

TECHNICAL NOTE



ULTRAMAX – THE ULTIMATE RESOLUTION

FLIR's new UltraMax technology is a unique image processing technique that allows you to generate reports with images that have four times as many pixels, and 50% less noise, so you'll be able to zoom in on smaller targets and measure them more accurately than ever.

UltraMax is an image enhancement technology on FLIR's T-Series cameras (except on the T600) that captures a series of thermal images and combines the data into one new image. The result is an impressive quadrupling of thermal pixels, including full radiometric measurement data. A 320 x 240 resolution T-Series camera using FLIR UltraMax can now produce true 640 x 480 images. Likewise, native 640 x 480 T-Series camera images can be converted to up to a 1.2 megapixel image with UltraMax.

As a result, UltraMax thermal images will be clearer and larger, allowing for a better analysis of small details. Because of an increased number of pixels covering the same

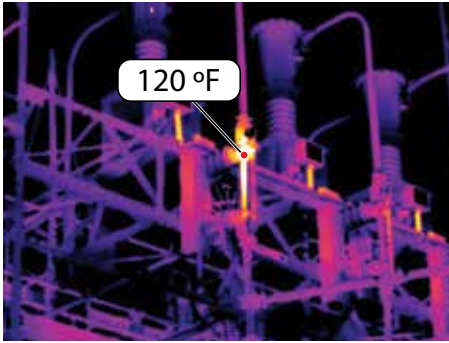
target area, UltraMax also decreases measurement spot size. This gives greater measurement accuracy to particularly small details. The cameras from the T-Series have been the most popular advanced FLIR thermal imagers for years. With the new UltraMax feature, users can obtain even better results, allowing them to be even more productive.

UltraMax explained

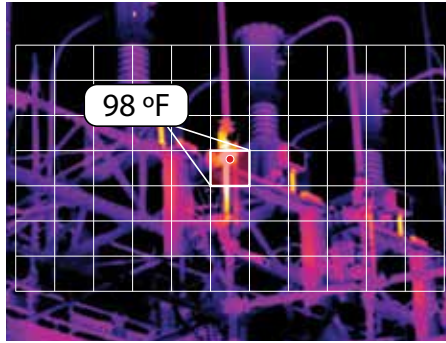
UltraMax is a type of superresolution, a technique for combining the information from multiple original images into an image with higher resolution and less noise. This might seem similar to two other scaling techniques – interpolation and pixel averaging. However, they are totally different.



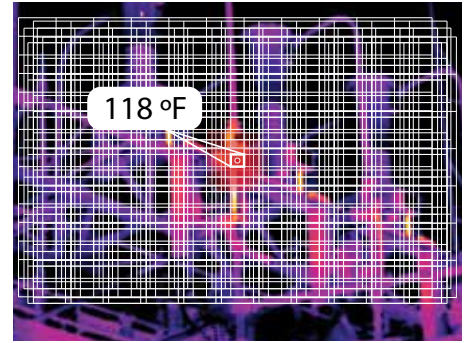
UltraMax is available on most FLIR T-Series cameras



The actual target is 120°F



The first reading in the native resolution is 98°F. This reading is limited based on how small or far away the target is in relation to the spot size of the single native image.



During natural movement, UltraMax gains more "pixels on target", resulting in a reading of 118°F, much closer to the true temperature (a 20° difference in this example)

UltraMax uses the natural movement of the human body to capture an image set in which each image is slightly offset from the others. This results in a wealth of data that is much greater than any one image could provide. The data is combined to form an image that includes many more pixels of the target, resulting in a resolution greater than that of the original camera detector. The data is also used to create a clearer image, since pixel noise can be reduced through comparing similar points in multiple images.

FLIR UltraMax captures 16 thermal images in less than one second. These are stored on the camera as a single jpg file, and will appear as one image when viewed on the camera or in software. In the FLIR

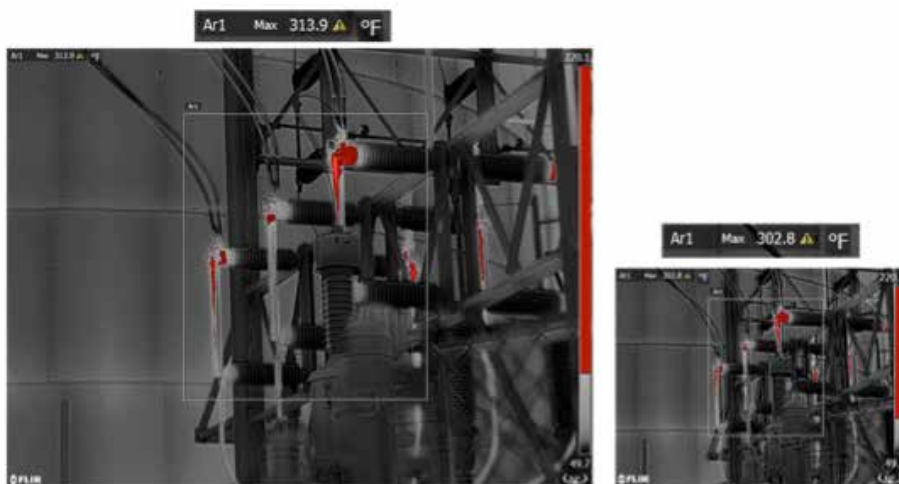
Tools environment, you can choose to enhance the image resolution. This is the UltraMax functionality. The enhanced image will have twice the original resolution and four times as many pixels. All pixels still include radiometric data, just as with normal FLIR thermal images.

As a result, UltraMax thermal images will be clearer and larger, allowing better analysis of small details. Because of an increased number of pixels covering the same target area, UltraMax also decreases measurement spot size. This gives greater measurement accuracy to particularly small details. For instance, a FLIR T420 has a resolution of 320 x 240, yielding 76,800 total pixels. An UltraMax image from the T420 will have a

resolution of 640 x 480, for a total of 307,200 pixels. The FLIR T620 with UltraMax for example, will result in a 1280 x 960 resolution for a full 1.2 mega pixels. UltraMax can be toggled on or off as desired from within the camera settings menu.

Limitations

There are some conditions in which UltraMax will not be able to enhance an image. Too much movement from the user or the target while the images are being captured will result in an image set that cannot be aligned. Similarly, if the thermal camera is mounted on a tripod, it will have too little movement, and the images will not have the necessary offset. FLIR Systems recommends simply holding the camera steady with two hands when capturing the images. A scene with uniformly low contrast, or images being out of focus may also impede the enhancement process.



In this example, the temperature using UltraMax shows as 313.9°F versus the native T640 image which shows the same target as 302.8°F. Sometimes that difference could be the deciding factor in whether to consider further investigation and repair.

For more information visit
www.flir.com/t-series

The images displayed may not be representative of the actual resolution of the camera shown. Images for illustrative purposes only.