# L3CAM

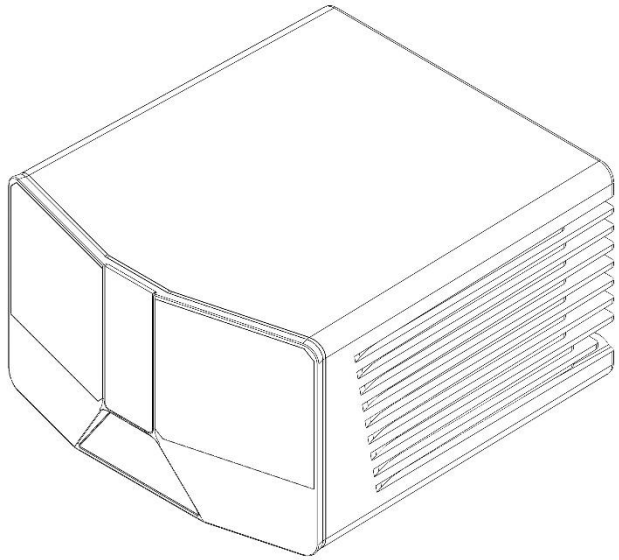
## MULTIMODE IMAGING LIDAR

### SUMMARY

The L3-CAM is a multimodal sensor composed essentially by a solid-state LIDAR sensor and 3 additional imaging modes (RGB, thermal and polarimetric).

The LIDAR system is a patented MEMS-based scanning technology that combines high-resolution 3D imaging, real time frame rate and long range. The most suitable combination for applications related to autonomous vehicles, security, object detection, situational awareness and mapping.

Critical applications, however, require more than a single “eye” to achieve high reliability levels once the data is processed. L3-CAM offers the all in a single, compact and cost-effective device.



### HIGHLIGHTS

- Solid-state LIDAR design
- Patented sunlight suppression
- High-end imaging performance
- Multi-sensor cross-talk immunity
- Up to 4 imaging modes
- Embedded processing:
- Parallax-free data fusion
- Automatic object detection and tracking

### OPTICAL PERFROMANCE

| **LIDAR** | |
|---|---|
| Technology | Solid-state scanning. MEMS proprietary concept. |
| FOV | 60 x 20 deg [HxV] |
| Spatial resolution | 460 x 150 px [HxV] – Other configurations are possible. |
| Angular resolution | 0.13 x 0.13 deg [HxV] |
| Angular sampling accuracy | ± 0.01 deg |
| Point rate | 568 KHz |
| Frame rate | 7 Hz |
| Laser product class | Class 1 eye-safe per IEC 60825-1:2007 & 2014<br>Class 3R available under customer request |
| Range (Class 1 eye-safe) | 60m @ 10% reflective lambertian target, 250W/m2 background sunlight<br>130m @ 50% reflective lambertian target, 250W/m2 background sunlight |
| Range (Class 3R) | 130m @ 10% reflective lambertian target, 250W/m2 background sunlight<br>300m @ 50% reflective lambertian target, 250W/m2 background sunlight |
| Range accuracy | ±2 cm |
| Number of returns | 4 |
| Laser wavelength | 1064 nm |

| **RGB** | |
|---|---|
| Image resolution | 4224 x 3156 px (13Mpx) |
| FOV | 68 x 40 deg |
| Responsivity | 0.62 V/lux-sec @ 545nm |
| Focal length | 4.61 mm |
| F-number | f/1.6 |
| SNR | 36.3 dB |
| Dynamic range | 65.8 dB |
| Lens type | S-Mount M12 |
| **LWIR** | |
| Image resolution | 320 x 240 px (76.800px) |
| FOV [HxV] | 56 x 42 deg |
| Sensitivity | 65 mK @ 25 ºC (100 mK max) |
| Focal length | 4 mm |
| F-number | f/100 |
| Spectral response | 7.8 to 14 µm |
| Scene dynamic range | -40 to 330 ºC |
| Temperature Accuracy | The greater of ±5ºC or 5% between 5ºC to 140ºC scene temp.<br>Typical performance of ±10% between 140ºC to 330ªC scene temp. |
| Non-Uniformity Correction (NUC) | Automatic, with shutter. |

## ELECTRICAL / MECHANICAL / OPERATIONAL

| | |
|---|---|
| Power supply voltage | 12V nominal |
| Power consumption | Stand-by mode: 9 W<br>Ready mode: 15 W<br>Class 1 mode: 31 W<br>Class 3R mode: 47 W |
| Connector type | Circular IP68 for Power + Data<br>Matching connector: Samtec ACPK-16-06-G-M-1 |
| Housing dimensions | Width: 96 mm<br>Hight: 112 mm<br>Depth: 208 mm |
| Weight | 3.5 Kg |
| Cooling | Forced air. Fan at the back face. |
| Storage temperature | -40 to +100 ºC |
| Operating temperature | -20 to +50 ºC |
| Ingress | IP67 |
| Mounting | 4 M6 screw at the base |
| Case materials | Aluminum, plastic and glass |
| Certification | CE, RoHS |

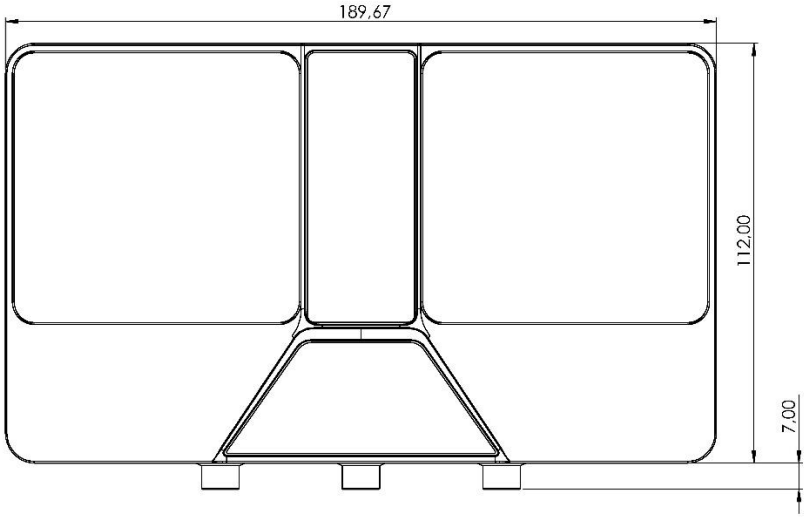
## CONTROL INTERFACE, COMMUNICATIONS

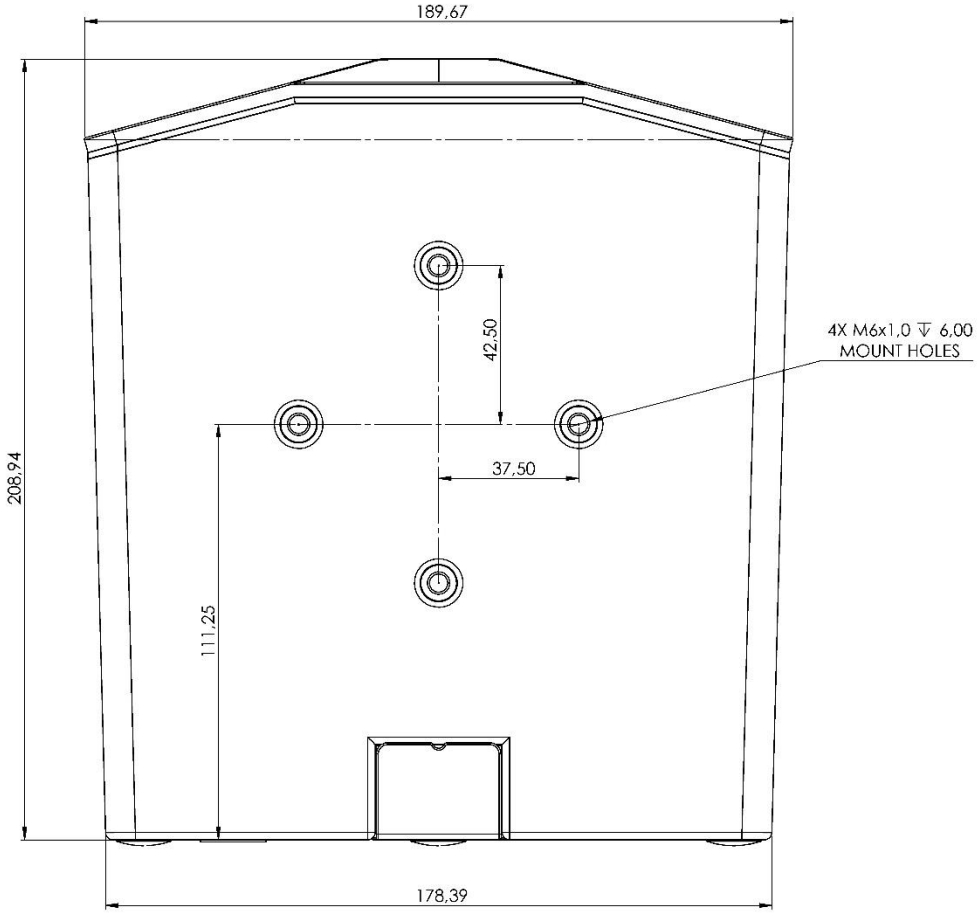
| | |
|---|---|
| Communication | Gigabit Ethernet<br>UDP: For data<br>TCP/IP: For control commands |
| Operating system | Linux - Ubuntu 20.4 LTS<br>Windows 10 |
| Embedded processor | Nvidia Jetson TX2<br>The customer can use it to develop their own processing and IA under request. |
| Available imaging modes | Standard: 3D, RGB, LWIR, Polarimetric.<br>Other modes can be considered under customer request |
| **LIDAR** | |
| 3D data types | Sparse point cloud (x,y,x)<br>Intensity<br>Depth map |
| Video format | RTSP over Gstreamer for the depth map |
| Data format | Binary file (proprietary format) over UDP for the sparse point cloud and intensity |
| Resolution / Frame rate | 230 x 75 px @ 28 frames/s<br>230 x 150 px @ 14 frames/s<br>460 x 75 px @ 14 frames/s<br>460 x 150 px @ 7 frames/s |
| **RGB** | |
| Video format | RTSP over Gstreamer |
| Compression format | RAW, H264 |
| Resolution / frame rate | 1920 x 1080 px (2 Mpx) @ 16 frames/s<br>1280 x 720 px (1 Mpx) @ 24 frames/s<br>640 x 480 px (0.3 Mpx) @ 30 frames/s |
| **LWIR** | |
| Video format | RTSP over Gstreamer |
| Compression format | RAW, H264 |
| Resolution | 320 x 240 px (76.800px) |
| Frame rate | 9 Hz |

## DATA FUSION AND PERCEPTION ARTIFICIAL INTELIGENCE

| | |
|---|---|
| **DATA FUSION** | |
| Data fusion parallax error | <0.15º (<0.5 m @ 100 m) |
| Data fusion latency | 40 ms |
| Data fusion synchronization | ±15 ms |
| Timestamp resolution | 100 ns |
| **PERCEPTION IA** | |
| Detection latency | ~40 ms (20 Hz) |
| Detection accuracy | RGB: >90% mAP @ 0.5 (proprietary dataset)<br>LWIR: >90% mAP @ 0.5 (proprietary dataset) |

## DIMENSIONS




*All dimensions are in mm.*