



## Electromagnetic Spectrum

Only a small part of the electromagnetic spectrum is visible light ranging from blue/violet light to red light. Ultraviolet light has a higher frequency than blue light, whereas infrared has a lower frequency than red light. Both ultraviolet and infrared light are invisible to the human eye.

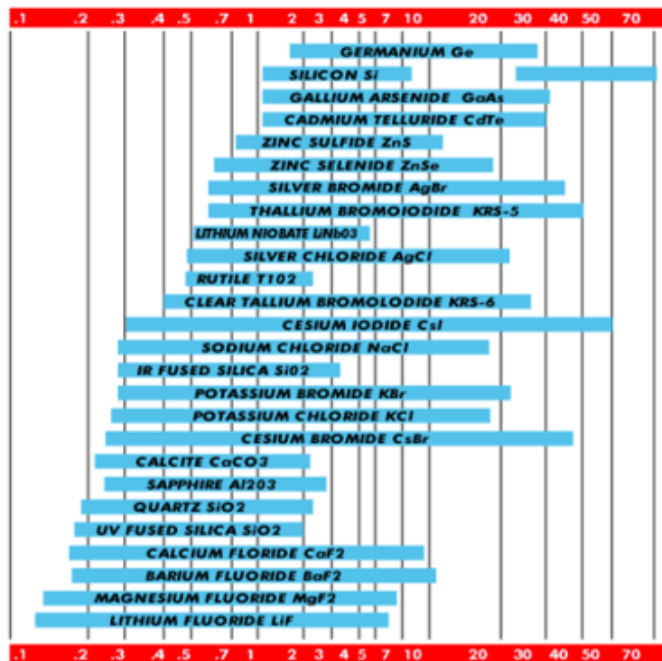
All objects above absolute zero (-273 degrees) emit radiation, some of which is infra-red. Depending on temperature and emissivity, most objects in the world can be thermally imaged.

### Visible

Visible light extends roughly from 400nm (violet) to 700nm (red).

### Infrared

In comparison to visible, the infrared region is quite large and has the following regions.



- ▶ Near (NIR): 0.7 to 1.5 µm
- ▶ Short wavelength (SWIR): 1.5 to 3 µm
- ▶ Mid wavelength (MWIR): 3 to 8 µm
- ▶ Long wavelength (LWIR): 8 to 15 µm
- ▶ Far infra-red (FIR): longer than 15µm

A common misconception regarding IR cameras is that they can see what you can see, this is not completely true. Glass and Perspex are completely transparent in the Visual wavelength; however to an Infra Red Camera they are completely opaque.

Too much importance is placed on providing IR window material with a very high infrared transmittance value; the table above shows just how much transmission rates vary with different lens materials, the most important thing with transmission is that you know what material you are using and at what wavelength you are working. At IRISS we quote our transmission rates at 9 µm for Long Wave IR cameras and 4 µm for Mid Wave IR Cameras. As long as you know the transmission rate of the window you can calculate the temperature of the target components you wish to view.

More consideration must be given to the environmental and operational conditions in which the window will be used, you want a window that will be functional for the life of the panel in which it is fitted, therefore never trade off mechanical properties for higher infrared transmission rates, you don't need them, you do however want a window that lasts.

The following pages contain information regarding the materials that are used by IRISS for our current range of IR windows