Terahertz Imaging Camera System

- 384 x 288 THz FPA
- ~4 - 0.1 THz (70 - 3200 um) waveband
  - Lens options
  - THz Illuminator module
MICROXCAM-384i-THz
Terahertz Camera

The MICROXCAM-384i-THz is a camera based on the sensitive INO 384 x 288-pixel uncooled microbolometer FPA optimized for the terahertz waveband. Due to its longer wavelength, THz band offers unmatched penetration depth for seeing through materials such as fabric, ceramic, plastic, leather, or cardboard. Thus, the camera shows sensitivity over a wide spectral range, providing live video images. It features a very small footprint: 61 x 61 x 65 mm.

The camera electronics handles raw data acquisition and data transfer over GigE, providing 16-bit raw image outputs at 50 Hz. The camera can be further equipped with fast or ultra-fast 44 mm focal length refractive optics optimized for the THz region.

APPLICATIONS
• Package inspection
• Manufacturing
• Security screening and surveillance
• Concealed weapons detection
• Vision through camouflage
• Quality control, process monitoring
• Spectroscopy
• Submillimeter astronomy
• Dental and medical imaging
• Food inspection

BENEFITS
• Wide band response
• High sensitivity
• 16-bit raw data
• High image quality
• Refractive optics available
## MICROXCAM-384i-THz

Terahertz Camera

### CAMERA SPECIFICATIONS (1)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waveband (2)</td>
<td>70 – 3189 µm / 4.25 – 0.094 THz</td>
</tr>
<tr>
<td>Sensor (2)</td>
<td>• 384 x 288 pixels uncooled microbolometer FPA</td>
</tr>
<tr>
<td></td>
<td>• 35 µm pixel pitch</td>
</tr>
<tr>
<td></td>
<td>• Silicon float zone window</td>
</tr>
<tr>
<td></td>
<td>• AR coating optimized for specific THz wavelengths</td>
</tr>
<tr>
<td>Frame rate</td>
<td>50 Hz</td>
</tr>
<tr>
<td>Video output</td>
<td>GigE Link</td>
</tr>
<tr>
<td></td>
<td>• RJ-45 connector</td>
</tr>
<tr>
<td></td>
<td>• 16-bit raw data</td>
</tr>
<tr>
<td>Supply</td>
<td>12 Vdc Nominal (10Vdc to 15Vdc)</td>
</tr>
<tr>
<td>Power</td>
<td>&lt; 3 W (excluding TEC power)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>61 mm (H) x 61 mm (W) x 65 mm (L)</td>
</tr>
<tr>
<td></td>
<td>2.4 in. (H) x 2.4 in. (W) x 2.6 in. (L)</td>
</tr>
<tr>
<td>Weight</td>
<td>360 g / 0.8 lb (excluding optics)</td>
</tr>
<tr>
<td>Temperature</td>
<td>0 to 40 °C</td>
</tr>
</tbody>
</table>

### OPTICS SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specifications (3)</th>
<th>Fast Optics</th>
<th>Ultrafast Optics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Refractive</td>
<td>Refractive</td>
</tr>
<tr>
<td>Focal length</td>
<td>44 mm</td>
<td>44 mm</td>
</tr>
<tr>
<td>F number</td>
<td>0.95</td>
<td>0.7</td>
</tr>
<tr>
<td>Object distance</td>
<td>90 cm to infinity</td>
<td>60 cm to infinity</td>
</tr>
<tr>
<td>Lens material</td>
<td>HRFZ-Si</td>
<td>HRFZ-Si</td>
</tr>
<tr>
<td>AR coating</td>
<td>Parylene-C</td>
<td>Parylene-C</td>
</tr>
<tr>
<td>Number of lenses</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Dimensions</td>
<td>80 mm (Ø), 52 mm (L)</td>
<td>80 mm (Ø), 66.5 mm (L)</td>
</tr>
<tr>
<td>Weight</td>
<td>235 g</td>
<td>350 g</td>
</tr>
</tbody>
</table>

(1) Subject to change.
(2) Detector and coating may vary depending on the selected wavelength.
(3) Custom specifications available on demand.

Call Boston Electronics for application support: 617-566-3821

Boston Electronics
91 Boylston St. Brookline, MA 02445
boselec@boselec.com
www.boselec.com
THz Illumination

INO offers a terahertz (THz) illumination source especially designed to build a complete THz imaging system when paired with INO’s THz camera, the MICROXCAM-384i-THz.

The THz imaging system is used for see-through imaging. Its default configuration is for transmission imaging, where the object under test is placed between the THz source and the THz camera. The system may also be configured to operate in reflection mode.

APPLICATIONS

• Security screening and surveillance
• Manufacturing
• Laboratory experiments
• Concealed weapons detection
• Vision through camouflage
• Quality control, process monitoring
• Dental and medical imaging
• Food inspection

BENEFITS

• Can be used in both transmission and reflection modes
# THz Illumination

<table>
<thead>
<tr>
<th>Specifications&lt;sup&gt;(1)&lt;/sup&gt;</th>
<th>Setup @ 515 GHz</th>
<th>Setup @ 282 GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Center Frequency&lt;sup&gt;(2)&lt;/sup&gt;</td>
<td>515 GHz</td>
<td>282 GHz</td>
</tr>
<tr>
<td>Illumination surface&lt;sup&gt;(2)&lt;/sup&gt;</td>
<td>~ 4.5 x 6 inches</td>
<td></td>
</tr>
<tr>
<td>THz illumination optics</td>
<td>Optimized for beam uniformity at ~ 515 GHz</td>
<td>Optimized for beam uniformity at ~ 282 GHz</td>
</tr>
<tr>
<td>Output Power</td>
<td>~ 1.25 mW typical</td>
<td>~ 4 mW typical</td>
</tr>
<tr>
<td>Power Supply</td>
<td></td>
<td>110-240 V AC</td>
</tr>
<tr>
<td>Power Consumption</td>
<td></td>
<td>~ 6 - 7 W</td>
</tr>
<tr>
<td>Recommended Operating Temperature</td>
<td></td>
<td>+20°C to +30°C</td>
</tr>
<tr>
<td>Overall Dimensions</td>
<td>25 cm (H) X 44 cm (W) X 40 mm (L)</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td></td>
<td>12.7 kg</td>
</tr>
</tbody>
</table>
| Others | | • Near-flat-top rectangular illumination  
• External housing  
• Patent pending |

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1 Specifications subject to change.  
2 Specifications can be adapted for specific requirements.

**ADDITIONAL COMPONENTS FOR COMPLETE THz IMAGING SYSTEM**

- THz components (camera, objective, computer) can be purchased to build a complete THz system
TERAHERTZ TEST & CHARACTERIZATION FACILITY

Sensitivity Characterization
- NEP
- Responsivity
- Noise

Beam Profiling
- Dynamic monitoring
- Oversampled beam
- 3D visualization tool

See-through Video-Rate Imaging
- Transmission, Reflection, Polarimetric
- 384x288 pixels
- 50 frames/sec

Resolution characterization

Interferometry
- Depth measurements

Optics characterization

Material Characterization
- Transmission
- Absorption

R&D CONTRACTS – PROTOTYPING – PREPRODUCTION
SHORT-RUN PRODUCTION – TECHNOLOGY TRANSFER
TERAHERTZ TEST AND CHARACTERIZATION FACILITY

See-through clothing imaging

Resolution characterization

Imaging through polyethylene

See-through imaging with 384x288 pixels THz Camera

INO is a world-class center of expertise in industrial applications for optics and photonics, and a leading simulation and characterization service provider of infrared and terahertz systems.
MICROXCAM-384i-THz
CAMERA

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