



# *Elevated Body Temperature Detector*

## *Application Note*

A global emergency like the Corona virus requires a fast response to prevent further spread and infection. Global medical professionals are working around the clock to stop the virus, and we here at Seek Thermal, global leaders in thermal imaging technology, are here to join the fight by showing you how to use our existing products as front line preventative screening tools.

Speed is important in a crisis like this, and the wide utility of thermal imaging allow us to respond quickly and provide valuable screening technology.

A lesson learned from the SARS outbreak of the last decade is that early detection of elevated body temperature is a first step toward identifying people who may be ill. Seek Products provide an adjunctive diagnostic tool that can detect elevated body temperature at distance. Non-contact, non-invasive screening technology is essential to efficient screening and limited contact with potentially infected people.

Infrared screening has long been used to detect soft tissue injuries that can be measured by body temperature. This combined with the increased need for febrile screening after reckoning with both SARS and H1N1 influenza has kicked off several studies examining the efficacy of using thermal imaging for measuring body temperature. The article “Comparison of 3 Infrared Thermal Detection Systems and Self-Report for Mass Fever Screening,” (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3294528/>) published in 2010 demonstrates that thermal imaging can serve as a fast, non-invasive way to detect elevated body temperature.

Thermal imaging cameras are designed to detect and display differences in temperature. While thermal cameras do provide a spot temperature reading, please remember that these are adjunctive tools and function best as front-line screening in your larger screening process. Seek Thermal cameras provide reliable displays of subtle differences in temperature, and this document will explain how to detect elevated body temperature by comparing a person to a known reference point.

To conduct your evaluation, point the camera at a person with one of the following reference points also in the frame:

**Option 1:** Include another person in the frame

**Option 2:** Include a calibrated blackbody in the frame

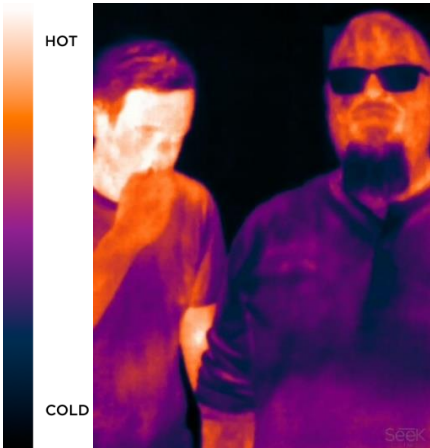
### EVALUATION OPTION ONE

**Include a person with normal body temperature in the frame as a reference point.**

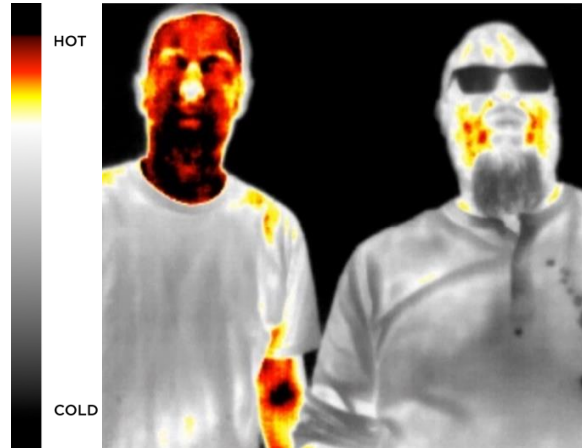
This is the simplest way for anyone to conduct the evaluation using only a Seek Thermal camera. If someone has elevated body temperature their skin will be displayed warmer than the person with normal body temperature. It is important to keep your subjects the same distance from the camera as

for the most accurate comparison. Distance is an important factor when scanning large groups of people at the same time.

### Body on Left Side of Scene is Warmer than the Body on the Right



In the above image warmer temperatures are displayed with lighter colors, while cooler temperatures are displayed with darker colors. This shows that the person on the left has warmer body temperature than the person on the right.



In the above image warmer temperatures are displayed in color. This shows that the person on the left has warmer body temperature than the person on the right.

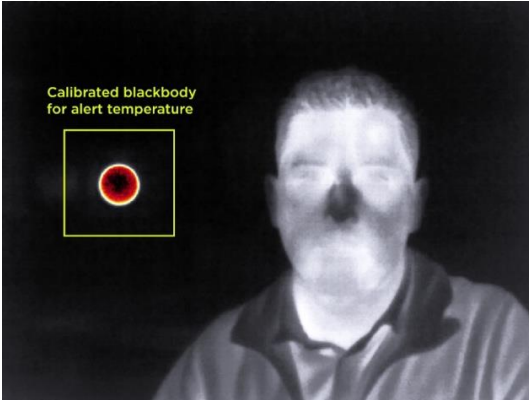
## EVALUATION OPTION TWO

### **Include a calibrated blackbody set at elevated body temperature in the frame as a reference point.**

This method is preferred for more precise evaluation in places like airports, hospitals, and public transportation hubs. Many different factors in addition to distance can affect temperature readings such as ambient temperature, sweat, facial hair, and glasses to name a few. It is best practice to eliminate as many variables as possible. Adding a known and constant temperature source, like a calibrated blackbody, to the scene makes it easy to determine if someone is hotter, cooler, or same as the blackbody temperature.

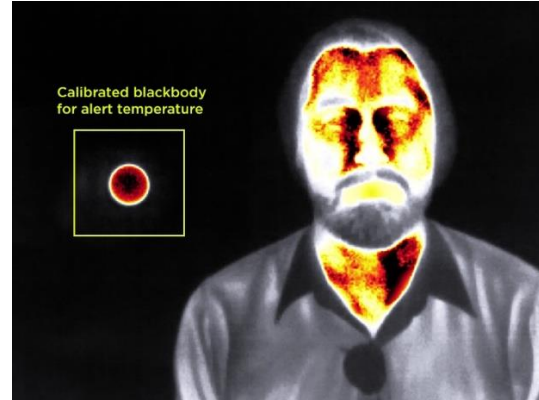
**NOTE:** A blackbody is a calibrated temperature emitter used regularly in Thermal Imaging. It can be set to emit thermal radiation at varying temperatures and will hold that temperature consistently over time

In the below images a blackbody was set to just above normal body temperature and the camera filter was configured to display that temperature in color.



**Displays Normal Body Temperature**

The person in the image above is not displayed in color and therefore does not have elevated body temperature.



**Displays Elevated Body Temperature**

The person in the image above is displayed in color and therefore may have elevated body temperature.

### EXAMPLE USING A SEEK COMPACT

The Seek Compact is designed to work with your smartphone and is the lowest cost solution from Seek. You can use any of the three models: Compact, CompactXR or CompactPRO, however we recommend the CompactPRO for this application based on its resolution, field of view and Span & Level feature. [Learn more about pricing and specification on the website.](#)



Compact



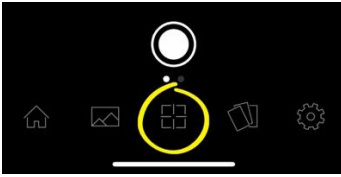
CompactXR



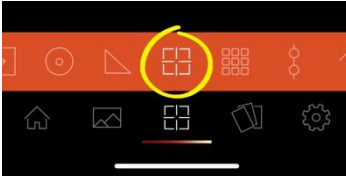
CompactPRO

1. Attach the camera to the phone's charging port
2. Open the Seek Thermal App

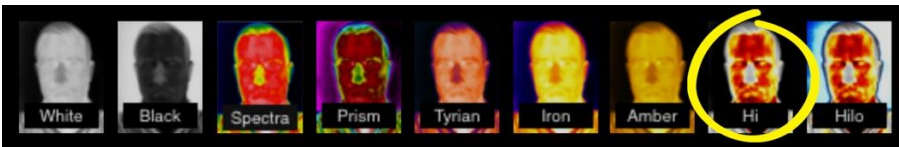
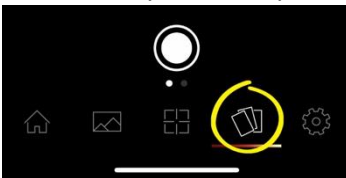
3. Select the 'Tools' Icon to open tools drawer (Crosshair Icon)



4. Select 'Normal Mode' Icon (Crosshair Icon again)



5. Select the 'Filters' Icon and scroll to the right to select the 'Hi' Icon. Any filter will work but we have found "Hi, Tyrian and Spectra" work best in this application.



6. Frame your subjects and make the evaluation.

**Note:** The above process works in much the same way for the [Reveal](#) and [SeekShot](#) products. The user interface will be different for those products but they will work with the same process and provide the same level of effectiveness.



## Interpreting the 'Hi' filter

This filter will always colorize the warmest part of the scene red. In the setup below a person with normal body temperature is standing in a temperature-controlled room, 3m in front of a Compact Pro and Android device running the Seek Thermal App. A warmer body enters the scene and stands next to the original subject as indicated below. This illustrates how to use two bodies to set a reference point to display elevated body temperature.



### Body is Warmest Part of Scene

The person in the image above is standing in front of a wall. The person's skin and face are highlighted in red because that is the hottest part of the scene.



### Body on Left Side of Scene is Warmer than the Body on the Right

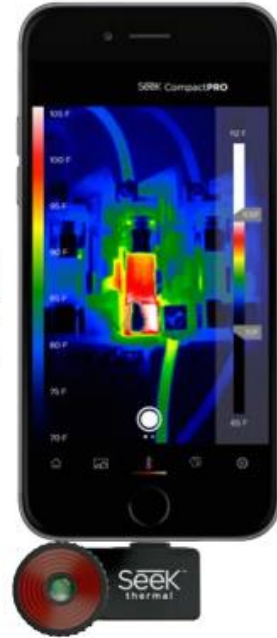
A second person enters the image and stands next to the original person in front of the same wall. The second person who enters the scene turns red, while the original person turns white indicating that person on the left may have a warmer body temperature than the person on the right.

## SPAN & LEVEL FEATURE – AVAILABLE WITH COMPACTPRO, REVEALPRO & SEEKSHOT PRODUCTS

Some of Seek Thermal's products have a Span & Level feature where you can set the temperature range for color. Setting the color temperature range just above normal body temperature is another fast and easy way to screen for people who have a warmer body temperature.

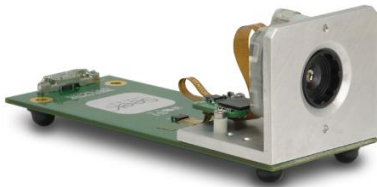
1. Pick the color palette for your preference
2. Make sure your source or subject is in the image when selecting the Span & Level Mode as the temperature range will be set using the temperature range in the scene.
3. Select the Span & Level Icon
4. Use the slider on the right and adjust the upper and lower limits accordingly

Easily set and lock a temperature range to display the maximum thermal information of any object or scene with a set point and range.



## EXAMPLE USING A SEEK OEM CORE

All Seek Thermal's [OEM camera cores](#) can be used to as Elevated Body Temperature Detectors using Seek's Linux, Windows, and Android SDKs. Using a Seek Thermal OEM Starter Kit and a Windows PC an Elevated Body Temperature system can be installed and running in minutes.



1. Download and install Seek Thermal's Simple Viewer for Windows onto a Windows PC and the Seek Thermal USB driver.
2. Plug in your Seek Thermal Starter Kit
3. Start the Windows Simple Viewer, Select the Seek Thermal Core from the Drop Down, and Press Start.
4. Select the Hi LUT from Display LUT Drop Down



In the image above the 'Hi' LUT, where the hottest part of the scene is shown in color, which indicates that the person on the left is warmer than the person on the right.