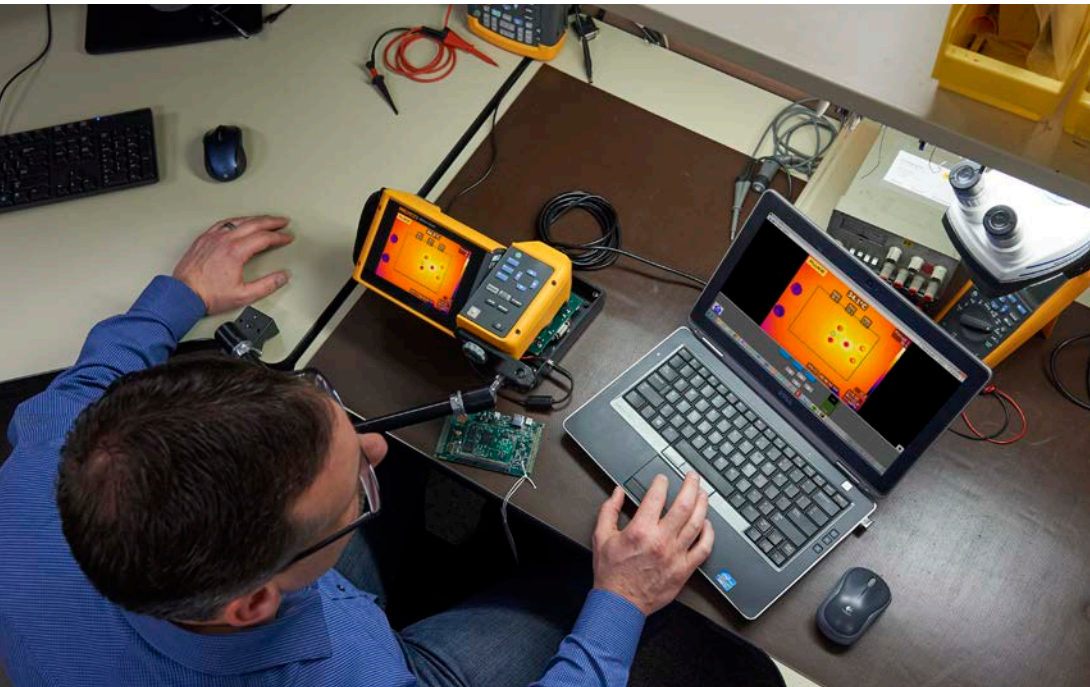


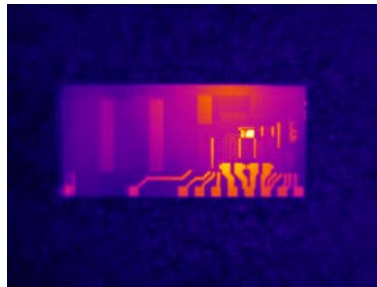
APPLICATION NOTE

# Find circuit board hot spots at the design stage with a high resolution infrared camera

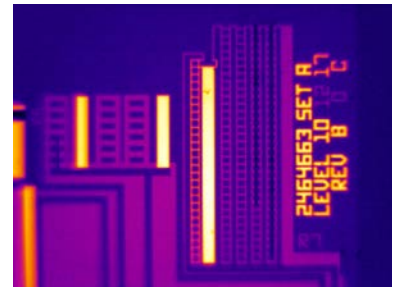
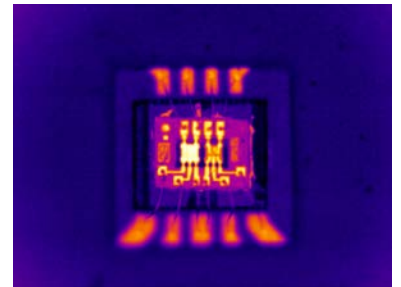


Printed circuit boards (PCBs) are an integral part of a growing number of products. As electronic devices get smaller and thinner, so do the circuit boards that power them. At the same time those circuit boards need to be rugged and reliable, to mechanically support electronic components and connect those components via conductive pathways, called traces. Design engineers need to ensure that their designs will work in real life situations, so stringent prototype testing is crucial.

Infrared cameras can be very effective for testing prototype PCBs because they can detect subtle temperature differences between very small components and current traces without touching the target board in most applications. These temperature differences can indicate a weakness or potential fault in the design. Using a non-contact infrared camera to measure performance or changes in thermodynamic properties of board components can help eliminate variations that might be introduced by a contact temperature device such as an RTD or thermocouple. As a result, inspecting PCBs with an infrared camera can help improve quality and expedite design and production.



This precise resistance chip was scanned with a standard lens on a Fluke TiX560 Infrared Camera.

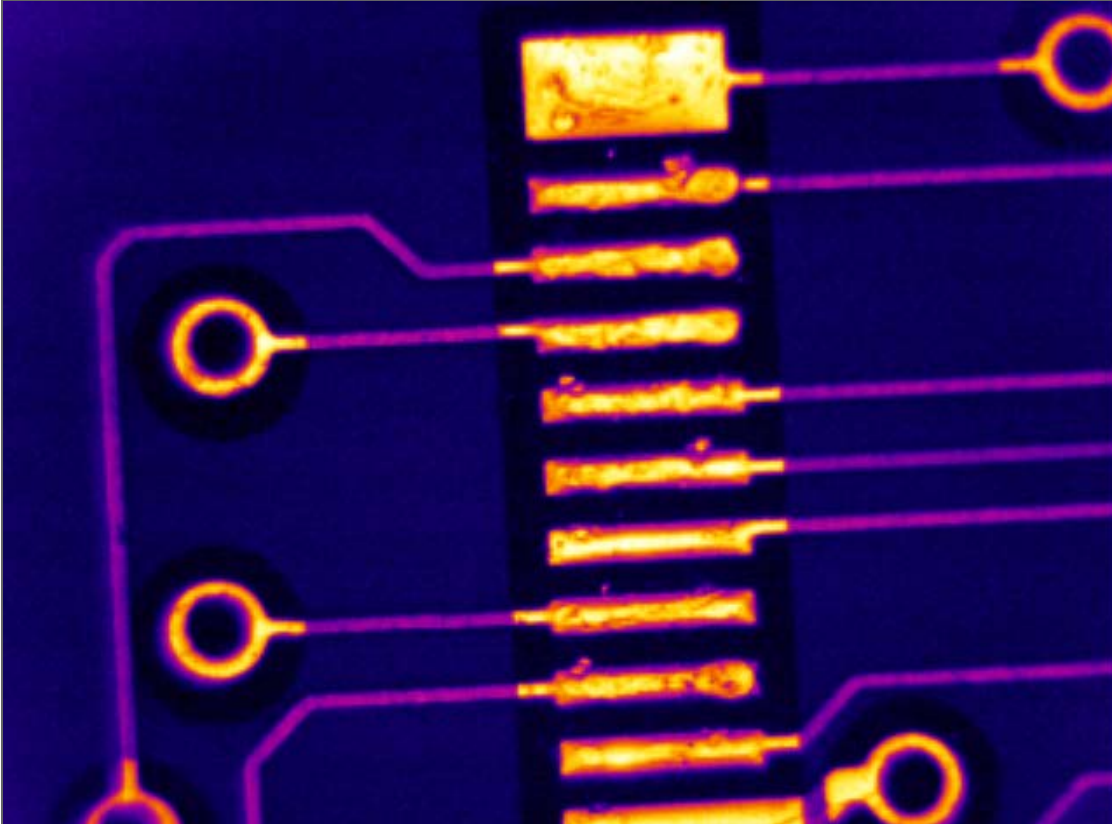


This image captured with a TiX560 and a 25 micron macro lens shows much more pattern detail in the precise resistance chip than could be seen with the standard lens.

## Top THREE

### Circuit board applications

1. Comparing component temperatures
2. Analyzing component load
3. Establishing production processes



However, not all infrared cameras or infrared lenses are the same. Make sure you use a camera and a lens that offer the spatial resolution and thermal sensitivity needed to help ensure the needed level of detail. While standard lenses are useful for viewing the thermal performance of a PCB, they only provide general indicative thermal information on smaller components. A macro lens—in particular a 25 micron macro lens—brings improved spatial resolution and the ability to show temperature differences in details as small as 25 microns. That's smaller than the average human hair.

Fluke now offers a 25 micron macro lens that, when paired with Fluke TiX560 and TiX520 infrared cameras, provides a level of thermal detail that helps you identify problems that you wouldn't be able to catch with a standard lens.

### **Reviewing PCB heat patterns to improve your design**

Fluke TiX560 and TiX520 infrared cameras with a Fluke 25 micron macro lens can be used to test circuit boards at every stage of development, as well as in production. By detecting temperature differences between components, these infrared cameras can analyze circuit performance and help detect potential faults in the design stage. For example:

#### **Comparing component temperature**

Thermal issues are a major cause of circuit board failure. After populating a prototype board, you can power up a board to the specified level for the finished product and monitor the results using a Fluke TiX560 or TiX520 series infrared camera with a 25 micron macro lens. The 640 x 480 resolution in SuperResolution mode on the TiX560,

combined with image sharpening, low NETD, and the ability to see far smaller details than a standard lens, enhances your ability to identify very slight temperature differences between very small components and their connection points. That information can help you determine any design modifications needed. After modifying the design you can rescan the board to ensure that the problem is resolved.<sup>2</sup>

#### **Analyzing component loads**

If a PCB is to be used in a battery powered portable device it is important to minimize power consumption. Using a TiX560 or TiX520 and a macro lens you can identify components using substantial power to help determine if they are within specifications.

#### **Establishing production processes**

You can use the large storage and radiometric video capabilities on the TiX560 to record thermal images and/or video of various manufacturing processes, such as solder point cooling so that you can set optimum cycle times for automated systems. You can also run quality review scans with the TiX5XX cameras at various stages of the manufacturing process to find issues that might lead to component failure down the road.



## Fluke TiX560 and TiX520 infrared cameras provide the first line of defense

The new Fluke TiX560 and TiX520 Expert Series Infrared Cameras provide a unique set of capabilities to help you quickly identify potential issues and keep you up and running.

- 1 **Ergonomic 180° articulating lens** gives you maximum flexibility and makes it easy to navigate over, under, and around objects so you can see the image before you capture it. It allows you to verify that the image is in focus before you record it, unlike a pistol-grip camera that can be very difficult to focus when you're in an awkward position. This allows technicians to work in more ergonomically agreeable positions for all day use.
- 2 **The only 5.7 inch responsive touchscreen** in its class<sup>1</sup> delivers 150%<sup>2</sup> more viewing area to make it easy to see even subtle changes and details right on the camera. Quickly finger scroll through saved thumbnail images on the screen, zoom in and out, and access shortcuts to save time and increase productivity.
- 3 **Enhanced image quality** and temperature measurement accuracy allow you to increase 320 x 240 images to 640 x 480 in SuperResolution mode to find subtle anomalies faster.
- 4 **LaserSharp® Auto Focus** at the touch of a button takes the guesswork out of precision focus. The built-in laser distance meter calculates the distance to your designated target and then automatically focuses to produce the optimum image.
- 5 **Image Sharpening** reduces fixed pattern noise to create sharper images, particularly in high temperature environments. (On TiX560 only)
- 6 **Filter mode** achieves Noise Equivalent Temperature Difference (NETD) as low as 30 mK to detect very slight temperature differences.
- 7 **Hot and cold spot markers** highlight the hottest and coldest pixels on the image and displays their temperature values at the top of the screen for quick identification of anomalies.
- 8 **On-camera storage, editing, and analysis** allow you to store thousands of images in memory and bring them up in the field to edit, add digital images, text or voice annotations, and analyze right on the camera.
- 9 **Fluke Connect®** wireless compatibility enables you to see, save, and share live video, still images, and measurements with team members who have the Fluke Connect™ mobile app on their smart phones. Just push the shortcut button to connect.

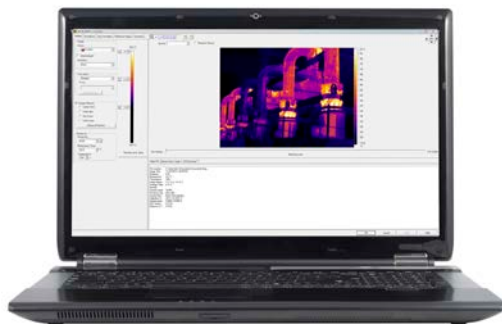
<sup>1</sup>Compared to industrial handheld infrared cameras with 320x240 detector resolution as of October 14, 2014.

<sup>2</sup>Compared to a 3.5 inch screen.



**See and share more results at one time with Fluke Connect® wireless capabilities**

The Fluke TiX560 and TiX520 cameras are Fluke Connect-enabled so you can transmit images and measurements from the cameras to smart phones or tablets that have the Fluke Connect\* mobile app. In so doing you can share results with authorized team members and thus enhance collaboration and help resolve problems faster.



With SmartView® software, included with Fluke infrared cameras, you can run additional analyses and document findings in reports that include thermal and visible light images, and measurement data. You can adjust most parameters on the stored image, including emissivity, color palette, and level/span, just to name a few.

Fluke Connect® is not available in all countries.  
\*Within providers wireless service area.

**Work faster and easier**

Unexplained hot spots could mean trouble for your operation. A high resolution infrared camera is the fastest way to get a clear, accurate view of those problems. Fluke TiX560 and TiX520 Expert Series cameras deliver the image resolution, thermal sensitivity and accuracy and ergonomic design to help you find those hot spots before they cause major damage.

To find out more, consult your Fluke sales representative or visit for more information.

**Fluke. Keeping your world up and running.®**

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