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Image Quality in Thermal Imaging Systems: RESOLUTION

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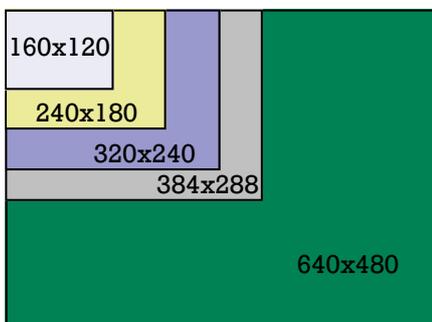
Thermal Imaging Detector

A Thermal Imaging Detector is the heart of every thermal imaging device. It is commonly known as "Thermal Core" or FPA (Focal Plane Array) and consists of tens of thousands of tiny sensors - microbolometers. Each sensor has a rectangular shape and changes its electrical resistance depending of wavelength of infrared radiation it catches. The resistance change from every microbolometer is then electronically processed and used to generate a thermal image.

Resolution

Resolution of a thermal imaging device is its performance parameter which is determined by how many microbolometers (or pixels) its FPA contains. Thermal detectors come in various configurations: 160x120, 240x180, 320x240, 384x288, and 640x480 pixels. It is easy to calculate that the total number of sensors for 640x480 detector is 307200, while a 160x120 FPA contains 16 times less pixels: only 19200.

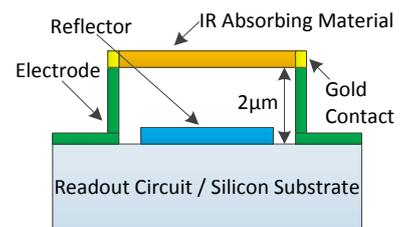
A single microbolometer is really small: for a 384x288 detector its size is 25 microns and only 17 microns for a 640x480 FPA - it is 4 times smaller than average thickness of human hair. Naturally, an increase of pixel density to achieve higher resolution results in a crispier and more detailed thermal image. From the diagrams below this statement becomes particularly obvious.



Relative pixel number comparison for thermal detectors with different resolution. The thermal image on the right was taken through a high-resolution FPA (640x480) and a front lens with low f-number ($f/1.0$)

Special points of interest:

- Thermal Imaging Detector (FPA)
- Resolution of a Thermal Detector
- Dare to Compare Leading Brands' Image Quality to GSCI's?



Schematic cross-section of a single microbolometer ("pixel") of a thermal imaging detector.



Nature has equipped some snakes with their own thermal imaging devices: they have infrared vision that enables them to sense heat emitted by objects regardless of ambient lighting.

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Dare to Compare?

From this newsletter you have learned (or refreshed in your memory) about the essential part of a thermal imaging device: Thermal Detector and its significant characteristic: resolution.

Next time we will be covering another important parameter of thermal imaging systems: thermal sensitivity. *Meanwhile we invite everybody to compare characteristics of GSCI thermal imaging systems to those from the next leading brands.*



References:

1. <http://en.wikipedia.org/wiki/Microbolometer>
2. http://en.wikipedia.org/wiki/Staring_array



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