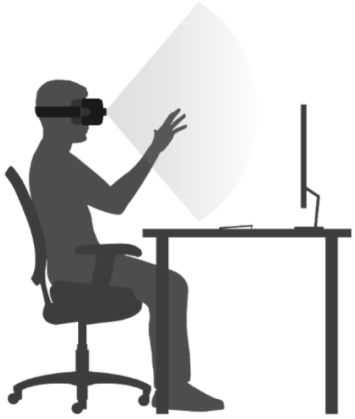
# Leap Motion Controller™

## The world's leading hand tracking technology

The Leap Motion Controller™ is an optical hand tracking module that captures the movement of users' hands and fingers so they can interact naturally with digital content. Small, fast, and accurate, the Leap Motion Controller™ can be used for productivity applications with Windows computers, integrated into enterprise-grade hardware solutions or displays, or attached to virtual/augmented reality headsets for AR/VR/XR prototyping, research, and development.

The controller is capable of tracking hands within a 3D interactive zone that extends up to 60cm (24") or more, extending from the device in a 120x150° field of view. Leap Motion's software is able to discern 27 distinct hand elements, including bones and joints, and track them even when they are obscured by other parts of the hand. With a 120Hz refresh rate and low-latency software, the time between motion and photon falls beneath the human perception threshold[1].

An accessory component, the VR Developer Mount, allows for easy, reliable, and consistent attachment of the device to virtual reality headsets such as the Oculus Rift and HTC Vive. The Leap Motion App Gallery features 75+ legacy desktop applications and a demo suite for virtual reality.



The Leap Motion Controller features a 120x150° field of view and an interactive tracking range of more than 2 feet (60cm).

## Example applications

- Entertainment *(location-based VR/AR experiences, arcades, amusement parks)*
- Healthcare *(stroke rehabilitation, training, mirror, medical imaging, lazy eye treatment)*
- Therapy Education *(anatomic visualizations, hands-on learning)*
- Personnel training *(flight simulators, complex computer systems)*
- Industrial design and engineering *(automotive, assembly lines, facilities management)*
- Robotics *(bomb disposal, telepresence, robotic controls, AI-assisted teaching)*
- Global team collaboration

## Robust and safety compliant

The Leap Motion Controller™ is certified compliant to safety and electrical regulatory standards. Its robustness and external certification enable commercial projects, including sterile environments.

## Easy to integrate and use

The Leap Motion Controller™ is designed for simple integration into customer applications and can be retro-fitted to existing concepts or hardware. Plugins for Unity and Unreal enable developers working with two leading 3D development platforms to incorporate hand tracking into their established workflow. The Unity integration features:

- Powerful Interaction Engine enabling natural hand/object interactions
- Example scenes with interactive scripts and menus
- Optimized rigged hand models and auto-rigging pipeline for custom hand designs

[1]Internal benchmarking tests have determined that the Leap Motion version software is capable of sub-millisecond image processing, though this varies by environmental conditions and number of hands. The camera framerate imposes 8 milliseconds of latency (1/120 seconds). Note that game engines, GPUs, and display systems are also factors in total system latency.

# Specifications

| | Height | Width | Depth | Weight |
|---|---|---|---|---|
| Metric | 13mm | 80mm | 30mm | 32g |
| Imperial | 0.5" | 3.2" | 1.2" | 1.15oz |
| Product category: | Specialized sensor | | | |
| Description: | Leap Motion Controller for hand tracking | | | |
| Power supply: | USB | | | |
| Data connection: | USB 2.0 (packaged with USB 2/3 hybrid cable, but can be used with any certified USB cables with the Hi-Speed USB 2.0 logo featured on the packaging) | | | |
| Ingress protection: | Splash resistant | | | |
| Mounting methods: | May be placed on a desktop, mounted on a VR headset using the Leap Motion VR Developer Mount, or recessed into a larger hardware installation | | | |
| Interaction zone: | 60cm (24") or more, extending from the device in a 120x150° field of view (approximately 8 cubic feet or 0.2 cubic meters of interactive space) | | | |
| Cameras: | Two 640x240-pixel near-infrared cameras; spaced 40 millimetres apart; with infrared-transparent window, operate in the 850 nanometre +/-25 spectral range; typically operates at 120Hz but hardware is capable of 240+; capable of image capture within 1/2000th of a second | | | |
| Camera interface: | Experimental Universal Video Class (UVC) release provides access to low-level controls such as LED brightness, gamma, exposure, gain, resolution, etc.; examples in C, Python, and Matlab, as well as OpenCV bindings | | | |
| LEDs: | Three, spaced on either side and between the cameras, baffled to prevent overlaps | | | |
| Range: | Arm's length, up to roughly 80 cm; varies depending on hand perspective conditions | | | |
| Construction: | Aluminium and scratch-resistant glass | | | |
| Ambient operating temperature: | 32º to 113º F (0º to 45ºC) | | | |
| Storage temperature: | 14º to 122º F (-10º to 50º C) | | | |
| Relative Humidity: | 5% to 85% (non-condensing) | | | |
| Operating Altitude: | 0 to 10,000 feet (0 to 3048 meters) | | | |
| Compliance: | CE, FCC, CAN ICES-3 | | | |
| Minimum system requirements (desktop): | Windows® 7+ or Mac® OS X 10.7 (note that OSX is no longer formally supported); AMD Phenom™ II or Intel® Core™ i3/i5/i7 processor; 2 GB RAM; USB 2.0 port | | | |
| Minimum system requirements (VR): | Windows 7 SP1 64 bit or newer; Intel® Core™ i5-4590 equivalent or greater; 8GB+ RAM; 3x USB 3.0 port; NVIDIA GTX 970 / AMD R9 290 equivalent or greater with compatible HDMI 1.3 video output | | | |

## Where to buy it

For a list of authorized retailers, visit https://www.leapmotion.com/where-to-buy/. We recommend ARROW (www.arrow.com) for enterprise and bulk ordering.

Some applications, including those distributed for more than US$500 or designed for use with or control of industrial, commercial or medical equipment, require a separate license from Ultrahaptics. Learn more at www.leapmotion.com/partners.

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# Stereo IR 170 Camera Module Evaluation Kit

The Ultraleap Stereo IR 170 is a next-generation optical hand tracking module that captures the movement of users' hands and fingers so they can interact naturally with digital content. It is designed to be integrated into enterprise-grade hardware solutions, displays, installations, and virtual/augmented reality headsets for AR/VR/XR prototyping, research, and development.

The Stereo IR 170 Evaluation kit consists of the Ultraleap Stereo IR 170 camera module in a plastic housing with USB header, allowing for easy plug-and-play evaluation.

## The world's most powerful hand tracking hardware

The Ultraleap Stereo IR 170 camera module uses the same core software as its predecessor, the Leap Motion Controller. Both can discern 27 distinct hand elements, including bones and joints, and track them even when they are obscured by other parts of the hand.

Ultraleap Stereo IR 170 features a wider field of view, a longer tracking range, lower power consumption, and smaller form factor. It's capable of tracking hands within a 3D interactive zone that extends from 10cm (4") to 75cm (29.5") or more, extending from the device in a 170x170° typical field of view (160x160° minimum).

## Example applications

- Touchless public interfaces (interactive kiosks, digital out-of-home, elevators)
- Entertainment (location-based VR/AR experiences, arcades, amusement parks)
- Healthcare (stroke rehabilitation, training, mirror, medical imaging, lazy eye treatment)
- Therapy and education (anatomic visualizations, hands-on learning)
- Personnel training (flight simulators, complex computer systems)
- Industrial design and engineering (automotive, assembly lines, facilities management)
- Robotics (telepresence, robotic controls, AI-assisted teaching)
- Remote collaboration

## Easy to integrate and use

The Ultraleap Stereo IR 170 is designed for robust integration into consumer and enterprise-grade products, and can be retro-fitted to existing concepts or hardware. Plugins for Unity and Unreal enable developers working with two leading 3D development platforms to incorporate hand tracking into their established workflow.

Our TouchFree application detects a user's hand in mid-air and converts it to an on-screen cursor, allowing touchscreen interfaces to be retrofitted with touchless gesture control.

## Specifications

| | |
|---|---|
| Power supply: | 5V DC via USB connector (minimum 0.5A). |
| Data connection: | Micro USB Type-B (2.0 or 3.0) when in plastic housing.<br>When integrated, PCB module can be wired directly. |
| Interaction zone: | Depth of between 10 cm (4") to 75cm (29.5") preferred, up to 1 m (39") maximum; 170×170° typical field of view (160×160° minimum). Tracking works in a range of environmental conditions. |
| Cameras: | Stereo IR operating at 90fps |
| Operating wavelength: | 850nm. Stereo IR 170 provides its own illumination via two IR LEDs spaced on either side of the cameras. |
| Ambient operating temperature: | 0° to 40°C (32° to 104° F) *N.B. Out of case operating temperature range is slightly wider, 0° to 50°C (32º to 122° F).* |
| Minimum system requirements: | Windows® 7+; AMD Phenom™ II or Intel® Core™ i3/i5/i7 processor; 2 GB RAM; USB 2.0 port. VR headsets may come with their own system requirements.<br>**Note: The Stereo IR 170 Evaluation Kit is currently Windows compatible only** |
| Software: | Downloadable from https://www.developer.ultraleap.com |

Ultraleap reserves the right to update or modify this specification without notice.

## Intended use

The Stereo IR 170 Evaluation Kit is intended for exploration and development purposes only and is not suitable for incorporation into a product for sale or distribution. For the purpose of the Ultraleap and Leap Motion SDK agreement, the Stereo IR 170 does not constitute a "Leap Motion-authorized embedded optical module".

This kit has been designed for the purpose of enabling the evaluation of Ultraleap hand tracking by professionals at research, design, or development facilities. We recommend to download the latest version of the SDK to optimise the performance of your device. This version of hardware is not tested or certified compliant to CE requirements or equivalent international standards. To protect the evaluation kit please ensure it is always handled with care and is stored appropriately with lens caps attached when not in use. Should the lenses require cleaning, we recommend gentle cleaning using >99% isopropyl alcohol (IPA) and a soft lint free cloth.

For intended performance, it is important that your Stereo IR 170 Evaluation Kit remains flat. Minimise flexing while mounting the device. Use a stiff, flat, mounting surface or for curved surfaces an alternative solution that provides minimal flexing.

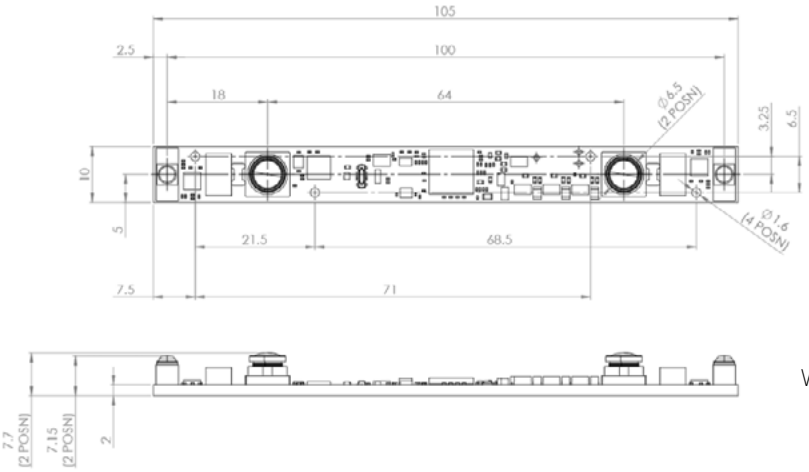
***CAUTION!*** *Removing the PCB from the plastic housing will invalidate your warranty. In particular, the USB header (the connection from the USB port to the PCB) is rated for 10 connections only. Removing the PCB from the plastic housing multiple times may cause the USB connection to stop working. If the PCB is outside the plastic housing, it is vulnerable to electrostatic discharge and calibration may also be affected, negatively impacting tracking performance. If you wish to remove the PCB from the plastic housing for evaluation purposes please contact Ultraleap for support.*

## Evaluation use only

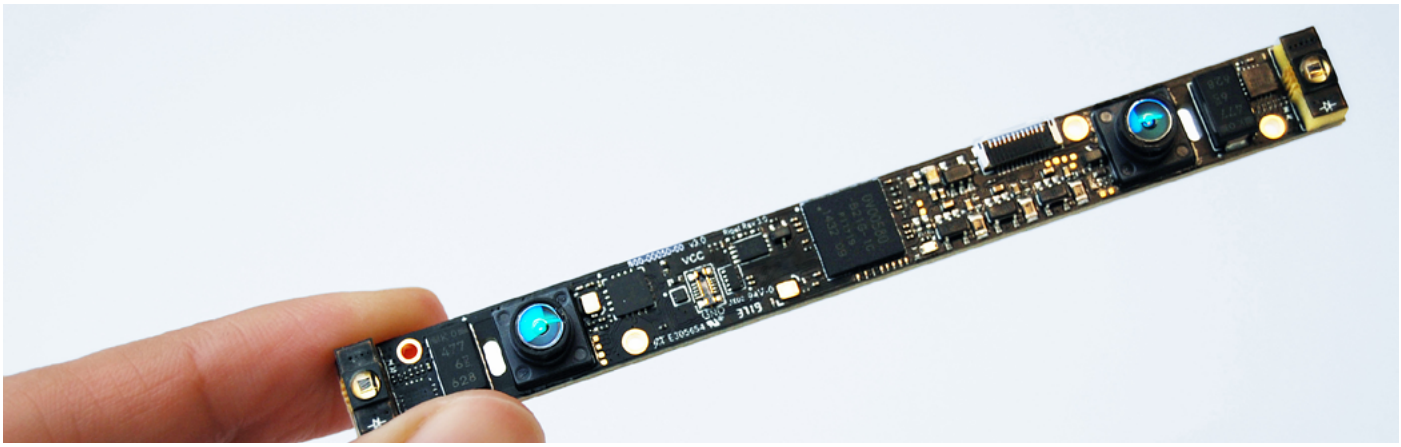
The Stereo IR 170 Evaluation Kit is provided for technical evaluation purposes only. Commercial or enterprise use is subject to license agreement. Resale without agreement from Ultraleap is prohibited. Get in touch with us at www.ultraleap.com/contact.

# Ultraleap Stereo IR 170 camera module

All dimensions in mm

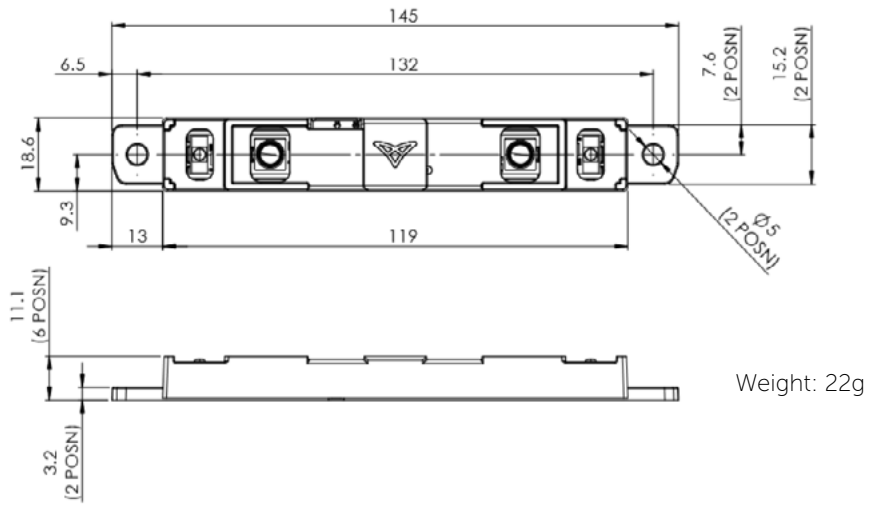



Weight: 10g



# Ultraleap Stereo IR 170 Evaluation Kit

All dimensions in mm (Stereo IR 170 camera module in plastic housing)




Weight: 22g

*CAD files for an Evaluation Kit mount are also available from [www.developer.ultraleap.com](http://www.developer.ultraleap.com). These can be used when prototyping, particularly in instances where the Evaluation Kit will regularly be removed and replaced.*



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# 3Di

## Stereo Hand Tracking Camera

The Ultraleap 3Di Stereo Hand Tracking Camera is designed to be connected to an interactive screen. Together with Ultraleap's world-leading software, it transforms displays into touchless, three-dimensional, immersive surfaces.

Ultraleap 3Di allows easy integration of Ultraleap hand tracking in a form factor ruggedized for use in permanent settings – such as self-serve kiosks, digital out-of-home installations, interactive displays in retail, museums, and theme parks, or medical/industrial uses.

*Front of Ultraleap 3Di.*

### Ultraleap TouchFree

Ultraleap 3Di is part of Ultraleap's TouchFree end-to-end solution – camera hardware, reliable hand tracking software, and developer tooling.

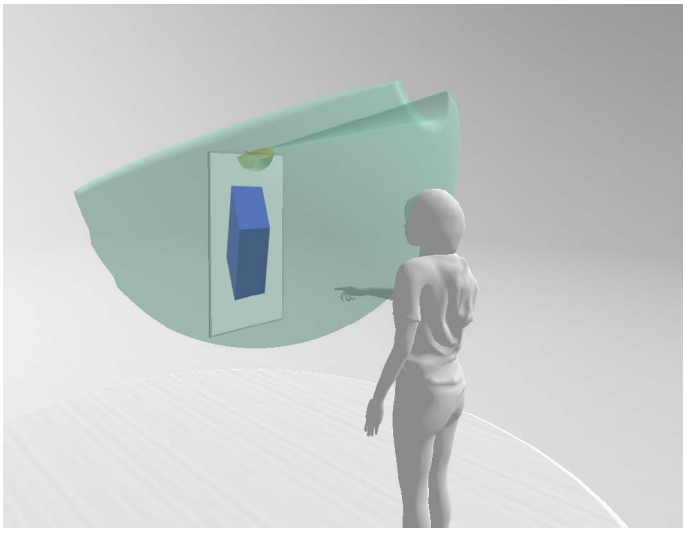
The camera uses Ultraleap's patented stereo infrared technology and world-leading Gemini hand tracking software. It is robust even in challenging lighting conditions, and reliably tracks a wide variety of hand sizes and shapes.

Ultraleap also provides a suite of developer tools for development of touchless experiences:

- **TouchFree Application:**
  Detects a user's hand in mid-air and converts it to an on-screen cursor. Retrofit existing touchscreen interfaces with touchless gesture control or evaluate using your desktop monitor.

- **TouchFree Tooling for Web or Unity:**
  Add touchless cursor control into kiosk applications in minutes, and have total control over how your application reacts to users' hand movements.

*Reverse of Ultraleap 3Di.*



*Simulation of Ultraleap 3Di tracking range when connected above a 42" screen.*

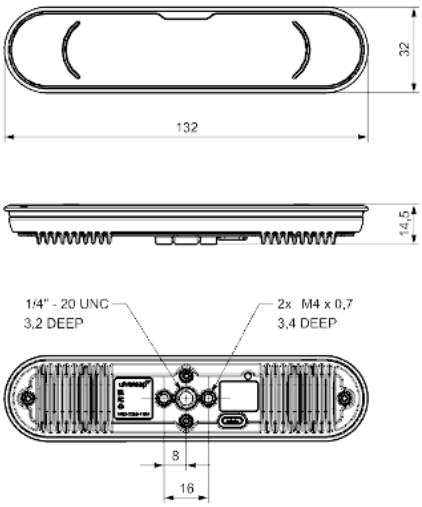
# Specifications

| | |
|---|---|
| Power: | 5 VDC via USB connector<br>500 mA max<br>250 mA typical |
| Data connection: | USB 2.0 via micro USB type-B connector |
| Tracking range and field of view: | Depth of between 10 cm (4”) to 75 cm (29.5”) preferred, up to 1 m (39”) maximum; 170°×170° typical field of view (160°×160° minimum).<br>Ultraleap 3Di can provide touchscreen emulation for screens up to 42” (portrait or landscape). Larger screens can also be controlled through interaction at a distance. |
| Camera framerate: | 90 fps |
| Operating wavelength: | 850 nm. Provides its own illumination via two IR LEDs spaced on either side of the cameras. |
| Temperature rating: | 0°C to 40°C (32°F to 104°F) |
| Ingress protection: | IP54 when mounted using Panel Mount Kit (available from Ultraleap) |
| Certification: | UKCA, CE, FCC |
| Minimum system requirements: | Windows® 10, 64-bit, Intel® Core™ i3 processor 5th Gen (must support AVX instructions), 2 GB RAM, USB 2.0 port. *Note: Ultraleap 3Di is currently Windows compatible only.* |
| Software: | Downloadable from https://www.developer.ultraleap.com/touchfree |

*Ultraleap reserves the right to update or modify this specification without notice.*

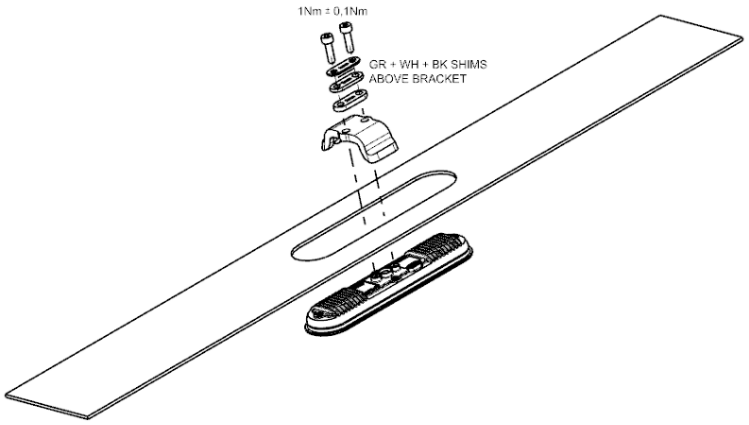
## Device dimensions

All dimensions in mm




## Mounting

Ultraleap 3Di is designed to be integrated directly into permanent installations. A Panel Mount Kit (available from Ultraleap) enables the camera to be securely mounted in a cutout of panels of thickness 2–8 mm.




*Example 2 mm panel installation using Panel Mount Kit*

Detailed guidelines on camera placement, further mounting options, TouchFree software setup and designing for touchless experiences can be found on https://docs.ultraleap.com/touchfree-user-manual/.



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