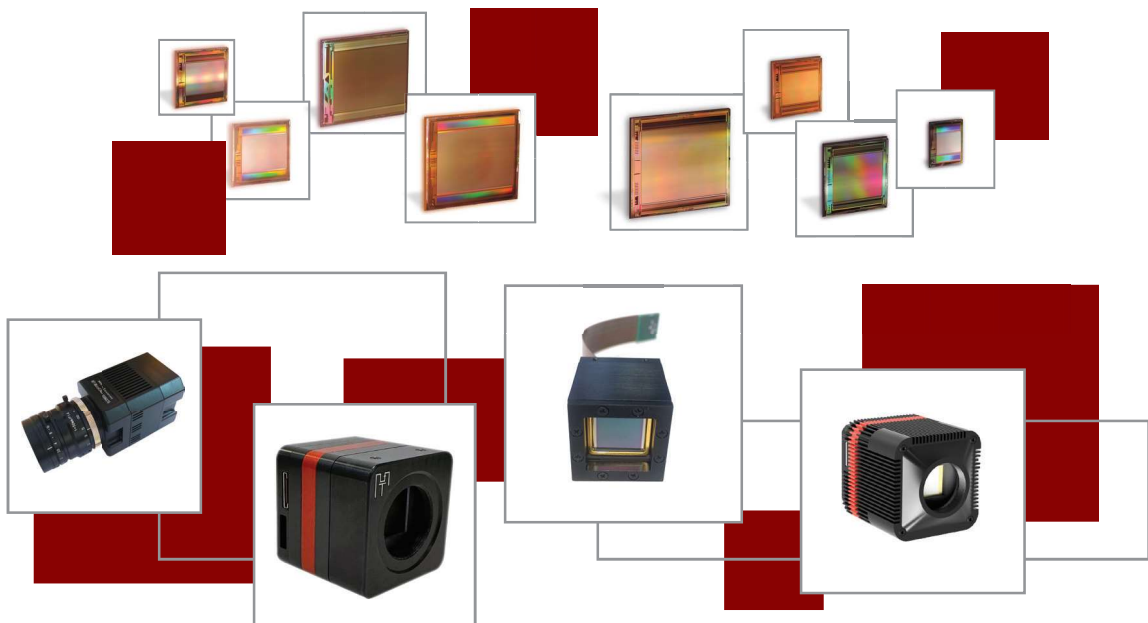


Mikro Tasarım



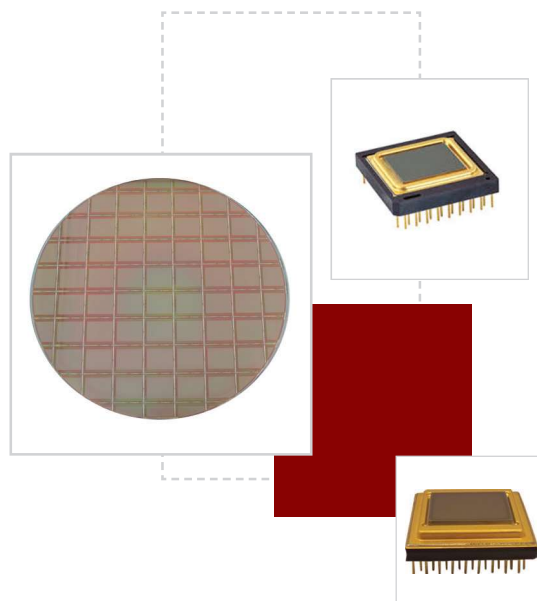
High-Performance ROICs, Sensors, and ASICs
for Infrared Imaging Systems



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



MT3825BA

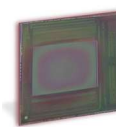
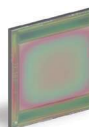
MT3817BA

MT6417BA

MT10217BA

MT6412BA

MT10212BD



	MT3825BA	MT3817BA	MT6417BA	MT10217BA	MT6412BA	MT10212BD
Resolution	384x288	384x288	640x480	1024x768	640x480	1024x768
Pixel Pitch	25 μ m	17 μ m	17 μ m	17 μ m	12 μ m	12 μ m
Spectral Band	8 - 12 μ m					
Detector Material	Resistive Microbolometer					
Biasing and Timing	On Chip Programmable					
ROIC Operating Mode	Rolling Line					
Windowing	Programmable (Size and Location)					
Integration Time	Programmable					
Output Noise Level	≤ 0.5 mV rms at 300K					4 Count@14bit
Frame Rate	≤ 50 fps	≤ 150 fps	≤ 60 fps	≤ 40 fps	≤ 60 fps	≤ 40 fps
Die Size (mm)	13.0 x 13.5	9.8 x 12.2	14.1 x 15.4	20.3 x 20.7	11.1 x 13.9	20.0 x 20.0

MicroBolometer Camera Solutions

Application Areas

- Thermal Inspection
- Industrial Process Control
- Security and Surveillance
- Building Automation
- Driver Vision Enhancement
- Drone and UAV-based Imaging

Key Features of μ Bolo Camera

- Demonstrate the performance of Mikro-Tasarim's ROIC and ASIC products
- 8-12 μ m Spectral Band
- CamLink, BT-656 output
- Modular and Reliable
- SWAP-C Designs
- CAM, MicroCAM, NanoCAM, PicoCAM

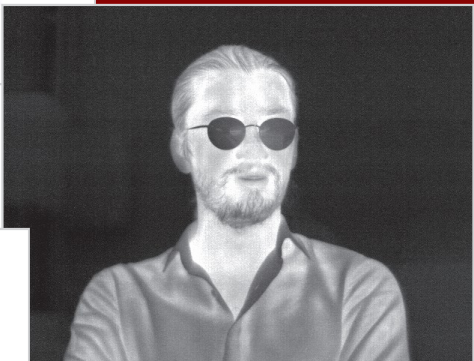
MT-CL-MicroCAM-B3825 μ Bolo Camera

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



MT-CL-MicroCAM-B6417 μ Bolo Camera

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



MT-CORE-B6417 μ Bolo Camera Core

- Camera core based on MT6417BA ROIC and MTAS1410X4 ASIC
- 640x480 format, 17 μ m pixel pitch
- Ceramic Vacuum Packaged μ Bolo Sensor
- 14-bit digital video (2 channel Serial LVDS)
- Frame Rate Up to 30 fps
- 26,6mm x 26,6mm x 28mm (w/o optics)
- \leq 35 gr (w/o optics)



Microbolometer Test Electronics using MTAS1410X4 ASIC

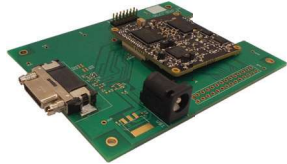
MT-CORE-F-B6417 μ Bolo Camera Core

- Camera core based on MT6417BA ROIC, MTAS1410X4 ASIC and FPGA
- 640x480 format, 17 μ m pixel pitch
- Ceramic Vacuum Packaged μ Bolo Sensor
- 14-bit digital video (Cam-Link, BT-656)
- Frame Rate Up to 30 fps
- 26,6mm x 26,6mm x 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



μ Bolo Sensor Test Electronics

- MicroBolometer Sensor Test Board uses Wafer Level/Ceramic Vacuum Packaged sensor

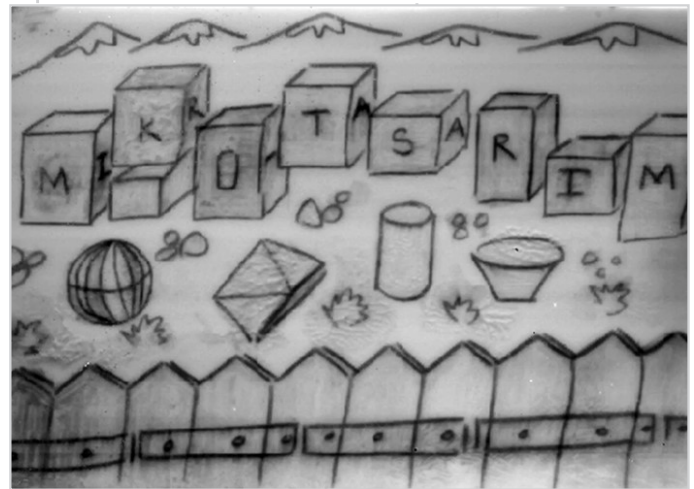
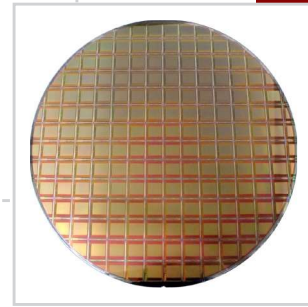


FPGA Board

Short Wave Infrared (SWIR) ROIC Solutions

Key Features of ROIC

- Advanced CTIA ROIC
- Detector Material: InGaAs, MCT, T2SL, and CQD
- Snapshot Operation: ITR
- Programmable Biasing, Timing, and Windowing
- High Speed, Low Power, and Very Low Noise



NEW
PRODUCT

	MT3230CA	MT6415CA1	MT6415CA3	MT12815CA1	MT12815CA3	MT12810CA	MT6410CA
Resolution	320x256	640x512	640x512	1280x1024	1280x1024	1280x1024	640x512
Pixel Pitch	30 μ m	15 μ m	15 μ m	15 μ m	15 μ m	10 μ m	10 μ m
Spectral Band	900 - 1700nm						
Input Circuit Type	Capacitive Trans Impedance Amplifier (CTIA)						
Detector Material	InGaAs, MCT, T2SL, and CQD						
Detector Biasing	12-bit programmable						
Readout Modes	Snapshot Operation: ITR Mode						
Integration Time	Programmable						
Readout Noise	HG: < 30e- rms LG: < 110e- rms	HG: < 30e- rms LG: < 110e- rms	HG: \leq 10e- rms LG: \leq 110e- rms	HG: < 30 e- rms LG: < 110 e- rms	HG: < 10 e- rms LG: < 110 e- rms	HG: < 10 e- rms LG: < 110 e- rms	HG: < 10 e- rms LG: < 110 e- rms
Frame Rate	\leq 1040 fps	\leq 260 fps	\leq 260 fps	\leq 60 fps	\leq 60 fps	\leq 60 fps	\leq 200 fps
Die Size (mm)	12.2 x 13.32	12.2 x 13.3	12.2 x 13.3	21.7 x 21	21.7 x 21	15.4 x 16.2	11.00x 11.08

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
- Quality Control Systems

Key Features of SWIR Camera

- Demonstrate the performance of MikroTasarım's ROIC products
- CamLink, DVP, Analog Video output
- CAM, MicroCAM, NanoCAM, PicoCAM

MT-MicroCAM4-SW6415 SWIR Camera

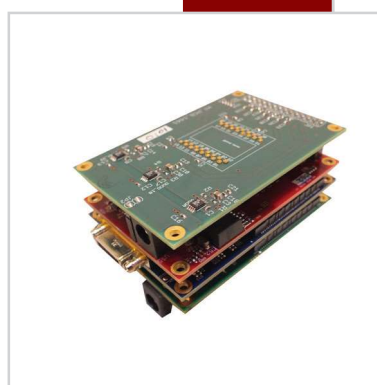
- Hybrid SWIR Imaging Sensor on MT6415CA ROIC
- 640 x 512 Format, 15 μm Pixel Pitch
- 900 -1700 nm Spectral Band
- Frame rate up to 50 fps
- CamLink output/IP output w/Processing unit
- Includes Shutter and TEC
- 5V - 24V DC
- 58 mm x 58 mm x 80 mm (w/o optics)
- 410 gr (w/o optics)

MT-MIMC-SW6415-IP SWIR Camera

- Hybrid SWIR Imaging Sensor on MT6415CA ROIC
- 640 x 512 Format, 15 μm Pixel Pitch
- 900-1700 nm Spectral Band
- Frame rate up to 50 fps
- IP stream (RTSP), Ethernet, H.264/265 USB2.0 UVC
- Includes Shutter and TEC
- 5V DC - 24V DC
- 51 mm x 51 mm x 68.7 mm (w/o optics)
- 220 gr (w/o optics)

MT-MIMC-SW12815-IP SWIR Camera

- Hybrid SWIR Imaging Sensor on MT12815CA ROIC
- 1280 x 1024 Format, 15 μm Pixel Pitch
- 900 - 1700 nm Spectral Band
- Frame rate up to 50 fps
- IP stream (RTSP), Ethernet, H.264/265 USB2.0 UVC
- Includes Shutter and TEC
- 5V DC - 24V DC
- 55 mm x 55 mm x 68.9 mm (w/o optics)
- 300 gr (w/o optics)



Short Wave Infrared (SWIR) Camera Solutions

MT-MIMC-SW12810-IP SWIR Camera

- Hybrid SWIR Imaging Sensor on MT12810CA ROIC
- 1280 x 1024 Format, 10 μm Pixel Pitch
- 900 - 1700 nm Spectral Band
- Frame rate up to 50 fps
- IP stream (RTSP), Ethernet, H.264/265 USB2.0 UVC
- Includes Shutter and TEC
- 5V DC - 24V DC
- 55 mm x 55 mm x 68.4mm (w/o optics)
- 300gr (w/o optics)

MT-MIMC-SW10210-IP SWIR Camera

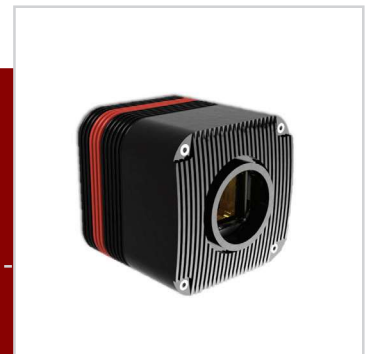
- Hybrid SWIR Imaging Sensor on MT12810CA ROIC
- 1024 x 768 Format, 10 μm Pixel Pitch
- 900 - 1700 nm Spectral Band
- Frame rate up to 50 fps
- IP stream (RTSP), Ethernet, H.264/265 USB2.0 UVC
- Includes Shutter and TEC
- 5V DC - 24V DC
- 55 mm x 55 mm x 68.4mm (w/o optics)
- 300gr (w/o optics)

MT-MIMC-SW6410-IP SWIR Camera

- Hybrid SWIR Imaging Sensor on MT6410CA ROIC
- 640 x 512 Format, 10 μm Pixel Pitch
- 900 - 1700 nm Spectral Band
- Frame rate up to 50 fps
- IP stream (RTSP), Ethernet, H.264/265 USB2.0 UVC
- Includes Shutter and TEC
- 5V DC - 24V DC
- 51mm x 51mm x 62mm (w/o optics)
- $\leq 210\text{gr}$ (w/o optics)
-

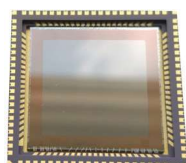
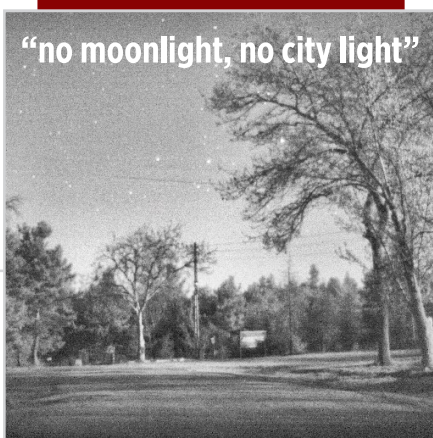
SWIR Sensor Test Electronics

- SWIR Sensor Test Board uses hybridized sensors



Visible Near Infrared (VNIR) Camera Solutions

“no moonlight, no city light”



Application Areas

- Low-Light-Level Imaging ($\leq 0.3\text{mLux}$)
- Security and Surveillance
- Driver Vision Enhancement
- Industrial MachineVision
- Scientific Visible/NIR Imaging
- Traffic Control
- Drone and UAV based imaging

MT-MIMC-V6418 VNIR Camera

- CMOS Based Sensor on MT01M18GD
- 640 x 480 Format, 18 μm Pixel Pitch
- 400-1100nm Spectral Band
- Frame rate up to 25 fps
- USB 2.0, H.264/265 IP Stream over Ethernet
- 5V, M5-4PIN (delivered with the camera)
- 44 mm x 44 mm x 50 mm (w/o optics)
- 120 gr (w/o optics)

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 $\leq 1.35\text{W}$
- 58mm x 55.5mm x 23mm (w/o optics)
- 88gr (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

EA.FT1 WUERTH ELEKTRONIK E328
 WEA.FT1 WUERTH ELEKTRONIK E328
 BW.A.FT1 WUERTH ELEKTRONIK E32
 BW.A.FT1 WUERTH ELEKTRONIK E32
 BW.A.FT1 WUERTH ELEKTRONIK E
 BW.A.FT1 WUERTH ELEKTRONIK E

Mid Wave / Long Wave Infrared (MWIR/LWIR) ROIC Solutions

Key Features of ROIC

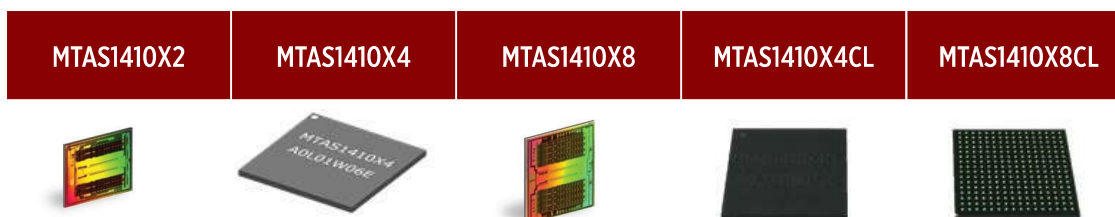
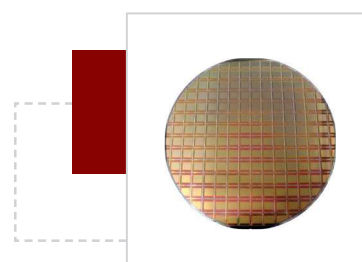
- Advanced DI and Dual-Polarity DI ROIC
- Detector Material (MCT, InSb, QWIP, T2SL)
- 1, 2, 4, or 8 analog output with reference
- Snapshot Operation: ITR and IWR
- Low Noise, Low Power, High Speed
- Cryogenic operation down to 65K



	MT3230DA	MT6425DA	MT6420DA	MT6420DDA	MT6415DA	MT12815DA	MT12810DA	MT6410DA
Resolution	320x256	640x512	640x512	640x512	640x512	1280x1024	1280x1024	640x512
Pixel Pitch	30 μm	25 μm	20 μm	20 μm	15 μm	15 μm	10 μm	10 μm
Input Circuit Type	DI	DI	DI	Dual-DI	DI	DI	DI	DI
Spectral Band	3 - 5 μm							
Detector Material	MCT, InSb, QWIP, T2SL							
Readout Modes	Snapshot Operation: ITR and IWR Modes							
Integration Time	Programmable							
Detector Biasing	On Chip Programmable							
Frame Rate	≤800 fps	≤120 fps	≤200 fps	≤200 fps	≤200 fps	≤50 fps	≤50 fps	≤200 fps
Die Size (mm)	12.20 x 13.30	19.0 x 17.7	15.5 x 15.5	15.5 x 15.5	12.20 x 13.30	21.7 x 21.0	15.4 x 16.2	11 x 11.08

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
- Mikro-Tasarim cameras and test electronics includes these ASICs
- Configurable signal path with buffers and PGAs
- Programmable general purpose CMOS outputs
- Integrated controller with program memory



	MTAS1410X2	MTAS1410X4	MTAS1410X8	MTAS1410X4CL	MTAS1410X8CL
Number of ADC Channels	2 parallel	4 parallel	8 parallel	4 parallel	8 parallel
Sampling	5MHz	10MHz	10MHz	10MHz	10MHz
ADC Resolution	14-bit				
Conversion Speed	≤ 10 Mega Samples / Second / ADC Channel				
Noise Level	≤ 0.9 LSB rms				
Package	Plastic Ball Grid Array (PBGA)				