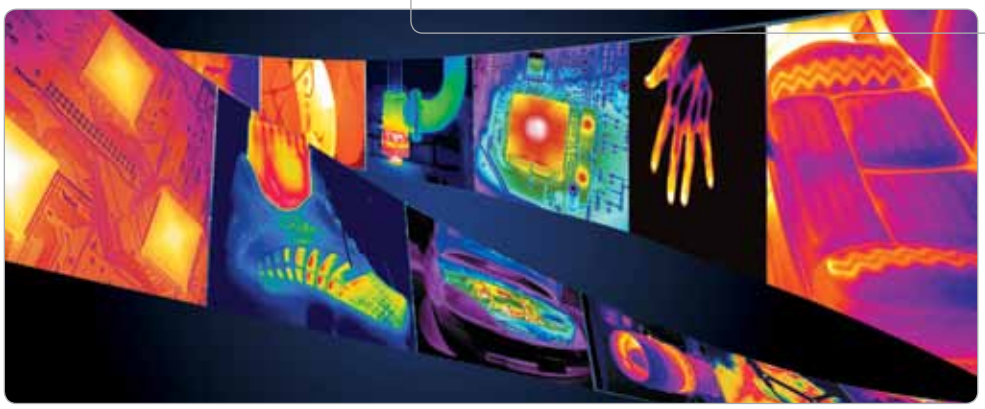
Thermal imaging cameras for Research and Development

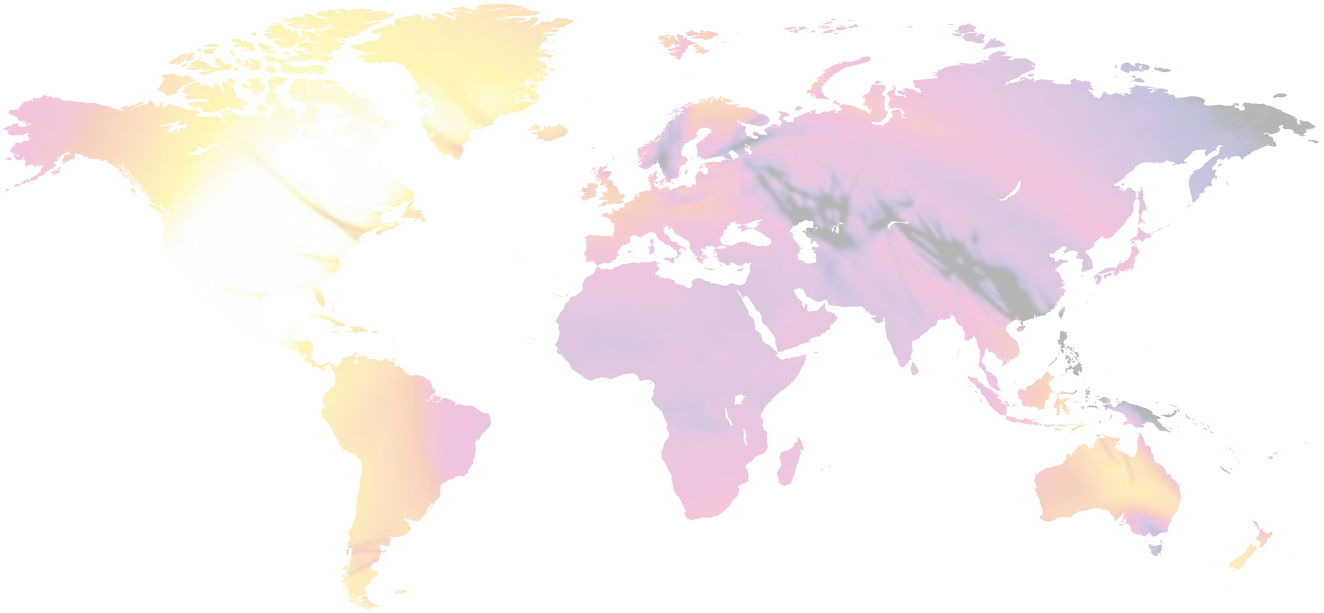


R&D Departments

Universities

Medical

Veterinary



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. Complicated 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.

FLIR, Stockholm, Sweden

FLIR ATS, France

FLIR, Boston, USA

FLIR Santa Barbara, USA

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 realize 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.

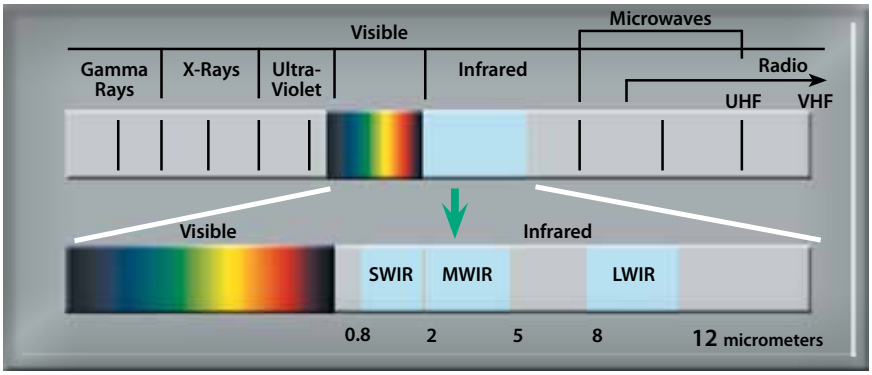
More than a camera, a complete solution
There is more to the world of thermal imaging than building a camera. FLIR is not only committed to providing you with the best camera, we are also able to offer you the best software, service and training to suit your thermal imaging needs.

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.

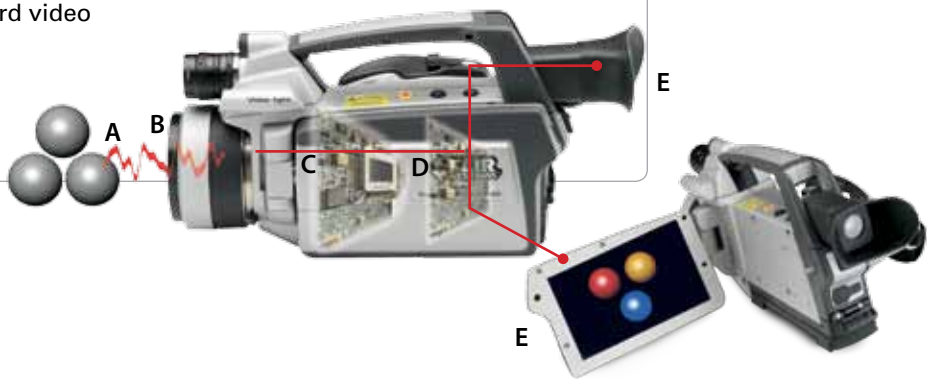
Any object that has a temperature above absolute zero (-273.15 degrees Celsius or 0 Kelvin) emits radiation in the infrared region. Even objects that we think of as being very cold, such as ice cubes, emit infrared radiation. We experience infrared radiation every day. The heat that we feel from sunlight, 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 thermal imaging 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 thermal imaging camera.



Why use thermal imaging cameras?

Why would you choose a FLIR thermal imaging camera? There are other technologies available to help you measure temperatures in a non-contact mode. Infrared thermometers for example.

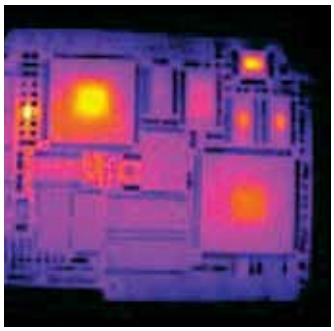
Infrared thermometers vs thermal imaging cameras
Infrared (IR) thermometers are reliable and very useful for single-spot temperature readings. But when scanning large areas or components, it's easy to miss a critical spot.

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

Use thousands of 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.

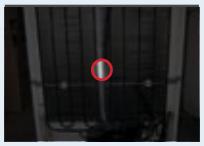
If we look at the FLIR SC660 one of our top models, which has an image resolution of 640 x 480 pixels, this means 307,200 pixels or using 307,200 infrared thermometers at the same time.

IR thermometer, measures temperature in one point



FLIR SC660 measures 307,200 temperature points

Find problems faster and easier with extreme accuracy.
It's easy to miss critical problems with a spot IR thermometer. A FLIR thermal imaging camera scans entire components giving you instant diagnostic insights showing the full extent of problems.



What an IR Thermometer sees.

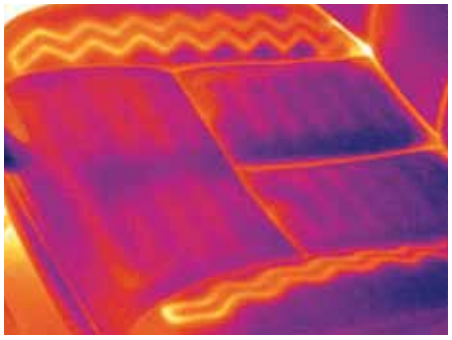
What a thermal imaging camera sees.

What an IR Thermometer sees.

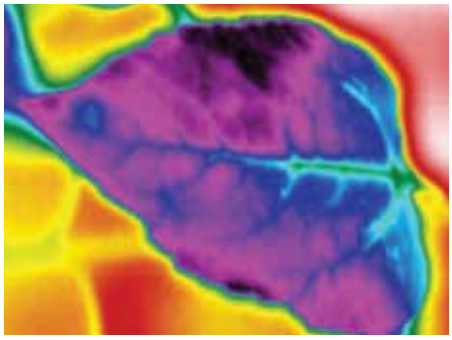
What a thermal imaging camera sees.

Thermal imaging cameras for R&D applications

In Research and Development applications, accuracy, reliability, sensitivity and high performance are vitally important. That's why FLIR thermal imaging cameras are widely used around the world for applications as diverse as microelectronics, paper processing, automotive, plastics, assessment of materials, target heat signatures, mechanical testing, R&D and much more.



Industrial R&D
Numerous new products have been developed with the help of a thermal imaging camera. Product developers study the heat dissipation and thermal characteristics.



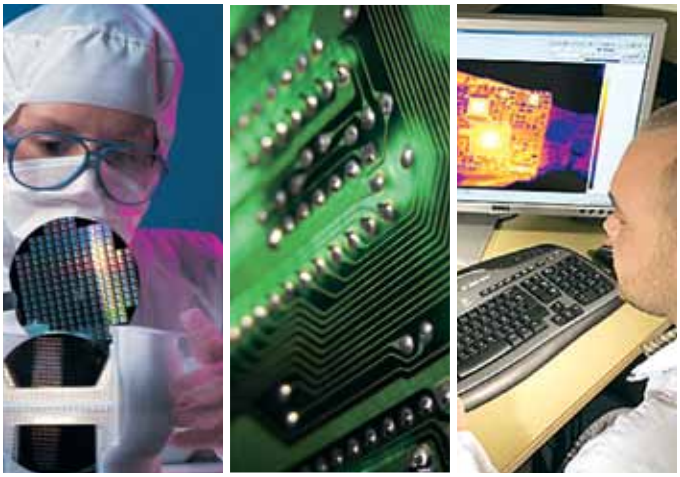
Scientific R&D
Fundamental or applied research, thermal imaging is used for a wide variety of applications.

FLIR's thermal imaging cameras are used for capturing and recording thermal distribution and variations in real-time, allowing engineers and researchers to see and accurately measure heat patterns, dissipation, leakage, and other temperature factors in equipment, products and processes.

These cameras can distinguish temperature changes as subtle as 0.02°C. They feature state-of-the-art detector technology and advanced mathematical algorithms for high performance and precise measurements from -80°C to +3000°C. The R&D camera ranges combine extremely high imaging performance and precise temperature measurements, with powerful tools and software for analysing and reporting.

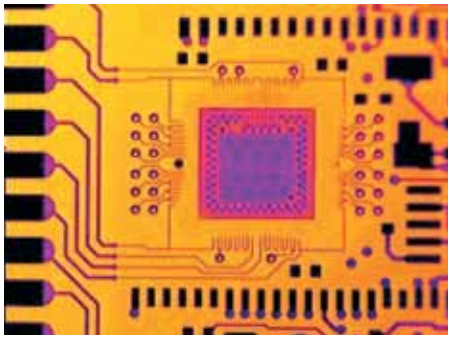
This combination makes them ideal for a wide range of research, thermal testing and product validation applications. With a vast choice of camera models, the FLIR R&D range can meet a wide variety of targets, applications and budget needs. They can be used as hand-held, portable devices, fix-mounted or tripod-mounted for continuous testing and operation.

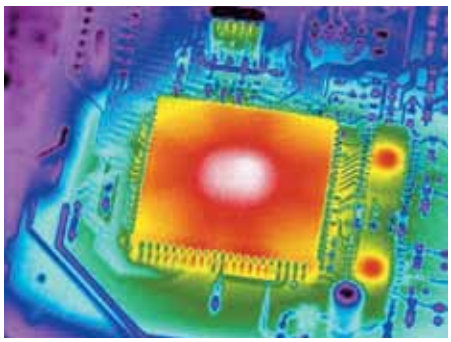
Infrared thermography has proven to be an invaluable tool to solve a wide range of scientific questions and problems.



The advantages of infrared thermography for R&D applications

- Gives a full, real-time thermal pattern of the situation
- Is contactless, non-destructive and non-intrusive
- Identifies and locates thermal anomalies
- Stores thermal information
- Allows for detailed analysis
- Addresses numerous applications





Printed Circuit Boards
Scientists designing printed circuit boards are challenged with managing the heat dissipation without sacrificing performance or cost. Accurately understanding heat has been extremely difficult. However, thanks to thermography, engineers are able to easily visualize and quantify heat patterns in the devices that they create.

Heat patterns are very difficult to predict. This means that it is not always possible to know where to attach the thermocouples necessary to make accurate measurements and effectively evaluate heat dissipation. Furthermore, since the thermocouple needs to be in contact with the component to be tested, it can influence the results of the measurement. Infrared has the advantage that it produces very comprehensive images without contact or intrusion.

A wide range of thermal imaging cameras for R&D applications
FLIR markets a full product range of thermal imaging cameras for R&D applications. Whether you are just discovering the benefits that thermal imaging cameras have to offer or if you are an expert thermographer, FLIR offers you the correct tool for the job.

Discover our full product range and find out why FLIR is the world leader in thermal imaging cameras.

FLIR SC305-SC325 and FLIR SC645-SC655

Speed up your design cycle with infrared

The FLIR SC305-SC325 and FLIR SC645-SC655 thermal imaging cameras are designed to keep the thermal efficiency of your development project under constant control. It prevents design faults in the making, ensures quality and cuts time-to-market.

Perfect your design, improve your design process

In the design process it is rarely possible to see a thermal problem with the naked eye or to measure temperature over surfaces accurately. Often, theoretical calculations and simulations do not give a satisfactory result without practical tests. And these are time consuming, requiring the precise connection of multiple thermocouples to prove the design.

Thermal imaging speeds up the development process and makes it more efficient. It shows the complete picture so that nothing is left to chance.

A thermal imaging camera gives you a sixth sense, allowing you to measure, monitor and analyze what you can't see, providing data and evidence in the fastest and easiest way possible. It is the perfect tool for verifying and validating design to ensure that the product fulfills specifications. Infrared also adds another dimension to non-destructive testing.

640x480 pixels
Some models of the SC-Series have an IR resolution of 640x480 pixels that allows more accuracy and shows more details at a longer distance.

High speed infrared windowing
The FLIR SC655 model has a high speed infrared windowing function. It allows you to record thermal images at a frame rate up to 200 Hz by windowing.

Conditional start/stop
Control start/stop recording in FLIR R&D software. Let an external signal control the image streaming.

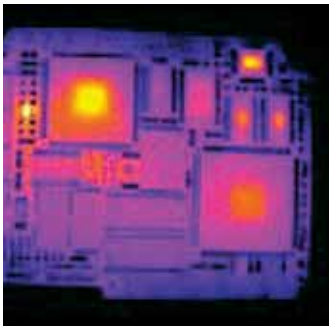
High sensitivity < 50 mK
< 50 mK thermal sensitivity captures the finest image details and temperature difference information.

Compact & lightweight design
Compact thermal imaging cameras for fixed R&D installations from FLIR.

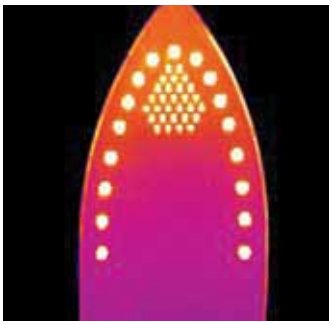
GigE Vision™ standard compatibility
An industry first. GigE Vision is a new camera interface standard developed using the Gigabit Ethernet communication protocol. GigE Vision is the first standard to allow for fast image transfer using low cost standard cables even over long distances. With GigE Vision, hardware and software from different vendors can interoperate seamlessly over GigE connections.

GenICam™ protocol support
An industry first. The goal of GenICam is to provide a generic programming interface for all kinds of cameras. Regardless of interface technology (GigE Vision, Camera Link, 1394 DCAM, etc.) or features implemented, the application programming interface (API) will always be the same. The GenICam protocol also makes third party software being possible to use with the camera.

Built-in Gigabit Ethernet connection
Real time 16 bit image streaming.



Verification of PCB



Thermal quality control on domestic appliances

Thermal image taken with a macro lens

	 **FLIR SC305**	 **FLIR SC325**	 **FLIR SC645**	 **FLIR SC655**
IR resolution	320 x 240 pixels	320 x 240 pixels	640 x 480 pixels	640 x 480 pixels
Image frequency	9 Hz	60 Hz	25 Hz	50 Hz Windowing option: 100/200 Hz
Temperature range	–20 °C to +350 °C in 2 ranges (+1200 °C optionally)	–20 °C to +350 °C in 2 ranges (+1200 °C optionally)	–20 °C to +650 °C in 2 ranges (+2000 °C optionally)	–20 °C to +650 °C in 2 ranges (+2000 °C optionally)
Ethernet image streaming	16-bit 320 x 240 pixels at 9 Hz	16-bit 320 x 240 pixels at 60 Hz	16-bit 640 x 480 pixels at 25 Hz	16-bit 640 x 480 pixels at 50 Hz Up to 200 Hz by windowing
USB	N/A	N/A	Control and image	Control and image
USB communication	N/A	N/A	TCP/IP socket-based FLIR proprietary and GenICam	TCP/IP socket-based FLIR proprietary and GenICam
USB image streaming	N/A	N/A	16-bit 640 x 480 pixels at 25 Hz	16-bit 640 x 480 pixels at 25 Hz Up to 100 Hz by windowing

FLIR SC620, FLIR SC640 and FLIR SC660

FLIR SC620, FLIR SC640 and FLIR SC660: state-of-the-art thermal imaging cameras, designed for demanding R&D specialists.

Highest sensitivity and most advanced feature set available in portable cameras. Offers a combination of infrared and visible spectrum images of superior quality and temperature measurement accuracy – plus contrast optimizer, laser pointer, voice annotation and a host of other advanced features.

640x480 pixel resolution
The FLIR SC620/SC640/SC660 have a high resolution pixel detector of 640 x 480 pixels for more accuracy and higher resolution.

High sensitivity (FLIR SC640 / SC660)
< 30 mK thermal sensitivity captures the finest image details and temperature difference information.

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

Contrast Optimizer (FLIR SC660)
Automatic optimization of brightness and contrast adjustments to make it easier to make thermal analyzes of detailed objects).

Multifunction Video Capture
The 5.6" widescreen LCD allows on-camera viewing of images. Its FireWire interface can transfer 14-bit radiometric data directly into a PC for real-time analysis of captured images and for FLIR SC660/SC640 also RAW data. Furthermore, radiometric sequences can be stored on high capacity SD-cards. MPEG-4 non-radiometric video sequences can also be streamed to a PC via USB, FireWire or WLAN (optional).

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 composite video connection, USB, FireWire, IrDA, and a direct connection to charge the battery inside the camera.

FLIR Thermal Fusion
Merges visual and thermal images to offer better analysis.

Picture-in-picture
Create an infrared overlay on your visual image. Scalable, moveable and resizable (depending on model).

Thumbnail image gallery
An easy-to-access thumbnail image gallery helps you to quickly review and find your infrared images.

Radiometric JPEG
FLIR uses a non proprietary radiometric JPEG image format that allows for post processing and report writing with Microsoft Word® based FLIR software.

Text and voice annotations
Text comments can be uploaded to the camera through a wireless IrDA interface. A headset can be connected to make voice annotations.

Automatic- and Manual focus, Digital zoom
Focus possibilities include; single shot auto focus, continuous auto focus, laser based (660-models) or manual focus. Digital zoom 1-2x continuous (SC620), 1-8x continuous (SC640 / SC660).

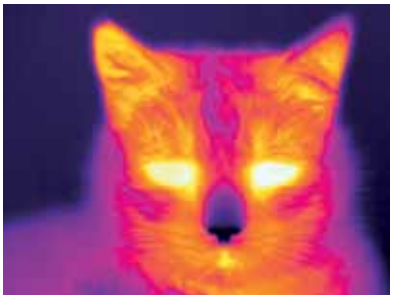
Large LCD screen
Super size 5.6" foldable high-quality LCD screen allows you to see the smallest details and temperature differences.

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.

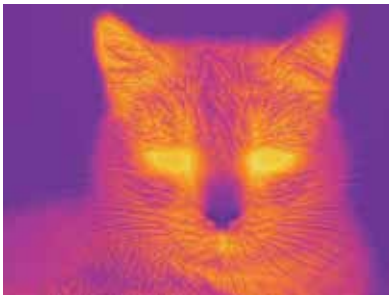
Programmable direct access buttons
For increased flexibility the operator can program buttons located on the top of the camera for direct access to favourite functions.

Connect to iPhone or iPad via Wi-Fi to use the FLIRViewer App for processing and sharing results

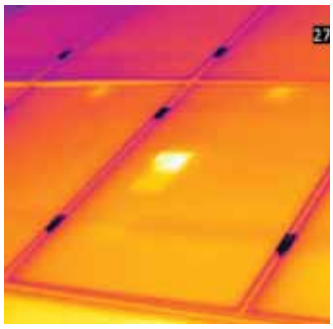
Contrast optimizer



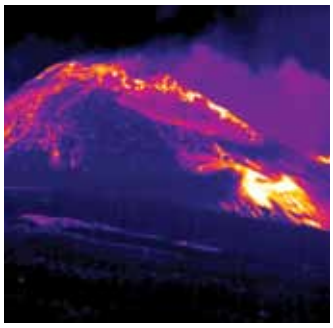
Basic thermal image.



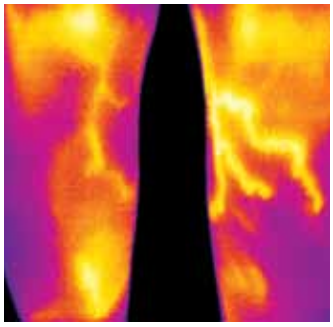
Thermal image enhanced with the Contrast Optimizer function.



Solar panels inspection



Thermal surveillance of volcanos



Vein cartography

FLIR SC620	FLIR SC640	FLIR SC660
		
<40 mK sensitivity, accuracy +/- 2% of reading accuracy +/-1% of reading (option)	<30 mK sensitivity, accuracy +/- 2% of reading accuracy +/-1% of reading (option)	<30 mK sensitivity, accuracy +/- 1% of reading
Standard 24° or 45° lens, fixed	Standard 12°, 24° or 45° lens	Standard 12°, 24° or 45° lens
2x digital zoom	8x digital zoom	8x digital zoom
Standard measurement functions	Extended measurement functions	Extended measurement functions
Laser Pointer	Laser Pointer	Advanced Laser Pointer
	Set temperature alarms	Set temperature alarms
	Sequence recording in camera	Sequence recording in camera
	Contrast Optimizer (option)	Contrast Optimizer
		Built-in GPS

R&D - Science Software

Turning tools into solutions

At FLIR, we recognise 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.

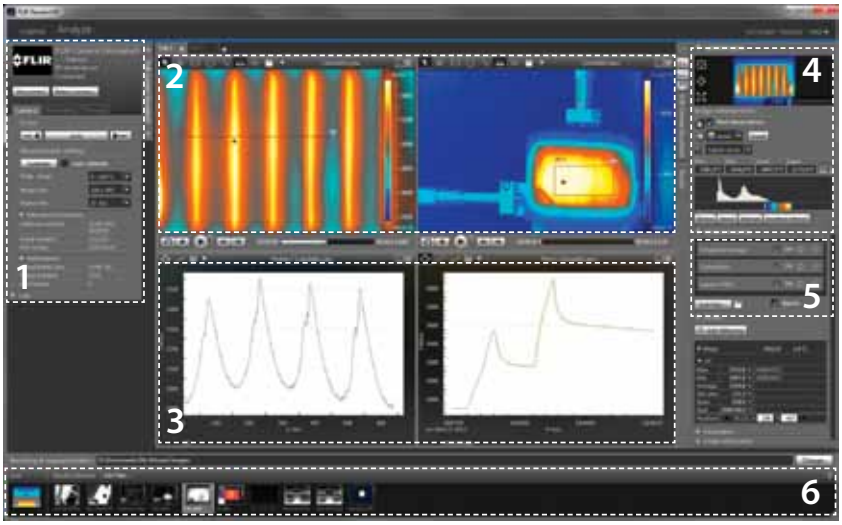
FLIR ResearchIR

FLIR ResearchIR is aimed at R&D-Science users of thermal imaging cameras with a cooled or uncooled detector. FLIR ResearchIR takes the most out of your thermal imaging camera and allows high speed recording and advanced thermal pattern analysis. ResearchIR is the perfect tool for industrial R&D. Users that are interested in more advanced science applications can choose for ResearchIR Max.

FLIR ResearchIR key features:

- More than 20 language versions available
- View, record and store images at high speed
- Post-processing of fast thermal events
- Generate time-temperature plots from live images or recorded sequences
- Advanced Start/Stop recording conditions
- Unlimited number of analysis functions (Spot, Line, Area)
- File organizer with Quick Collection and preview of sequences
- Zoom & Pan allows a closer look
- Multiple user-configurable tabs for live images, recorded images or plot

FLIR ResearchIR User interface



1. **Camera and recording control:**
   FLIR ResearchIR software connects directly to FLIR thermal imaging cameras to acquire thermal snapshots or movie files. ResearchIR supports multiple acquisition options, including camera triggering or conditional start/stop, based on thermal measurements.
2. **Flexible measurement workspace:**
   Imagery, data and charts can be arranged by a simple drag and drop. Measurement analysis can be done live when connected to a thermal imaging camera or in playback with recorded snapshots or movie sequences.
3. **Charts and graphics:**
   Line profiles are easy to add. Measurement tools or complete image statistics can be plotted against time. A result table presents data statistics for all images in parallel allowing for seamless comparative analysis.
4. **Intuitive image colorization control:**
   Allows changing the color palette, color distribution, contrast and isotherms, zooming and panning.
5. **Image processing pipe:**
   Provides powerful real time processing such as image subtraction, sliding subtraction or averaging. Each process can be individually configured and its order can be easily managed.
6. **Quick collection bar:**
   Shows the active images and sequences.

FLIR ResearchIR Max key features:

FLIR ResearchIR Max contains all the features or FLIR ResearchIR. Furthermore it contains features for advanced thermal analysis, such as:

- Pre/Post Triggering
- Mathematical processing toolbox
- Image filtering toolbox
- Multiple camera support for parallel recording
- Radiometric Digital Detail Enhancement (DDE): improves dramatically the understanding of the thermal scene, still keeping the radiometric measurement accuracy.

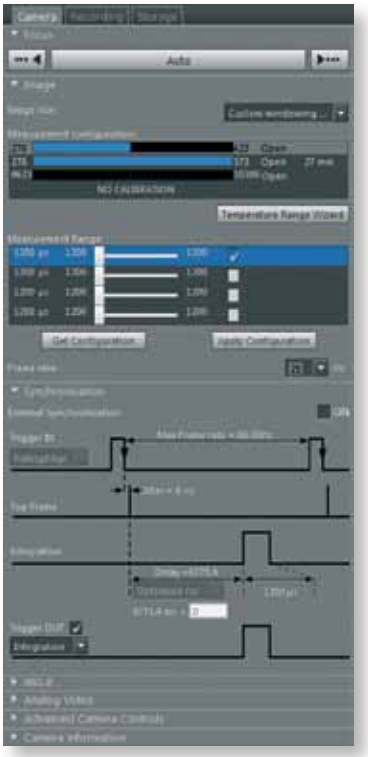
Advanced recording options

Controls multiple parameters and options to achieve the most reliable acquisition

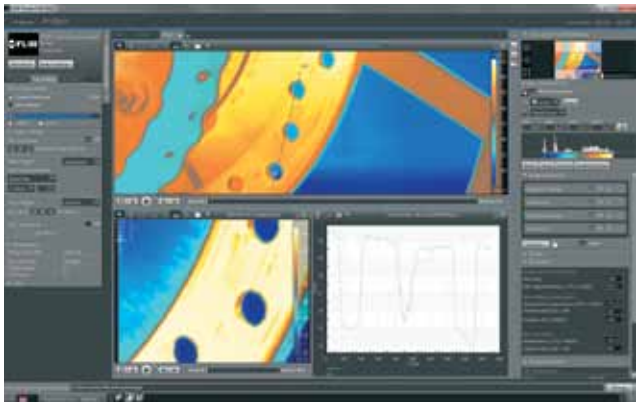
- Pre / Post triggering allows to catch the most fleeting event.
- Multiple start and stop acquisition options. Can be based on camera trigger signal status, image measurement threshold or time.
- Acquisition performance is clearly shown. No doubt remains about your acquisition quality.

Complete control of camera parameters

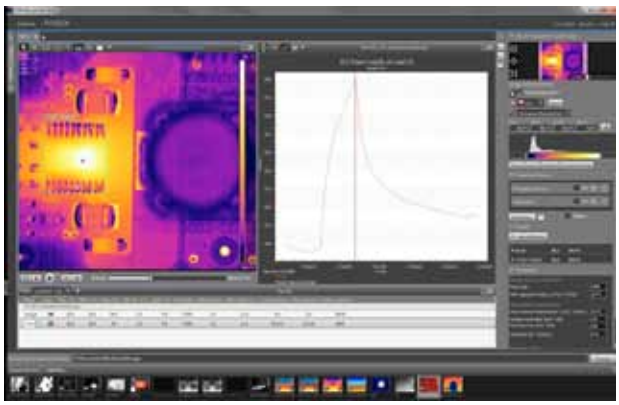
Complete, yet easy to use camera control. Measurement configuration, ranges, image size, frame frequency and synchronization to external signal is exposed.



Application examples



Recorded sequence of a brake disk



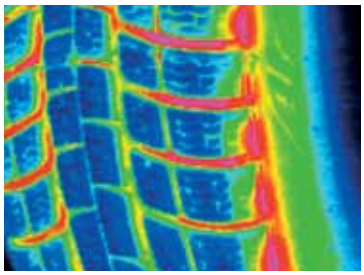
Electronic board thermal design

Software Development Kits

Optional Software Development Kit (SDK) for Visual Studio users and a LabVIEW™ toolkit are also available enabling the functionality of the camera to be optimised for specific needs.

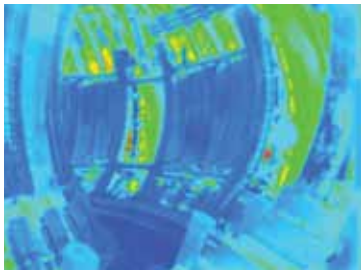
Advanced Thermography measurements

In many circumstances, R&D applications require advanced measurement capabilities. In addition to the FLIR SC300 and FLIR SC600 Series, FLIR is also offering a large range of ultra fast, ultra sensitive cooled IR cameras, the FLIR SC5000, FLIR SC6000, FLIR SC7000 and FLIR SC8000 Series, NIR infrared cameras and the FLIR SC2000 Series. These cameras provide superior measurement capabilities in challenging setups for fast motion and thermal event, wide temperature range, small amplitude phenomena, multispectral analysis or very small object evaluation. The FLIR SC2000 Series will be usefull for laser profiling, paint analysis, silicon wafer inspection, high temperature measurement and all kinds of applications for which the SWIR spectral band offers measurement advantages.



Fast motion - Short integration time

Application description:
Thermal image of a tire during a quality test done at 200km/h.
Camera model:
FLIR SC7650 with an external synchronization sensor.
Requirement:
Short Snapshot integration time, external trigger input with a slave camera mode for the data acquisition.



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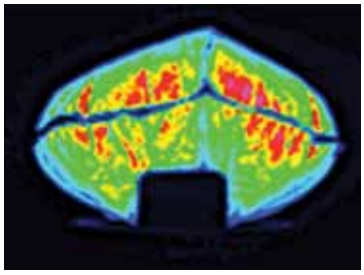
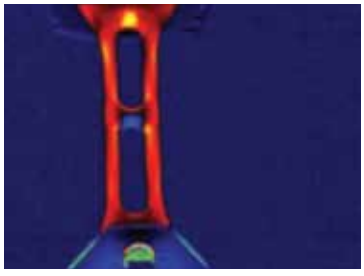
Large temperature range - Multi-TI Mode

Application description:
JET Fusion plasma reactor temperature measurement.
Camera model:
FLIR SC5500 with rolling integration time.
Requirement:
Superframing and real time extended range.



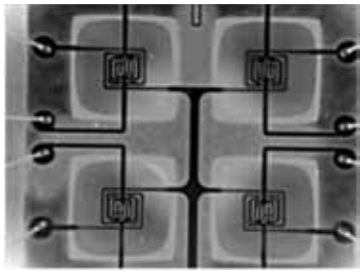
Fast thermal event - Fast frame rate

Application description:
Airbag deployment analysis.
Camera model:
FLIR SC5500 at 3.5Khz fps in a windowing mode.
Requirement:
Fast frame rate in a Snapshot mode with an external trigger input.



Small amplitude phenomena - Thermal resolution & Lock-in thermography

Application description:
Thermal stress analysis
Camera model:
FLIR SC7200 with a lock-in signal input
Requirement:
A very high thermal sensitivity (<20mK), a lock-in signal input, a snapshot mode

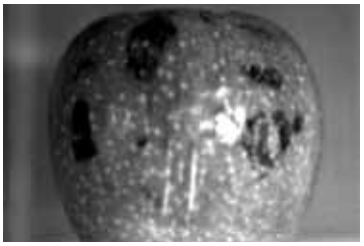


Very small object analysis - High spatial resolution

Application description:
Thermal evaluation of an integrated circuit.
Camera model:
FLIR SC5650 with x5 microscopy lens with a 3µm/pixel resolution.
Requirement:
High quality image resolution due to advanced design microscopic lens, a very low NETD and a large FPA detector. A very short integration time will also allow transient analysis.

Multispectral analysis – multiple lenses and filter combinations

Application description:
Multispectral IR signature of airliner jet.
Camera model:
FLIR SC7500 ORION with high speed spectral filters wheel and dedicated long distance measurement lens.
Requirement:
Thermal analysis in different spectral bands, snapshot mode and dedicated set of filters and lenses.

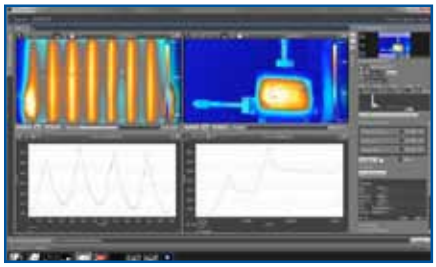


Examples of SWIR applications

Application description :
Quality control on fruits.
Camera model :
FLIR SC2500 equipped with a high pass filter.
Requirement:
Spectral analysis above 1.500nm.

FLIR ResearchIR Max software

As a complementary tool to these Advanced Thermal Imaging systems, FLIR ResearchIR Max software is capable to offer you all necessary functionalities for ultra-fast and real time image acquisition, accurate triggering, lock-in thermography and stress analysis. ResearchIR Max contains all the features of ResearchIR but was especially developped to work together with thermal imaging cameras that are equipped with a cooled detector.

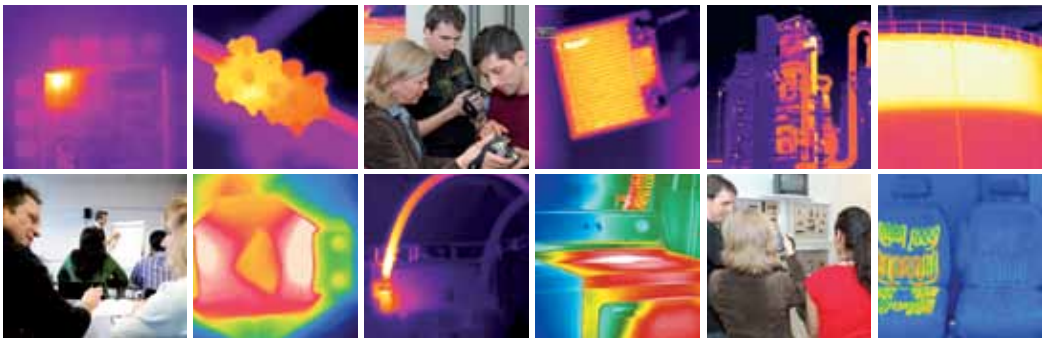


For more information regarding these more Advanced Thermal Solutions, please consult our catalogue for cooled products or visit www.flir.com

ITC

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. As the leading company for thermal imaging technology, we like to share our knowledge with our customers and other interested parties.

We therefore organise regular courses and seminars. We also organise 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 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.

Follow one of our courses and become a thermal imaging expert.

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

After Sales

FLIR After Sales

At FLIR, building a relationship with a customer takes more than just selling a thermal imaging camera. After the camera has been delivered, FLIR 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 familiarise 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.

FLIR SC305-SC325 and FLIR SC645-SC655

Technical specifications

Camera specific




	FLIR SC305	FLIR SC325	FLIR SC645	FLIR SC655
Imaging and optical data				
Focal length	18 mm (0.7 in.)	18 mm (0.7 in.)	24.6 mm (0.97 in.)	24.6 mm (0.97 in.)
Spatial resolution (IFOV)	1.36 mrad	1.36 mrad	0.68 mrad	0.68 mrad
F-number	1.3	1.3	1.0	1.0
Image frequency	9 Hz	60 Hz	25 Hz	50 Hz (100/200 Hz with windowing)
Detector data				
IR resolution	320 × 240 pixels	320 × 240 pixels	640 × 480 pixels	640 × 480 pixels
Detector pitch	25 µm	25 µm	17 µm	17 µm
Measurement				
Object temperature range	–20 to +120°C 0 to +350°C (+1200°C as an option)	–20 to +120°C 0 to +350°C (+1200°C as an option)	–20 to +150°C 100 to +650°C (+2000°C as an option)	–20 to +150°C 100 to +650°C (+2000°C as an option)
USB				
USB	N/A	N/A	Control and image USB, standard USB 2 HS	Control and image USB, standard USB 2 HS
USB, connector type	N/A	N/A	USB Mini-B	USB Mini-B
USB, communication	N/A	N/A	TCP/IP socket-based FLIR proprietary	TCP/IP socket-based FLIR proprietary
USB, image streaming	N/A	N/A	16-bit 640 × 480 pixels at 25 Hz - Signal linear - Temperature linear - Radiometric	16-bit 640 × 480 pixels at 25 Hz - Signal linear - Temperature linear - Radiometric
USB, protocols	N/A	N/A	TCP, UDP, SNTP, RTSP, RTP, HTTP, ICMP, IGMP, ftp, SMTP, SMB (CIFS), DHCP, MDNS (Bonjour), uPnP	TCP, UDP, SNTP, RTSP, RTP, HTTP, ICMP, IGMP, ftp, SMTP, SMB (CIFS), DHCP, MDNS (Bonjour), uPnP
Ethernet				
Ethernet, image streaming	16-bit 320 × 240 pixels at 9 Hz - Signal linear - Temperature linear - Radiometric GigE Vision and GenICam compatible	16-bit 320 × 240 pixels at 60 Hz - Signal linear - Temperature linear - Radiometric GigE Vision and GenICam compatible	16-bit 640 × 480 pixels at 25 Hz - Signal linear - Temperature linear - Radiometric GigE Vision and GenICam compatible	16-bit 640 × 480 pixels at 50 Hz Up to 200 Hz by windowing - Signal linear - Temperature linear - Radiometric GigE Vision and GenICam compatible

** After product registration on www.flir.com*

General

Imaging and optical data	
Field of view (FOV) / Minimum focus distance	25° × 19° / 0.25 m (0.82 ft.)
Lens identification	Automatic
Thermal sensitivity/NETD	< 0.05°C at +30°C (+86°F) / 50 mK
Focus	Automatic or manual (built in motor)

Imaging performance	
Focal Plane Array (FPA) / Spectral range	Uncooled microbolometer / 7.5–14 µm

Measurement	
Accuracy	+/- 2°C (+/- 3.6°F) or +/- 2% of reading

Measurement analysis	
Atmospheric transmission correction	Automatic, based on inputs for distance, atmospheric temperature and relative humidity
Optics transmission correction	Automatic, based on signals from internal sensors
Emissivity correction	Variable from 0.01 to 1.0
Reflected apparent temperature correction	Automatic, based on input of reflected temperature
External optics/windows correction	Automatic, based on input of optics/window transmission and temperature
Measurement corrections	Global object parameters

Ethernet	
Ethernet	Control and image
Ethernet, type	Gigabit Ethernet
Ethernet, standard	IEEE 802.3
Ethernet, connector type	RJ-45
Ethernet, communication	TCP/IP socket-based FLIR proprietary and GenICam protocol
Ethernet, protocols	TCP, UDP, SNTP, RTSP, RTP, HTTP, ICMP, IGMP, ftp, SMTP, SMB (CIFS), DHCP, MDNS (Bonjour), uPnP

Digital input/output	
Digital input, purpose	Image tag (start, stop, general), Image flow ctrl. (Stream on/off), Input ext. device (programmatically read)
Digital input	2 opto-isolated, 10–30 VDC
Digital output, purpose	Output to ext. device (programmatically set)
Digital output	2 opto-isolated, 10–30 VDC, max 100 mA
Digital I/O, isolation voltage	500 VRMS
Digital I/O, supply voltage	12/24 VDC, max 200 mA
Digital I/O, connector type	6-pole jackable screw terminal

Power system	
External power operation	12/24 VDC, 24 W absolute max
External power, connector type	2-pole jackable screw terminal
Voltage	Allowed range 10–30 VDC

Environmental data	
Operating temperature range	–15°C to +50°C (+5°F to +122°F)
Storage temperature range	–40°C to +70°C (–40°F to +158°F)
Humidity (operating and storage)	IEC 60068-2-30/24 h 95% relative humidity +25°C to +40°C (+77°F to +104°F)
EMC	• EN 61000-6-2:2001 (Immunity) • EN 61000-6-3:2001 (Emission) • FCC 47 CFR Part 15 Class B (Emission)
Encapsulation	IP 30 (IEC 60529)
Bump	25 g (IEC 60068-2-29)
Vibration	2 g (IEC 60068-2-6)

Physical data	
Weight	0.9 kg (1.98 lb.)
Camera size (L × W × H)	170 x 70 x 70 mm (6.7 x 2.8 x 2.8 in.) for FLIR SC305- SC325 216 x 73 x 75 mm (8.5 x 2.9 x 3.0 in.) for FLIR SC645 - SC655
Tripod mounting	UNC ¼″-20 (on three sides)
Base mounting	2 × M4 thread mounting holes (on three sides)
Housing material	Aluminium

Scope of delivery

- Hard transport case or cardboard box
- Thermal imaging camera with lens
- Utility CD-ROM
- Calibration certificate
- Ethernet™ cable
- USB cable (FLIR SC645 and FLIR SC655 only)
- Mains cable
- Power cable, pig-tailed
- Power supply
- Printed Getting Started Guide
- Printed Important Information Guide
- User documentation CD-ROM
- Warranty extension card or Registration card

FLIR SC305-SC325

Accessories

FLIR SC305 / SC325:

Lenses

IR lens f = 30 mm, 15° incl. case [1196961]
When the target in question is a distance away it may be useful to use a telescope lens. The 15° lens is a popular lens accessory and provides almost 2X magnification compared to the 25° lens. Ideal for small or distant targets.

IR lens f = 10 mm, 45° incl. case [1196960]
Sometimes there isn't enough room to step back and see the whole picture. This wide angle lens has a field of view almost double than the one of the standard 25° lens. Perfect for wide or tall targets.

Lens 76 mm (6°) with case and mounting [T197407]
For maximum magnification, the 6° lens is the only choice. This optic provides almost 3.5X magnification compared to the 25° lens.

Lens 4 mm (90°) with case and mounting support [T197411]
Sometimes there isn't enough room to step back and see the whole picture. This wide angle lens has a field of view almost four times the one of the standard 25° lens. This wide angle lens is perfect for wide or tall targets.

Close-up 1× (25 µm) incl. case and mounting support [T197415]
This macro lens provides resolution of extremely small targets.

Close-up lens 2x, 50 µm, incl. case [T197214]
This macro lens provides resolution of extremely small targets.

Close-up lens 4x, 100 µm, incl. case [T197215]
This macro lens provides resolution of extremely small targets.

Extended measurement ranges

High temperature option to +1,200°C [T197000]
Allow to measure temperatures of up to +1,200°C with the camera.

Power

Power supply incl. Multi-plugs [T910922]
This power supply is used when powering the camera from the mains supply or to charge the batteries. It comes with different types of plugs.

Power cord EU [1910400]
Power cord with EU plugs for the power supply.

Power cord US [1910401]
Power cord with US plugs for the power supply.

Power cord UK [1910402]
Power cord with UK plugs for the power supply.

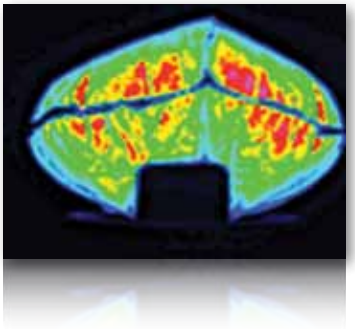
Cables

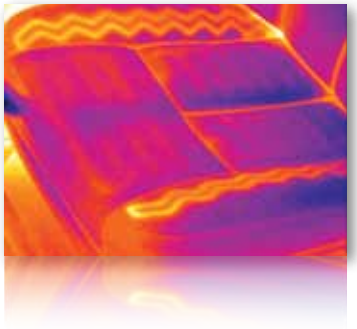
Ethernet cable CAT-6, 2m/6.6 ft. [T951004]
This cable is used to connect the thermal imaging camera to Ethernet.

Power cable, pigtailed [1910586]
This cable is used, when a separate power supply is used (not the one supplied with the camera)

Transport

Hard transport case [T197871]
Rugged watertight plastic shipping case. Holds all items securely. The case can be locked with padlocks and features a breather valve to prevent pressure build-up in airplane cargo holds.





FLIR SC645-SC655

Accessories

FLIR SC645 & SC655

Lenses

IR lens, f = 88.9 mm, 7° incl. case [T198165]
The 7° lens is a popular accessory and provides 3.6× magnification compared to the standard lens. Ideal for small or distant targets such as overhead power lines.

IR lens f = 41.3 mm, 15° incl. case [T197914]
The 15° lens is a popular lens accessory and provides 1.7x magnification compared to the standard lens. Ideal for small or distant targets such as overhead power lines.

IR lens f = 24.6 mm, 25° incl. case [T197922]
The standard 25° lens is suitable for the majority of applications.

IR lens f = 13.1 mm, 45° incl. case [T197915]
This wide angle lens has a field of view almost double of that of the standard 25° lens. Perfect for wide or tall targets or when working in confined areas.

Close-up IR lens 2.9x (50 µm) incl. case [T198059]
For R&D usage or development purposes. A typical example is looking at PCB's or small electronic components.

Close-up IR lens 5.8x (100 µm) incl. case [T198060]
For R&D usage or development purposes. A typical example is looking at PCB's or small electronic components.

Extended measurement ranges

High temperature option to +2,000 °C [T197896]
Allow to measure temperatures of 300 °C up to +2,000 °C with the camera.

Power

Power supply incl. Multi-plugs [T910922]
This power supply is used when powering the camera from the mains supply or to charge the batteries. It comes with different types of plugs.

Power cord EU [1910400]
Power cord (EU) for the power supply.

Power cord US [1910401]
Power cord with US plugs for the power supply.

Power cord UK [1910402]
Power cord (UK) for the power supply.

Cables

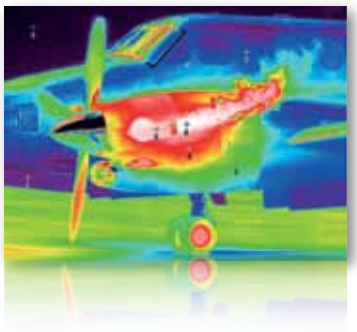
Ethernet cable CAT-6, 2m/6.6 ft. [T951004]
This cable is used to connect the thermal imaging camera to Ethernet.

Power cable, pigtailed [1910586]
This cable is used, when a separate power supply is used (not the one supplied with the camera)

USB cable Std-A <-> Mini-B, 1.8 m [1910423]
USB cable to connect the camera with a computer, using the USB protocol.

Transport

Hard transport case [T197871]
Rugged watertight plastic shipping case. Holds all items securely. The case can be locked with padlocks and features a breather valve to prevent pressure build-up in airplane cargo holds.



FLIR SC620, FLIR SC640 and FLIR SC660

Technical specifications

Camera specific

	FLIR SC620	FLIR SC640	FLIR SC660
Imaging performance			
Field of View (FOV) / minimum focus distance	24° x 18° / 0.3 m 45° x 34° / 0.2 m lens needs to be specified when ordering	24° x 18° / 0.3 m 12° x 9° / 1.2 m 45° x 34° / 0.2 m lens needs to be specified when ordering	24° x 18° / 0.3 m 12° x 9° / 1.2 m 45° x 34° / 0.2 m lens needs to be specified when ordering
Spatial resolution	0.65 mrad for 24° lens 1.3 mrad for 45° lens	0.65 mrad for 24° lens 0.33 mrad for 12° lens 1.3 mrad for 45° lens	0.65 mrad for 24°lens 0.33 mrad for 12° lens 1.3 mrad for 45° lens
Thermal sensitivity	40 mK at 30°C	30 mK at 30°C	30 mK at 30°C
Electronic zoom	1-2x continuous including pan function	1-8x continuous including pan function	1-8x continuous including pan function
Electric and manual focus with USM technology	Auto and manual	Auto and manual	Auto (follows laser spot) and manual
Image presentation			
Automatic contrast optimization	N/A	Adjustable DDE (option)	Adjustable DDE
Measurement			
Temperature range	-40°C to +500°C (optional up to +2000°C)	-40°C to +1500°C (optional up to +2000°C)	-40°C to +1500°C (optional up to +2000°C)
Accuracy	+/- 2°C or +/- 2% of reading +/- 1°C or +/- 1% of reading as an option (restricted range)	+/- 2°C or +/- 2% of reading +/- 1°C or +/- 1% of reading as an option (restricted range)	+/- 1°C or +/- 1% of reading (restricted range) +/- 2°C or +/- 2% of reading
Measurement analysis			
Spotmeter	3	10	10
Area	3 boxes or circles with Max./Min./Average	5 boxes or circles with Max./Min./Average	5 boxes or circles with Max./Min./Average
Measurement function alarm	N/A	Audible/visual alarms (above/below) on any selected measurement function	Audible/visual alarms (above/below) on any selected measurement function
Profile	N/A	1 live line, horizontal or vertical	1 live line, horizontal or vertical
Image storage			
In-camera storage	N/A	Built-in RAM for burst recording	Built-in RAM for burst recording
Laser pointer			
Laser alignment	N/A	N/A	Position is automatically displayed on IR image
Laser mode	N/A	N/A	Auto-focus / level / spotmeter
Video recording			
Radiometric IR video recording	PC storage via Firewire interface	Real-time to built-in RAM, transferrable to memory card, PC storage via Firewire interface	Real-time to built-in RAM, transferrable to memory card, PC storage via Firewire interface
Non-radiometric IR video recording	N/A	MPEG-4 to memory card	MPEG-4 to memory card
Geographic Information System			
Built-in GPS	N/A	N/A	Location data automatically added to every image for referencing on WEB maps

Connect to iPhone or iPad via Wi-Fi to use the FLIRViewer App for processing and sharing results

** After product registration on www.flir.com*

General

Imaging Performance	
IR resolution	640 x 480 pixels
Spectral range	7.5 - 13 µm
Image frequency	30 Hz (60 / 120 Hz with windowing)
Focus	Automatic or manual
Focal Plane Array (FPA)	Uncooled microbolometer
Image presentation	
Thermal Fusion	IR image shown above, below or within temperature interval on the visual image (with 24° lens only)
Picture in Picture	Resizeable and moveable IR area on visual image (with 24° lens only)
Display	Built-in Widescreen, 5.6" color LCD, 1024 x 600 pixels
Viewfinder	Built-in, tiltable LCD, 800 x 600 pixels
Automatic image adjustments	Continuous/manual; linear or histogram based
Manual image adjustments	Level/span/max./min.
Image modes	IR image, Visual image, Thumbnail gallery, Thermal Fusion, Picture in Picture
Reference image	Shown together with live IR image
Measurement analysis	
Isotherm	2 with above/below interval
Difference temperature	Delta temperature between measurement functions or reference temperature
Automatic hot / cold detection	Max./Min. temp. value and position shown within box, circle or on a line
Reference temperature	Manually set or captured from any measurement function
Emissivity correction	Variable from 0.01 to 1.0 or selected from list of materials
Measurement corrections	Reflected temperature, optics transmission, atmospheric transmission and external optics
External optics/windows correction	Automatic, based on inputs of optics/window transmission and temperature
Setup	
Set-up controls	Local adaptation of units, language, date and time formats
Programmable buttons	2
Image storage	
Type	SD memory card
Format	Standard JPEG - including measurement data
Modes	IR/visual images, simultaneous storage of IR and visual images, visual image is automatically associated with corresponding IR image
Periodic image storage	Every 10 seconds up to 24 hours
Panorama	For creating panorama images in FLIR Reporter Building software
Image annotations	
Voice	60 seconds via Bluetooth stored with the image
Text	Predefined text or free text from PDA (via IrDA) stored with the image
Image marker	4 on IR or visual image
Digital camera	
Built-in digital camera	3.2 Mpixel auto-focus and video lamp
Laser Pointer	
Laser	Semiconductor AlGaInP diode laser, Class 2
Power System	
Battery type	Rechargeable Lithium-ion battery
Battery operating time	3 hours at 25 °C
Charging system	In camera, AC adaptor, 2-bay charger or 12 V from a vehicle
Power management	Automatic shutdown and sleep mode (user selectable)
AC operation	AC adaptor, 90–260 V AC, 50/60 Hz
Adaptor voltage	12 VDC out
Environmental specifications	
Operating temperature range	-15 °C to +50 °C
Storage temperature range	-40 °C to +70 °C
Humidity (operating and storage)	IEC 68-2-30/24 h 95% relative humidity +25 °C to +40 °C
Shock	25 g (IEC 60068-2-29)
Vibration	2 g (IEC 60068-2-6)
Encapsulation	IP 54 (IEC 60529)
Interfaces	
1394 Firewire	Fully Radiometric 14 bit real time video to PC
USB-A	Connect external USB device (copy to memory stick)
USB-Mini-B	Data transfer to and from PC / streaming MPEG-4
Composite video	PAL or NTSC
IrDA	For sending text comment files from PDA to camera,
WLAN	Using Wi-Fi USB micro adapter (depending on CE and FCC regulations regarding wireless equipment for country)
Headset connection	Yes
Physical characteristics	
Camera weight, incl. battery	1.8 kg
Camera size (L × W × H)	299 x 144 x 147 mm
Shipping size	520 x 400 x 200 mm
Shipping weight	8.2 kg

Standard package

FLIR SC620, SC640 or FLIR SC660: Hard transport case, Thermal imaging camera with lens, Battery (2 ea., one inserted in camera, one outside camera), Battery charger, Bluetooth Headset, Bluetooth USB-micro adapter, Wi-Fi USB microadaptor (depending on CE and FCC regulations regarding wireless equipment for your country), Calibration certificate, FLIR QuickReport™ PC software CD-ROM, FireWire cable, 4/6, FireWire cable, 6/6, Lens cap (mounted on lens), Lens cap (2 ea.), Memory card-to-USB adaptor, Memory card with adaptor, Power supply incl. multi-plugs, Printed Getting Started Guide, Printed Important Information Guide, Shoulder strap, USB cable, User documentation CD-ROM, Video cable, Warranty extension card or Registration card.

FLIR SC620, FLIR SC640 and FLIR SC660

Accessories

Lenses

Lens 131 mm, 7° field of view, incl. case [T197190]
For maximum magnification, the 7° lens is the only choice. This optic provides almost 3.5X magnification compared to the 24° lens. Due to the weight of this lens, a tripod is recommended.

Lens 76 mm, 12° field of view, incl. case [T197188]
When the target in question is a distance away it may be useful to use a telescope lens. The 12° lens is a popular lens accessory and provides 2X magnification compared to the 24° lens. Ideal for small or distant targets.

Lens 38 mm, 24° field of view, incl. case [T197187]
The 24° lens can be used for daily inspections. Suitable for the majority of applications.

Lens 19 mm, 45° field of view [T197189]
Sometimes there isn't enough room to step back and see the whole picture. This wide angle lens has a field of view almost double than the one of the standard 24° lens. Perfect for wide targets.

Protective window (fits 24° lens) incl. case [T197343]
A protective plastic window: suitable when the camera is used in a dusty environment or when there is a risk of liquids splashing on the lens. The window is made of monocrystalline fluoride.

Macro lens 1X (25µm) incl. case [T197341]
Provides resolution of extremely small targets. For R&D usage or development purposes.

Close-up lens (50µm, fits on 24° lens) incl. case [1196683]
This close-up optic attaches to the standard 24° lens and provides resolution of very small targets.

Power

Battery [1196209]
Extra battery that will allow you to spend extra time in the field doing inspections.

Battery charger [T197692]
This 2 bay battery charger is used for charging FLIR camera batteries.

Cigarette lighter adaptor kit, 12 V DC, 1.2 m [1910490]
Can be used to power the camera from the cigarette lighter socket in a car.

Power supply incl. Multi-plugs [T910814]
This power supply is used when powering the camera from the mains supply or to charge the batteries. It comes with different types of plugs.

Accessories

Hard transport case [T197262]
Rugged, watertight plastic shipping case. Holds all items securely. The case can be locked with padlocks and features a breather valve to prevent pressure build-up in airplane cargo holds.

Extended measurement ranges

High temperature option to +1,500°C [1196744]
Allow to measure temperatures of up to +1,500°C with the camera.

High temperature option to +2,000°C [1196745]
Allow to measure temperatures of up to +2,000°C with the camera.

Miscellaneous

Headset, 3.5 mm plug [1910489]
This head-set is used when annotating thermal images with voice messages. It features an adjustable microphone that can be on the right or on the left side of the head-set. It connects to the head-set connector on the camera.

Remote control unit [T197230]
Can be used to control the camera safely from a remote distance. Extremely useful when the camera needs to look at dangerous processes.

Bluetooth® headset [T197771]
Headset with Bluetooth® for wireless connection with the thermal imaging camera, including microphone.

Bluetooth® USB micro adaptor [T951235]
Bluetooth® USB micro adaptor for wireless connection between the thermal imaging camera and external Bluetooth® equipment.

Wi-Fi USB adaptor [T951387]
Wi-Fi USB adaptor for wireless connection between the thermal imaging camera and external equipment.

Storage

Adaptor, SD memory card to USB [1910475]
Allows to transfer the images from the SD card to a PC.

Memory card micro-SD with adaptors [T910737]
Capture images on the go with your camera. These small cards are easy to use and can hold a great amount of data.

Cables

FireWire cable 4/6, 2 m [1910483]
This cable is used to connect a thermal imaging camera to a computer using the FireWire protocol.

FireWire cable 6/6, 2 m [1910482]
This cable is used to connect a thermal imaging camera to a computer using the FireWire protocol.

USB cable Std-A to Mini-B, 1.8 m [1910423]
Can be used to transfer images from the camera to a computer using the USB protocol.

Video Cable RCA to RCA [1910484]
This cable can be used to transfer the images of the SC-Series thermal imaging cameras to a monitor.

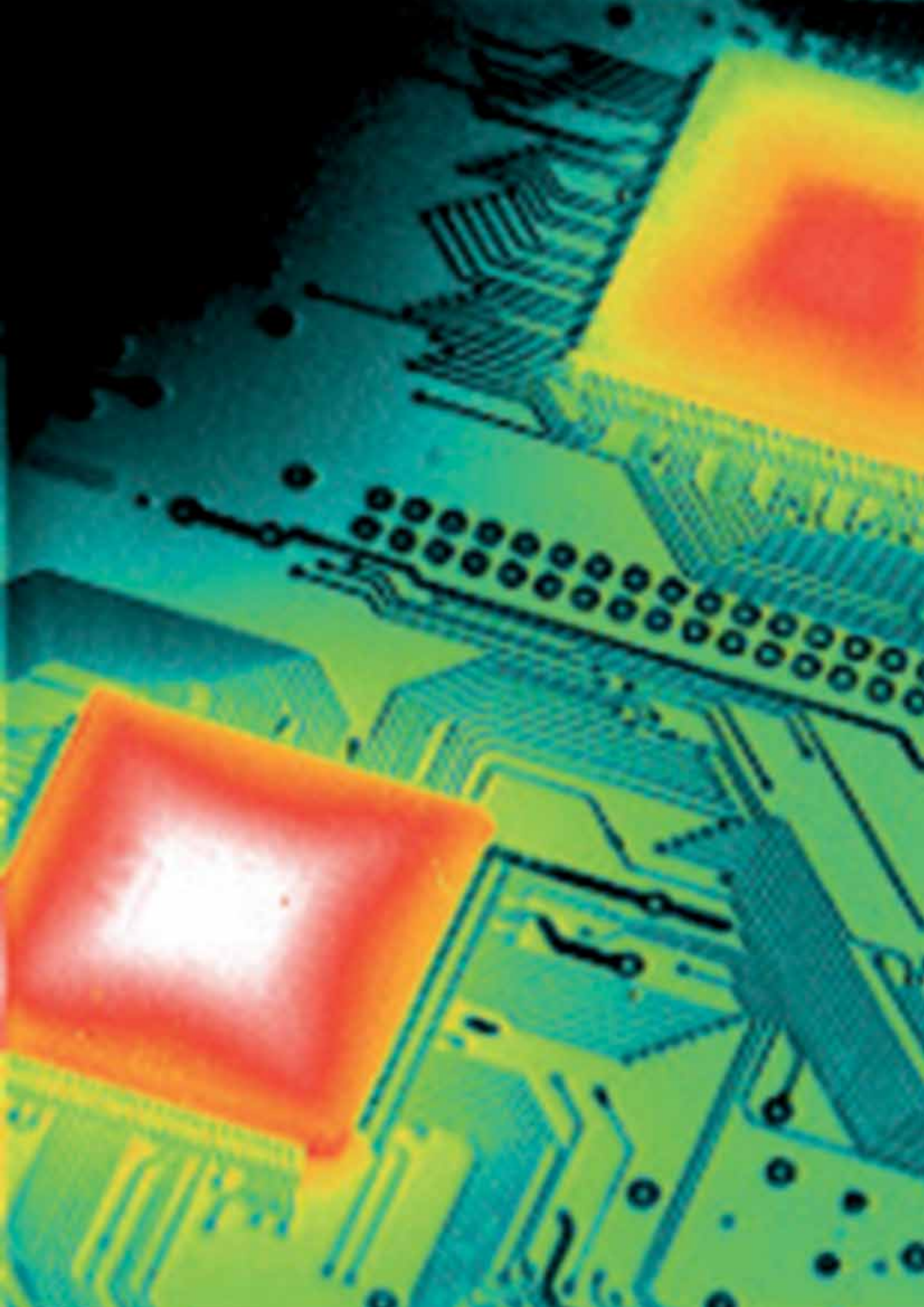
FLIR

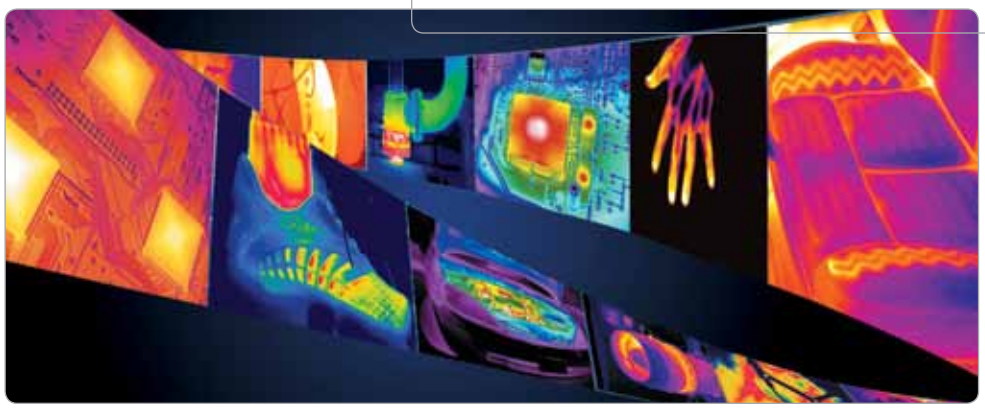
Export Licensing

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

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

December 2011. All previous catalogues are obsolete.





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Edition: December 2011
T820147(en-SV)_A