High-Performance ROICs, Sensors, and ASICs for Infrared Imaging Systems
**MicroBolometer ROIC Solutions**

**Key Features of ROIC**
- Advanced MicroBolometer ROIC
- Resistive detector arrays
- Low Noise, Low Power, High Speed
- Monolithic infrared sensors
- Fabricated on Silicon based ReadOut Integrated Circuits (ROICs)
- Using pixel arrays made of thermally suspended resistive structures
- Materials with high TCR (temperature coefficient of resistance): e.g. VOx
- Capable of detecting very small changes in the pixel resistance

<table>
<thead>
<tr>
<th></th>
<th>MT3825BA</th>
<th>MT3817BA</th>
<th>MT6417BA</th>
<th>MT10217BA</th>
<th>MT6412BA</th>
<th>MT10212BD</th>
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<tbody>
<tr>
<td>Resolution</td>
<td>384x288</td>
<td>384x288</td>
<td>640x480</td>
<td>1024x768</td>
<td>640x480</td>
<td>1024x768</td>
</tr>
<tr>
<td>Pixel Pitch</td>
<td>25 µm</td>
<td>17 µm</td>
<td>17 µm</td>
<td>17 µm</td>
<td>12 µm</td>
<td>12 µm</td>
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<tr>
<td>Spectral Band</td>
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<tr>
<td>8 - 12 µm</td>
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<tr>
<td>Detector Material</td>
<td></td>
<td>Resistive Microbolometer</td>
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<td></td>
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<tr>
<td>Biasing and Timing</td>
<td></td>
<td>On Chip Programmable</td>
<td></td>
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<tr>
<td>ROIC Operating Mode</td>
<td></td>
<td>Rolling Line</td>
<td></td>
<td></td>
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<tr>
<td>Windowing</td>
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<tr>
<td>Programmable (Size and Location)</td>
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<tr>
<td>Integration Time</td>
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<tr>
<td>Programmable</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Output Noise Level</td>
<td></td>
<td>≤ 0.5mV rms at 300K</td>
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<td></td>
<td></td>
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<td>4 Count@14bit</td>
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<tr>
<td>Frame Rate</td>
<td>≤50 fps</td>
<td>≤150 fps</td>
<td>≤60 fps</td>
<td>≤40 fps</td>
<td>≤60 fps</td>
<td>≤40 fps</td>
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<tr>
<td>Die Size (mm)</td>
<td>13.0 x 13.5</td>
<td>9.8 x 12.2</td>
<td>14.1 x 15.4</td>
<td>20.3 x 20.7</td>
<td>11.1 x 13.9</td>
<td>20.0 x 20.0</td>
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</tbody>
</table>
Application Areas
- Thermal Inspection
- Industrial Process Control
- Security and Surveillance
- Building Automation
- Driver Vision Enhancement
- Drone and UAV based imaging

Key Features of µBolo Camera
- Demonstrate the performance of Mikro-Tasarım’s ROIC and ASIC products
- 8-12μm Spectral Band
- CamLink, BT-656 output
- Modular and Reliable
- SWAP-C Designs
- CAM, MicroCAM, NanoCAM, PicoCAM

MT-CL-MicroCAM-B3825 µBolo Camera
- Camera based on MT3825BA ROIC and MTAS1410X4 ASIC
- 384x288 format, 25μm pixel pitch
- 14-bit digital video (Cam-Link)
- Frame Rate Up to 50 fps
- 60mm × 54mm × 51,5mm (w/o optics)
- 240 gr (w/o optics)

MT-CL-MicroCAM-B6417 µBolo Camera
- Camera based on MT6417BA ROIC and MTAS1410X4 ASIC
- 640x480 format, 17μm pixel pitch
- 14-bit digital video (Cam-Link)
- Frame Rate Up to 30 fps
- 60 mm × 54 mm × 51,6 mm (w/o optics)
- 240 gr (w/o optics)

MT-CORE-B6417 µBolo Camera Core
- Camera core based on MT6417BA ROIC and MTAS1410X4 ASIC
- 640x480 format, 17μm pixel pitch
- Ceramic Vacuum Packaged µBolo Sensor
- 14-bit digital video (2 or 4 channel Serial LVDS)
- Frame Rate Up to 30 fps
- 26,6mm × 26,6mm × 28mm (w/o optics)
- ≤35 gr (w/o optics)

MT-CORE-F-B6417 µBolo Camera Core
- Camera core based on MT6417BA ROIC, MTAS1410X4 ASIC and FPGA
- 640x480 format, 17μm pixel pitch
- Ceramic Vacuum Packaged µBolo Sensor
- 14-bit digital video (Cam-Link, BT-656)
- Frame Rate Up to 30 fps
- 26,6mm × 26,6mm × 28mm (FPA and ASIC Core)
- 40mm x 40mm x 7mm (FPGA board) (w/o optics)
- 40 gr (w/o optics)
- Gain Offset Correction, Histogram Equilization Algorithms

µBolo Sensor Test Electronics
- MicroBolometer Sensor Test Board uses Wafer Level/Ceramic Vacuum Packaged sensor
Short Wave Infrared (SWIR) ROIC Solutions

Key Features of ROIC
- Advanced CTIA ROIC
- Detector Material: InGaAs, CQD, MCT
- Snapshot Operation: ITR and IWR
- Programmable Biasing, Timing, and Windowing
- Low Noise, Low Power, High Speed

<table>
<thead>
<tr>
<th></th>
<th>MT6415CA</th>
<th>MT12815CA-3G</th>
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<tbody>
<tr>
<td><strong>Resolution</strong></td>
<td>640x512</td>
<td>1280x1024</td>
</tr>
<tr>
<td><strong>Pixel Pitch</strong></td>
<td>15 µm</td>
<td>15 µm</td>
</tr>
<tr>
<td><strong>Spectral Band</strong></td>
<td></td>
<td>900 - 1700nm</td>
</tr>
<tr>
<td><strong>Detector Material</strong></td>
<td></td>
<td>Capacitive Trans Impedance Amplifier (CTIA)</td>
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<tr>
<td><strong>Biasing and Timing</strong></td>
<td></td>
<td>InGaAs, CQD, MCT</td>
</tr>
<tr>
<td><strong>ROIC Operating Mode</strong></td>
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<td>12-bit programmable</td>
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<tr>
<td><strong>Windowing</strong></td>
<td></td>
<td>Snapshot Operation: ITR and IWR Modes</td>
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<tr>
<td><strong>Integration Time</strong></td>
<td></td>
<td>Programmable</td>
</tr>
<tr>
<td><strong>Output Noise Level</strong></td>
<td>&lt;5e- at 300K</td>
<td></td>
</tr>
<tr>
<td><strong>Frame Rate</strong></td>
<td>≤260 Hz</td>
<td>≤60 Hz</td>
</tr>
<tr>
<td><strong>Die Size (mm)</strong></td>
<td>12.20 x 13.32</td>
<td>21.7 x 21.0</td>
</tr>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>65K to 300K</td>
<td></td>
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</tbody>
</table>
Short Wave Infrared (SWIR) Camera Solutions

Application Areas
- Driver Vision Enhancement (see through fog)
- Industrial Control (see through plastic, paint, and glass)
- Traffic Control
- Scientific Imaging
- Security and Surveillance
- Drone and UAV based imaging

Key Features of SWIR Camera
- Demonstrate the performance of Mikro-Tasarım’s ROIC and ASIC products
- CamLink, DVP, Analog Video output
- CAM, MicroCAM, NanoCAM, PicoCAM

MT-CL-MicroCAM-SW6415 SWIR Camera
- Hybrid SWIR Imaging Sensor on MT6415CA ROIC
- 640x512 Format, 15µm Pixel Pitch
- 900-1700nm Spectral Band
- Frame rate up to 70 fps
- 5V, CamLink Output
- 40mm x 40mm x 40mm (w/o optics)
- 72 gr (w/o optics)

MT-CL-MicroCAM-SW12815 SWIR Camera
- Hybrid SWIR Imaging Sensor on MT12815CA ROIC
- 1280x1024 Format, 15µm Pixel Pitch
- 900-1700nm Spectral Band
- Frame rate up to 25 fps
- 5V, CamLink Output
- 40mm x 40mm x 40mm (w/o optics)
- 72 gr (w/o optics)

MT-MicroCAM2-SW6415 SWIR Camera with TEC
- Hybrid SWIR Imaging Sensor on MT6415CA ROIC
- 640x512 Format, 15µm Pixel Pitch
- 900-1700nm Spectral Band
- Frame rate up to 50 fps
- Includes Shutter and TEC
- 5V, CamLink, DVP, Analog Video Output
- 58mm x 58mm x 80mm (w/o optics)
- <410 gr (w/o optics)

MT-MicroCAM2-SW12815 SWIR Camera with TEC
- Hybrid SWIR Imaging Sensor on MT12815CA ROIC
- 1280x1024 Format, 15µm Pixel Pitch
- 900-1700nm Spectral Band
- Frame rate up to 25 fps
- Includes Shutter and TEC
- 5V, CamLink, DVP, Analog Video Output
- 58mm x 58mm x 80mm (w/o optics)
- <410 gr (w/o optics)

SWIR Sensor Test Electronics
- SWIR Sensor Test Board uses hybridized sensors
Visible Near Infrared (VNIR) Camera Solutions

**Application Areas**
- Low-Light-Level Imaging (≤0.3mLux)
- Security and Surveillance
- Driver Vision Enhancement
- Industrial Machine Vision
- Scientific Visible/NIR Imaging
- Traffic Control
- Drone and UAV based imaging

**MT-MP-MicroCAM-VNIR6418 Camera**
- CMOS Sensor
- 640x480 Format,
- 18 µm Pixel Pitch
- 400-1100nm Spectral Band
- Frame Rate up to 40 fps
- Includes Shutter
- 5V, MIPI Output
- Power ≤1.35W
- 58mm × 55.5mm × 23mm (w/o optics)
- 86gr (w/o optics)

**MT-VNIR-CAM-640-CL Camera**
- CMOS Sensor
- 640x480 Format,
- 18 µm Pixel Pitch
- 400-1100nm Spectral Band
- Frame Rate up to 40 fps
- Includes Shutter
- 5V, CamLink, Analog Video Output
- Power ≤ 3W
- 60mm × 60mm × 75mm (w/o optics)
- 350gr (w/o optics)

**Key Features of Sensor**
- Sensor Type: CMOS
- 640x480 Format,
- 18 µm Pixel Pitch
- Exposure control: Global Shutter
- Programmable Integration Time, and Windowing
- Low Noise, Low Power, High Speed
- Digital Output

“no moonlight, no city light”
Key Features of ROIC

- Advanced DI and Dual-Polarity DI ROIC
- Detector Material (MCT, InSb, QWIP, T2SL)
- 1, 2, 4, or 8 analog output with reference
- Snapshot Operation: ITR and IWR
- Low Noise, Low Power, High Speed
- Cryogenic operation down to 65K

<table>
<thead>
<tr>
<th></th>
<th>MT6425DA</th>
<th>MT6420DA</th>
<th>MT6420DDA</th>
<th>MT6415DA</th>
<th>MT12815DA</th>
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<td>640x512</td>
<td>640x512</td>
<td>640x512</td>
<td>1280x1024</td>
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<tr>
<td>Pixel Pitch</td>
<td>25 µm</td>
<td>20 µm</td>
<td>20 µm</td>
<td>15 µm</td>
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<td>Input Circuit Type</td>
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<td>Dual-DI</td>
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<td>Spectral Band</td>
<td>3 - 5 µm / 8-12 µm</td>
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<tr>
<td>Detector Material</td>
<td>MCT, InSb, QWIP, T2SL</td>
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<td>Readout Modes</td>
<td>Snapshot Operation: ITR and IWR Modes</td>
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<td>Integration Time</td>
<td>Programmable</td>
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<tr>
<td>Detector Biasing</td>
<td>On Chip Programmable</td>
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<tr>
<td>Frame Rate</td>
<td>≤120 fps</td>
<td>≤200 fps</td>
<td>≤200 fps</td>
<td>≤200 fps</td>
<td>≤50 fps</td>
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<td>Die Size (mm)</td>
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<td>15.6 x 15.6</td>
<td>12.4 x 13.5</td>
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<tr>
<td>Operating</td>
<td>65K to 300K</td>
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<tr>
<td>Temperature</td>
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</table>

Key Features of ASIC

- ROIC/Sensor driver and digitizer ASIC
- 1,2,4 or 8 ADC Channel Modes
- 14-bit 10MHz ADCs with serial LVDS outputs
- All Mikro-Tasarım cameras and test electronics includes these ASICs
- Configurable signal path with buffers and PGAs
- Programmable general purpose CMOS outputs
- Integrated controller with program memory

<table>
<thead>
<tr>
<th></th>
<th>MTAS1410X2</th>
<th>MTAS1410X4</th>
<th>MTAS1410X8</th>
<th>MTAS1410X4CL</th>
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<tr>
<td>Number of ADC Channels</td>
<td>2 parallel</td>
<td>4 parallel</td>
<td>8 parallel</td>
<td>4 parallel</td>
<td>8 parallel</td>
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<td>Sampling</td>
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<td>10MHz</td>
<td>10MHz</td>
<td>10MHz</td>
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<tr>
<td>ADC Resolution</td>
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<tr>
<td>Conversion Speed</td>
<td>≤10 Mega Samples / Second / ADC Channel</td>
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<tr>
<td>Package</td>
<td>Plastic Ball Grid Array (PBGA)</td>
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</table>
Key Features of VNIR DVE System

- Increase vehicle safety and security
- Increase local situational awareness of driver
- Night vision enhancement
- Assisting driver to identify potential threats and obstacles
- Display in real time video
- Switching between front and rear cameras
- Virtual image of wheel tracks for assisting driving
- Video recording
- User friendly user interface, touch screen monitor

A. Front Camera
- Sensor: VNIR Sensor Module (640x480)
- Lens: 25mm f/0.85-f/360 DC-Auto Iris
- Processing Unit: 1 GHz 4-Core ARM CPU
- Housing: Metal Housing, IP67

B. Rear Camera
- Sensor: VNIR Sensor Module (640x480)
- Lens: 25mm f/0.85-f/360 DC-Auto Iris 25mm f/0.95 Manual Iris Lens (*Optional)
- Processing Unit: 1 GHz 4-Core ARM CPU
- Housing: Metal Housing, IP67

C. Smart Display and Processing Unit
- Display: Touch Screen, 10.1"
- Processor: 1 GHz 4-Core ARM CPU
- Display Housing: Metal case, mounted inside
- Control Boards: 4-port Gigabit Network and Power