERATORS

## HYDROGEN (CO<sub>2</sub> TRACER GAS)

Imaging the tracer gas, CO<sub>2</sub>, with an optical gas camera allows operators of hydrogen-cooled generators to efficiently find hydrogen leaks.

## SULFUR HEXAFLUORIDE

Scan substation circuit breakers for sulfur hexafluoride (SF<sub>6</sub>) leaks at a safe distance from high-voltage areas, without the need to shut down operations.



SPOT HARD-TO-FIND CO<sub>2</sub> LEAKS

## CARBON DIOXIDE

Prevent shut-downs by detecting carbon dioxide (CO<sub>2</sub>) leaks early in chemical production, manufacturing, and Enhanced Oil Recovery programs.



FIND LEAKS AT STEEL PLANTS

## CARBON MONOXIDE

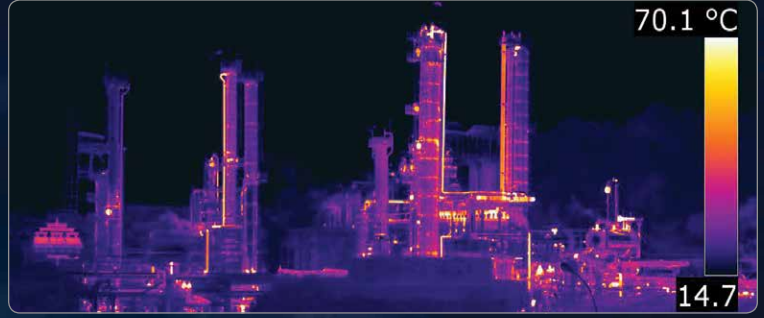
Protect workers and the environment from toxic levels of CO by pinpointing leaks quickly and efficiently.



DETECT R-124 COMPRESSOR LEAKS

## REFRIGERANTS

Find leaks early to avoid interruptions in operations, prevent the loss of perishable products, and limit the environmental impact of toxic refrigerants.



FROM NATURAL GAS EXTRACTION TO PETROCHEMICAL OPERATIONS AND POWER GENERATION, COMPANIES HAVE SAVED MORE THAN \$10 MILLION ANNUALLY IN LOST PRODUCT BY INCLUDING FLIR OPTICAL GAS IMAGING IN THEIR LEAK DETECTION AND REPAIR (LDAR) PROGRAMS.



# OPTICAL GAS IMAGING CAMERAS

## TRACK LEAKS TO THEIR SOURCE

A facility can have thousands of connections and fittings that require regular inspection, but the reality is less than one percent of these components will ever leak. Inspectors spend more than 99 percent of their time surveying safe, non-leaking components. Testing these components with traditional "sniffers" takes a great deal of time and effort.

The GF-Series optical gas imaging cameras can detect natural gas, SF<sub>6</sub>, and CO<sub>2</sub> leaks quickly, accurately, and safely without the need to shut down systems, or the need for contact with the components. Gas leaks that are invisible to the naked eye look like smoke on infrared optical gas imaging cameras, making them easy to see – even from a distance.

FLIR's optical gas imaging cameras provide a number of benefits compared to "sniffers", including:

- Scan a broader area much more rapidly and from a safe distance.
- See into areas that are difficult to reach with contact measurement tools, such as the thousands of connections and fittings within large petrochemical facilities.
- Offer temperature measurement capabilities that allow you to also use the optical gas camera as a predictive maintenance tool.
- Improve compliance with environmental standards, as regulatory agencies around the world consider optical gas imaging an important component of efforts to reduce fugitive methane and VOC emissions.



CAPTURED GAS LEAK FROM PRODUCTION SITE

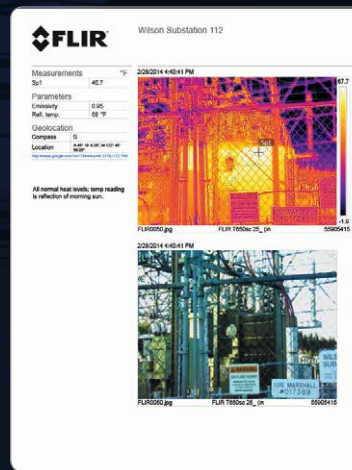


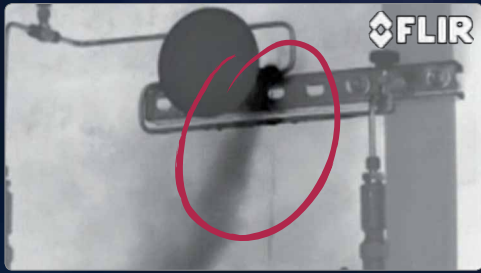
# OPTICAL GAS REPORTING SOFTWARE

## ANALYZE RESULTS AND MAKE RECOMMENDATIONS

The documentation and reporting of your findings is just as important as the discovery of potential problems in the first place. Your reports need to be easily customizable to any situation and customer requirement. They need to reflect your professionalism and the quality of your work, and your recommendations for action need to be clear and well-documented in order for others to complete repairs.

FLIR offers several reporting software products including a mobile app for remote camera control in the field.

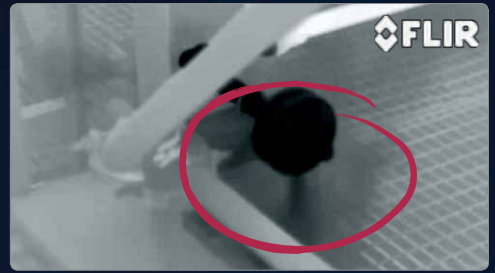




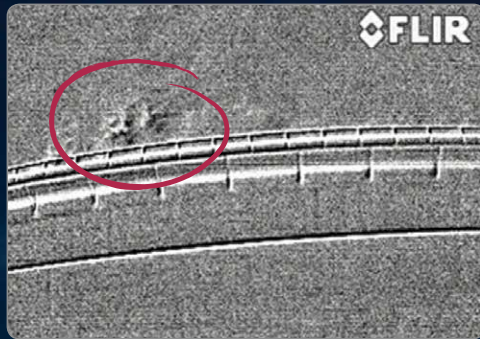
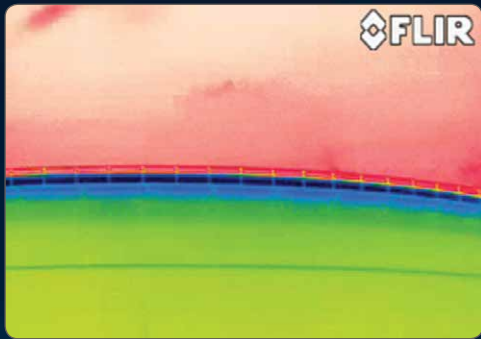
A LEAKING PRESSURE GAUGE



CAPTURED GAS LEAK



GAS LEAK IS CLEARLY VISIBLE ON THE THERMAL IMAGE



THESE IMAGES, RECORDED WITH THE FLIR GF320 OPTICAL GAS IMAGING CAMERA, ILLUSTRATE THE DIFFERENCE BETWEEN DIGITAL CAMERA MODE, STANDARD THERMAL MODE, AND HIGH SENSITIVITY MODE. A LEAK THAT IS BARELY VISIBLE IN THE STANDARD THERMAL RAINBOW PATTERN (MIDDLE) SHOWS UP CLEARLY IN HIGH SENSITIVITY MODE (RIGHT).



## HELPFUL ACCESSORIES

### FLEXIBLE SYSTEMS THAT MEET YOUR CHANGING NEEDS

No other thermal imaging camera manufacturer offers a wider range of accessories than FLIR Systems. Hundreds of accessories are available to customize our cameras for a wide variety of imaging and measurement applications. From a comprehensive range of lenses, through LCD screens, to remote control devices, everything is available to tailor your camera to your specific application.

## REFRIGERANTS: GF304

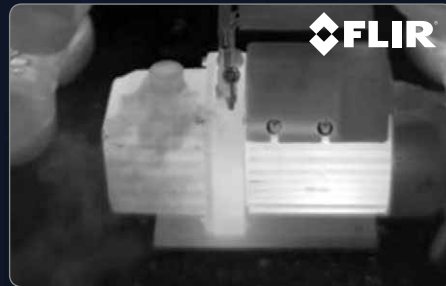
The FLIR GF304 detects refrigerant gas leaks without interrupting or shutting down operations. Most modern refrigerants are organofluorine compounds, and while they are not ozone-depleting, some blends contain Volatile Organic Compounds (VOCs). Refrigerants are used in a variety of systems, including food production, pharmaceutical storage, and air conditioning.

GF304 cameras are ideal for:

- Food production, storage, and retail
- Automotive production and repair
- Air conditioning
- Pharmaceutical production, transport, and storage



DIGITAL IMAGE OF LEAKING AC UNIT



OPTICAL GAS IMAGE OF LEAKING AC UNIT



HIGH SENSITIVITY MODE IMAGE OF LEAKING AC UNIT

### GF304 DETECTS THE FOLLOWING REFRIGERANT GASES:

- R125
- R134A
- R143A
- R245fa
- R404A
- R407C
- R410A
- R417A
- R422A
- R507A

## SULFUR HEXAFLUORIDE & AMMONIA: GF306

The FLIR GF306 detects sulfur hexafluoride ( $\text{SF}_6$ ) – used to insulate high voltage circuit breakers – as well as the industrial refrigerant and fertilizer anhydrous ammonia ( $\text{NH}_3$ ).  $\text{SF}_6$  is a potent greenhouse gas, with a global warming potential that's 22,000 times greater than  $\text{CO}_2$  over a 100 year period. By detecting and repairing  $\text{SF}_6$  leaks, energy producers can avoid costly damage to circuit breakers while protecting the environment.

GF306 cameras are ideal for:

- Utilities
- Ammonia plants
- Industrial refrigeration systems

### GF306 DETECTS THE FOLLOWING GASES:

- Acetic acid
- Acetyl chloride
- Allyl bromide
- Allyl chloride
- Allyl fluoride
- Anhydrous ammonia
- Bromomethane
- Chlorine dioxide
- Ethyl cyanoacrylate (superglue)
- Ethylene
- Freon-12
- Furan
- Hydrazine
- Methylsilane
- Methyl ethyl ketone (MEK)



OPTICAL GAS IMAGES OF  $\text{SF}_6$  LEAKS



## METHANE & HYDROCARBONS: GF300/GF320

The FLIR GF300/GF320 camera detects methane emissions from the production, transportation, and use of oil and natural gas. It allows you to survey large areas quickly and effectively, detecting even small emissions from within large complexes and at a rate that's nine times faster than traditional "sniffer" methods. The GF320 also offers highly accurate temperature measurements, meaning it can be used to spot electrical and maintenance issues as well as survey for gas leaks.

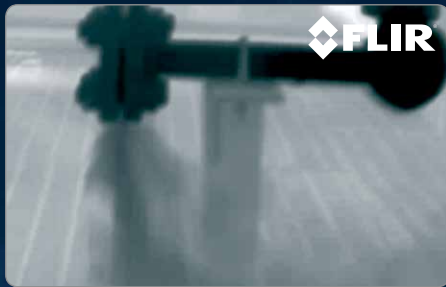
GF300/GF320 cameras are ideal for:

- Oil refineries
- Natural gas processing plants
- Off-shore oil platforms
- Bio-gas and power generation plants

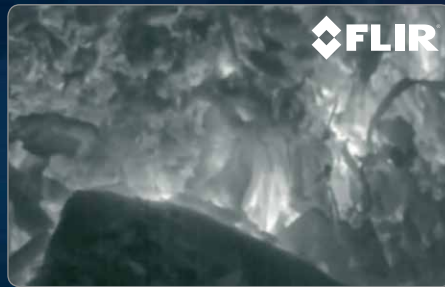


### PER EPA AND API-RECOMMENDED TESTING GUIDELINES, GF300/GF320 CAMERAS DETECT:

- Benzene
- Ethylene
- Methyl ethyl ketone (MEK)
- MIBK
- Propane
- Butane
- Heptane
- Methane
- Octane
- Propylene
- Ethane
- Hexane
- Methanol
- Pentane
- Toluene
- Ethylbenzene
- Isoprene
- 1-Pentane
- Xylene



METHANE LEAKS FROM A GAS VALVE



METHANE EMISSIONS FROM A LANDFILL SURFACE



GF300/GF320 CAMERAS FIND LEAKS QUICKLY OVER WIDE AREAS



- Methyl vinyl ketone
- Tetrahydrofuran
- Vinyl cyanide
- Propenal
- Trichloroethylene
- Vinyl ether
- Propene
- Uranyl fluoride
- Sulfur hexafluoride
- Vinyl chloride

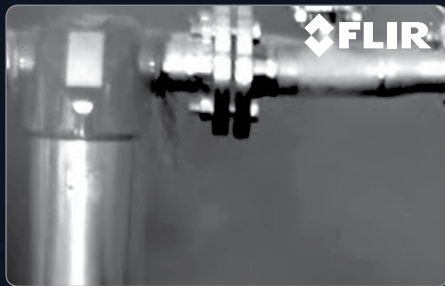
## NEW! CARBON DIOXIDE: GF343

The GF343 lets you see CO<sub>2</sub> leaks quickly and accurately, whether the gas is the result of a production process, part of an Enhanced Oil Recovery program, or being used as a tracer gas for hydrogen. CO<sub>2</sub> is a primary greenhouse gas, with emissions resulting not only from the combustion of fossil fuels but also from industrial processes, oil production, and manufacturing. Reliable non-contact CO<sub>2</sub> detection allows plants to inspect equipment while it is still online in the course of normal operations, avoiding unplanned outages. It also helps keep operations safe while moving towards carbon-neutral capture and storage operations.



### GF343 CAMERAS ARE IDEAL FOR:

- Enhanced Oil Recovery programs
- Hydrogen-cooled power generators
- Carbon capture systems
- Ethanol producers
- Industrial tightness testing



SPOT HARD-TO-FIND CO<sub>2</sub> LEAKS



SEE MORE WITH HIGH SENSITIVITY MODE (HSM)



IDENTIFY LEAKS IN VALVES

## FIXED CAMERAS

Have a need for continuous leak detection monitoring or automated leak detection in critical areas? With thermal imaging cameras such as the G300a, G300pt, and A6604, you can constantly monitor vital gas pipelines and installations in

remote or difficult to access zones. You will immediately see if a dangerous and costly gas leak appears. Monitoring is performed from a safe distance without the need to send technicians into potentially dangerous areas.

### G300A, G300PT, AND THE A6604 CAMERAS ARE IDEAL FOR:

- Offshore oil platforms
- Natural gas processing plants
- Biogas generation plants
- Petrochemical facilities

LEARN ABOUT OUR FIXED OGI PLATFORMS AT [WWW.FLIR.COM](http://WWW.FLIR.COM)



## NEW! CARBON MONOXIDE: GF346

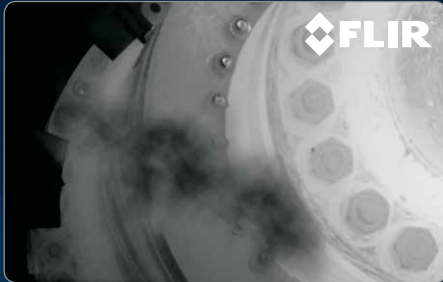
The FLIR GF346 exposes invisible, odorless carbon monoxide (CO) emissions from a safe distance. CO leaking from vent stacks or pipes can be deadly, especially if the gas is allowed to collect in an enclosed area. The GF346 can quickly scan broad areas and pinpoint even small leaks from several meters away, increasing worker safety and protecting the environment.

GF346 cameras are ideal for:

- Steel industry
- Bulk chemicals manufacturing
- Packaging systems
- Petrochemical industry

### GF346 DETECTS THE FOLLOWING GASES:

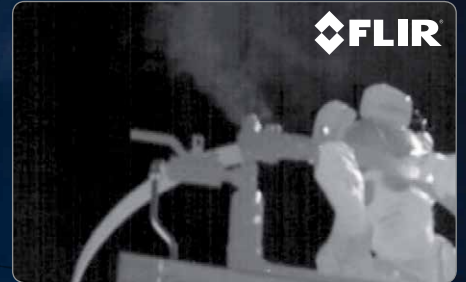
- Acetonitrile
- Acetyl cyanide
- Arsine
- Bromine isocyanate
- Butyl isocyanide
- Carbon monoxide
- Chlorine isocyanate
- Chlorodimethylsilane
- Cyanogen bromide
- Dichloromethylsilane
- Ethenone
- Ethyl thiocyanate
- Germane
- Hexyl isocyanide
- Ketene
- Methyl thiocyanate
- Nitrous oxide
- Silane



OPTICAL GAS IMAGE OF CO LEAK



CO LEAK FROM A BLAST FURNACE



OPTICAL GAS IMAGE OF CO LEAK



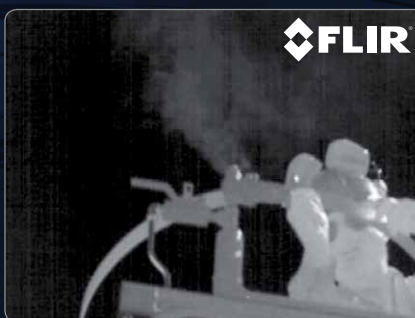
IR.COM/OGI, OR CALL 866.477.3687 FOR INFORMATION.

# IMAGING SPECIFICATIONS



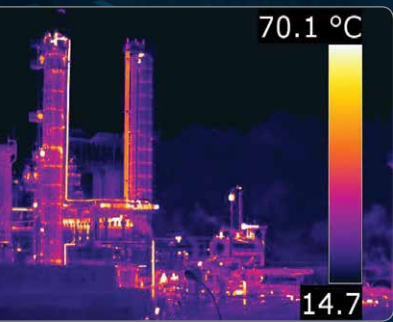
Imaging Specifications	GF300/GF320	GF304	
Primary Gas Seen	Methane	Refrigerants	
Detector Type	Cooled InSb	Cooled QWIP	
Spectral Response	3.2 – 3.4 $\mu\text{m}$	8.0 – 8.6 $\mu\text{m}$	
Resolution			
Total Pixels			
Thermal Sensitivity			
Accuracy	$\pm 1^\circ\text{C}$ ( $\pm 1.8^\circ\text{F}$ ) for temperature range $0^\circ\text{C}$ to		
Temperature Range	$-20^\circ\text{C}$ to $+350^\circ\text{C}$ ( $-4^\circ\text{F}$ to $+662^\circ\text{F}$ )*	$-20^\circ\text{C}$ to $+250^\circ\text{C}$ ( $-4^\circ\text{F}$ to $+482^\circ\text{F}$ )	
High Temperature Option	Yes*		
Lenses	Standard: $24^\circ \times 18^\circ$ ; Optional: $14.5^\circ$ , $6^\circ$	Standard: $24^\circ \times 18^\circ$ ; Optional: $14.5^\circ$	
Zoom			
Focus			
Color LCD Monitor			
Adjustable Viewfinder			
Video Camera w/Lamp			
Laser Spot			
Video Out			
Analysis			
Spotmeters			
Area Boxes			
Profiles			
Delta T	Delta temperatur		
Annotation			
GPS			
File Storage			
Radiometric JPEG			
MPEG Recording			

\*GF300 and GF343 are not calibrated for temperature measurement.





GF306	GF343	GF346
Sulfur hexafluoride	Carbon dioxide	Carbon monoxide
Cooled QWIP	Cooled InSb	Cooled InSb
10.3 – 10.7 μm	4.0 – 4.4 μm	4.52 – 4.67 μm
320 x 240		
76,800		
<15 mK at +30°C (+86°F)		
+100°C (+32°F to +212°F) or ±2% of reading for temperature range >+100°C (>+212°F)*		
-40°C to +500°C (-40°F to +932°F)		-20°C to +300°C (-4°F to +572°F)
Standard: 14.5° x 10.8°; Optional: 24°	Standard: 24° x 18°; Optional: 14.5°	Standard: 24° x 18°; Optional: 14.5°, 6°
1-8x continuous digital zoom		
Auto and manual		
4.3 in., 800 x 480 pixels		
Tilttable OLED, 800 x 480 pixels		
3.2 MP		
Activated by dedicated button		
HDMI		
10*		
5 (min./max./avg.)*		
1 live line (horizontal or vertical)*		
re between measurement functions or reference temperature*		
Location data automatically added to images		
14-bit measurement data included		
RTP/MPEG4		





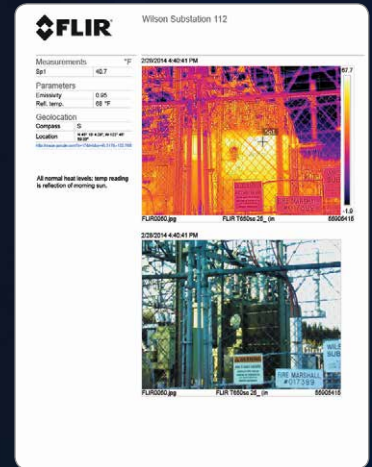
# FLIR TOOLS FOR MAC OR PC

## FREE REPORTING SOFTWARE THAT MAKES YOU LOOK GOOD

FLIR Tools and FLIR Tools+ are easy-to-load software for your Mac or PC. These versatile software programs allow you to quickly import and analyze video, create inspection reports, remote control cameras over USB, and update camera firmware. With FLIR Tools+, you also get advanced reporting features such as Rapid Report™, the option to create radiometric panoramas with or without MSX, and radiometric IR video recording.

### KEY FEATURES:

- Import video and images from the camera to the computer
- Search using file name, text description, and other properties
- Analyze and tune radiometric images and measure temperatures
- Create PDF reports from a variety of pre-defined templates
- Clickable GPS link in the PDF report
- Remotely control and record images and video



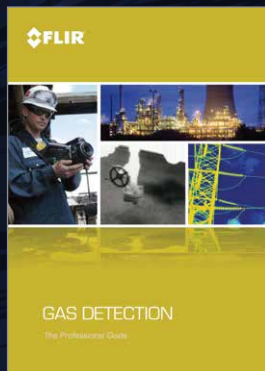
VISIT [WWW.FLIR.COM/OGI](http://WWW.FLIR.COM/OGI) TO DOWNLOAD TRIAL VERSIONS OF OUR POWERFUL SOFTWARE TOOLS.

## FLIR.COM/OGI

### SEE OPTICAL GAS IMAGING IN ACTION, ACCESS CASE STUDIES, AND MUCH MORE

Still images don't do justice to the GF-Series' capabilities. It's much easier to comprehend the full impact of a gas leak – which looks like smoke in infrared – when you can see its billowing motion on video. The example videos available at [FLIR.com/OGI](http://FLIR.com/OGI) demonstrate just how quickly the camera can detect different gases. You'll also see side-by-side comparisons of infrared and visible light videos of dangerous gas leaks that look completely innocuous in visible light. See how sulfur hexafluoride, carbon monoxide, methane, and other leaking gases appear in infrared at [FLIR.com/OGI](http://FLIR.com/OGI).

Also at [FLIR.com/OGI](http://FLIR.com/OGI), you can read case studies and technical papers from companies that have found success with their GF-Series cameras, download "Gas Detection: The Professional Guide", and access product literature on all of the GF-Series cameras.



WATCH VIDEOS FROM GF-SERIES CAMERAS AT [WWW.FLIR.COM/OGI](http://WWW.FLIR.COM/OGI), OR CALL 866.477.3687 FOR ADDITIONAL INFORMATION.



## FLIR TOOLS MOBILE

### IMPORT, PROCESS, AND SHARE DATA QUICKLY WITH THE FREE APP

Get the word out straight from the field with FLIR Tools Mobile for Apple® and Android™. Connect your smartphone or tablet to your GF-Series camera, then use the app to transfer video from the camera, tack on more measurement spots, add text, change palettes, add notes, and generate a PDF. Email video and findings to colleagues and customers in no time. Upload to Dropbox and Box.net accounts or use the app to display images on-site to those who need to know immediately.

FLIR Tools Mobile also lets you stream live video from your GF-Series, plus take remote control of GF-Series functions, including focus, level, span, and many other modes. This functionality is perfect when you need to place the camera off on its own for monitoring or safety reasons, or need to share live imaging with others nearby.

#### KEY FEATURES:

- Wirelessly import images from the camera's SD card
- Stream live video
- Remotely control and record images and video
- Analyze and tune radiometric images and measure temperatures
- Create PDF reports with text and custom logos
- Share images and reports using email, Box.net, and Dropbox

## GF-SERIES TEST DRIVE

### TRY BEFORE YOU BUY YOUR FLIR

#### RENT

FLIR's rental program is a great way to make sure you are getting the model, performance, and features you need. Our rental department has all the current models in stock and we are ready to help.

#### LEASE

Leasing is a great way to minimize your initial expense and may even provide tax advantages. FLIR has several options for those interested in starting or upgrading their program. Give us a call and we can help.

#### TRADE UP

FLIR offers trade-in value for many existing cameras. Contact your FLIR representative about our trade-in program, and check into our stock of pre-owned cameras while you're at it.



# INFRARED TRAINING CENTER

## THE PREMIER INFRARED CAMERA USER EDUCATIONAL & TRAINING RESOURCE

Your professionalism drives you to know everything you can about your business; that's why you'll want to get the most out of your GF-Series camera.

FLIR cameras are easy to use and intuitive, but only expert training will give you the knowledge and skills to wring every last bit of capability from your investment. An Infrared Training Center (ITC) certificate is proof of your expertise in operating your camera and interpreting the thermal information it provides.

During the three-day ITC Optical Gas Imaging certification course, you'll learn how to set up and operate FLIR GF-Series cameras, which gases these cameras can see, and how environmental conditions affect gas leak detection, all while earning 2.0 IACET CEUs. Training includes classroom instruction and lab time covering basic inspection procedures, permitting requirements, safety practices, and more.

### ITC COURSES PROVIDE:

- Industry-leading, high-quality interactive instruction
- The most qualified international instructors
- The most extensive hands-on laboratories
- ISO 9001-registered
- Optional online training courses

### OTHER ITC COURSES INCLUDE:

- Level I, Level II, and Level III Thermography
- Building Diagnostics
- Building Science Certificate
- Weatherization & Energy Audits
- Commercial Roof IR Inspections
- Commercial Electrical IR Inspections

Attend classes at our training center, locally at one of our regional classes, or in your facility with our on-site service.



FOR FULL COURSE DESCRIPTIONS, UPDATED SCHEDULES, AND MORE INFORMATION, VISIT THE ITC WEBSITE AT [WWW.INFRAREDTRAINING.COM](http://WWW.INFRAREDTRAINING.COM) OR CALL 1.866.872.4647.



# ABOUT FLIR

## THE WORLD LEADER IN DESIGNING, MANUFACTURING & MARKETING THERMAL IMAGING SYSTEMS

Not all infrared cameras are created equal, because infrared camera manufacturers are not all the same. FLIR Systems, Inc. stands above the rest.

The largest commercial infrared company in the world, FLIR has more than 50 years of experience building and integrating high-performance infrared cameras, with a command of this specialized technology that no one else can touch. FLIR's products are at work every day saving lives, protecting troops overseas, and keeping facilities safe.

FLIR cameras are also available for personal use; on your boat, in your car, or even as a home security system. The same FLIR innovation behind the GF-Series camera can be found in Audi and BMW cars as pedestrian detection systems. If you enjoy hunting and other outdoor activities, there's an inexpensive FLIR for you, too. Even if you don't recognize FLIR by name, you've seen our products at work since the 1960s.



CALL 866.477.3687 TO SPEAK WITH A FLIR SPECIALIST.

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[www.FLIR.com/OGI](http://www.FLIR.com/OGI)  
NASDAQ: FLIR

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