Thermal imaging cameras for optical gas imaging (OGI) and furnace inspections

Detect gas leaks
Protect the environment
See through flames
Increase safety
FLIR: The world leader in thermal imaging cameras

FLIR is the world leader in the design, manufacturing and marketing of thermal imaging systems for a wide variety of commercial, industrial and government applications.

FLIR thermal imaging systems use state-of-the-art infrared imaging technology that detects infrared radiation - or heat. Based on detected temperature differences, thermal imaging cameras can create a crisp image. Advanced algorithms also make it possible to read correct temperature values from this image. We design and manufacture all of the critical technologies inside our products, including detectors, electronics, and special lenses ourselves.

Rapidly emerging markets and organisation
Interest for thermal imaging has grown considerably over the last few years in a large variety of markets. To face this increased demand, FLIR has expanded its organisation drastically. Today we employ more than 3,200 people. Together, these infrared specialists realise a consolidated annual turnover of more than 1 billion US dollars. This makes FLIR the largest manufacturer of commercial thermal imaging cameras in the world.

Manufacturing capabilities
FLIR currently operates 6 manufacturing plants: three in the USA (Portland, Boston and Santa Barbara, California) one in Stockholm, Sweden, one in Estonia and FLIR ATS - Advanced Thermal Solutions, near Paris, at Marne la Vallée.

More than a camera, a complete solution
There is more to the world of thermal imaging than building a camera. FLIR is not only committed to providing you with the best camera, we are also able to offer you the best software, service and training to suit your thermal imaging needs.
INFRARED: more than meets the eye

Infrared - part of the electromagnetic spectrum

Our eyes are detectors that are designed to detect visible light (or visible radiation). There are other forms of light (or radiation) that we cannot see. The human eye can only see a very small part of the electromagnetic spectrum. At one end of the spectrum we cannot see ultraviolet light, while at the other end our eyes cannot see infrared. Infrared radiation lies between the visible and microwave portions of the electromagnetic spectrum. The primary source of infrared radiation is heat or thermal radiation. Any object that has a temperature above absolute zero (-273.15 degrees Celsius or 0 Kelvin) emits radiation in the infrared region. Even objects that we think of as being very cold, such as ice cubes, emit infrared radiation. We experience infrared radiation every day. The heat that we feel from sunlight, a fire or a radiator is all infrared. Although our eyes cannot see it, the nerves in our skin can feel it as heat. The warmer the object, the more infrared radiation it emits.

The infrared camera

Infrared energy (A) coming from an object is focused by the optics (B) onto an infrared detector (C). The detector sends the information to sensor electronics (D) for image processing. The electronics translate the data coming from the detector into an image (E) that can be viewed in the viewfinder or on a standard video monitor or LCD screen. Infrared thermography is the art of transforming an infrared image into a radiometric one, which allows temperature values to be read from the image. In order to do this, complex algorithms are incorporated into the infrared camera. Tuning (filtering) an infrared detector to specific wavelengths can also allow the camera to image a variety of invisible gases.
Why would you choose a FLIR thermal imaging camera? There are other technologies available to help you find gases and measure temperatures in a non-contact mode. Gas sniffers and infrared thermometers for example.

Gas sniffers versus thermal imaging cameras
In a complex petrochemical facility there may be many thousands of potential leak paths. Some may be leaking but most will not. Conventional leak detection equipment such as a Volatile Organic Compound meters (or sniffers) mean that the operator must visit and test each potential leak site. Each item must therefore be accessible or made accessible to be tested. Gas sniffers may expose inspectors to invisible and potentially harmful chemicals.

Using gas detection cameras allows the user to examine many potential leak sources in a short time and from a distance.

Infrared thermometers vs thermal imaging cameras
Infrared (IR) thermometers are reliable and very useful for single-spot temperature readings, but, for scanning large areas or components, it’s easy to miss critical components that may be near failure and need repair.

A FLIR thermal imaging camera can scan entire motors, components, or panels at once - never missing any overheating hazards, no matter how small.

Use thousands of gas sniffers and infrared thermometers at the same time
With an infrared thermometer you are able to measure the temperature at one single spot. FLIR thermal imaging cameras can measure temperatures on the entire image. FLIR GF-Series thermal imaging cameras produce an image with a resolution of 320 x 240 pixels, this means 76,800 pixels or using 76,800 infrared thermometers at the same time.

The same goes for the comparison with a gas sniffer. Using a gas sniffer, inspectors need to scan every point where gas leaks are possible, individually. A GF-Series thermal imaging camera gives the user a comprehensive overview of an entire area.
Thermal imaging cameras for optical gas imaging (OGI) and seeing through flames

A thermal imaging camera for optical gas imaging visualizes and pinpoints gas leaks without the need to shut down the operation. The portable camera also greatly improves operator safety, by detecting gases at a safe distance, and helps to protect the environment by tracing leaks of environmentally harmful gases.

Captured gas leak from production site.

A leaking pressure gauge.

Captured gas leak.

Gas leak is clearly visible on the thermal image.

Detecting gas leaks

Many chemical compounds and gases are invisible to the naked eye. Yet many companies work intensively with these substances before, during and after their production processes. Several gases have a high global warming potential and strict regulations govern how companies trace, document, rectify and report any leaks of harmful gaseous compounds, and how often these procedures are to be carried out.

Greatly Improved Efficiency

Experience shows that up to 84 percent of leaks occur in less than 1 percent of the components in a refinery*. This means that 99 percent of what are expensive, time-consuming inspection tools are being used to scan safe, leak-free components.

Using a Gas Detection camera you get a complete picture and can immediately exclude areas that do not need any action. This means you can achieve enormous savings in terms of time and personnel.

Another advantage is that systems do not have to be shut down during the inspection. They can be carried out remotely and rapidly and – most important of all – problems can be identified at an early stage.

Increased worker safety

Leak detection of gases can be performed in a non-contact mode, and from a safe distance. This reduces the risk of the inspector being exposed to invisible and potentially harmful or explosive chemicals. With an optical gas imaging camera it is easy to scan areas of interest that are difficult to reach with conventional methods. The camera is ergonomically designed with a bright LCD and tiltable viewfinder, which facilitates its use over a full working day.

Gases that can be detected are camera model dependant.

* Analysis of Refinery Screening Data; American Petroleum Institute, Publication Number 310, November 1997.
Thermal imaging cameras for OGI:
- Give you a full image of the situation
- Perform inspections when systems are under load
- Find the problems before real problems occur
- Save you valuable time and money
- Identify and locate the problem
- Tell you exactly what needs to be fixed
- Increase the worker safety
- Protects the environment
- Are as easy to use as a camcorder or a digital camera
- Measure temperatures
- Store information

Seeing through flames
A wide variety of industries relies on furnaces and boilers for manufacturing processes. But furnace and boiler equipment is prone to failures from a variety of mechanisms. These include coking that plugs the inside of tubes and impedes product flow, slag build-up on the outside of tubes, clinker damage, under- and over-heating, flame impingement on tubes due to burner misalignment, and product leaks that ignite and cause serious damage to the equipment.

These failures cause not only quality problems; they can also shut down an entire process line. FLIR thermal imaging cameras can detect most of these equipment problems during operation, and at an early stage, so failures can be prevented. This allows an orderly shutdown and component replacement, thereby reducing maintenance costs and production losses.

The FLIR GF309 is the perfect tool for seeing through flames and will help you to keep your production running efficiently at all times.

Maintenance inspections
All FLIR GF-Series thermal imaging cameras are dual-use systems. They not only allow the user to detect gases or see through flames. They can also be used for industrial maintenance inspections. High- and low voltage electrical installations, mechanical installations, pipework and insulation, ovens and many more can all be inspected with a FLIR GF-Series thermal imaging camera.

Temperature differences that can lead to production losses or even fires can be detected before real problems occur.

All FLIR GF-Series thermal imaging cameras can also be used for predictive maintenance inspections.
FLIR GF-Series

*Ergonomically designed and full featured*

All FLIR GF-Series thermal imaging cameras are designed to be used several hours per day. They all contain a number of useful features that will help you to do your inspections more efficiently and to detect the smallest of gas leaks or thermal anomaly.

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**High sensitivity**
The GF-Series allow you to see temperature differences as small as 0.015°C. Ideal for detecting the smallest anomalies in electrical or other industrial installations.

**Tiltable viewfinder**
The high-resolution viewfinder is tiltable and can be adapted to the individual user. It is ideal for outdoor use or when the LCD screen is not used.

**Large LCD screen**
Super size 4.3” foldable high-quality LCD screen allows you to see the smallest details and temperature differences.

**Multi-angle handle with integrated direct access buttons**
A turnable control grip allows you to use the camera in the most comfortable position. The buttons and joystick to control the camera are integrated in this handle and always stay right underneath your fingertips.

**Programmable direct access button**
For increased flexibility the operator can program a button located on the top of the camera for direct access to favorite functions.

**Large number of analysis tools**
Movable spotmeters, line profiles, areas and many more allow for detailed thermal analysis.

**MPEG-4 video**
Create visual and infrared non radiometric MPEG-4 video files.

**High quality visual camera**
An integrated 3.2 megapixel visual camera for generating crisp visual images in all conditions.

**Laser Pointer**
Helps you associate the hot or cold spot in the IR image with the real physical target in the field.

**Flexible interfaces**
Easy access to digital video connection, USB, and a direct connection to charge the battery inside the camera.

**Built-in GPS**
GPS allows to georeference infrared images to determine their geographic location.

**Wireless connectivity**
Connect to smartphone or tablet via a Wi-Fi USB adapter, use the FLIR Tools mobile app (Apple iOS and Android) for processing and sharing results as well as for remote control.

**Radiometric IR video streaming**
16 bit radiometric IR video can be streamed to a PC (via USB) running the FLIR software.

**High Sensitivity Mode (HSM)**
Further enhances the sensitivity of the camera so that the smallest gas leaks can be detected (FLIR GF304, GF306, FLIR GF320 and FLIR GF346).
Connect to smartphone or tablet via a Wi-Fi USB adapter and use the FLIR Tools mobile app (Apple iOS and Android) for processing and sharing results as well as for remote control.

- Manual focus ring
- Laser button
- Temperature range button
- Tiltable viewfinder
- Programmable direct access button
- Laser pointer
- High quality digital camera and video lights
- Multi-angle handle
- IR-lens
- Mode wheel
  - Camera mode: save images
  - Video mode: record video clips and sequences
  - Archive mode: view saved images, video clips and sequences
  - Program mode: set up periodical saving of images
  - Setup mode: change general settings
- Cover for the connector compartment:
  - Video connector
  - USB connector
  - SD-card slots
- Cover for the battery compartment
- Large bright LCD screen
The FLIR GF309 is an IR camera for the high-temperature measurement of industrial furnaces, chemical heaters, and coal-fired boilers, without the need to shut down the operation. The portable camera also greatly improves operator safety, by measuring through flames at a safe distance, for all types of furnaces. A good knowledge of the furnace condition can avert failures and unscheduled shutdowns.

Industrial furnaces, heaters, and boilers are found in the chemical, petrochemical, and utility industries.

**See through flames**
The GF309 is equipped with a special “flame filter” that allows you to see and measure high temperatures (up to +1500°C) through flames. Ideal for furnace and boiler inspections.

**Wide temperature range**
The FLIR GF309 visualizes temperatures from -40°C to +1,500°C. This makes the camera extremely suited for high temperature inspections.

**Dual use**
The FLIR GF309 can be used both for internal and external furnace and maintenance inspections and can make also the smallest of temperature differences clearly visible.

**Heat shield**
A nickel coated heat shield improves worker safety and comfort during inspection.

**Available lenses**
The FLIR GF309 comes either with a fixed 14.5° lens or with a fixed 24° lens. A version with interchangeable lenses is also available but requires a US Department of State license.

**Cooled detector**
The FLIR GF309 contains a cooled Indium Antimonide (InSb) detector. This highly sensitive detector is spectrally tuned to 3.8 - 4.05 micrometer waveband for seeing through flames.
The FLIR GF304 is a gas imaging camera which was especially developed for the detection of refrigerant gases without the need to shut down the operation.

Refrigerant gases are used worldwide in industrial refrigeration systems for production, storage and retailing of food. Refrigerant gas is also used in the chemical, pharmaceutical and automotive industries and in air conditioning systems. Keeping an industrial refrigeration system running is of great importance due to the value of the cooled goods.

Furthermore, replacing or recharging gas can be a costly exercise. Although refrigerant gases are vital for many industries they can also be dangerous for the environment and may be governed by local regulations. That is why it is of the utmost importance to find leaks quickly and easy.

**Cooled detector**
The FLIR GF304 contains a cooled Quantum Well Infrared Photodetector (QWIP) and a cold band pass filter that allow to visualize gases in the 8.0-8.6 micrometer waveband. It will not only make refrigerant gases, but also the smallest of temperature differences, clearly visible.

**Temperature range**
The FLIR GF304 visualizes temperatures from -20°C to +500°C.

**Dual use**
The FLIR GF304 can be used both for finding gas leaks and maintenance inspections. High voltage, low voltage, mechanical and many other inspections can all be easily done with the FLIR GF304.

**Available lenses**
The FLIR GF304 comes either with a fixed 14.5° lens or with a fixed 24° lens. A version with interchangeable lenses is also available but requires a US Department of State license.

The FLIR GF304 detects the following refrigerant gases:
- R404A
- R407C
- R410A
- R134A
- R417A
- R422A
- R507A
- R143A
- R125
- R245fa

**Industries:**
- Petrochemical & chemical industries
- Food industry
Cooled detector
The FLIR GF306 contains a cooled Quantum Well Infrared Photodetector (QWIP). This highly sensitive detector visualizes gases in the 10.3 – 10.7 micrometer waveband. It will not only make gases, but also the smallest of temperature differences, clearly visible.

Temperature range
The FLIR GF306 visualizes temperatures from -40°C to +500°C.

Dual use
The FLIR GF306 can be used both for finding gas leaks and maintenance inspections.

Available lenses
The FLIR GF306 comes either with a fixed 14.5° lens or with a fixed 24° lens. A version with interchangeable lenses is also available but requires a US Department of State license.

The FLIR GF306 detects the following gases:
- Sulfur Hexafluoride (SF₆)
- Acetyl Chloride
- Acetic Acid
- Allyl Bromide
- Allyl Chloride
- Allyl Fluoride
- Ammonia (NH₃)
- Bromomethane
- Chlorine Dioxide
- Ethyl Cyanoacrylate
- Ethylene
- Furan
- Hydrazine
- Methylsilane
- Methyl Ethyl Ketone
- Methyl Vinyl Ketone
- Propenal
- Propene
- Tetrahydrofuran
- Trichloroethylene
- Uranyl Fluoride
- Vinyl Chloride
- Vinyl Cyanide
- Vinyl Ether

Industries:
- Petrochemical & chemical industries
- Electrical Utility
- Captured SF₆ leak
Cooled detector
The FLIR GF320 contains a cooled Indium Antimonide (InSb) detector. This highly sensitive detector visualizes gases in the 3.2 - 3.4 micrometer waveband. It will not only make gases, but also the smallest of temperature differences, clearly visible.

Temperature range
The FLIR GF320 visualizes temperatures from -40°C to +350°C.

Dual use
The FLIR GF320 can be used both for finding gas leaks and maintenance inspections.

Available lenses
The FLIR GF320 comes either with a fixed 14.5° lens or with a fixed 24° lens. A version with interchangeable lenses is also available but requires a US Department of State license.

The FLIR GF320 detects the following gases:
- Benzene
- Ethanol
- Ethylbenzene
- Heptane
- Hexane
- Isoprene
- Methanol
- MEK
- MIBK
- Octane
- Pentane
- 1-Pentene
- Toluene
- Xylene
- Butane
- Ethane
- Methane
- Propane
- Ethylene
- Propylene

The FLIR GF320 is an IR camera for optical gas imaging (OGI) that visualizes and pinpoints leaks of VOCs, without the need to shut down the operation. The portable camera also greatly improves operator safety, by detecting emissions at a safe distance, and helps to protect the environment by tracing leaks of environmentally harmful gases. The GF320 is used in industrial settings such as oil refineries, natural gas processing plants, offshore platforms, chemical/petrochemical industries, and biogas and power generation plants.
The FLIR GF346 is an IR camera for optical gas imaging (OGI) that visualizes and pinpoints gas leaks of CO, without the need to shut down the operation. The portable camera also greatly improves operator safety, by detecting emissions at a safe distance, and helps to protect the environment by tracing leaks of environmentally harmful gases. CO is an industrial gas with applications in the steel industry and bulk chemicals manufacturing. It is also used for packaging systems for fresh meat and fish.

Cooled detector
The FLIR GF346 contains a cooled Indium Antimonide (InSb) detector. This highly sensitive detector visualizes gases in the 4.52 - 4.67 micrometer waveband. It will not only make gases, but also the smallest of temperature differences, clearly visible.

Wide temperature range
The FLIR GF346 visualizes temperatures from -20°C to +300°C.

Dual use
The FLIR GF346 can be used both for finding gas leaks and maintenance inspections.

Available lenses
The FLIR GF346 comes either with a fixed 14.5° lens or with a fixed 24° lens. A version with interchangeable lenses is also available but requires a US Department of State license.

The FLIR 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

Industries:
- Steel manufacturing
- Petrochemical & chemical industries
- Gas leak
- CO leak in off blast furnace

Visit www.flir.com
At FLIR Systems, we recognize that our job is to go beyond just producing the best possible thermal imaging camera systems. We are committed to enabling all users of our thermal imaging camera systems to work more efficiently and productively by providing them with the most professional camera-software combination.

Our team of committed specialists are constantly developing new, better and more user-friendly software packages to satisfy the most demanding thermal imaging professionals. All software is Windows-based, allows fast, detailed and accurate analysis and evaluation of thermal inspections.

FLIR Reporter
Creating compelling and professional reports

FLIR Reporter is a powerful software for creating compelling and professional reports with the latest Microsoft operating system and Word compatibility.

Flexible report design and layout
• Fully integrated with Microsoft Word™
• Powerful temperature analysis
• Wizard-guided report generation
• Automatic report generation by drag-and-drop
• Predictive trending functionality
• Automatic link to Google™ Maps for images with GPS coordinates

Automatic report generation
With FLIR Reporter it’s easy to create customized reports, such as insertion of logos, etc. The ReportWizard guides you step-by-step to make a professional inspection report.

Compatible with GPS
FLIR GF-Series customers have built-in GPS capability with their cameras. FLIR Reporter provides an automatic link to Google™ Maps for images with GPS coordinates.

Predictive trending functionality
Trending is a powerful tool to help you track thermal information relating to your IR surveys. Armed with this information you can better determine when maintenance procedures need to be performed.

More advanced features
FLIR Reporter includes numerous advanced features, including: digital zoom, color palette changes, play back of voice comments recorded in the field. Automate calculations with the powerful formula tool and the time-saving one-click ΔT function. Instant report summary creation with the Summary Table tool. Histogram and line profile graph features to facilitate more advanced analysis.
FLIR Reporter Key features:
- Flexible report page design and layout for customized reports
- Use quick insert function to easily create custom report pages
- Fully integrated with standard Microsoft Word
- Generates reports in standard MS Office format and PDF-format
- Powerful temperature analysis
- Rapid report manager supporting automatic report generation by drag-and-drop
- Trending functionality
- Automatic link to Google™ Maps for images with GPS coordinates
- Automatic summary table for the report
- Fine tune images and make full temperature analysis directly in Microsoft Word
- Spell check
- Create your own formulas including measurement values from images
- Play radiometric sequences directly in the report
- Search functionality to quickly find images for your report
- Panorama tool for combining several images to a larger image
- Windows 7, 32 and 64-bit
- Support for MeterLink™ data
- *.docx compatibility
- Grid function

FLIR VideoReport: free software with every OGI-camera

Every FLIR optical gas imaging camera comes with FLIR VideoReport software included. FLIR VideoReport makes reports including videos easy. You can create and edit your video clips taken with the FLIR GF-Series thermal imaging cameras. Build your movie with a few simple drag-and-drops. Delete bad shots and include only the best scenes.

FLIR VideoReport is a software package specifically designed to provide an easy way to edit non-radiometric *.mp4 and *.avi video clips taken with FLIR GF-Series thermal imaging cameras.

FLIR Tools Mobile App for Android, iPad, iPhone, and iPod Touch

FLIR leads the way with forward-thinking Wi-Fi connectivity to Android and to iPad, iPhone and iPod Touch devices. Just download the new FLIR Tools Mobile app from Android Market or from the App Store and you're ready to see, capture and import thermal images as well as to stream and capture live video from select FLIR cameras.

FLIR Tools Mobile can also be used for remote control of the camera.

FLIR Tools: Software with every thermal imaging camera

FLIR Systems has since long realized the importance of making inspection reports. That is why every FLIR Systems thermal imaging camera is coming with software that allows users to organize and analyze the images from their thermal imaging cameras and present them in a report. The software allows for adjusting image settings such as color palette, level and span and for basic thermal analysis. Users that want more flexibility and more analysis tools can choose for FLIR Reporter.
FLIR Infrared Training Center

The Infrared Training Center (ITC) offers the world’s leading infrared training and thermographer certification programs.

Although all our cameras are designed for easy installation and operation, there is a lot more to thermal imaging than just knowing how to handle the camera. We therefore organize regular courses and seminars. We also organize in-company training on request, so that you, or your staff, can gain familiarity with thermal imaging and its applications.

The ITC not only welcomes FLIR Systems customers but also users of other brands of cameras. In fact, anyone who wants to learn more about thermal imaging for any applications, before deciding to purchase a camera, is also invited.

The mission of the ITC is to make our customers and partners successful by enhancing their knowledge of IR technology, thermal imaging products, and relevant applications. The ITC offers a portfolio of courses that presents the right mix of theoretical and practical content to help professionals quickly apply thermal imaging technology to real life applications.

All our instructors are experienced thermal imaging specialists. Not only do they have a profound theoretical knowledge but they also have practical experience with numerous applications. For our customers, this means that attending one of the ITC’s courses will give them a real hands-on learning experience.

The ITC also organizes advanced gas detection courses. Participants learn to set up and operate FLIR GF cameras, to get the most out of their thermal imaging camera. Courses are ideal for people that want to complement or replace their traditional Leak Detection and Repair (LDAR) programs with a thermal imaging camera.

Each ITC course is a perfect combination of theoretical fundamentals and practical exercises. It guarantees participants a real hands-on learning experience.

Visit www.flir.com
After Sales

At FLIR Systems, building a relationship with a customer takes more than just selling a thermal imaging camera. After the camera has been delivered, FLIR Systems is there to help meet your needs.

Once purchased, thermal imaging cameras are vital pieces of equipment. To keep them running at all times, we operate a worldwide service network with subsidiaries in Belgium, China, France, Germany, Hong Kong, Italy, the Netherlands, Sweden, United Arab Emirates, the United Kingdom and the USA.

If there should be a problem with one of our camera systems, these local service centers have all the know-how and equipment to solve it within the shortest possible time. Local camera service gives you the assurance that your system will be ready for use again within an extremely short timeframe.

Buying a thermal imaging camera is a long-term investment. You need a reliable supplier who can provide you with support over a long period of time.

Our service personnel regularly follows training programs at our production facilities in Sweden or the USA. Not only to learn about the technical aspects of the products, but also to familiarize themselves with your individual customer requirements and the latest applications.

Different types of maintenance contracts can be offered to make sure that, whatever happens, your thermal imaging camera is always available for use.

CUSTOMER CARE is not just a slogan. We write it in capital letters at FLIR.
In today’s fast-changing environment, requirements for purchased capital equipment can change from year to year or from project to project. Things that are vital today can be redundant tomorrow.

That makes it important for the equipment in which you invest to be flexible enough to meet the ever-changing needs of your applications. 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 own, specific application.
**Technical specifications**

**Imaging and optical data**

- **Field of view (FOV) / Minimum focus distance**
  - 14.5° lens: 14.5° x 10.8° / 0.5 m
  - 24° lens: 24° x 18° / 0.3 m

- **F-number**: 1.5

- **Thermal sensitivity/NETD**: <15 mK @ +30°C

- **Zoom**: 1–8× continuous, digital zoom

- **Digital image enhancement**: Noise reduction filter

- **Focal Plane Array (FPA) / Spectral range**: Cooled InSb / 3.8–4.05 µm

- **IR resolution**: 320 × 240 pixels

**Electronics and data rate**

- **Full frame rate**: 60 Hz

**Image presentation**

- **Display**: Built-in widescreen, 4.3 in. LCD, 800 × 480 pixels

- **Viewfinder**: Built-in, tiltable OLED, 800 × 480 pixels

- **Automatic image adjustment**: Continuous/manual; linear or histogram based

- **Manual image adjustment**: Level/span

- **Image modes**: IR-image, visual image

**Measurement**

- **Temperature range**: –40 to +150°C
- **Accuracy**: ±1°C for temperature range (-100 °C) or ±2% of reading for temperature range (> 100 °C)

- **Spotmeter**: 10

- **Area**: 5 boxes with max/min/average

- **Profile**: 1 live line (horizontal or vertical)

- **Difference temperature**: Delta temperature between measurement functions or reference temperature

- **Reference temperature**: Manually set or captured from any measurement function

- **Emissivity correction**: Variable from 0.01 to 1.0 or selected from editable materials list

- **Reflected apparent temperature correction**: Automatic, based on input of reflected temperature

- **Measurement corrections**: Reflected temperature, distance, atmospheric transmission, humidity, external optics

**Set-up**

- **Menu commands**: Level, span, Auto adjust continuous/manual/semi-automatic, Zoom, Palette, Start/stop recording, Store image, Playback/recall image

- **Color palettes**: Iron, Gray, Rainbow, Arctic, Lava, Rainbow HC

- **Set-up commands**: 1 programmable button, local adaptation of units, language, date and time formats

**Storage of images**

- **Image storage type**: Removable SD or SDHC Memory Card, two card slots

- **Image storage capacity**: > 1200 images (JPEG) with post process capability per GB on memory card

- **Image storage mode**: IR/visual images. Visual image can automatically be associated with corresponding IR image.

- **File formats**: Standard JPEG, 14 bit measurement data included

- **GPS**: Location data automatically added to every image from built-in GPS

**Video recording and streaming**

- **Radiometric IR-video recording**: 15 Hz direct to memory card

- **Non radiometric IR-video recording**: MPE4 (up to 80 minutes/clip) to memory card. Visual image can automatically be associated with corresponding recording of non radiometric IR-video.

- **Digital camera video recording**: MPE4 (25 minutes/clip) to memory card

- **Non radiometric IR-video streaming**: RTP/MPE4

**Digital camera**

- **Built-in digital camera**: 3.2 Mpixel, auto focus, and two video lamps

**Laser pointer**

- **Laser**: Activated by dedicated button

**Data communication interfaces**

- **WLAN**: Peer to peer (adhoc) for iOS or infrastructure (network) for Android

- **USB**:
  - **USB-A**: Connect external USB device (e.g. memory stick)
  - **USB Mini-B**: Data transfer to and from PC
  - **USB Mini-B: 2.0 High Speed**

- **Video**: Digital Video output (image)

**Power system**

- **Battery type**: Rechargeable Li Ion battery

- **Battery voltage**: 7.2 V

- **Battery operating time**: > 3 hours at 25°C and typical use

- **Charging system**: In camera (AC adapter or 12 V from a vehicle) or 2-bay charger

- **Start-up time**: Typically 7 min. @ 25°C

**Environmental data**

- **Operating temperature range**: –20°C to +50°C

- **Storage temperature range**: –30°C to +60°C

- **Humidity (operating and storage)**: IEC 68-2-30/24 h 95% relative humidity +25°C to +40°C (2 cycl)

- **EMC**: EN 61000-6-4 (Emission)

- **EN 61000-6-2 (Immunity)**

- **FCC**: 47 CFR Part 15 class A (Emission)

- **Encapsulation**: EN 61 000-4-8, I5

- **Bump**: IP 54 (IEC 60529)

- **Vibration**: 2 g (IEC 6068-6-6)

**Physical data**

- **Camera weight, incl. lens and battery**: 2.48 kg

- **Battery weight**: 0.24 kg

- **Cameras size, incl. lens (L x W x H)**: 305 × 169 × 161 mm

- **Tripod mounting**: Standard, 1/4”-20

- **Housing material**: Aluminium, Magnesium

- **Grip material**: TPE Thermoplastic Elastomers

**Scope of delivery**

- **Thermal imaging camera**: Standard Lens, 14.5° or 24° (Si)

- **Hard transport case**

- **Lens cap (mounted on lens)**

- **Batteries 2 ea. (1 of the batteries inside camera)**

- **Charger**

- **Power supply incl. multi-plugs**

- **HDMI-DVI + HDMI-HDMI cable**

- **USB cable**

- **SD card**

- **SD card adapter (connects via USB to PC)**

- **Getting Started Guide (printed)**

- **Manual for GF-series on CD**

- **FLIR Tools on CD**

- **Heat shield**

- **Wi-Fi USB micro-adapter (depending on CE and FCC regulations regarding wireless equipment for your country)**

**Scope of delivery**

- **WLAN**: Peer to peer (adhoc) for iQs or infrastructure (network) for Android

- **USB**

- **USB A**: Connect external USB device (e.g. memory stick)

- **USB Mini-B**: Data transfer to and from PC

- **USB Mini-B: 2.0 High Speed**

- **Video**: Digital Video output (image)
Automatic (one Touch) and Manual Focus w/ 1 to 8 Continuous Digital Zoom helps you to deliver the perfect picture at ease.

Tiltable, flip-out 4.3” High Contrast Color LCD allows you to view targets more safely from any angle.

Visit www.flir.com
General specifications

Imaging and optical data

Field of view (FOV) / Minimum focus distance
14.5º lens: 14.5º x 10.8º / 0.5m
24º lens: 24° x 18° / 0.3 m

F-number
1.5

Focus
Automatic (one touch) or manual (electric or on the lens)

Zoom
1–8x continuous, digital zoom

Digital image enhancement
Noise reduction filter, High Sensitivity Mode (HSM)

IR resolution
320 × 240 pixels

Thermal sensitivity / NETD
<15 mK @ +30°C

Sensor cooling
Stirling Microcooler (FLIR MC-3)

Electronics and data rate

Full frame rate
60 Hz

Image presentation

Display
Built-in widescreen, 4.3 in. LCD, 800 x 480 pixels

Viewfinder
Built-in, tiltable OLED, 800 × 480 pixels

Automatic image adjustment
Continuous/manual; linear or histogram based

Manual image adjustment
Level/span

Image modes
IR-image, visual image, High Sensitivity Mode (HSM)

Measurement analysis

Spotmeter
10

Area
5 boxes with max/min/average

Profile
1 live line (horizontal or vertical)

Difference temperature
Delta temperature between measurement functions or reference temperature

Reference temperature
Manually set or captured from any measurement function

Emissivity correction
Variable from 0.01 to 1.0 or selected from editable materials list

Measurement corrections
Reflected temperature, distance, atmospheric transmission, humidity, external optics

Set-up

Menu commands
Level, span
Auto adjust continuous/manual/semi-automatic
Zoom
Palette
Start/stop recording
Store image
Playback/recall image

Color palettes
Iron, Gray, Rainbow, Arctic, Lava, Rainbow HC

Set-up commands
1 programmable button, overlay recording mode, local adaptation of units, language, date and time formats

Storage of images

Image storage type
Removable SD or SDHC Memory Card, two card slots

Image storage capacity
1,200 images (JPEG) with post process capability per GB on memory card

Image storage mode
IR/Visual images

Visual image can automatically be associated with corresponding IR image

Periodic image storage
Every 10 seconds up to 24 hours

File formats
Standard JPEG, 14 bit measurement data included

GPS
Location data automatically added to every image from built-in GPS

Video recording and streaming

Non radiometric IR-video recording
MPEG4 (up to 60 minutes/clip) to memory card.
Visual image can automatically be associated with corresponding recording of non radiometric IR-video.

Visual video recording
MPEG4 (25 minutes/clip) to memory card

Radiometric IR-video streaming
Full dynamic to PC using USB or WLAN

Non radiometric IR-video streaming
RTP/MPEG4

Visual video streaming
MPEG4 using Wi-Fi
Uncompressed colorized video using USB

Digital camera

Built-in digital camera
3.2 Mpixel, auto focus, and two video lamps

Laser pointer

Activated by dedicated button

Data communication interfaces

WLAN
Peer to peer (adhoc) for iOS or infrastructure (network) for Android

USB
USB-A: Connect external USB device (e.g. memory stick)
USB Mini-B: Data transfer to and from PC

USB, standard
USB Mini-B 2.0 High Speed

Video
Digital Video Output (image)

Power system

Battery type
Rechargeable Li Ion battery

Battery voltage
7.2 V

Charging system
In camera (AC adapter or 12 V from a vehicle) or 2-bay charger

Environmental data

Storage temperature range
-30°C to +60°C

Humidity (operating and storage)
IEC 68-2-30/24 h 95% relative humidity +25°C to +40°C (2 cyc)
EN61000-6-4 (Emission)
EN61000-6-2 (Immunity)
FCC 47 CFR Part 15 class A (Emission)
EN 50 080-4-8, L5

Encapsulation
IP 54 (IEC 60529)

Bump
25 g (IEC 60068-2-29)

Vibration
2 g (IEC 60068-2-6)

Physical data

Camera weight, incl. lens and battery
2.48 kg

Battery weight
2.24 kg

Cameras size, incl. lens (L x W x H)
306 x 168 x 161 mm

Tripod mounting
Standard, 1/4”-20

Housing material
Aluminium, Magnesium

Grip material
TPE Thermoplastic Elastomers

Scope of delivery

Thermal imaging camera, Hard transport case, Battery charger, Battery, 2 ea., Calibration Certificate, Downloads brochure, FLIR Tools PC software CD-ROM, FLIR VideoReport™ PC software CD-ROM, HDMI-DVI cable, HDMI-HDMI cable, Lens cap (mounted on lens), Memory card, Memory card adapter, Power supply, incl. multi-plugs, Printed Getting Started Guide, Printed important information guide, Registration card, Service & training brochure, Shoulder strap, USB cable, User documentation CD-ROM, Wi-Fi USB micro-adapter (depending on CE and FCC regulations regarding wireless equipment for your country)

Note: These specifications are for GF-Series with a fixed 14.5º or 24º lens. Versions with an interchangeable lens are also available but these require a US Department of State Export license.
Lenses
All FLIR GF-Series can be delivered with either a 14.5° or 24° fixed lens. Versions with interchangeable lenses are also available but require a US Department of State License and will be subject to limitations on resale. Also each individual lens requires a US Department of State License and will be subject to limitations on resale. For GF-Series thermal imaging cameras with interchangeable lenses, the following lens options are available:

**FLIR GF309**
- IR lens, 24° with case [T197387]
  The standard 24° lens is suitable for the majority of applications.
- IR lens, 14.5° with case [T197385]
  The 14.5° lens is a popular lens accessory and provides 1.7x magnification compared to the standard lens. Ideal for small or distant targets.
- IR lens, 6° with case [T197388]
  The 6° lens is a popular lens accessory and provides 4x magnification compared to the standard lens. Ideal for small or distant targets. Not compatible with the heatshield.

**FLIR GF304**
- IR lens, 24° with case [T197386]
  The standard 24° lens is suitable for the majority of applications.
- IR lens, 14.5° with case [T197384]
  The 14.5° lens is a popular lens accessory and provides 1.7x magnification compared to the standard lens. Ideal for small or distant targets.

**FLIR GF306**
- IR lens, 24° with case [T197386]
  The standard 24° lens is suitable for the majority of applications.
- IR lens, 14.5° with case [T197384]
  The 14.5° lens is a popular lens accessory and provides 1.7x magnification compared to the standard lens. Ideal for small or distant targets.

**FLIR GF320**
- IR lens, 24° with case [T197387]
  The standard 24° lens is suitable for the majority of applications.
- IR lens, 14.5° with case [T197385]
  The 14.5° lens is a popular lens accessory and provides 1.7x magnification compared to the standard lens. Ideal for small or distant targets.
- IR lens, 6° with case [T197388]
  The 6° lens is a popular lens accessory and provides 4x magnification compared to the standard lens. Ideal for small or distant targets. Not compatible with the heatshield.

**FLIR GF346**
- IR lens, 24° with case [T198267]
  The standard 24° lens is suitable for the majority of applications.
- IR lens, 14.5° with case [T198298]
  The 14.5° lens is a popular lens accessory and provides 1.7x magnification compared to the standard lens. Ideal for small or distant targets.
- IR lens, 6° with case [T197388]
  The 6° lens is a popular lens accessory and provides 4x magnification compared to the standard lens. Ideal for small or distant targets.
The following accessories are available for all GF-Series thermal imaging cameras

**Power**

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>[1196209]</td>
</tr>
<tr>
<td>Extra high capacity battery for the thermal imaging camera.</td>
<td></td>
</tr>
<tr>
<td>Battery charger, incl. power supply with multi plugs</td>
<td>[T197692]</td>
</tr>
<tr>
<td>Stand-alone 2-bay battery charger, including power supply with multi plugs.</td>
<td></td>
</tr>
<tr>
<td>Power supply, incl. multi plugs</td>
<td>[T910814]</td>
</tr>
<tr>
<td>Power supply, including multiple plugs, to charge the battery when it is inside the camera or in the battery charger.</td>
<td></td>
</tr>
<tr>
<td>Cigarette lighter adapter kit, 12 VDC, 1.2 m.</td>
<td>[1910490]</td>
</tr>
<tr>
<td>This cable is used to power the thermal imaging camera or to charge the battery from the cigarette lighter socket in a car.</td>
<td></td>
</tr>
</tbody>
</table>

**Storage**

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapter, SD memory card to USB</td>
<td>[1910475]</td>
</tr>
<tr>
<td>Easy to install and use; no additional driver installation required for Windows ME, 2000 and XP. Driver included for Windows 98SE.</td>
<td></td>
</tr>
<tr>
<td>Memory card micro-SD with adapters</td>
<td>[T910737]</td>
</tr>
<tr>
<td>Micro-SD Card for data storage (e.g. images)</td>
<td></td>
</tr>
</tbody>
</table>

**Cables**

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB cable Std A &lt;-&gt; Mini-B</td>
<td>[1910423]</td>
</tr>
<tr>
<td>This cable is used to connect the thermal imaging camera with a computer, using the USB protocol.</td>
<td></td>
</tr>
<tr>
<td>HDMI to DVI cable 1.5 m</td>
<td>[T910816]</td>
</tr>
<tr>
<td>This cable is used to connect the thermal imaging camera with an external display.</td>
<td></td>
</tr>
<tr>
<td>HDMI to HDMI cable 1.5 m</td>
<td>[T910815]</td>
</tr>
<tr>
<td>This cable is used to connect the thermal imaging camera with an external display.</td>
<td></td>
</tr>
</tbody>
</table>

**Transport**

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard transport case for FLIR GF3xx-Series</td>
<td>[T197555]</td>
</tr>
<tr>
<td>Hard transport case for FLIR GF3xx-Series</td>
<td></td>
</tr>
</tbody>
</table>

**Miscellaneous**

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat Shield for FLIR GF309 only</td>
<td>[T197482]</td>
</tr>
<tr>
<td>Heat shield for the FLIR GF309.</td>
<td></td>
</tr>
<tr>
<td>Wi-Fi USB adaptor</td>
<td>[T951387]</td>
</tr>
<tr>
<td>Wi-Fi USB adaptor for wireless connection between the thermal imaging camera and external equipment.</td>
<td></td>
</tr>
</tbody>
</table>
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Also each individual lens requires a US Department of State License and will be subject to limitations on resale.

All products described in this publication may require government authorization for export/re-export or transfer. Contact FLIR Systems for details.

Specifications are subject to change without notice. Weights and dimensions are indicative. Images used for illustration purposes only

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