Product Specifications QUARTZ cameras

4 Megapixel models

- Q-4A150/CL
- Q-4A180/CL
- Q-4A180/CXP

Introduction

QUARTZ series supports 4Mpx sensor solutions with acquisition speeds up to 180 fps in full resolution. The buffered pipeline with internal memory decouples sensor acquisition speed from interface link speed enabling to acquire at the highest speed while transmitting at a lower data rate (burst mode). This unique feauture enables QUARTZ cameras to be applied in any existing Camera Link infrastructure and use maximum acquisition speed performance at all times. The buffered pipeline also facilitates averaging which increases the image signal-to-noise ratio up to +10dB (linear) over intrinsic sensor performance! Combined with ROI imaging for speed increase, this yields the best imaging performances possible in camera-frame grabber setups.

Product Features

- **Capture Best Image Details** with Adimec True Accurate Imaging® Technology
- **Monochrome, Color (Bayer), NIR** sensor solutions
- **Maximum Optical Precision** via Anti-Reflection-Coating
- **Fastest Acquisition Rates in Industry** on any **Camera Link** and **CoaXPress** configuration through dual-port buffered pipeline architecture (burst mode)
- **Signal-to-Noise** improvement up to 10 dB (linear) over intrinsic sensor performance
- **Easy Fit to Application Processing** with image flip, ROI and LUT functionality
- **Robust Design** for intensive use with highest precision

Models

Camera name	Resolution		Max acq. speed	Max InterFace speed
	Mp	H x V	fps	fps @ IF
Q-4A150/CL	4	2048 x 2048	180	150 @ CL 8 tap
Q-4A180/CL	4	2048 x 2048	180	180 @ CL 10 tap
Q-4A180/CXP	4	2048 x 2048	180	180 @ CXP-5 dual

Specification all models

All values are typical and measured at 25°C

Sensor type	Monochrome, Bayer color filter or NIR optimized
Architecture	Active pixel digital CMOS sensor with micro lenses, pipelined global shutter
Pixel size	5.5 µm (H) x 5.5 µm (V)
Optical format	2/3" for 2 Megapixel; 1" for 4 Megapixel
Cover glass	Anti reflection coating is optional
Shutter efficiency	1:50000
Sensitivity at sensor surface (typical)	0.06 Lux s (monochrome) 0.14 Lux s (color, green only)
Readout noise	13 e-
Full well capacity	13.5 ke- (max)
Linear dynamic range	60 dB (HDR and HiQ mode for dynamic range extension and noise reduction)
Blooming and Smear	No Blooming or Smear

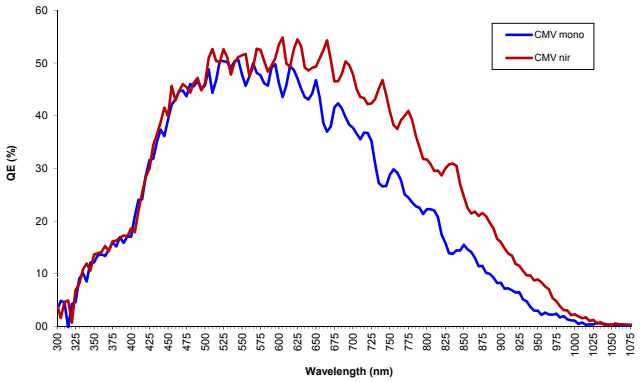

Figure 1. QE curves mono and NIR enhanced versions

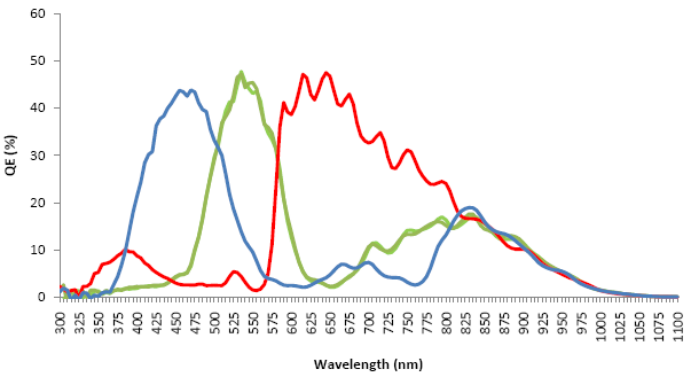

Figure 2. QE curves color versions R,G,B

Functionality all models

Acquisition

Image Acquisition	Continuous or externally controlled (triggered). Image acquisition timing is fully separated from the output interface by means of a real-time FIFO buffer. This supports burst mode acquisition
Gain	Digital Fine Gain selectable between 1x and 8x in steps of 0.01
Memory	FIFO buffer of 51 full size images
Intergration time control (continuous mode)	Programmable between 12 µs and 100 ms in units of 1 µs

Processing

Digital Binning	2x, 4x (N.A. in color version)
Defect Pixel Correction	Advanced defect correction, 100 defect correction map capacity
Flat Field Correction	Offset and gain correction per pixel 4 sets user programmable
HiQ mode	Averages multiple images (max. 10) in-camera and outputs a single image at full or ROI resolution. Shot noise improvement up to 10 dB (see figure 3)
HDR mode	Sensor multi-slope (knee) function enhancing scene Dynamic Range up to 90 dB (non-linear)
ROI	Fully programmable ROI in horizontal and vertical direction Max frame speed increases when ROI is reduced in vertical direction (see figure 4)
Mirroring	Selectable horizontal and vertical mirror
Video compression	10-bit output LUT, fully user programmable

Service & Miscellaneous

Test mode	Internal test pattern generator available for checking the complete digital image chain
User storage	Availability of storage for 16 signed integers and 16 strings of 32 characters
Image tagging	Attaches digital information to output image
Camera ID	Camera type, build state and serial number can be queried via software

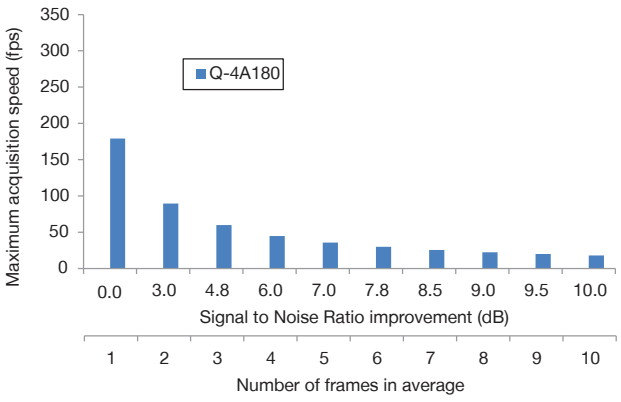

Figure 3. Maximum frame rates at maximum resolution as a function of SNR improvement (due to averaging). More detailed examples in Appendix.

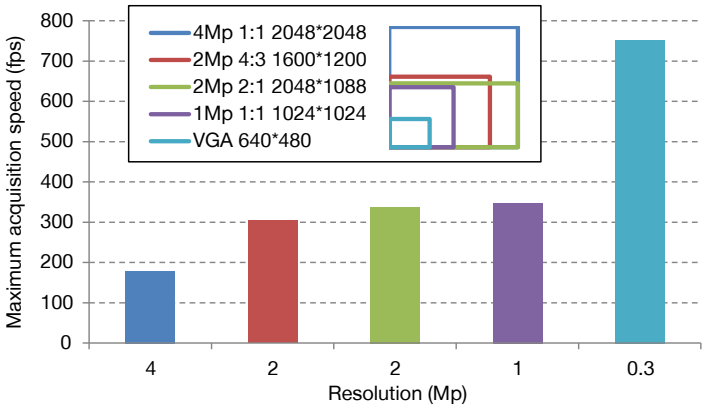

Figure 4. Maximum frame rates for various ROI settings. For more details on the specific configurations of the interface, refer to Appendix.

Interfacing Camera Link models

Video

Video output	Camera Link, 2 or 4 taps at 8 or 10 bit; 8 or 10 taps* at 8 bit (user programmable)
Interface clock	66/85 MHz (user programmable)
Connector	2x 3M MDR 26

* 10 tap not available in Q-4A150

Camera Control

Interface	Camera Link
Baud rate	57600
Protocol	ASCII based

I/O

Output	Strobe signal (user programmable)
Input	Trigger signal (programmable polarity)
Connector	Hirose HR10A-7R-4SB (optional : Binder series 712 type 09-0412-30-04)

Power

Input voltage	10 - 24 Volt ± 10%
Typical power dissipation	8 W @ 12 Vdc at full speed
Reverse voltage protection	Yes
Power connector	Hirose HR10A-7R-6PB (optional: Binder series 712 type 09-0403-30-02)

Interfacing CoaXPress models

Video

Video output	8 or 10 bit (user programmable)
Connector	2x BNC (F) 75 Ω

Camera Control

Interface	GenICam
Protocol	CoaXPress

I/O

Output	Strobe signal (user programmable)
Input	Trigger signal (programmable polarity)
Connector	Hirose HR10A-7R-4SB (optional : Binder series 712 type 09-0412-30-04)

Power over CoaXPress

Input voltage	24 Volt according to CoaXPress
Typical power dissipation	10 W at full speed
Reverse voltage protection	Yes
Power connector	2x BNC (F) 75 Ω

Mechanical all models

Type	Camera in housing
Outline	See figure 5 and 6
Mounting	2 mounting holes per side on camera front
Lensmount	Standard C-mount with back focus adjustment possibility. (T2, M42, Nikon F and TFLII optional)
Weight	400 g ± 10%, excluding lensmount

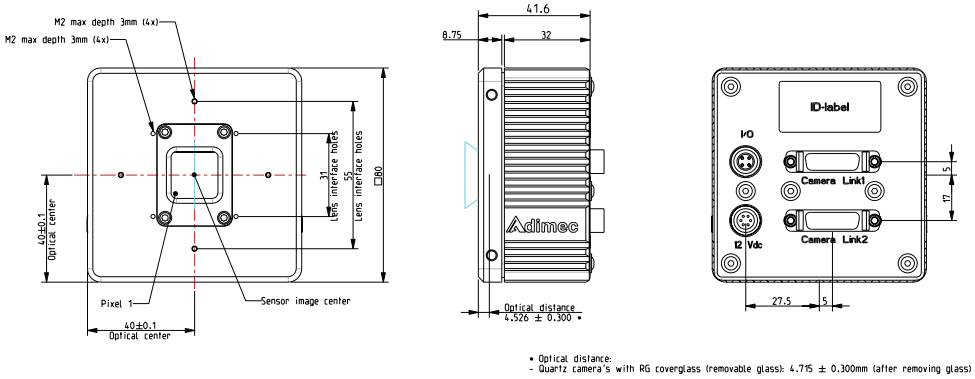

Figure 5. Mechanical Outline Camera Link models

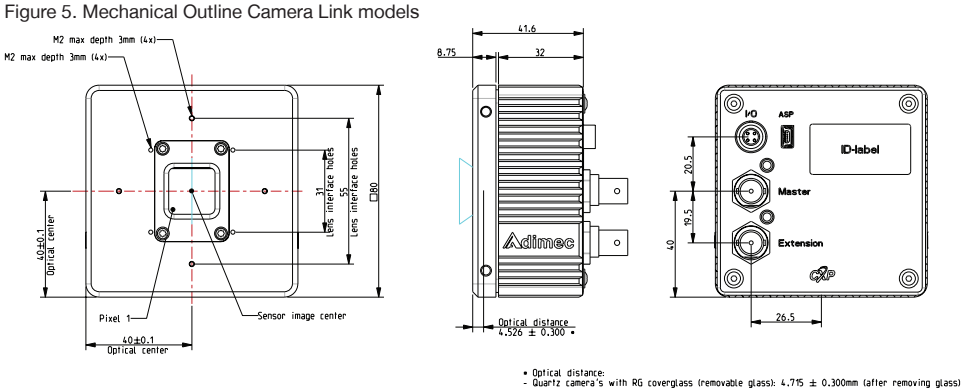

Figure 6. Mechanical Outline CoaXPress models

Sensor Mounting Accuracy all models

XY-centering	± 0.1 mm (see figure 7)
Rotation	± 4 mrad (see figure 7)
Optical distance	± 0.3 mm (see figure 7)
Perpendicularity	± 2 mrad (see figure 7)

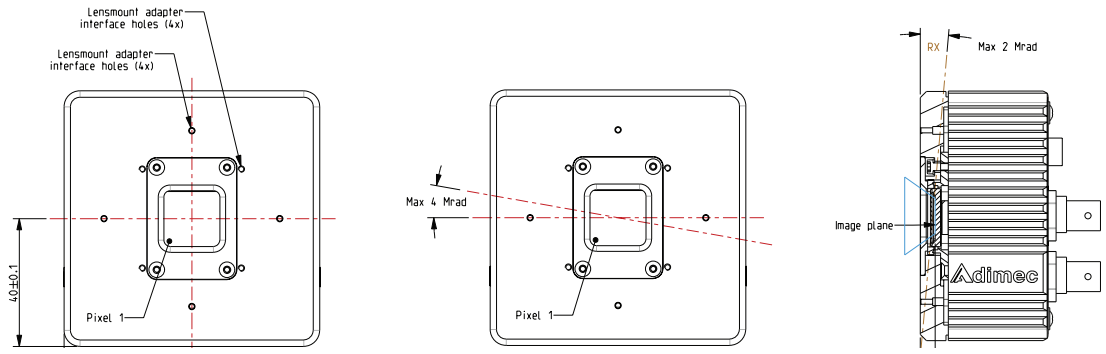

Figure 7. Sensor accuracy reference

Environmental all models

Operating

Temperature	0°C to +40°C
Humidity (relative)	20% - 80% RH, non-condensing
Shock	10 g, half sine shape, 6-10 ms duration
Vibration	3 g, sinusoidal vibration sweeps 5-150 Hz

Storage

Temperature	-25°C to +65°C
Humidity (relative)	5% - 95% RH, non-condensing
Shock	25 g, half sine shape, 6-10 ms duration
Vibration	10 g, sinusoidal vibration sweeps 5-150 Hz

Compliance & Reliability all models

RoHS

Directive	2011/65/EU

CE-mark

Electromagnetic compatibility	2004/108/EC
Generic standard	EN61000-6-4 and EN61000-6-2

Reliability

MTBF	> 75,000 h @ 40°C

Appendix: possible camera configurations - resolution, speed, averaging

Camera	Acquisition region of Interest	Averaging*)	SNR improvement	Bit depth	Max sustained output speed	Interface configuration**)
Q-4A180/CL	Full resolution (2048*2048)	disabled	native	8 bit	180 fps	CL 10 tap***)
		4x	+6 dB	8 bit	45 fps	CL 4 tap
		10x	+10 dB	8/10 bit	18 fps	CL 2 tap
Q-4A180/CXP	Full resolution (2048*2048)	disabled	native	8 bit	180 fps	CXP-5 dual
			native	10 bit	180 fps	CXP-6 dual
		4x	+6 dB	8/10 bit	45 fps	CXP-3 single
		10x	+10 dB	8/10 bit	18 fps	CXP-3 single
	2 Mp 4:3 (1600*1200)	disabled	native	8/10 bit	307 fps	CXP-5 dual
		4x	+6 dB	8/10 bit	76 fps	CXP-3 single
		10x	+10 dB	8/10 bit	30 fps	CXP-3 single
Q-4A150/CL	Full resolution (2048*2048)	disabled	native	8 bit	160 fps	CL 8 tap
		4x	+6 dB	8 bit	45 fps	CL 4 tap
		10x	+10 dB	8/10 bit	18 fps	CL 2 tap
	1 Mp 1:1 (1600*1200)	disabled	native	8 bit	307 fps	CL 8 tap
		4x	+6 dB	8/10 bit	76 fps	CL 2 tap
		10x	+10 dB	8/10 bit	30 fps	CL 2 tap

*) When averaging is enabled, images are susceptable to motion blur.

**) Configuration required to maintain maximum speed at indicated bit depth.

***) At CL 10 tap, the maximum output width is 2000 instead of 2048

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