Datasheet

D-152A16x/CXP-12-T01

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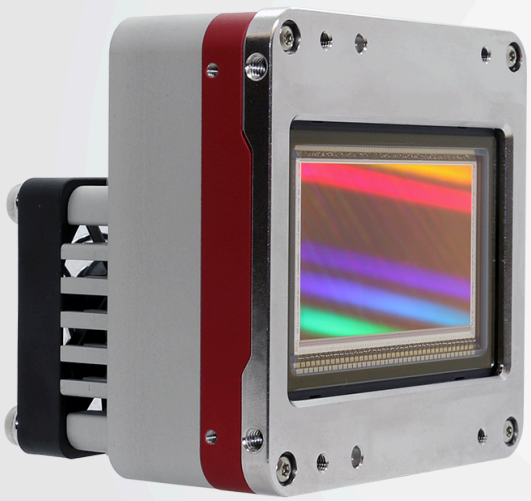


CoaXPress

The D-152A16-T is part of Teledyne Adimec's DIAMOND Gentific™ camera series. The DIAMOND Gentific™ camera series are designed to offer an off-the-shelf solution for the most challenging in-line metrology and scientific healthcare image requirements.

The DIAMOND D-152A16-T offers the next leap for ultra-high-resolution in-line display module inspection tools. It is optimized for LCD, OLED and MicroLED inspections. For De-Mura and display pixel calibration where multiple, extremely uniform, images are required, the D-152A16-T combines 152 megapixel running up to 16 fps with a linear response. For Mura dark inspection the camera has superb sensitivity in combination with low noise performance at long exposure times. The controlled sensor temperature eliminates the effect of ambient temperature fluctuations on the camera performance.

The global shutter in combination with long exposure DSNU correction allows dark and bright inspection of LED-based displays without the need for complex mechanical and software system integrations to take care of the large difference in light conditions. With these functions and in combination with a 60.6 mm sensor diagonal and a high system throughput, the camera provides a cost effective display measurement. Teledyne Adimec's Connect & Grab™ allows engineers to choose a variety of frame grabbers and start system development at camera arrival.

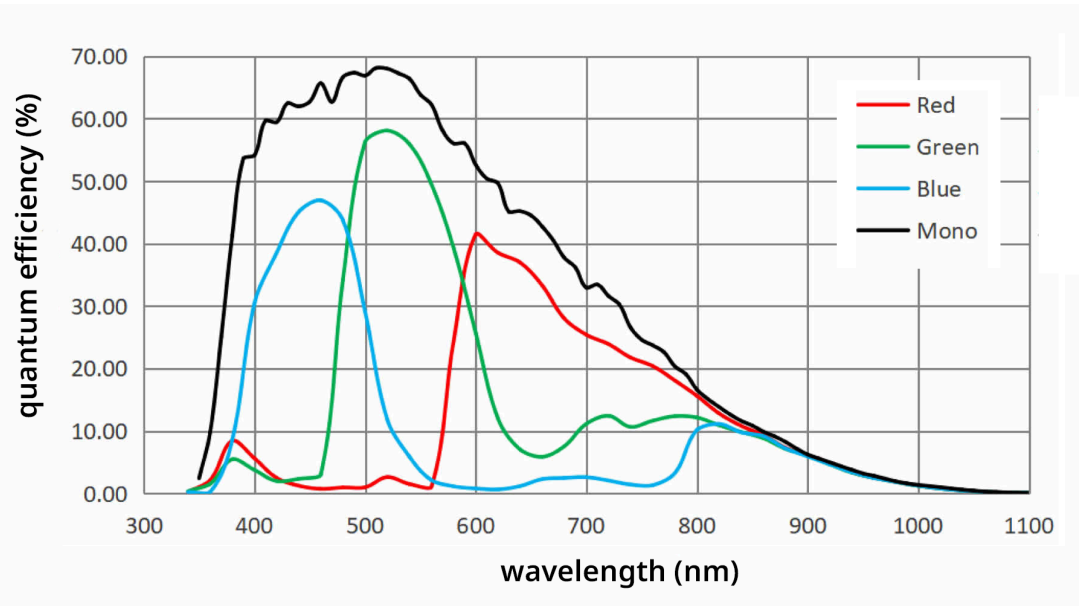
- 16544 x 9200 at 16 fps
- Monochrome and color
- Stabilized sensor temperature
- Device-to-device repeatability
- Low frequency flat field correction in bright
- Long exposure DSNU correction

Performance

Type	GPIXEL GMAX32152
Architecture	CMOS progressive scan Global Shutter (PLS < 1/15000, angular dependent)
Sensor diagonal	60.6 mm (53.0 x 29.4 mm)
Pixel size	3.2 µm x 3.2 µm
Active pixels	16544 (H) x 9200 (V)
Microlenses	Yes
Dynamic range	67.3 dB @ PGA gain 1.4**
Full well	9.3 ke- @ PGA gain 1.4**
Dark noise	4.0 e- @ PGA gain 1.4**
Sensitivity mono	275 DN_{12}·cm^2/nJ @ 500 nm*

* Typical value ** Sensor specification

Quantum Efficiency



Functionality

Functionality	◨	■	Description
Image acquisiton	√	√	Timed, TriggerWidth, SyncControl, TimedTriggerControl
Integration time control	√	√	Programmable between 19 µs and 20 s in steps of 1 µs
Analog gain	√	√	Programmable analog gain amplifier selectable between 0.5 and 2.8 in steps of 0.1and between 2.8 and 5.2 in steps of 0.4
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 frame rate
Mirroring	√	√	The output can be flipped in the horizontal and vertical direction
Defect pixel correction	√	√	Factory calibrated - Review and editing of defect pixel map
Dark field uniformity correction	√	√	User calibratable pixel based dark field (DSNU) correction to ensure device-to-device repeatability
Bright field uniformity correction	√	√	User calibratable column based bright field (PRNU) correction 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
Frame averaging	√	√	Increase bright measurement accuracy by increasing signal-to-noise ratio
Sensor temperature control	√	√	Programmable sensor temperature controlled via TEC and FAN
User data storage	√	√	Up to 2 GB eMMC memory available for user to store data
Firmware update	√	√	Programmable over CXP and ASP (USB port)
External control via I/O	√	√	Control an external device via UART or RS485
UARTs over CXP	√	√	Two serial interfaces (UARTs) can be controlled over CXP
Camera settings storage	√	√	1 factory set and 10 user sets for storage of camera settings
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
Humidity readout	√	√	Readout the relative humidity
Identification	√	√	Camera type, build state and serial number can be read via software

* Available on request

DSNU correction

	Available range for user calibrations
DSNU correction exposure time range	19 µs - 21 s*
DSNU correction sensor temperature range	+20 °C to +55 °C - using a stabilized sensor temperature

*DSNU correction corrects for actual exposure time and is default calibrated at 1 s - 3 s

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
Connectors	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

Output	1 x Flashstrobe output (5 V)
Input	1 x Trigger input (5 V)
External control via I/O	1 x RS485 - 1 x UART with TX_ENABLE (5 V)*
Connector	Phoenix Contact 12 pin SACC-CI-M12FS-12CON-L180 THR - 1441970

*Maximum I/O cable length is 3m.

Fan

Feedback signal	Indicates if fan is running
Voltage	5 V - 1.05 W (typical), 1.4 W (max)*

*A total power of 12 W is shared between the fan and the TEC.

Power

Input voltage	2 x 24 Vdc nominal, range: 18.5 - 26 Vdc PoCXP for camera module, TEC and fan
Power dissipation	< 13 W @ 24 Vdc for camera module < 13 W @ 24 Vdc for TEC and fan
Power connector	Micro BNC master connection and extension 1 for camera module, fan and TEC

Interface connectors

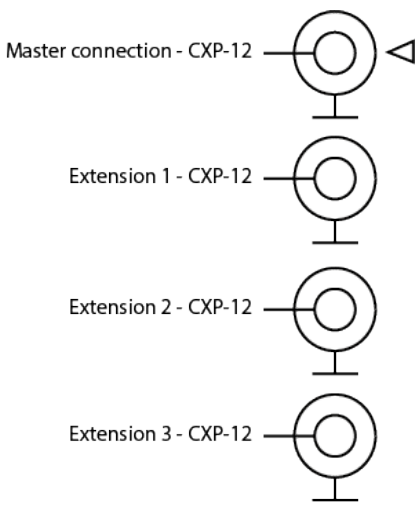


Figure 1. Quad CXP Micro-BNC

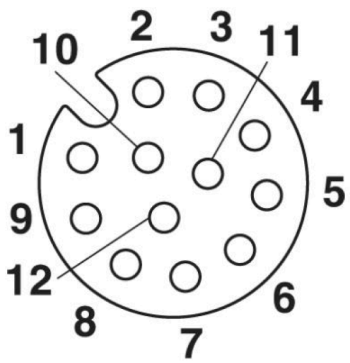


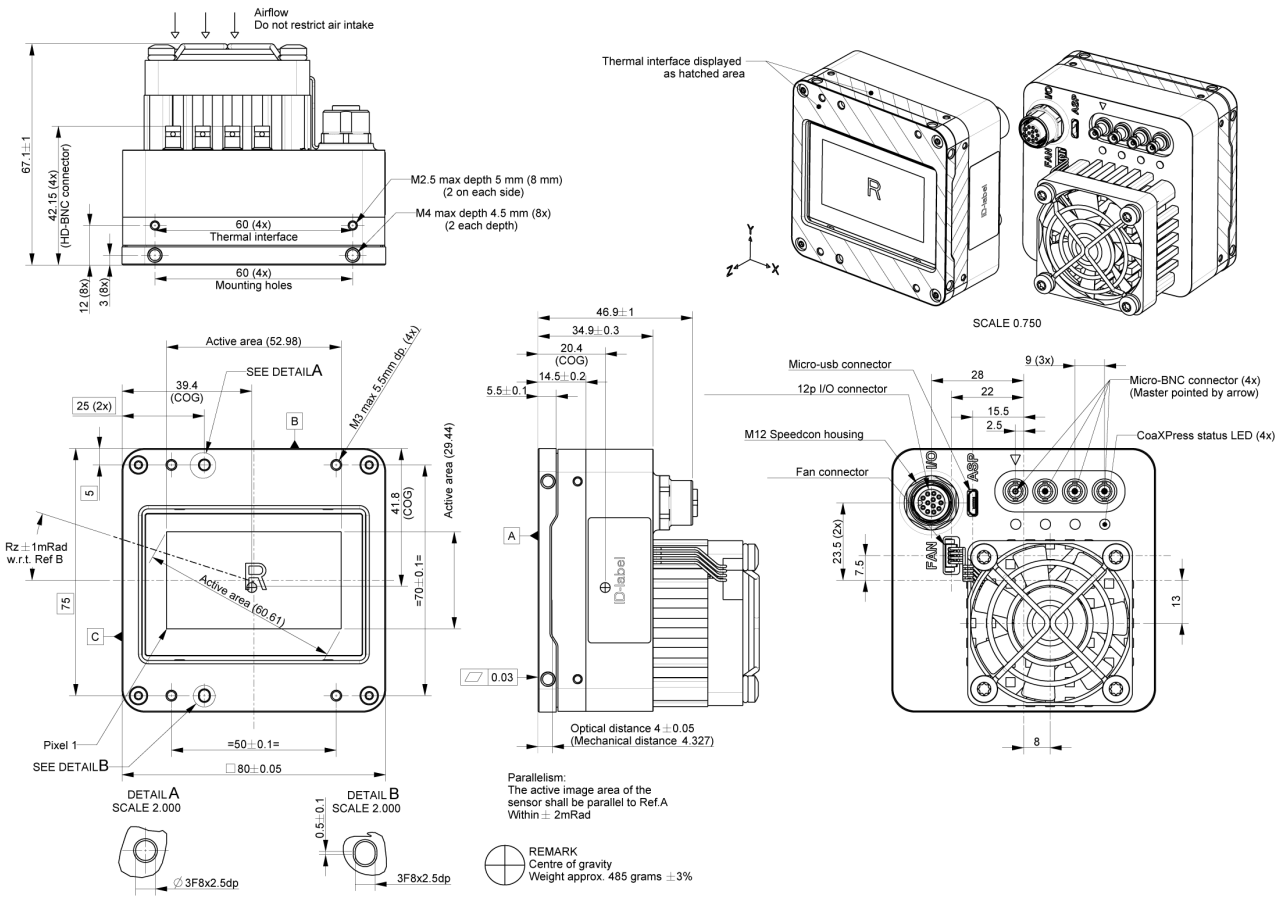
Figure 2. Phoenix Contact 12 pin SACC-CI-M12FS-12CON-L180 THR - 1441970 I/O connector

I/O pin connection table	
1	Reserved
2	Reserved
3	Trigger input (TTL, 5 V)
4	Flashstrobe output (TTL, 5 V)
5	5 V - UART TX
6	5 V - UART RX
7	5 V - UART TX_Enable
8	Reserved
9	GND for pin 3 to 7
10	GND _RS485
11	RS485 (+)
12	RS485 (-)

Mechanical

Mounting	2 x M4 mounting holes per side on camera front
Thermal interface	2 x M2.5 holes per side on camera front
Lensmount	4 x M3 holes at 70 x 50 mm pitch on camera front (on request: M72)
Alignment holes	Ø 3 mm F8, depth 2.5 mm (1x hole and 1x slot)
Outline	See figure
Weight	485 g +/- 3%

Mechanical outline



Sensor Mounting Accuracy

XY-centering	± 0.1 mm
Rotation	± 1 mRad
Optical distance	4 ± 0.05 mm
Perpendicularity	± 2 mRad

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

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 camera excluding fan	> 75,000 h (at 30 °C), calculated according to the part stress analysis of MIL-HDBK-217F for a ground fixed, uncontrolled environment.
MTTF fan	> 70,000 h (at 45°C), 15 to 65% RH

Environmental

Operating

Ambient temperature	+10°C to +45°C
Stabilized sensor temperature	+20°C to +55°C - minimum 5°C above ambient temperature - stabilized at programmed temperature +/- 1°C
Maximum sensor temperature	+60°C
Humidity (relative)	20% - 80% non-condensing
Shock	10 g, half sine shape, 6-10 ms 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

Camera Types

Sample product name	D	-152A16	m	/CXP-12	-T01	-1.0

Series	D	-	Application optimized camera platform
Sensor	-152A16	-	152 Mpixel at 16 fps
Sensor type	m	-	Monochrome
	c	-	Color (Bayer output)
Interface	/CXP-12	-	CoaXPress interface at max 12.5 Gb/s
Variant	-T01	-	Variant with TEC and fan
Issue No.	-1.0	-	Camera issue number

Accessories

Optional accessory	Pitch	Acode
M72-mount fixed	70 x 50 mm	212720

Teledyne Adimec

Teledyne Adimec is the leading supplier of high-end cameras for machine vision, healthcare and outdoor imaging applications. Our 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

Teledyne Adimec can offer additional camera functions and create customer specific cameras even for small volume programs. Our standard camera line, built from flexible platforms, allows us to tailor our products to meet your specific requirements. 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 Teledyne Adimec

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