



More Precision

thermoIMAGER TIM // Compact thermal imaging cameras





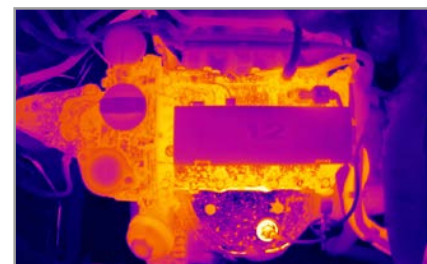
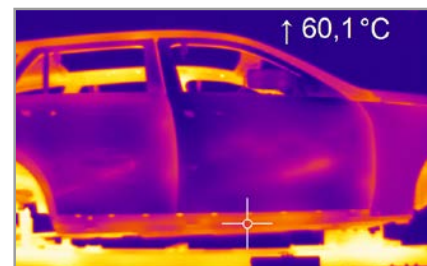
thermoIMAGER TIM 640

Miniature infrared camera with VGA resolutions

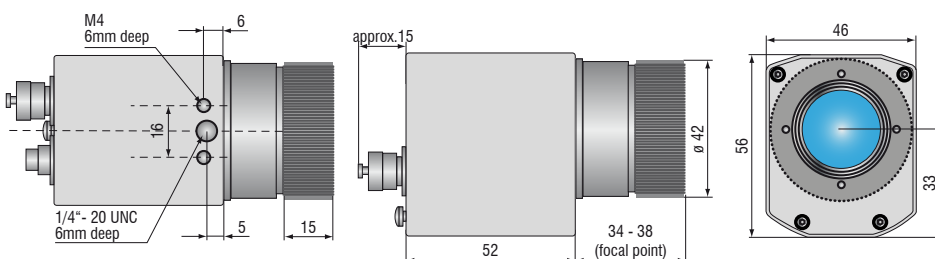
- Thermography in VGA resolution
- 640 x 480 pixels
- Measuring range from -20 °C to 900 °C (special model up to 1500 °C)
- Radiometric video recording with 32 Hz, 125Hz in the subframe mode (640x120 pixels)
- Compact design (46 x 56 x 90 mm) with USB interface
- Lightweight (320 g incl. lens)
- Exchangeable lenses & industrial accessories
- Software TIMConnect included
- Software Developer Kit and LabVIEW examples included

Software

- Display of the thermal image in real time (32 Hz) with recording function (video, snapshot)
- Complete set up of parameters and remote control of the camera
- Detailed analysis of fast, thermodynamic processes
- Output of analog temperature or alarm values via the process interface
- Digital communication via RS232 or DLL for software integration



Razor-sharp infrared pictures and videos for process optimization e.g. in the automotive industry



| Model | TIM 640 |
|----------------------------------|---|
| Optical resolution | 640 x 480 pixels |
| Temperature ranges | -20 °C to 100 °C / 0 °C to 250 °C / 150 °C to 900 °C additional range: 200 °C to 1500 °C (option) |
| Spectral range | 7.5 to 13 μm |
| Frame rate | 32 Hz / 125 Hz in the subframe mode (640x120 pixels) |
| System accuracy | ± 2 °C or ± 2 %, whichever is greater |
| Lenses | 15° x 11° FOV / f = 41.5 mm or 33° x 25° FOV / f = 18.7 mm or 60° x 45° FOV / f = 10.5 mm or 90° x 64° FOV / f = 7.7 mm ¹⁾ |
| Thermal sensitivity (NETD) | 75 mK |
| Detector | FPA, uncooled (17 μm x 17 μm) |
| Outputs/digital | USB 2.0 / optional GigE |
| Standard process interface (PIF) | 0-10 V input, digital input (max. 24 V), 0-10 V output |
| Industry process interface (PIF) | 2x 0-10 V inputs, digital input (max. 24 V), 3x 0(4)-20 mA outputs, 3x relays (0-30 V/ 400 mA), fail-safe relay |
| Cable length (USB) | 1 m (standard), 5 m, 10 m 5 m and 10 m also as high temperature USB cable (180 °C) |
| Power supply | USB powered |
| Tripod mount | ¼-20 UNC |
| Protection class | IP67 |
| Ambient temperature range | 0 °C to 50 °C |
| Storage temperature | -40 °C to 70 °C |
| Relative humidity | 20 to 80 %, non-condensing |
| Vibration | IEC 60068-2-6 (sinus-shaped) / IEC 60068-2-64 (broadband noise) |
| Shock | IEC 60068-2-27 (25 g and 50 g) |
| Housing (size) | 46 mm x 56 mm x 90 mm |
| Weight | 320 g, incl. lens |

PC requirements: minimum 1.5 GHz, 1 GB RAM, Windows XP SP 2 or Windows 7

¹⁾ Please note: measurement accuracy can be out of specification with distances below 200 mm

Scope of supply

TIM 640

- TIM process camera
incl. a selectable lens
- Instruction Manual
- USB cable 1 m
- Software for real-time processing
and analyzing thermal images
- Tripod mount
- PIF cable incl. terminal block (1 m)
- Transport case

thermoIMAGER TIM NetPC / NetPCQ PC solution for thermoIMAGER TIM applications

TIM NetPC is a professional, embedded industrial PC solution with passive cooling (fanless) for thermoIMAGER applications and is suitable for top hat rail mounting. The NetPC and the TIM camera can be operated in combination as stand-alone system. Remote maintenance via Ethernet is possible. Data provided by the TIM camera can be stored directly on the NetPC where customer-specific software can also be installed. A recovery-stick is included in the scope of delivery.

- Supports all thermoIMAGER TIM models
- Supports 120 Hz (TIM 160), up to 80 Hz (TIM 4x0), up to 32 Hz (TIM 640) frame rates
- Including TIMConnect software
- Monitor via VGA (analog)
- Integrated watchdog feature
- Optional: up to 20 m USB cable, high temperature USB cable, extendable up to 100 m Ethernet cable



thermoIMAGER TIM NetPC

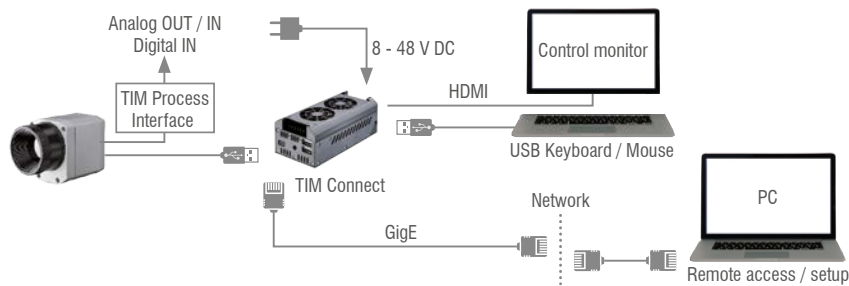
| Model | TIM NetPC | TIM NetPCQ |
|---------------------------|---|--|
| Ambient temperature range | 0 °C to 50 °C | |
| Storage temperature | -20 °C to 60 °C | |
| Relative humidity | 10 to 95 %, non-condensing | |
| Dimensions | 165 x 65 x 130 mm (W x H x D) | |
| Material (housing) | Anodized aluminum | |
| Weight | 1000 g | |
| Vibration | IEC-2-6: 3 G, 11 - 200 Hz, each axis | |
| Shock | IEC-2-27: 50 G, 11 ms, each axis | |
| Operating system | Windows 7 embedded | |
| Power supply | 12 - 24 V DC | |
| Power consumption | approx. 9.5 W without TIM [0.76 A with 12 V] | |
| Cooling | passive cooling (fanless) | |
| Processor | Intel® Atom™ 2600 @ 2x1.6 GHz Dual | Intel® Atom™ J1900 @ 4x2.4 GHz |
| Hard drive | integrated 64 GB SSD | |
| RAM | 2 GB DDR3 RAM 800 MHz | |
| Ports | 1 Gbit/s (GigE), 2 x RS 232, 4 x USB 2.0, VGA | 1 GigE, 2 x RS232 / 485, 3 x USB 2.0, 1 x USB 3.0, VGA |
| Additional functions | 1x status LED | |

thermoIMAGER TIM NetBox Miniature PC for thermoIMAGER TIM series

- Can be integrated into CoolingJacket Advanced Extended
- Miniature PC for TIM 160/ 4x0 standalone mode for cable extension
- Supports 120 Hz (TIM 160 up to 70 Hz (TIM 4x0) frame rate, 32 Hz (TIM 640)
- Integrated hardware and software watchdog
- Optional: up to 20 m USB cable, high temperature USB cable, extendable up to 100 m Ethernet cable (PoE)

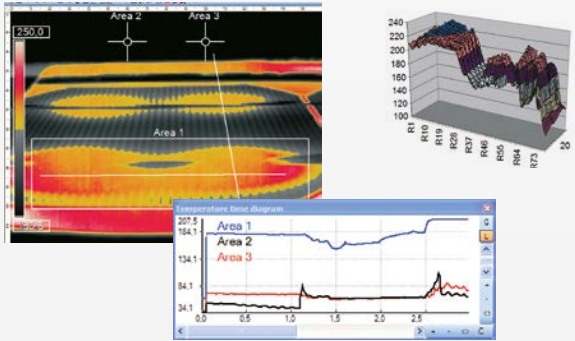


thermoIMAGER TIM NetBox



| Model | TIM NetBox |
|-----------------------|--|
| Operating temperature | 0 °C up to 50 °C |
| Storage temperature | -20 °C to 75 °C |
| Relative humidity | 10 to 95 %, non-condensing |
| Material (housing) | Anodized aluminum |
| Dimensions | 113 x 57 x 47 mm |
| Weight | 385 g |
| Vibration | IEC 60068-2-6 (sinus-shaped) / IEC 60068-2-64 (broadband noise) |
| Shock | IEC 60068-2-27 (25 g and 50 g) |
| Operating system | Windows 7 Professional |
| Power supply | 8 ... 48 VDC or Power over Ethernet (PoE/ 1000BASE-T) |
| Power consumption | 7.5 W (+ additional 2.5 W for TIM camera) |
| Cooling | Active via two integrated fans |
| Board | COM Express® mini embedded board |
| Processor | Intel® E3845 Quad Core, 1.91 GHz |
| Hard drive | 16 GB SSD |
| RAM | 2 GB (DDR2, 533MHz) |
| Ports | 2x USB 2.0, 1x USB 3.0, 1x Mini-USB 2.0, Micro-HDMI, Ethernet (Gigabit Ethernet) |
| Extensions | micro SDHC / SDXC card |
| Additional functions | 4x status LEDs |

TIMConnect SOFTWARE FEATURES



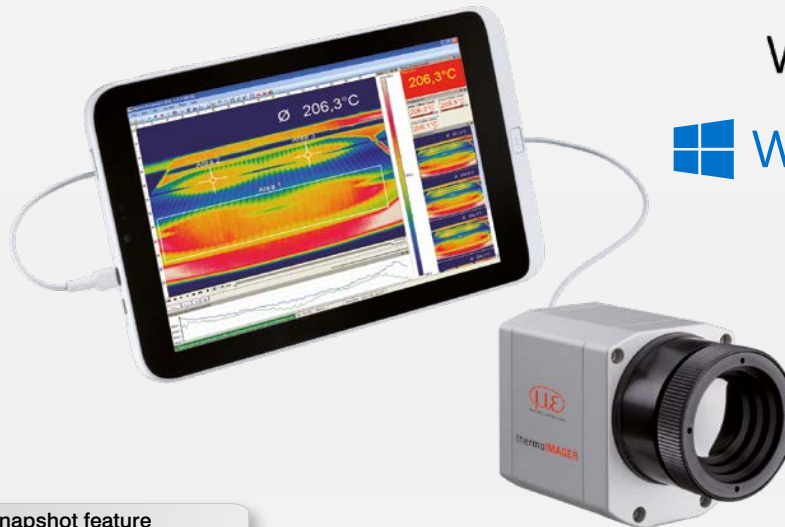
Comprehensive IR camera software

- License-free analysis software and complete SDK included
- Intuitive user interface
- Camera remote control via software
- Displays several camera images in different windows
- Compatible with Windows 7, 8 and 10 and Linux (Ubuntu)
- Data output via PIF hardware interface using up to 3 analog channels



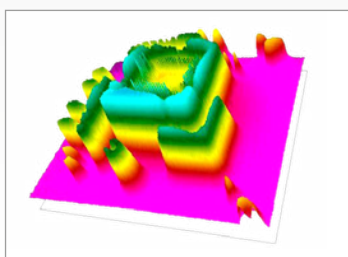
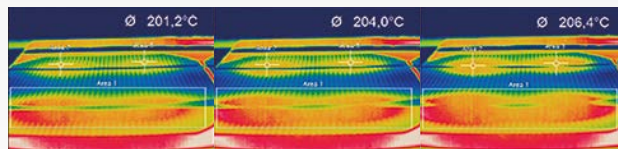
Windows 7

Windows 10



Video recording and snapshot feature (IR or BI-SPECTRAL)

- Recording of video sequences and individual images for later analysis or documentation
- Adjustable frame rate to reduce data volume
- Display of snapshot process for direct analysis



Online and offline data analysis

- Real-time temperature information (°C or °F) in main window, as digital display or graphic display
- Detailed analysis using measuring fields, automatic hotspot/coldspot search
- Logical linking of temperature information
- Slow-motion replay without connected camera
- Various color palettes to highlight thermal contrasts

Temperature data analysis and documentation

- Triggered data collection
- Radiometric video sequences (*.ravi) and snapshots (*.tiff)
- Thermal images as *.tiff or text files *.csv, *.dat incl. complete temperature information
- Data transfer in real time to other software programs via DLL or COM port interfaces

| TIM 160 / 200 | | Focal length [mm] | Angle | Minimum measurement distance* | Distance to measurement object [m] | | | | | | | | | | | |
|------------------------|------|--------------------------------|-------|-------------------------------|------------------------------------|-------|------|------|------|------|------|------|-------|------|-------|-------|
| 160 x 120 px | | | | | 0.02 | 0.1 | 0.2 | 0.3 | 0.5 | 1 | 2 | 4 | 6 | 10 | 30 | 100 |
| 23° Standard lens | 10 | 23° 17° 29° 2.48 mrad | 0.2 m | HFOV [m] | 0.012 | 0.043 | 0.08 | 0.12 | 0.21 | 0.41 | 0.81 | 1.62 | 2.44 | 4.1 | 12.2 | 40.6 |
| | | | | VFOV [m] | 0.009 | 0.032 | 0.06 | 0.09 | 0.15 | 0.30 | 0.60 | 1.21 | 1.81 | 3.0 | 9.0 | 30.1 |
| | | | | DFOV [m] | 0.015 | 0.054 | 0.10 | 0.16 | 0.26 | 0.51 | 1.01 | 2.02 | 3.03 | 5.1 | 15.2 | 50.5 |
| | | | | IFOV [mm] | 0.1 | 0.3 | 0.5 | 0.8 | 1.3 | 2.5 | 5.0 | 9.9 | 14.9 | 24.8 | 74.4 | 248.0 |
| 6° Telephoto lens | 35.5 | 6° 5° 8° 0.70 mrad | 0.5 m | HFOV [m] | | | | | 0.06 | 0.11 | 0.23 | 0.45 | 0.68 | 1.1 | 3.4 | 11.3 |
| | | | | VFOV [m] | | | | | 0.04 | 0.09 | 0.17 | 0.34 | 0.51 | 0.8 | 2.5 | 8.5 |
| | | | | DFOV [m] | | | | | 0.07 | 0.14 | 0.28 | 0.57 | 0.85 | 1.4 | 4.2 | 14.2 |
| | | | | IFOV [mm] | | | | | 0.4 | 0.7 | 1.4 | 2.8 | 4.2 | 7.0 | 21.1 | 70.4 |
| 48° Wide angle lens | 5.7 | 41° 31° 51° 4.39 mrad | 0.2 m | HFOV [m] | 0.022 | 0.082 | 0.16 | 0.23 | 0.38 | 0.76 | 1.51 | 3.00 | 4.50 | 7.5 | 22.5 | 74.9 |
| | | | | VFOV [m] | 0.016 | 0.059 | 0.11 | 0.17 | 0.28 | 0.55 | 1.10 | 2.19 | 3.28 | 5.5 | 16.4 | 54.5 |
| | | | | DFOV [m] | 0.027 | 0.101 | 0.19 | 0.29 | 0.47 | 0.94 | 1.86 | 3.72 | 5.57 | 9.3 | 27.8 | 92.7 |
| | | | | IFOV [mm] | 0.1 | 0.4 | 0.9 | 1.3 | 2.2 | 4.4 | 8.8 | 17.5 | 26.3 | 43.9 | 131.6 | 438.6 |
| 72° Wide angle lens | 3.3 | 72° 52° 89° 7.51 mrad | 0.2 m | HFOV [m] | 0.039 | 0.152 | 0.29 | 0.43 | 0.72 | 1.42 | 2.84 | 5.66 | 8.49 | 14.1 | 42.4 | 141.4 |
| | | | | VFOV [m] | 0.027 | 0.106 | 0.20 | 0.30 | 0.50 | 0.99 | 1.98 | 3.95 | 5.92 | 9.9 | 29.6 | 98.6 |
| | | | | DFOV [m] | 0.048 | 0.186 | 0.36 | 0.53 | 0.87 | 1.74 | 3.46 | 6.91 | 10.35 | 17.2 | 51.7 | 172.3 |
| | | | | IFOV [mm] | 0.2 | 0.8 | 1.5 | 2.3 | 3.8 | 7.5 | 15.0 | 30.0 | 45.0 | 75.1 | 225.2 | 750.8 |

| TIM 400 / 450 / G7 | | Focal length [mm] | Angle | Minimum measurement distance* | Distance to measurement object [m] | | | | | | | | | | | |
|--|------|--------------------------------|-------|-------------------------------|------------------------------------|-------|------|------|------|------|------|------|-------|------|------|-------|
| 382 x 288 px | | | | | 0.02 | 0.1 | 0.2 | 0.3 | 0.5 | 1 | 2 | 4 | 6 | 10 | 30 | 100 |
| 29° Standard lens | 18.7 | 29° 22° 37° 1.34 mrad | 0.2 m | HFOV [m] | | 0.060 | 0.11 | 0.16 | 0.27 | 0.53 | 1.0 | 2.1 | 3.1 | 5.2 | 15.6 | 52.1 |
| | | | | VFOV [m] | | 0.045 | 0.08 | 0.12 | 0.20 | 0.40 | 0.78 | 1.6 | 2.3 | 3.9 | 11.7 | 39.0 |
| | | | | DFOV [m] | | 0.074 | 0.14 | 0.20 | 0.33 | 0.66 | 1.3 | 2.6 | 3.9 | 6.5 | 19.5 | 65.1 |
| | | | | IFOV [mm] | | 0.1 | 0.3 | 0.4 | 0.7 | 1.3 | 2.7 | 5.4 | 8.0 | 13.4 | 40.1 | 133.7 |
| 13° Telephoto lens (except for G7) | 41 | 13° 10° 17° 0.61 mrad | 0.5 m | HFOV [m] | | | | | 0.12 | 0.23 | 0.47 | 0.94 | 1.40 | 2.3 | 7.0 | 23.4 |
| | | | | VFOV [m] | | | | | 0.09 | 0.17 | 0.35 | 0.70 | 1.05 | 1.7 | 5.2 | 17.5 |
| | | | | DFOV [m] | | | | | 0.15 | 0.29 | 0.58 | 1.17 | 1.75 | 2.9 | 8.8 | 29.2 |
| | | | | IFOV [mm] | | | | | 0.3 | 0.6 | 1.2 | 2.5 | 3.7 | 6.1 | 18.4 | 61.2 |
| 53° Wide angle lens | 10.5 | 53° 40° 66° 2.38 mrad | 0.2 m | HFOV [m] | | 0.11 | 0.21 | 0.31 | 0.51 | 1.0 | 2.0 | 4.0 | 6.0 | 9.9 | 29.7 | 99.0 |
| | | | | VFOV [m] | | 0.08 | 0.15 | 0.23 | 0.37 | 0.73 | 1.4 | 2.9 | 4.3 | 7.2 | 21.6 | 71.9 |
| | | | | DFOV [m] | | 0.14 | 0.26 | 0.38 | 0.63 | 1.2 | 2.5 | 4.9 | 7.4 | 12.2 | 36.7 | 122.3 |
| | | | | IFOV [mm] | | 0.2 | 0.5 | 0.7 | 1.2 | 2.4 | 4.8 | 9.5 | 14.3 | 23.8 | 71.5 | 238.4 |
| 80° Wide angle lens | 7.7 | 80° 56° 97° 3.25 mrad | 0.2 m | HFOV [m] | | 0.182 | 0.35 | 0.84 | 0.84 | 1.65 | 3.29 | 6.55 | 9.82 | 16.4 | 49.0 | 163.4 |
| | | | | VFOV [m] | | 0.119 | 0.23 | 0.55 | 0.54 | 1.08 | 2.14 | 4.28 | 6.41 | 10.7 | 32.0 | 106.6 |
| | | | | DFOV [m] | | 0.218 | 0.41 | 1.00 | 1.00 | 1.97 | 3.92 | 7.83 | 11.73 | 19.5 | 58.5 | 195.1 |
| | | | | IFOV [mm] | | 0.3 | 0.7 | 1.6 | 1.6 | 3.3 | 6.5 | 13.0 | 19.5 | 32.5 | 97.4 | 324.7 |

| TIM M1 / TIM M05 ¹⁾ | Focal length [mm] | Angle | Minimum measurement distance* | Distance to measurement object [m] | | | | | | | | | | | |
|------------------------------------|----------------------|--------------------------------|-------------------------------------|------------------------------------|-------|------|------|------|------|------|------|------|-----|------|------|
| | | | | | 0.1 | 0.2 | 0.3 | 0.5 | 1 | 2 | 4 | 6 | 10 | 30 | 100 |
| 382 x 288 px | 16 | 20° 15° 25° 0.94 mrad | 0.2 m | HFOV [m] | | 0.07 | 0.11 | 0.18 | 0.36 | 0.72 | 1.43 | 2.15 | 3.6 | 10.7 | 35.8 |
| | | | | VFOV [m] | | 0.05 | 0.08 | 0.14 | 0.27 | 0.54 | 1.08 | 1.62 | 2.7 | 8.1 | 27.0 |
| | | | | DFOV [m] | | 0.09 | 0.13 | 0.22 | 0.45 | 0.90 | 1.79 | 2.69 | 4.5 | 13.5 | 44.9 |
| | | | | IFOV [mm] | | 0.2 | 0.3 | 0.5 | 0.9 | 1.9 | 3.8 | 5.6 | 9.4 | 28.1 | 93.8 |
| f=25 mm standard lens | 25 | 13° 10° 16° 0.60 mrad | 0.5 m | HFOV [m] | 0.023 | 0.05 | 0.07 | 0.11 | 0.23 | 0.46 | 0.92 | 1.38 | 2.3 | 6.9 | 22.9 |
| | | | | VFOV [m] | 0.017 | 0.03 | 0.05 | 0.09 | 0.17 | 0.35 | 0.69 | 1.04 | 1.7 | 5.2 | 17.3 |
| | | | | DFOV [m] | 0.029 | 0.06 | 0.09 | 0.14 | 0.29 | 0.57 | 1.15 | 1.72 | 2.9 | 8.6 | 28.7 |
| | | | | IFOV [mm] | 0.1 | 0.1 | 0.2 | 0.3 | 0.6 | 1.2 | 2.4 | 3.6 | 6.0 | 18.0 | 60.0 |
| f=50 mm telephoto lens | 50 | 7° 5° 8° 0.30 mrad | 1.5 m | HFOV [m] | | | | 0.06 | 0.11 | 0.23 | 0.46 | 0.69 | 1.1 | 3.4 | 11.5 |
| | | | | VFOV [m] | | | | 0.04 | 0.09 | 0.17 | 0.35 | 0.52 | 0.9 | 2.6 | 8.6 |
| | | | | DFOV [m] | | | | 0.07 | 0.14 | 0.29 | 0.57 | 0.86 | 1.4 | 4.3 | 14.4 |
| | | | | IFOV [mm] | | | | 0.2 | 0.3 | 0.6 | 1.2 | 1.8 | 3.0 | 9.0 | 30.0 |
| f=75 mm Super telephoto lens | 75 | 4° 3° 5° 0.20 mrad | 2.0 m | HFOV [m] | | | | | 0.08 | 0.15 | 0.31 | 0.46 | 0.8 | 2.3 | 7.6 |
| | | | | VFOV [m] | | | | | 0.06 | 0.12 | 0.23 | 0.35 | 0.6 | 1.7 | 5.8 |
| | | | | DFOV [m] | | | | | 0.10 | 0.19 | 0.38 | 0.57 | 1.0 | 2.9 | 9.6 |
| | | | | IFOV [mm] | | | | | 0.2 | 0.4 | 0.8 | 1.2 | 2.0 | 6.0 | 20.0 |

¹⁾ TIM M05 only available with OF25 lens | Please note: the camera provides 382 x 288 px in the 80 Hz mode

| TIM M1 / M05 with VGA ¹⁾ Resolution | Focal length [mm] | Angle | Minimum measurement distance* | Distance to measurement object [m] | | | | | | | | | | | |
|--|----------------------|--------------------------------|-------------------------------------|------------------------------------|-------|------|------|------|------|------|------|------|-----|------|------|
| | | | | | 0.1 | 0.2 | 0.3 | 0.5 | 1 | 2 | 4 | 6 | 10 | 30 | 100 |
| 764 x 480 px | 16 | 39° 25° 46° 0.94 mrad | 0.2 m | HFOV [m] | | 0.14 | 0.21 | 0.36 | 0.72 | 1.43 | 2.87 | 4.30 | 7.2 | 21.5 | 71.6 |
| | | | | VFOV [m] | | 0.09 | 0.14 | 0.23 | 0.45 | 0.90 | 1.80 | 2.70 | 4.5 | 13.5 | 45.0 |
| | | | | DFOV [m] | | 0.17 | 0.25 | 0.42 | 0.85 | 1.69 | 3.38 | 5.08 | 8.5 | 25.4 | 84.6 |
| | | | | IFOV [mm] | | 0.2 | 0.3 | 0.5 | 0.9 | 1.9 | 3.8 | 5.6 | 9.4 | 28.1 | 93.8 |
| f=25 mm standard lens | 25 | 26° 16° 30° 0.60 mrad | 0.5 m | HFOV [m] | 0.046 | 0.09 | 0.14 | 0.23 | 0.46 | 0.92 | 1.83 | 2.75 | 4.6 | 13.8 | 45.8 |
| | | | | VFOV [m] | 0.029 | 0.06 | 0.09 | 0.14 | 0.29 | 0.58 | 1.15 | 1.73 | 2.9 | 8.6 | 28.8 |
| | | | | DFOV [m] | 0.054 | 0.11 | 0.16 | 0.27 | 0.54 | 1.08 | 2.17 | 3.25 | 5.4 | 16.2 | 54.1 |
| | | | | IFOV [mm] | 0.1 | 0.1 | 0.2 | 0.3 | 0.6 | 1.2 | 2.4 | 3.6 | 6.0 | 18.0 | 60.0 |
| f=50 mm telephoto lens | 50 | 13° 8° 15° 0.30 mrad | 1.5 m | HFOV [m] | | | | 0.11 | 0.23 | 0.46 | 0.92 | 1.38 | 2.3 | 6.9 | 22.9 |
| | | | | VFOV [m] | | | | 0.07 | 0.14 | 0.29 | 0.58 | 0.86 | 1.4 | 4.3 | 14.4 |
| | | | | DFOV [m] | | | | 0.14 | 0.27 | 0.54 | 1.08 | 1.62 | 2.7 | 8.1 | 27.1 |
| | | | | IFOV [mm] | | | | 0.2 | 0.3 | 0.6 | 1.2 | 1.8 | 3.0 | 9.0 | 30.0 |
| f=75 mm Super telephoto lens | 75 | 9° 5° 10° 0.20 mrad | 2.0 m | HFOV [m] | | | | | 0.15 | 0.31 | 0.61 | 0.92 | 1.5 | 4.6 | 15.3 |
| | | | | VFOV [m] | | | | | 0.10 | 0.19 | 0.38 | 0.58 | 1.0 | 2.9 | 9.6 |
| | | | | DFOV [m] | | | | | 0.18 | 0.36 | 0.72 | 1.08 | 1.8 | 5.4 | 18.0 |
| | | | | IFOV [mm] | | | | | 0.2 | 0.4 | 0.8 | 1.2 | 2.0 | 6.0 | 20.0 |

¹⁾ TIM M05 is only available with OF25 lens | Please note: the camera provides 764 x 480 px in the 32 Hz mode

High performance sensors made by Micro-Epsilon



Sensors and systems for displacement and position



Sensors and measurement devices for non-contact temperature measurement



2D/3D profile sensors (laser scanner)



Optical micrometers, fiber optic sensors and fiber optics



Color recognition sensors, LED analyzers and color online spectrometer



Measurement and inspection systems