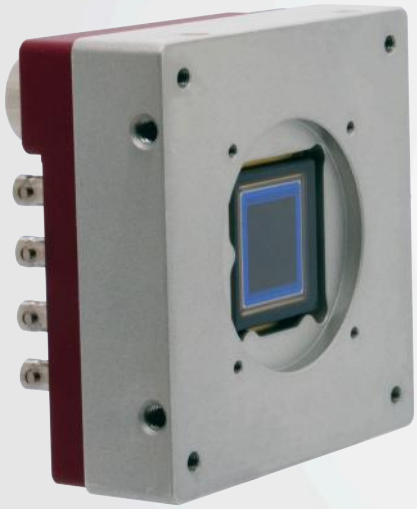
Target Specification

Q-25A150x/CXP

Adimec
Excellence in Imaging



CoaXPress

The QUARTZ Q-25A150 CoaXPress camera operates the Gpixel GMAX0505 sensor at a unique performance in terms of noise, power and ease of integration. With a 5120 x 5120 pixel resolution and 150 frames per second of measurement speed, the Q-25A150 can greatly improve the precision and throughput of your system.

The Q-25A150 supports all required functionality for real time metrology tasks, such as dark field and (multiple) bright field corrections, in a 65x65x25 mm formfactor. Each camera is calibrated and tested to ensure it meets high quality performance standards as well as copy exact requirements.

The Q-25A150 comes in a low power, compact outline design without forced cooling through a fan. This provides optimal design freedom for system integration with maximum system reliability. The camera offers Adimec Connect & Grab™ allowing engineers to start system development at camera arrival.

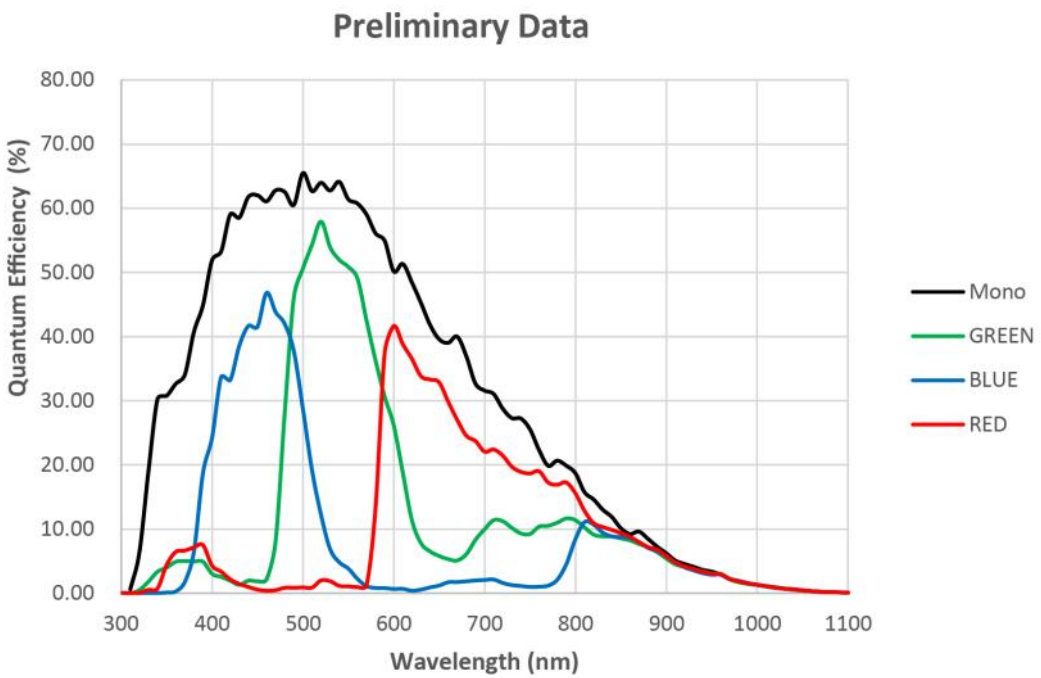
Typical application examples: Semiconductors component inspection, (3D) PCBA optical inspection, Semiconductors Advanced Packaging, Display Inspection, and more.

- 5120 x 5120 at 150 fps
- GMAX0505
  Monochrome and color
- Compact outline
- Device-to-device repeatability
- Optimized image quality
- CXP-12 interface for 4 x 12.5 Gb/s

Performance

Type	GPIXEL GMAX0505	
Architecture	CMOS progressive scan Global Shutter	
Sensor diagonal	18.1 mm (12.8 mm x 12.8 mm)	
Pixel size	2.5 µm x 2.5 µm	
Active pixels	5120 (H) x 5120 (V)	
Parasitic light sensitivity	< -80 dB	
Microlenses	Yes	
	PGA gain 1 @ 10 bit	PGA gain 2.5 @ 10 bit
Dynamic range	57.1 dB*	61.4 dB*
Full well	6.5 ke$^-$*	4 ke$^-$*
Dark noise	9 e$^-$*	3.4 e$^-$*
Sensitivity mono	66 $DN_{10}.cm^2/nJ$ @ 500 nm	
*Sensor specification		

Quantum Efficiency



Characterization

Defect pixel limits

Defect pixel threshold in dark image (t_{exp} = 15 µs)	> 52 DN_{10}
Defect pixel threshold in bright image (t_{exp} < 50 ms)	+/- 20% wrt local neighborhood pixels
Defect pixel threshold in saturated image (t_{exp} < 100 ms)	< -20% wrt local neighborhood pixels
Max total defect pixels	400
Max clusters of size = 2-4 (monochrome)	12*
Max clusters of size = 4 (color)**	12*
Max clusters of size > 4	0
Defect column/row threshold in dark image (t_{exp} = 15 µs)	> 31 DN_{10} wrt local neighborhood columns/rows
Defect column/row threshold in bright image (t_{exp} < 50 ms)	+/- 3% wrt local neighborhood columns/rows
Defect column/row threshold in saturated image (t_{exp} < 100 ms)	+/- 3% wrt local neighborhood columns/rows
Max total defect column/row	0

These limits are applied during the factory calibration of the defect pixel map for the defect pixel correction.
Measurement conditions: No filter or lens; Light source: uniform LED; F-number = 16; Sensor temperature = 60°C

* Clusters with 4 consecutive defect pixels in a row are not allowed.
** Clusters are detected within the same Bayer color plane.

Acceptance Test Limits

Dark Signal Non-Uniformity	< 0.6 DN_{10}
Pixel Response Non-Uniformity	< 1.5 % rms
Sensitivity matching	0.150 DN_{10}/e- < conversion gain < 0.165 DN_{10}/e-

Measurement conditions: No filter or lens; Light source: uniform LED; F-number = 2; Exposure time < 100 ms

Environmental

Operating

Sensor temperature	+5°C to +70°C
Humidity (relative)	20% - 80% non-condensing
Shock	10 g, half sine shape, 6-10ms duration in ±X, ±Y and ±Z
Vibration	3 g sinusoidal vibration sweeps 5 - 150 Hz

Storage

Ambient temperature	-25°C to +65°C
Humidity (relative)	5% - 95% non-condensing
Shock	25 g, half sine shape, 6-10 ms duration in ±X, ±Y and ±Z
Vibration	10 g sinusoidal vibration sweeps 5 - 150 Hz

Functionality

Functionality	◨	▦	Description
Image acquisiton	√	√	Timed, TriggerWidth, SyncControl, TimedTriggerControl
Integration time control	√	√	Programmable between TBD µs and 5 s in steps of 1 µs
Analog gain	√	√	Programmable analog gain amplifier selectable between 1x and 2.5x in steps of 0.5
Digital gain	√	√	Digital fine gain selectable between 1x and 32x in steps of 0.001
White balance	-	√	Digital fine gain per color channel selectable between 1x and 4x in steps of 0.001 - Manual or one-push
Programmable LUT	√	√	Look-up table to map the measured video level to a user defined video level
Gamma curve	√	√	Tone mapping on the video data to match the display image to the image perception of the human eye
Region of interest	√	√	Programmable size and position of readout image - Increased frame speed via ROI
Digital binning	*	*	Sum or average small groups of pixel on sensor to increase signal-to-noise ratio
Band ROI	*	*	Multiple regions of interest combined into a single image to increase frame rate
Mirroring	*	*	The output can be flipped in the horizontal and vertical direction
Defect pixel correction	√	√	Maximum (corrected) defect pixel cluster size of 4 pixels - Factory calibrated
Uniformity correction	√	√	Factory calibrated darkfield and brightfield uniformity corrections to ensure device-to-device repeatability
Low Frequency Flat Field Correction (LF FFC)	√	√	Up to 50 LF FFC sets can be saved in non-volatile memory - Up to 14 out of 50 can be live switched from frame to frame
Sensitivity matching	√	√	Conversion gain calibrated per camera to achieve sensitivity matching between cameras
User data storage	*	*	Up to 2.9 GB memory available for user to store data
Camera settings storage	√	√	1 factory set and 10 user sets for storage of camera settings
Trigger deglitch	√	√	Suppress glitches on the external I/O trigger input signal
Flash strobe	√	√	Flash strobe output signal which indicates when sensor is integrating
Test mode	√	√	Internal test pattern generator available to check the complete digital image chain
Frame counter	√	√	Add frame number to image in meta data overlay
Temperature readout	√	√	Readout sensor and FPGA temperature in units of 0.1 °C
Identification	√	√	Camera type, build state and serial number can be read via software

*Available on request

Compliance

RoHS	Yes
ESD	Contact discharge +/- 4 kV; Air discharge +/- 8 kV
Workmanship	In accordance with IPC-J-STD-001 class 2 and inspected according IPC-A-610 class 2

Reliability

MTBF	> 75,000 h @ 30°C calculated according to the part stress analysis of MIL-HDBK-217F for ground fixed, uncontrolled environment.

Interfacing

Video

Video output	CoaxPress V1.1.1 CXP3/6/10/12 - 1, 2 and 4 lanes configurable
External Sync	I/O or CXP controlled
Output resolution	8 / 10 / 12 bit
Connector	4 x Micro-BNC

Camera Control Protocol

Interface	GenICam (SFNC)*
Throughput	40 Mbps for CXP10 and CXP12 / 20 Mbps for CXP3 and CXP6
Protocol	GenTL*

*Conform CoaXPress standard

I/O

Input	1 LVDS input and 1 galvanically isolated input - Trigger signal with programmable polarity
Output	LVDS output - Fully programmable flash strobe signal (duration, delay and polarity)
Connector	Phoenix Contact 12 pin SACC-CI-M12FS-12CON-L180 THR - 1441970

Power

Input voltage	24 Vdc nominal, range: 18.5 Vdc to 26 Vdc PoCXP
Power dissipation	Typical 11 W @ 24 Vdc full continuous operation at maximum framespeed
Power connector	Micro-BNC master connection

Interface connectors

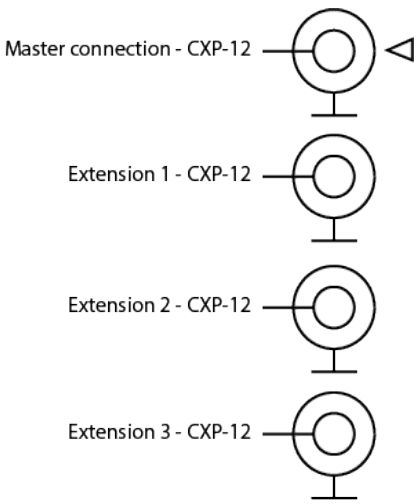


Figure 1. Quad CXP Micro-BNC

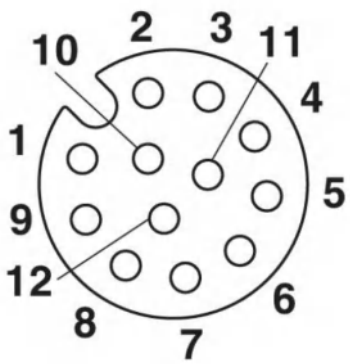


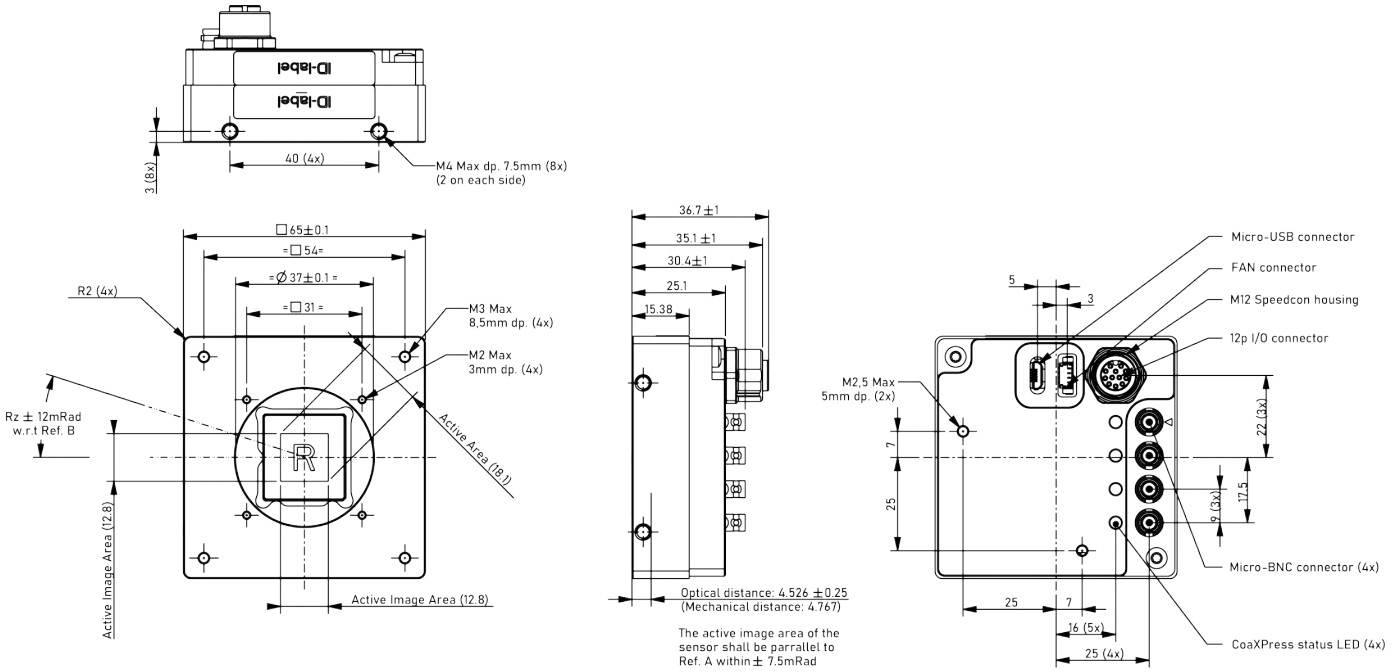
Figure 2. Phoenix Contact 12 pin SACC-CI-M12FS-12CON-L180 THR - 1441970 I/O connector

I/O pin connection table	
1	Ground
2	Trigger 2 in (galvanic isolation +)
3	Flash strobe out (LVDS -)
4	Flash strobe out (LVDS +)
5	Do not use
6	Do not use
7	Do not use
8	Do not use
9	Ground
10	Trigger 2 in (galvanic isolation -)
11	Trigger in (LVDS -)
12	Trigger in (LVDS +)

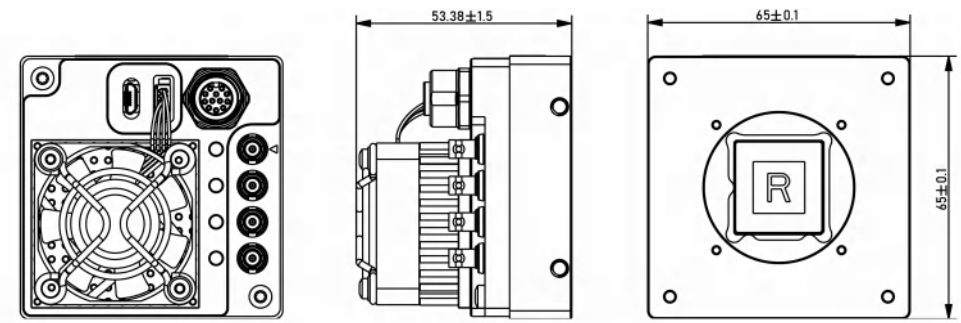
Mechanical

Mounting	2 x M4 mounting holes per side on camera front
Lensmount	4 x M3 at 54mm pitch - 4 x M2 at 31mm pitch (on request: Fn, C)
Camera heatsink	2 x M2.5 on camera backplate - compatible with Coolinnovations 3-161605UBFA or similar
Outline	See figure
Weight	195 g +/- 3% excl. lensmount, heatsink and fan

Mechanical outline



Mechanical outline with accessories



Sensor Mounting Accuracy

	Passive alignment	Active alignment*
XY-centering	± 0.25 mm	± 0.050 mm
Rotation	± 12 mRad	± 1 mRad
Optical distance	4.526 ± 0.25 mm	4.526 ± 0.050 mm
Perpendicularity	± 7.5 mRad	± 2 mRad

All specifications on the sensor alignment are with respect to the camera front without lensmount and lens

*Active alignment is optional and will be available in 2024.

Camera Types

Sample product name			Q -25A150 m /CXP -S P -1.0
Series	Q	-	High speed CMOS Global Shutter cameras
Sensor	-25A150	-	26.2 Mpixel at 150 fps
Sensor type	m	-	Monochrome
	c	-	Color (Bayer output)
Interface	/CXP	-	CoaXPress interface at max 12.5 Gb/s
Variant	-S	-	Standard product
Sensor alignment	P	-	Passive alignment
	A*	-	Active alignment*
Issue No.	-1.0	-	Camera issue number

* Available on request

Accessories

Heatsink and fan	Optional
Fn-mount	Optional
C-mount	Optional
Other lens mounts	Available on request

Adimec

Adimec is the leading supplier of high-end cameras for machine vision, medical and outdoor imaging applications. Our Adimec True Accurate Imaging® technology forms the foundation for a broad range of camera products, and brings new levels of precision and accuracy to vision systems.

Custom cameras

Adimec has the ability to offer additional camera functionality and create customer specific cameras even for small volume programs. Built from platforms, our standard line of cameras give us a flexible base that can be tailored to fit your specifications. Contact us to discuss these options in more detail. Visit: www.adimec.com for product details.

For maximum image quality, performance, and reliability in demanding applications - Choose Adimec

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