

## Introduction

Thermal Imaging Cameras can be used to understand where a building is losing heat and help reduce a building's running cost, carbon emissions and make them a more comfortable place to live.

The camera does this by transforming light in the infrared spectrum into the visible spectrum so you can see where heat is being lost. In general using a camera's default palette, warm objects are represented in red and cold objects in blue; the aim is to try to reduce heat loss represented by cold (blue) areas of your home from the inside, or warm (red) areas of your home from the outside. For example the image below shows a front door from the inside, showing cold air (blue) leaking from below the door:



In this example you could reduce the heat loss by installing draught-proofing around the sides of the door, place a draught excluder across the bottom of the door or install a thermal curtain. Please note that if you were looking at the door from the outside the colours would be reversed and you would be looking to reduce heat (red) coming out of the building.

## Best conditions for thermal imaging

The amount of detail you can see on the camera is proportional to the difference between the inside and outside temperature. So for example if you heated your home to 20C, and it was 5C outside that would be a temperature difference of 15C. We would recommend the following to get the most out of the camera:

1. A minimum temperature difference of 10C, so when its below 10C outside if your home is 20C inside, - this is typically between November and March
2. The camera works best from inside the building
3. If you are using the camera outside, avoid rain, wind and sunshine as they make it difficult to see what is going on
4. You should heat all the rooms in your house as hot as possible (at least 20C) for at least 2 hours before you thermally image to allow the heat to distribute evenly throughout the house
5. The camera is not waterproof so don't use it when it is raining

If the weather conditions aren't suitable when you borrow the camera then we would recommend you borrow it again when conditions are better. If you borrow the camera in too warm weather you might not be able to see and therefore miss lots of issues with your home.

### Problems with thermal imaging

1. **Misunderstanding thermal images:** It's easy to misunderstand thermal images and think you have a problem with your home when there isn't (false positive). A good example is that corners of rooms often look cold (blue) – this is generally not because they are losing heat but because heat from your radiators isn't circulating all the way into the corners of the room. There would be no point in this circumstance attempting to insulate a corner
2. **Emissivity:** like in the visual spectrum different materials radiate or reflect heat differently, so in the visual spectrum mirrors are very good at reflecting light. This also applies for thermal imaging and it can make interpreting heat loss on certain surfaces difficult – for example glass, plastic and tiles; as a result using a thermal imaging camera in kitchens and bathrooms is difficult
3. **Damp/condensation:** when you remediate your home to reduce heat loss you need to be very careful to avoid increasing damp, condensation, or interstitial (hidden) condensation in your home, as it might ultimately detrimental damage the fabric of your home

To get the most out of the camera we would recommend you go on a two hour training course which will cover all of these issues, help you make the most of the camera and provide advice on how best to make your home more energy efficient. Contact Share & Repair for details. Transition Bath and Go Green Widcombe have also developed a detailed guide to interpreting thermal images [here-TBD](#).

## How to use the Share and Repair Flir C5 Thermal Imaging Camera

The Flir C5 is an easy to use camera. It has a lot of flexibility and configuration options but we would suggest the default settings provide the best results, and if you do change the settings could you reverse the changes before returning the camera to Share and Repair, so as not to confuse the next user of the camera.

The controls are simple and straightforward:



Start by turning the camera on. Move the camera around your home, until you see something you would like a permanent record of, click the shutter button, and you can then later download via the USB port.



## Configuration:

- We would advise you not to reconfigure the camera as it is of limited benefit to most users and may ultimately confuse both you and subsequent users

## HOWEVER, if you do need to configure the camera (please reverse any changes made at the end)

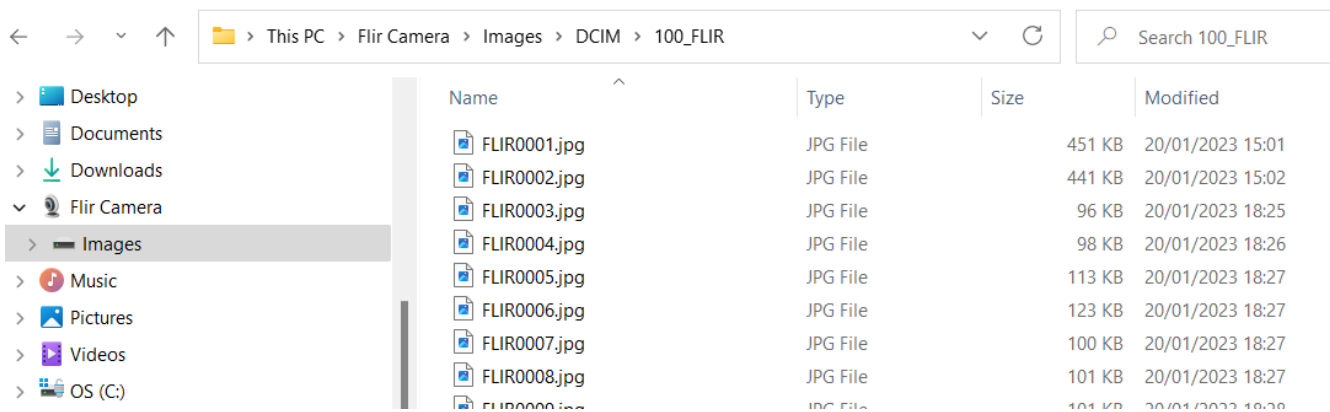
- The configuration menu is brought up if you click on the three dots at the bottom of the touch screen
- The right pointing arrow can be used to move back up to the previous level of menu
- Clicking on the camera on the top right returns you back from configuration to the viewing display
- The 'Image mode' configuration allows you to change between 'Thermal MX' mode which overlays a visual spectrum image with the thermal image (easiest to understand) and a 'Thermal' only image, which is useful on some occasions

## Downloading images

If you click on the 'shutter' button the camera will save pictures to its internal memory, you may then want to download these before returning the camera to Share and Repair.

Although you can connect to the camera via the 'Flir Tools' app on both Apple iOS and Android using WiFi and Bluetooth, it is much easier to download the images via USB. Flir have also recently withdrawn some of the functionality previously advertised for the camera e.g. live streaming to another device - this no longer works.

Connect the camera to your PC or Mac using the supplied USB cable. The camera will now look like a 'USB drive' as files on a directory system e.g.:



You will need to navigate to the 'Images/DCIM/100\_FLIR' directory to find and then copy your images back to your PC or MAC.

## Before returning the camera to Share and Repair:

- fully charge the battery via the supplied USB cable
- return any camera configuration changes back to where they were when you picked up the camera
- remove all the images you have saved to the camera by deleting them using your file browser on your PC/MAC while the camera is connected via USB
- Please return:
  - the camera
  - USB cable



## Flir C5 Thermal Imaging Camera Operating Instructions

- black Flir case
- cardboard box