



ASCENDENT
TECHNOLOGY GROUP



Ascendent Thermal Imaging

Thermal cameras, unlike traditional visible cameras, use heat rather than light to see an object, giving them a huge advantage over other imaging technologies. Using minute differences in infrared (IR) radiation they produce a high-contrast thermal image in complete darkness. It is unaffected by bright light and has the ability to see through obstructions such as smoke, dust, and light fog. This makes thermal ideal for a number of applications including but not limited to surveillance & security search and rescue, fire, marine and land navigation, machine vision, and wide-area situational assessment.

Everything above absolute zero (-273°C) emits thermal IR radiation. Thermal cameras convert this into a digital image that can be displayed, distributed and recorded. Humans, animals, and vehicles are very hot in contrast to a background making them easily detectable by a thermal imaging camera, even at distances up to 30km. This technology gives you state-of-the-art protection that can be used in the most demanding applications where the limitations of traditional CCTV and camera technologies just cannot compare.

IR radiation passes through smoke, dust, modest foliage, and light fog with ease, making a person clearly visible even in the worst lighting conditions. Thermal energy is passive and, unlike other technologies, does not artificially increase light or require illumination for clean crisp images both day and night for detection of intruders at extreme rang-

es. Ascendent's thermal cameras let you see further than any other night vision technology. There are also certain situations where thermal imaging can be better than regular CCTV cameras even during the day. CCTV cameras can be rendered useless by direct or reflected sunlight, and they rely on contrast in order to identify a intruder. In areas where

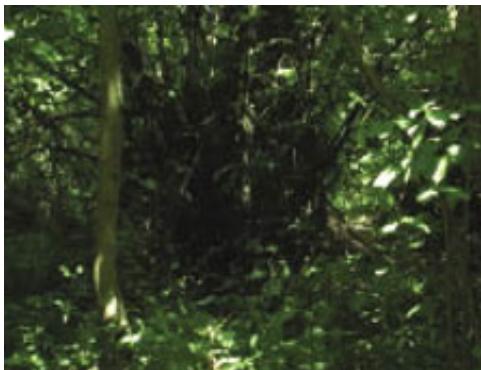
Ascendent's thermal imagers come in a variety of housings to suit your application.



Even in complete darkness, thermal imaging cameras give you perfect night vision.

contrast is poor, visible cameras can be rendered useless. Since humans always give off much more thermal energy than their environment they are easily picked up by video analysis software or human viewers. Trespassers hiding in shadows or bushes are easily spotted, providing maximum protection of your assets.





Person in foliage, regular CCTV and thermal image comparison

Since the Cooler has to constantly maintain temperatures often below freezing point, the cryogenic cooler is continuously running and requires replacement every 8000~10,000 hours of operation. This makes cooled cameras have a much higher cost of ownership compared to standard uncooled thermal cameras.



A foggy day, regular CCTV and thermal image comparison

Since cooled thermal IR cameras are so sensitive to minute temperature differences, they can spot a target with only a few degrees temperature difference than its background. They work on Mid-Wave Infrared (MWIR) and typically use wavelengths of 3-5UM (3000nm ~5000nm). The combination of the cooled image core and the ability to work on the MWIR spectrum, when used with Ascendent's long-range optics, means ultra-long range detection capabilities (up to 20 miles or 30km) even if there is only a few degrees temperature variance between the target and background.

Why Thermal?

Thermal cameras are ideal for detection because they use heat rather than light, meaning they require no artificial illumination. They are able to take advantage of the full view, allowing them to offer both wide-angle and long-range imagery. Thermal cameras offer numerous advantages and cover a host of applications and industries. One camera can replace many traditional cameras and reduce the need for motion and intrusion detectors. This allows them to actually reduce

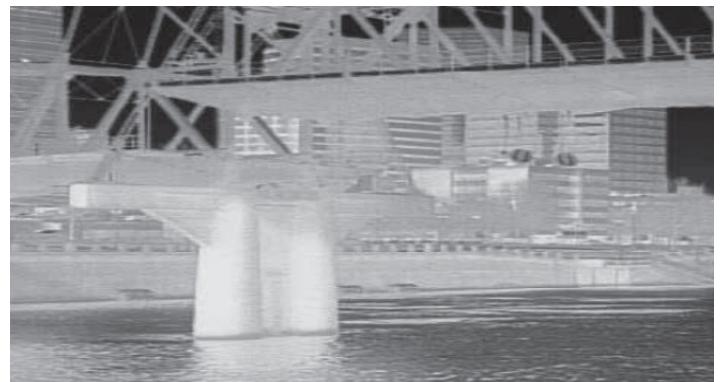
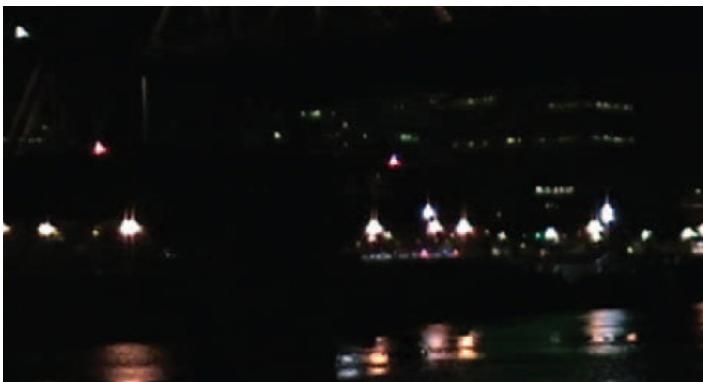
equipment and installation costs on projects while enhancing security and effectiveness.

Cooled Thermal

Cooled thermal imaging cameras are a thermal camera with an integrated cryocooler, hence the name cooled camera. The cooler brings the thermal image core to temperatures as low as -40C. Since thermal cameras work by using heat waves, cooling the core exponentially increases the sensitivity. This dramatically increases both range and performance.

While cooled cameras are a significant investment and are considerably more expensive than uncooled, their superior range and performance allows

Marine navigation, regular CCTV and thermal image comparison



them to replace up to 8 uncooled cameras, making them a viable and cost effective solution for certain applications such as home land security, and coastal surveillance.

Uncooled Thermal

Uncooled thermal imaging cameras are infrared cameras that do not require cryogenic cooling. A common detector design is based on the micro bolometer, a tiny vanadium oxide resistor with a large temperature coefficient, a silicon element with large surface area, low heat capacity, and good thermal isolation. Changes in scene temperature cause changes in the bolometer temperature which are converted to electrical signals and processed into an image.

Uncooled sensors are designed to work in the Long-Wave Infrared (LWIR) band from 7-14UM (7000nm-14000nm) the wavelength where terrestrial temperature targets emit most of their infrared energy. Uncooled cameras provide up to 8km of detection and have no maintenance cost making them account for over 80% of all thermal cameras due to their low price and high value compared to cooled cameras.

Pan-Tilt Zoom (PTZ)

A vast majority of cameras installed are what the industry calls "fixed." These are designed to monitor a specific region of interest and do not have the ability to adjust the lens or the position of the camera. Ascendent offers PTZ systems, allowing



Cooled thermal cameras give much higher contrast

you to pan, tilt, and zoom the camera in any direction for wide area coverage. These systems can be controlled remotely via an operator or set for automatic tours. These features, integrated with intrusion detection, make them extremely versatile. When properly installed, one PTZ camera system can effectively replace many fixed ones and add flexibility to your security system.

Multi-Sensor Systems

Thermal imaging systems boast a variety of advantages, but because they use passive heat radiation they only have the ability to render im-

ages in 256 grey scale. Visible cameras operate on the same spectrum as the human eye and reproduce images with up to 16.7 million colors, allowing you to identify a target rather than just detect and classify it. When there is sufficient amounts of light visible cameras often have larger zoom lenses to optically zoom on a target with focal lengths over 2000mm. This is why Ascendent designs and manufactures multi-sensor systems that use both thermal and visible CCTV cameras to leverage the advantages of both in one integrated system.



Night Vision

Thermal