

Thermal Imaging

How it Works?

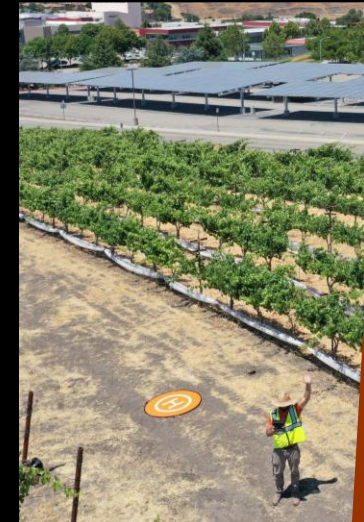
Thermal cameras detect **heat energy, not temperature**. This is a fundamental concept.

Heat (called *infrared*, or *thermal*, energy) and **light** are both parts of the electromagnetic spectrum

- A thermal sensor detects ***long wave infrared*** that causes a special resistor (**microbolometer**) to heat up, this temperature change is measured as electrical resistance and processed into an image.



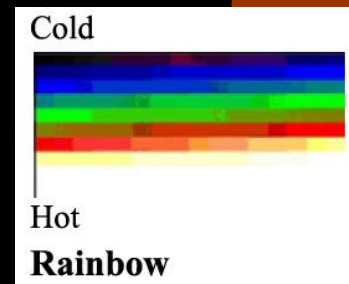
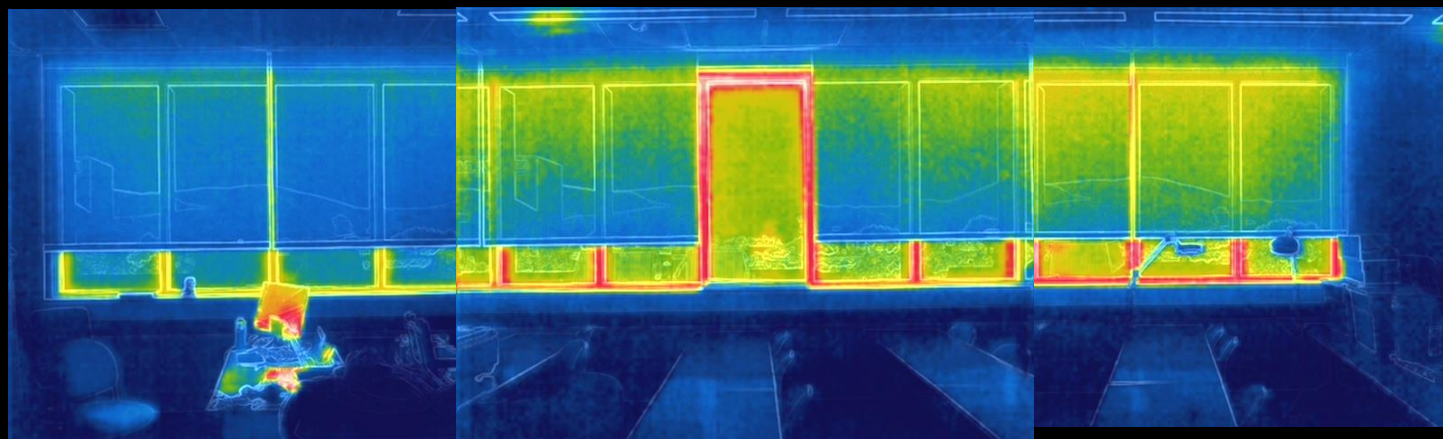
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Thermal Imaging



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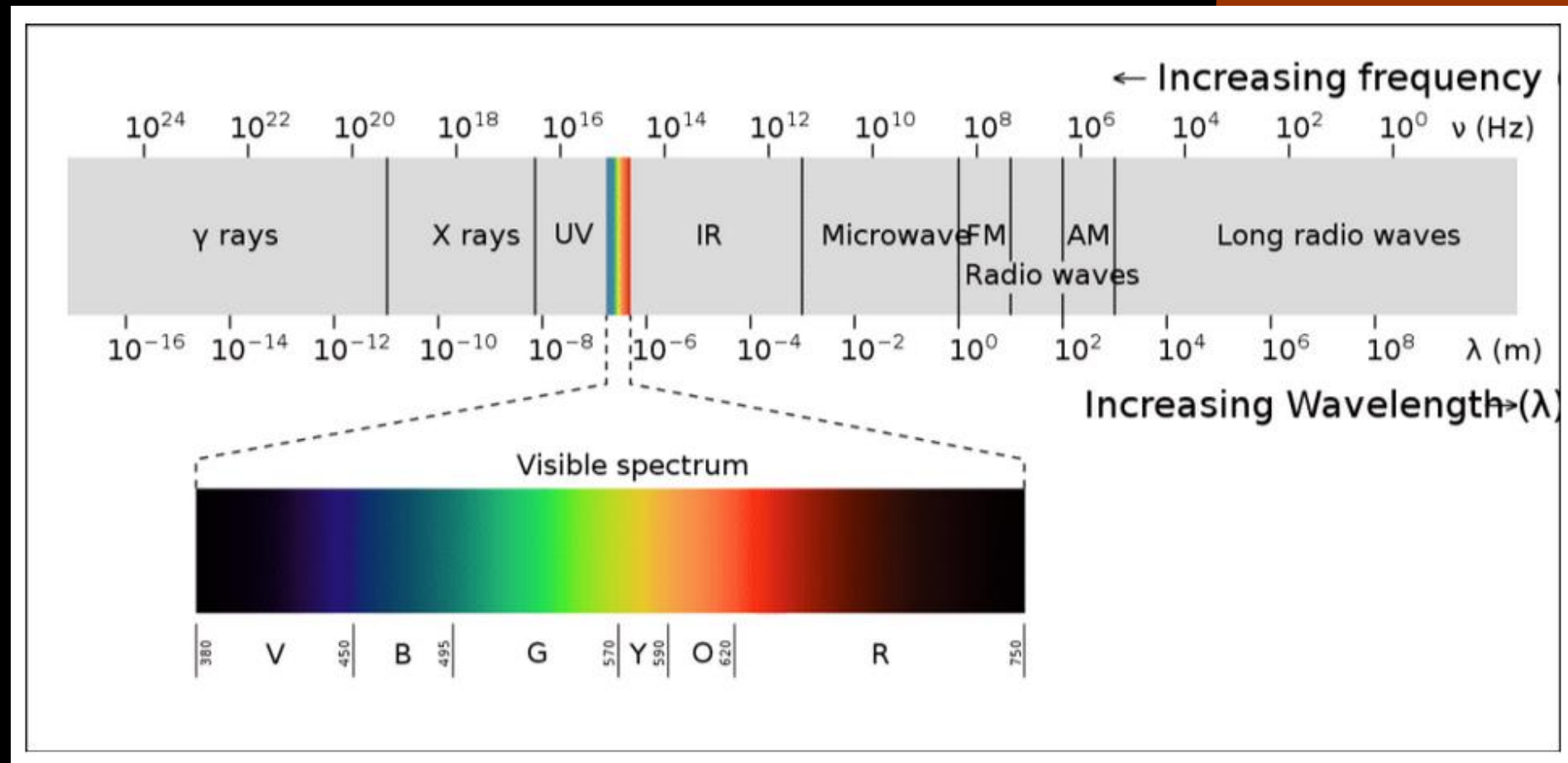
Rainbow

Thermal Imaging

At the most basic level. It senses infrared radiation (IR), a wave from 1 to 14 micrometers on the electromagnetic spectrum.

Unlike visible light, which ranges from 0.4 to 0.7 micrometers in wavelength, infrared waves cannot be seen by the human eye.

Rainbow



Color Palettes



- The drone has many **preset color palettes** for different scenarios.
- There is the ability to preselect a custom range if needed.

Thermal Imaging



Thermal Imaging

Friction Creates Heat

**Rub your clothes
back and forth
quickly**

Thermal Imaging

Thermal Imagery: It's a trickster

*Visible Light and Thermal Light do not
act the same*

Thermal Imaging

Thermal Imagery: It's a trickster

It can

1. Emitted

Or

1. Reflective

Thermal Imaging

Thermal Imagery: It's a trickster

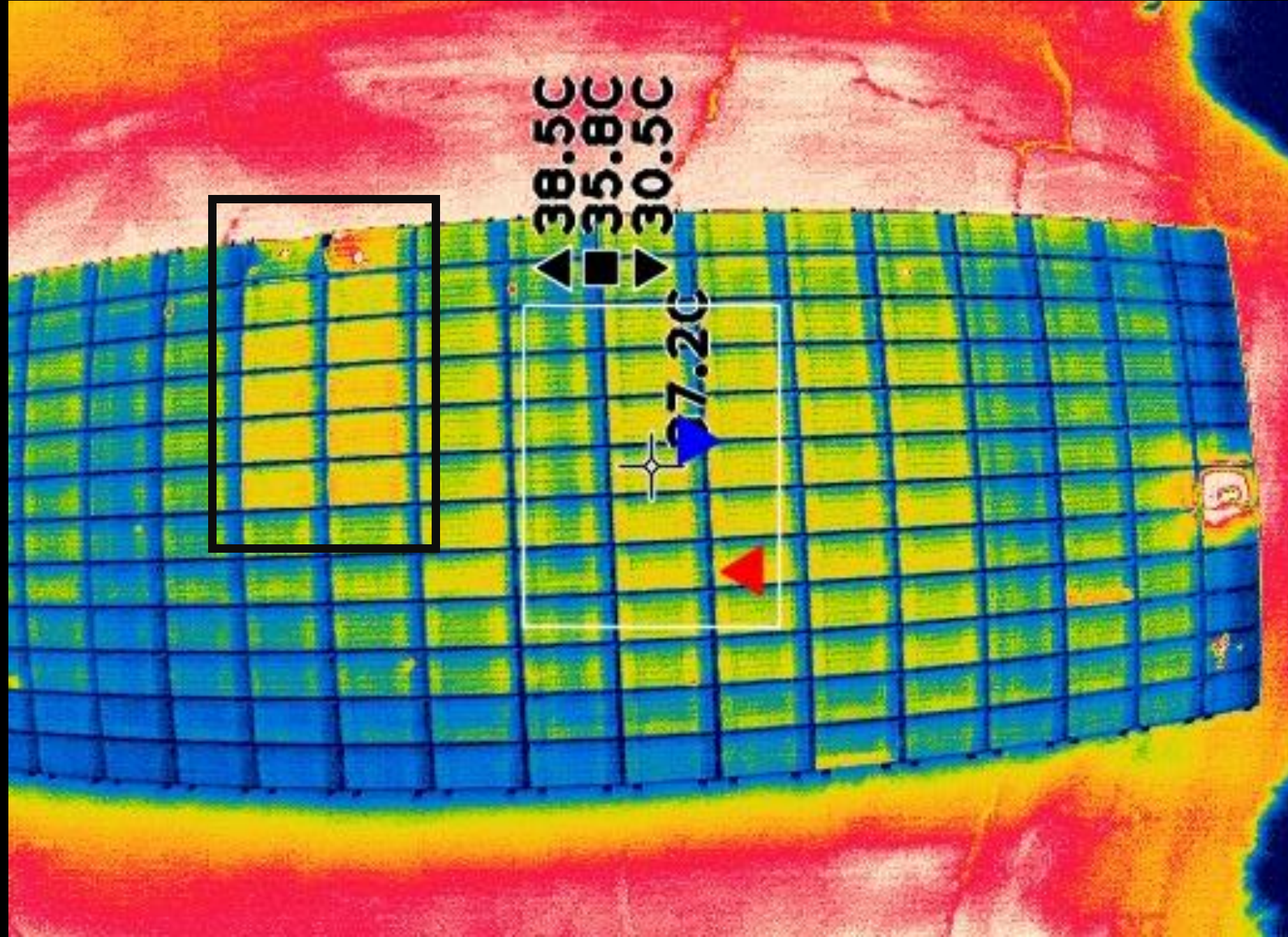


Thermal Camera Test

Lot E Solar Array - FLIR Vue TZ20







38.5C
35.8C
30.5C

27.2C

30.5C

Thermal Imaging

Thermal Imagery: It's a trickster

Emissivity is a measure of how well a material emits thermal radiation

- *Certain materials give different values*
- *Thermal imagery is a surface phenomenon*

Thermal Imaging

Thermal Imagery: It's a trickster

Factors to consider for thermal imagery

- 1. Material*
- 2. Surface conditions*
- 3. Proximity*
- 4. Contact to other materials*

Specifications



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FLIR (Forward Looking Infrared Radar)

OVERVIEW

Dimensions	Payload: 75 × 70 × 55 mm With gimbal: 128 × 154 × 141 mm
Pixel Pitch	12 μm LWIR
Thermal Sensitivity	85 mK @ F/1.0
Weight	640 g
Zoom	5x optical (WFOV/NFOV), 4x digital Effective zoom: 1x (95°), 2x, 5x (4.5°), 10x, 20x
Ground Control	DJI Pilot App
Airframe Compatibility	DJI Matrice 200 v2 and Matrice 300 series

ELECTRICAL & MECHANICAL

Mechanical Interface	Skyport 2.0
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ENVIRONMENTAL & APPROVALS

Storage	2 micro SD™ cards
Operational Temperature	-20°C to 45°C (-4°F to 113°F)
Storage Temperature	-20°C to 60°C (-4°F to 140°F)
Certifications	FCC/CE, REACH, RoHS, WEEE
Environmental Sealing	IP44

IMAGING & OPTICAL

Array format	2 FLIR Boson® 640 × 512
Streaming Video	640 × 512 @ 30 Hz
IR Camera Optics	Wide FOV: 95° HFOV, 4.9 mm EFL Narrow FOV: 18° HFOV, 24 mm EFL

FLIR (Forward Looking Infrared Radar)

FLIR Boson camera

Tiff: WFOV and NFOV images

Jpeg (colorized)