Cores and components
for thermal imaging applications

FLIR

Photon™

High-resolution infrared sensor in a small, light,
and affordable package

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Real Size

Photon with 19mm lens

Photon is a high sensitivity, high reliability, uncooled long wave thermal imager. The compact design of Photon makes it well-suited for OEM packaging and integration. The Photon has several lens options designed to meet most applications.

Excellent image quality

The Photon incorporates an uncooled Vanadium Oxide (VOx) focal plane array consisting of 324 x 256 pixels. This maintenance free system delivers crisp video images which can be displayed on virtually any monitor that accepts composite video. The focal plane array delivers outstanding image quality and sensitivity. The Photon detects temperature differences of 85 mK or less (< 35 mK when normalized to f/1.)

Choice of lenses

The photon is available with a 14.25 mm, 19mm, 35mm, 50 mm or 100 mm lens. Lenses are not interchangeable and must be specified at time of order.

Compact, easy to integrate

The Photon is a very compact and lightweight package. The core weight is only 97 grams, not including rear cover or lens. It can easily be integrated in small locations. The integrator can interface directly to the Photon's SAMTEC 30-pin electrical connector for power (in), video (out), RS-232 commands, serial digital data and other select functions. Optionally a 15-pin connector is available.

Advanced video processing

Photon supplies PAL analog video at 8.3 Hz or NTSC analog video at 7.5 Hz as a standard. Versions supplying 25 Hz PAL or 30 Hz NTSC are available, subject to obtaining a validated export license from the US Department of Commerce for use outside the USA. A choice of 8- or 14-bit digital video is output simultaneously with the analog format. The digital data protocol is serial LVDS. Video processing features include multiple automatic, dynamic image optimization algorithms, as well as polarity control (white-hot/black-hot), image-orientation control (invert / revert), and freeze-frame capability.

Wide operating temperature range

The Photon surpasses the requirements of the most demanding ambient temperature requirements with an operating temperature range between -40°C to +80°C.

Digital Zoom

The Photon core incorporates a 2x digital zoom feature. The center 160 x 120 pixels of the FPA are upsampled to the full 320 x 240 pixels image resolution. This enables close-up imaging at safe stand-off distances. Color look-up tables are also supported in the Photon.

Advanced image processing

The Photon contains an advanced Digital Detail Enhancement (DDE) video processing algorithm. This is a sharpening filter which aids in making edges and other image details more distinct in both night or daytime conditions.

No Thermo-Electric Cooler (TEC)

The Photon employs a novel combination of on-FPA circuitry and non-uniformity compensation (NUC) processing to eliminate the thermo-electric cooler (TEC). FLIR's patented approach to TEC-less operation enables the camera to operate over a wide temperature range while maintaining excellent dynamic range and image uniformity. Two significant benefits are realized from TEC-less operation: reduced power consumption and an "instant-on" capability. The time to image is less than 2 seconds - ideal for on-demand applications.

The Photon can be easily integrated for a wide variety of thermal imaging applications

14.25 mm lens

19 mm lens

35 mm lens

50 mm lens

100 mm lens

Software Developers Kit (SDK) to create applications for camera control and/or acquiring digital data

The Photon SDK enables customers to create their own applications for camera control as well as data acquisition using one of several interfaces. Languages supported include VB6, VB.net, C#, and C++ (MFC). Code examples are included to help illustrate how some of the functions can be used. The Photon SDK also works on Linux. There is an example in the SDK that works in the Linux environment. It has everything needed to write your own Photon control application.

Accessory Kit

The accessory kit provides an easy way to operate the Photon core until a more direct interface to the 30-pin SAMTEC connector on the back of the unit is developed by the end-user. The interface documentation to enable such connections is provided.

The kit consists of the following parts: Input/Output module, AC/DC power supply, line cord, interface cable, wearsaver connector, wearsaver cover.

Photon™

Technical specifications

IMAGING PERFORMANCE

Detector type	Focal Plane Array (FPA), uncooled Vanadium Oxide microbolometer 324 x 256 pixels
Spectral range	7.5 to 13.5µm

LENSES

	14.25 mm	19 mm	35 mm	50 mm	100 mm
Field of View	50° (H) x 38° (V)	36° (H) x 27° (V)	20° (H) x 15° (V)	14° (H) x 11° (V)	7° (H) x 5° (V)
	Lenses not interchangeable. Lens must be specified at time of order.				
Lens coating	High durability	High durability	Hard coated carbon	Hard coated carbon	Hard coated carbon
Spatial resolution (IFOV)	2.667 mrad	2 mrad	1.086 mrad	0.760 mrad	0.4 mrad

Thermal sensitivity	< 85 mK at f/1.6
Image frequency *	7.5 Hz (NTSC) or 8.3 Hz (PAL) *
Focus	Factory-set at infinity focus; lens thread mount allows focus adjustment
Electronic zoom	2x
Image processing	Digital Detail Enhancement (DDE).

IMAGE PRESENTATION

Video output	RS170 EIA/NTSC or CCIR/PAL composite video. Video format must be specified at time of order. 14-bit serial LVDS Data stream
Connector types	30-pin SAMTEC connector for video, power, communications and digital data 15-pin D-Sub connector optionally available

POWER

Requirements	5 - 24 V DC
Consumption	1.6 W Steady State

ENVIRONMENTAL SPECIFICATION

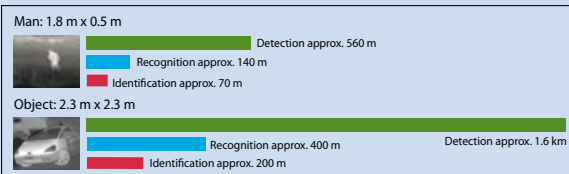|	
Operating temperature range	-40°C to +80°C
Storage temperature range	-50°C to +85°C
Humidity	Non-condensing humidity in the range 5% to 95%
Shock	70 g shock pulse with a 11ms half-sine profile
Vibration	4.3 g rms random vibration for 8 hours (three axes)

PHYSICAL CHARACTERISTICS

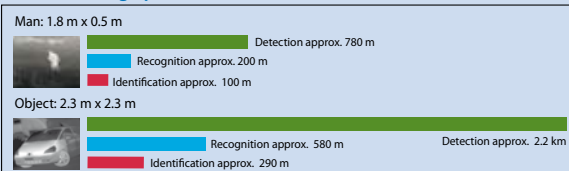|	14.25 mm	19 mm	35 mm	50 mm	100 mm
Camera weight (camera core + lens)	153 grams	130 grams	185.5 grams	225 grams	450 grams
Camera size (camera core + lens) L x W x H in mm	64.7 x 51.40 x 49.72	53.5 x 51.40 x 49.72	77.4 x 51.40 x 49.72	100.9 x 51.40 x 49.72	164.2 x 81.98 x 81.98

INTERFACES

RS-232	Command and control all functions

* 30 Hz NTSC or 25 Hz PAL available. Subject to approval of the US Department of Commerce for use outside the USA.

Photon: range performance 35 mm lens
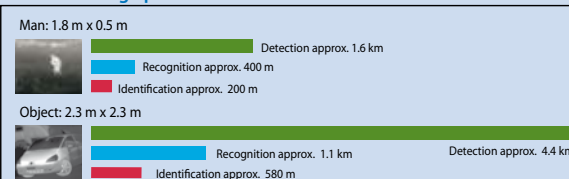
Man: 1.8 m x 0.5 m
Detection approx. 560 m
Recognition approx. 140 m
Identification approx. 70 m

Object: 2.3 m x 2.3 m
Recognition approx. 400 m
Detection approx. 1.6 km
Identification approx. 200 m

Photon: range performance 50 mm lens

Man: 1.8 m x 0.5 m
Detection approx. 780 m
Recognition approx. 200 m
Identification approx. 100 m

Object: 2.3 m x 2.3 m
Recognition approx. 580 m
Detection approx. 2.2 km
Identification approx. 290 m

Photon: range performance 100 mm lens

Man: 1.8 m x 0.5 m
Detection approx. 1.6 km
Recognition approx. 400 m
Identification approx. 200 m

Object: 2.3 m x 2.3 m
Recognition approx. 1.1 km
Detection approx. 4.4 km
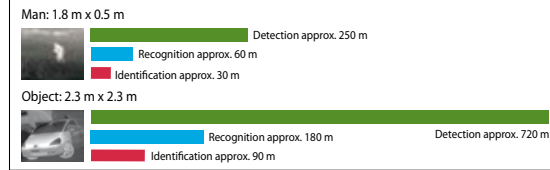Identification approx. 580 m

Actual range may vary depending on camera set-up, environmental conditions, user experience and type of monitor or display used.
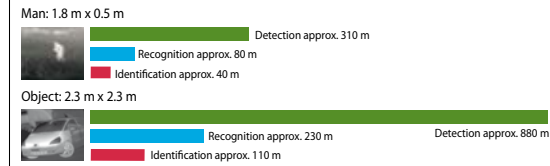
Assumptions:
50 % probability of achieving objective at specified distance given 2°C temperature difference and 0.85 / km atmospheric attenuation factor.

Photon: range performance 14.25 mm lens

Man: 1.8 m x 0.5 m
Detection approx. 250 m
Recognition approx. 60 m
Identification approx. 30 m

Object: 2.3 m x 2.3 m
Recognition approx. 180 m
Detection approx. 720 m
Identification approx. 90 m

Photon: range performance 19 mm lens

Man: 1.8 m x 0.5 m
Detection approx. 310 m
Recognition approx. 80 m
Identification approx. 40 m

Object: 2.3 m x 2.3 m
Recognition approx. 230 m
Detection approx. 880 m
Identification approx. 110 m

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