
Features

- High Sensitivity and High SNR Performance Linear CCD
- 1024, 2048 or 4096 Resolution with 10 μm Square Pixels
- 512, 1024 or 2048 Resolution with 14 μm Square Pixels
- 100% Aperture, Built-in Anti-Blooming, No Lag
- EIA-644 (LVDS) Data Format (Base Configuration)
- High Data Rate up to 60 Mpixels/s
- Flexible and Easy to Operate via RS232 Control:
 - Gain: 0 dB to 40 dB by Step of 0.05 dB
 - Output Format: 8-, 10- or 12-bit Data
 - Offset (for Contrast Expansion)
 - Trigger Mode: Free Run or External Trigger Modes
 - Data Output Mode (Dual, Single)
- Multi Camera Synchronization
- Single Power Supply: DC 12V to 24V
- Very Compact Design: 56 x 60 x 39.4 mm (w, h, l)
- High Reliability – CE and FCC Compliant
- C or F (Nikon) Mount Adapter (Lens Not Supplied)
- T2 (M42 x 0.75) or M42 x 1 Mount Adapter (Lens Not Supplied)

Description

This camera is designed with three concepts in mind: accuracy, versatility and easy implementation.

- The same compact mechanical design incorporates all the sensors, from 512 to 4096 pixels.
- Atmel manages the whole chain, from the sensor to the camera. The result is a camera able to work up to 12-bit, with dedicated electronics offering an excellent signal to noise ratio.
- The programmable settings let the user work at different integration time, gain and offset. The external clock and trigger allow the user to synchronize several cameras.

Applications

Performance and reliability of this camera make it well suited for the most demanding industrial applications, from web inspection to document scanning, from surface inspection to metrology.



AViiVA™ M2 LV

**LVDS
Linescan
Camera**



Rev. 2161B-IMAGE-04/03



Typical Performances

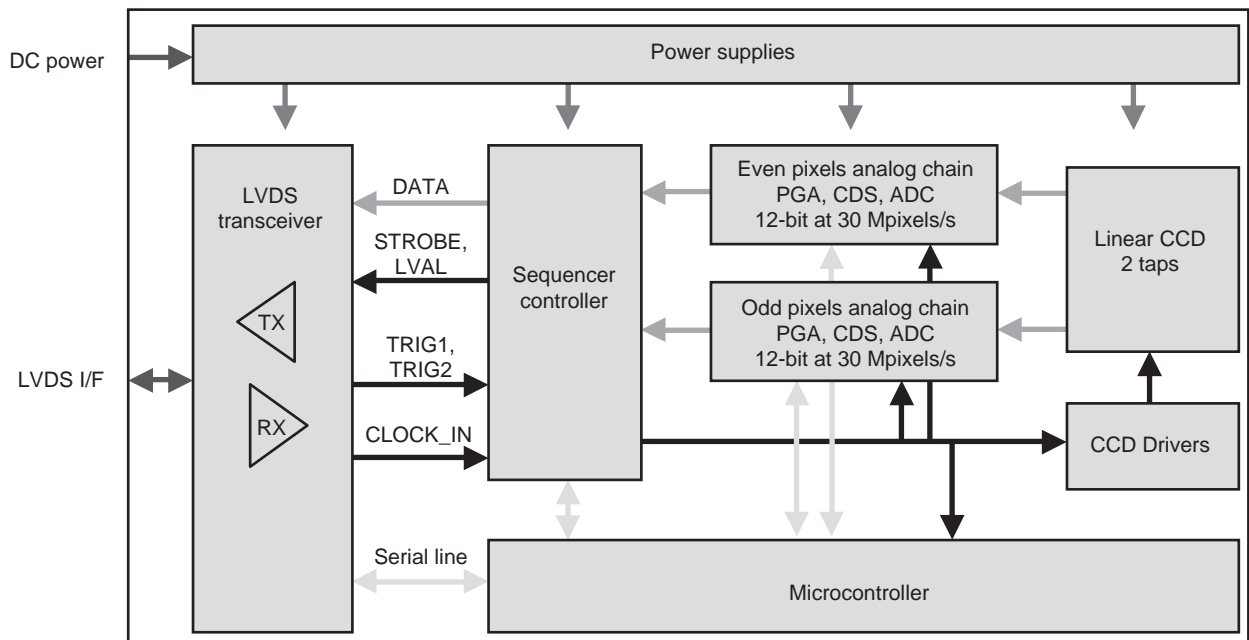
Table 1. Typical Performances

| Parameter | Value | | | | Unit |
|---|--|-------------|--------------|---------|--|
| Sensor Characteristics at Maximum Pixel Rate | | | | | |
| Resolution | 512 | 1024 | 2048 | 4096 | pixels |
| Pixel size (square) | 14 – | 14 10 | 14 10 | – 10 | μm μm |
| Max Line rate | 98 | 53 | 28 | 14 | kHz |
| Anti blooming | x 150 | | | | – |
| Radiometric Performances (maximum Pixel Rate, Tamb = 25°C) | | | | | |
| Output Format | 12 (also configurable in 8 or 10) | | | | bit |
| Spectral range | 250 - 1100 | | | | nm |
| Linearity | < 1 | | | | % |
| Gain range (step of 0.047 dB) | Gmin 0 | Gnom 18 | Gmax 30 | | dB |
| Peak response ⁽¹⁾⁽²⁾ with 14 μm pitch 10 μm pitch | 130 50 | 1040 400 | 4180 1600 | | LSB/(nJ/cm ²) LSB/(nJ/cm ²) |
| SNR Effective bit | 67.4 11.2 | 49 8.2 | 37 6.2 | | dB bit |
| Input RMS Noise with 14 μm pitch 10 μm pitch | 14 37 | | | | pJ/cm ² pJ/cm ² |
| PRNU (Pixel Response Non Uniformity) | ± 3 (± 10 max) | | | | % |
| Mechanical and Electrical Interface | | | | | |
| Size (w x h x l) | 56 x 60 x 39.4 | | | | mm |
| Lens mount | C, F, T2, M42 x 1 | | | | – |
| Sensor alignment (See “Sensor Alignment” on page 16) | $\Delta x, y = \pm 50 - \Delta z = \pm 30 - \Delta \text{tilt}_z = 0-35$ $\Delta \theta x, y = \pm 0.2$ | | | | μm ° |
| Power supply | DC, single 12 to 24V | | | | V |
| Power dissipation | < 8 | | | | W |
| Operating temperature ⁽³⁾ | 0 to 65 (non condensing) | | | | °C |
| Storage temperature | -40 to 75 (non condensing) | | | | °C |
| Spectral Response | | | | | |

- Notes:
1. LSB are given for 12-bit configuration
 2. nJ/cm² measured on the sensor
 3. Camera front face temperature

Camera Description

Figure 1. Camera Synoptic



The LVDS linescan camera is based on a two-tap linear CCD. Therefore, two analog chains process odd and even pixel outputs of the linear sensor. The CCD signal processing encompasses the correlated double sampling (CDS), the dark level correction (dark pixel clamping), the gain (PGA) and offset correction and finally the analog to digital conversion on 12-bit.

Note: PGA stands for Programmable Gain Array.

The camera is powered by a single DC power supply from 12V to 24V.

The functional interface (data and control) is provided with LVDS transceivers.

The data can be delivered either on two channels or on a single multiplexed channel. The data format can be configured in 8-, 10- or 12-bit.

The camera can be used with external triggers (TRIG1 and TRIG2 signals) in different trigger modes (see “Synchronization Mode” on page 6). The camera can be also clocked externally, allowing system synchronization and/or multi-camera synchronization.

The camera configuration and settings are performed via a serial line.

This interface is used for:

- Gain, offset setting.
- Dynamic range, data rate setting.
- Trigger mode setting: free run or external trigger modes.
- Integration time setting: in free running and external trigger mode.



Standard Conformity

The cameras have been tested in the following conditions:

- Shielded power supply cable.
- Shielded and twisted pairs data transfer cable.
- Linear AC-DC power supply.

Atmel recommends using the same configuration to ensure the compliance with the following standards.

CE Conformity

AViiVA Cameras comply with the requirements of the EMC (European) directive 89/336/CEE (EN 50081-2, EN 61000-6-2)

FCC Conformity

AViiVA Cameras comply with Part 15 of FCC rules.

Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Camera Command and Control

Camera configuration is set through the serial interface. Please refer to "Serial Communication" on page 10 for the detailed protocol of the serial line.

Table 2. Camera Command and Control

| Setting | Command | Parameter | Description |
|-------------------------------------|---------|--|---|
| Configuration record ⁽¹⁾ | E= | 0 1 | The camera configuration is recorded on each change The camera configuration is recorded only on request (! = 4) |
| Gain ⁽²⁾ | G= | 0 to 851 | Gain setting from 0 to 40 dB (~0.047dB steps) |
| Even Gain ⁽²⁾ | A= | 0 to 20 | Even pixels gain adjustment (odd – even mismatch adjustment) |
| Odd Gain ⁽²⁾ | B= | 0 to 20 | Odd pixels gain adjustment (odd – even mismatch adjustment) |
| Data transfer | H= | 0 1 2 3 4 5 6 7 8 9 10 | Two outputs on external clock One output (multiplexed) on external clock Two outputs at 10 MHz data rate One output (multiplexed) at 20 MHz data rate Two outputs at 15 MHz data rate One output (multiplexed) at 30 MHz data rate Two outputs at 20 MHz data rate One output (multiplexed) at 40 MHz data rate Two outputs at 30 MHz data rate One output (multiplexed) at 60 MHz data rate One output (multiplexed) on external clock (data frequency / 2) ⁽⁶⁾ |
| Output format ⁽³⁾ | S= | 0 1 2 | 12-bit Output data 10-bit Output data 8-bit Output data |
| Special 2 x 8-bit mode | Y= | 0 1 | Standard: All dual output modes use the two data connectors Special: Dual 2 x 8-bit data output on a single 44-pin connector |
| Pattern ⁽⁴⁾ | T= | 0 1 | Standard Test pattern |
| Integration Time | I= | 5 to 13000 | Integration time (µs) in free run or external triggered mode |
| Trigger mode | M= | 1 2 3 4 | Free run with integration time setting (see timing diagram) External trigger with integration time setting (see timing diagram) Trigger and Integration time controlled Trigger and integration time controlled by two inputs |
| Even data Offset ⁽⁵⁾ | O= | 0 to 15 | Even Offset setting from 0 to approx. 200 LSB |
| Odd data Offset ⁽⁵⁾ | P= | 0 to 15 | Odd Offset setting from 0 to approx. 200 LSB |
| Special commands | != | 0 1 2 3 4 5 | Camera identification readout User camera identification readout Software version readout Camera configuration readout Current camera configuration record Default camera configuration restoration |
| User camera ID | \$= | String of Char. | Writing and record of the user camera identification |

- Notes:
1. ATMEL commends to use E = 1 because of the limited EEPROM write cycles refer on page 10.
 2. Camera gain (dB) = G x 0.047. A and B gain value are set in manufacturing but can be adjust if necessary.
 3. Corresponding pinout in “Connector Description” on page 11. If 8- or 10-bit are needed, the user can also select “S = 0” and make the cable for using the MSB.
 4. The test pattern is useful to check if the interfacing is well done. The user should see a jagged image of 256 pixels steps.

5. The offset is set in manufacturing to balance both the channels. The initial setting is about 8 (~ 130 LSB). In some cases, the user may have to change it (for example if the ambient temperature is very high).

6. To be used for multi-camera synchronisation. Refer to Figure 6.

Timing

Synchronization Mode

Four different modes may be defined under user control. The TRIG1 and TRIG2 signals may be used to trigger external events and to control the integration time. The Master clock is either external or internal clock.

Free Run Mode with Integration Time Setting

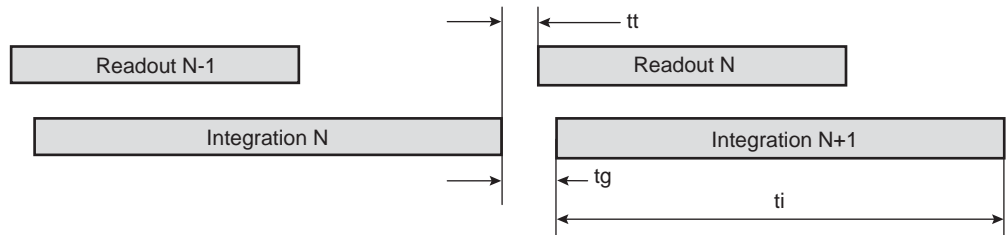
The integration and readout periods start automatically and immediately after the previous period. The read-out time depends on pixel number and pixel rate.

Table 3. Free Run Mode with Integration Time Setting

| Label | Description | Min | Typ | Max |
|-------|---|-----|-----------|-------|
| ti | Integration time duration | (1) | – | 13 ms |
| tg | Consecutive integration period gap (at maximum frequency) | – | 6 μ s | – |
| tt | Integration period stop to read-out start delay | – | 1 μ s | – |

Note: 1. The integration time is set by the serial line and should be higher than the read-out time (otherwise it is adjusted to the readout time).

Figure 2. Timing Diagram



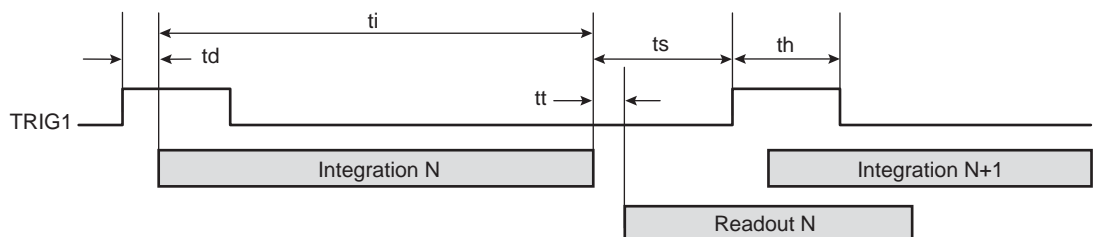
Triggered Mode with Integration Time Setting

The integration period starts immediately after the rising edge of TRIG1 input signal. The Integration time is set by the serial line. This integration period is immediately followed by a readout period. The read-out time depends on pixel number and the pixel rate.

Table 4. Triggered Mode with Integration Time Setting

| Label | Description | Min | Typ | Max |
|-------|---|-----------|-------------|-------|
| ti | Integration time duration | 5 μ s | – | 13 ms |
| td | TRIG1 rising to integration period start delay | – | 5.5 μ s | – |
| tt | Integration period stop to read-out start delay | – | 1 μ s | – |
| ts | Integration period stop to TRIG1 rising set-up time | 4 μ s | – | – |
| th | TRIG1 hold time (pulse high duration) | 1 μ s | – | – |

Figure 3. Timing Diagram



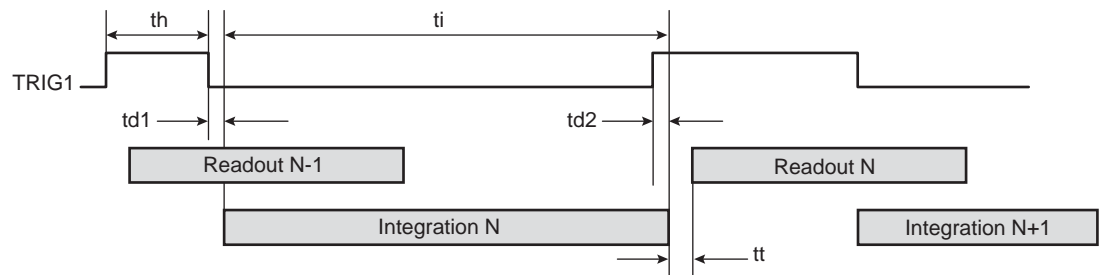
Trigger and Integration Time Controlled by One Input

The integration period starts immediately after the falling edge of TRIG1 input signal, stops immediately after the rising edge of TRIG1 input signal, and is immediately followed by a read-out period. The read-out time depends on pixel number and pixel rate.

Table 5. Trigger and Integration Time Controlled by One Input

| Label | Description | Min | Typ | Max |
|-------|---|-----------|-------------|-----|
| ti | Integration time duration | 5 μ s | – | – |
| td1 | TRIG1 falling to integration period start delay | – | 100 ns | – |
| td2 | TRIG1 rising to integration period stop delay | – | 1.3 μ s | – |
| tt | Integration period stop to read-out start delay | – | 1 μ s | – |
| th | TRIG1 hold time (pulse high duration) | 1 μ s | – | – |

Figure 4. Timing Diagram



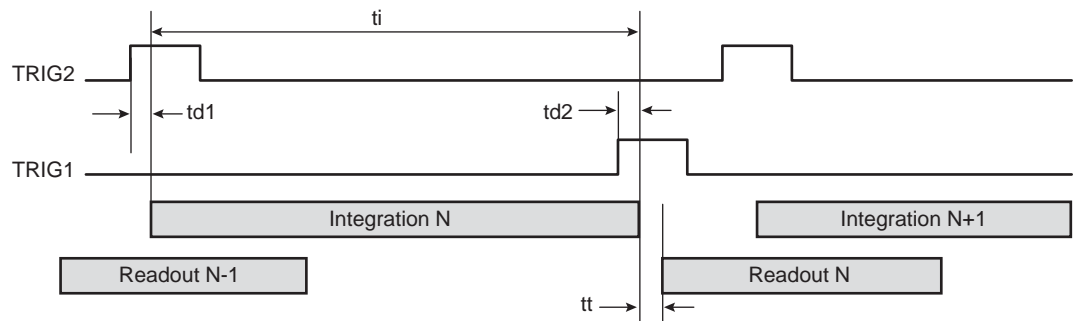
Trigger and Integration Time Controlled by Two Inputs

The TRIG2 rising edge starts the integration period. The TRIG1 rising edge stops the integration period. This period is immediately followed by a readout period.

Table 6. Trigger and Integration Time Controlled by Two Inputs

| Label | Description | Min | Typ | Max |
|-------|---|-----------|-------------|-----|
| ti | Integration time duration | 5 μ s | – | – |
| td1 | TRIG2 rising to integration period start delay | – | 100 ns | – |
| td2 | TRIG1 rising to integration period stop delay | – | 1.3 μ s | – |
| tt | Integration period stop to read-out start delay | – | 1 μ s | – |
| th | TRIG1 and TRG2 hold time (pulse high duration) | 1 μ s | – | – |

Figure 5. Timing Diagram

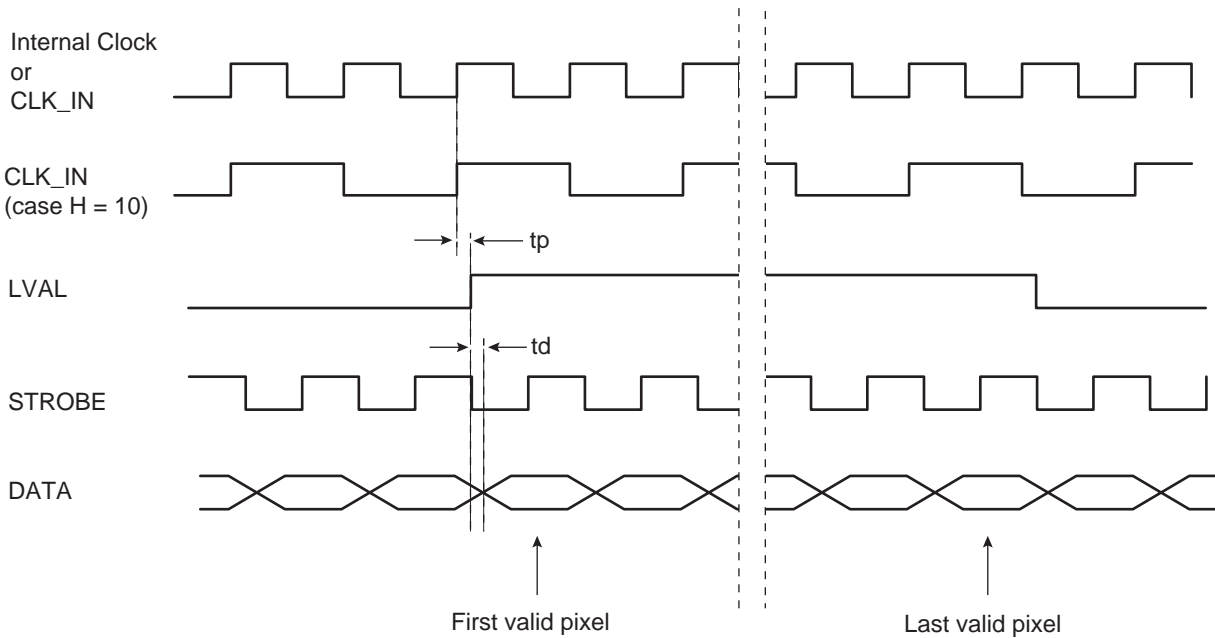


Output Data Timing

Table 7. Output Data Timing

| Label | Description | Min | Typ | Max |
|-------|--|-------|------|-------|
| tp | Input falling edge to output clock propagation delay | – | 7 ns | – |
| td | STROBE to synchronized signals delay | -5 ns | – | +5 ns |

Figure 6. Timing Diagram



Note: CLOCK_IN input frequency must be in the range 5 to 60 MHz. Out of this range, the performances may be decreased.

In case of **multi-cameras synchronisation** (means more than one camera on one acquisition board):

- the "master" camera will provide DATA, STROBE and LVAL signals to the acquisition board. The others will only provide DATA.
- the external clock CLK_IN must be input on each cameras to guaranty perfect data synchronisation.
- the trigger(s) input (TRIG1 and/or TRIG2) must be input on each cameras. It is recommended to synchronise the rising edge of these signals on the CLK_IN falling edge.
- cables must be balanced between each cameras (same quality, same length) to ensure perfect cameras synchronisation.
- the CLK_IN frequency must be equal to the two CCD register frequency. It means that the user shall use either H=2 (2 taps at CLK_IN data rate) or H=10 (1 tap at 2xCLK_IN data rate). **Using H=1 clock mode will provide LVAL jitter on the "slave" camera.**
- Only "triggered and integration time controlled" (M=3 or M=4) can be used. These modes ensure perfect readout phase starting for each cameras.

Electrical Interface

Power Supply

It is recommended to insert a 1A fuse between the power supply and the camera.

Table 8. Power Supply

| Signal Name | I/O | Type | Description |
|-------------|-----|------|---|
| PWR | P | – | DC power input: +12V to +24V ($\pm 0.5V$) |
| GND | P | – | Electrical and Mechanical ground |

I = input, O = output, IO = bi-directional signal, P = power/ground, NC = not connected

Camera Control

The Camera interface provides three LVDS signals dedicated to camera control.

Table 9. Camera Control

| Signal Name | I/O | Type | Description |
|-------------|-----|-------|---|
| TRIG1 | I | RS644 | Synchronization input (refer to “Synchronization Mode” on page 6) |
| TRIG2 | I | RS644 | Start Integration period in dual synchro mode (refer to “Synchronization Mode” on page 6) |
| CLOCK_IN | I | RS644 | External clock for (multi-)camera synchronization (refer to “Synchronization Mode” on page 6) |

I = input, O = output, IO = bi-directional signal, P = power/ground, NC = not connected

Video Data

Table 10. Video Data

| Signal Name | I/O | Type | Description |
|-------------|-----|-------|--|
| ODD[11-0] | O | RS644 | Odd pixel data (refer to “Output Data Timing” on page 8), ODD-00 = LSB, ODD-11 = MSB |
| EVEN[11-0] | O | RS644 | Even pixel data (refer to “Output Data Timing” on page 8), EVEN-00 = LSB, EVEN-11 = MSB |
| STROBE | O | RS644 | Output data clock (refer to “Output Data Timing” on page 8), data valid on the rising edge |
| LVAL | O | RS644 | Line valid (refer to “Output Data Timing” on page 8), active high signal |

I = input, O = output, IO = bi-directional signal, P = power/ground, NC = not connected

Note: In case of Single output, the data (multiplexed) are output in place of Odd data.

Serial Communication

The RS-232 interface allows to parameter the camera.

The RS-232 configuration is:

- Full duplex/without handshaking. The camera is configured in DCE/Modem
- 9600 bauds, 8-bit data, no parity bit, 1 stop bit.

Table 11. Serial Communication

| Signal Name | I/O | Type | Description |
|-------------|-----|-------|------------------|
| TX | O | RS232 | Transmitted data |
| RX | I | RS232 | Received data |

Command Syntax

The valid syntax is "S = n(CR)" with:

- S: command identification as per "Camera Command and Control" on page 4. S is a single character in upper case.
- n: setting value.
- (CR): means "carriage return".

no space, nor tab may be inserted between S, =, n and (CR).

Example of a valid command:

- G = 3(CR): sets the camera to gain 3 (refer to "Camera Command and Control" on page 4 for exact value calculation).

Example of non valid commands:

- G = 3(CR): spaces.
- g = 3(CR): g instead of G.
- G = 1040(CR): 1040 is outside of range.

Command Processing

Each command received by the camera is processed:

- If the command is valid:
 - the setting is done in case of a write command.
 - the camera returns the data separated by (CR) in case of the read command.
 - the camera returns: >OK(CR).
- If the command is not valid:
 - nothing is done.
 - the camera returns: >1 = out of range; >2 = syntax error; >3 = command too long; >4,>6,>7 = internal error; >5 undefined function.

Example: when receiving "! = 3(CR)" the camera returns its current settings:

- A = 0(CR); B = 0(CR); ...; E = 0(CR); >OK(CR).

Storage of the Settings in EEPROM

ATMEL recommends to use "E = 1" for settings that are often changed (check the maximum number of write cycles above) and when the time required by the camera to process a command is critical. The maximum number of write cycles allowed for the EEPROM is: 100 000.

Connector Description

All connectors are on the rear panel.

Note: Cables for digital signals shall be shielded twisted pairs.

Power Supply

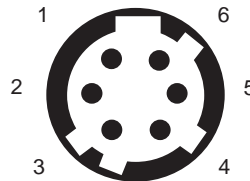
Camera connector type: Hirose HR10A-7R-6PB (male).

Cable connector type: Hirose HR10A-7P-6S (female).

Table 12. Power Supply Connector Pin-out

| Signal | Pin | Signal | Pin |
|--------|-----|--------|-----|
| PWR | 1 | GND | 4 |
| PWR | 2 | GND | 5 |
| PWR | 3 | GND | 6 |

Figure 7. Receptacle Viewed from Camera Back



RS232 Connector

Camera connector type: D-Sub 9-pin female.

RTS (pin 4) and CTS (pin 6) are connected together inside the camera.

DTR (pin 7) and DSR (pin 8) are connected together inside the camera.

Table 13. RS232 Connector Pin-out

| Signal | Pin | Signal | Pin | Signal | Pin |
|--------|-----|--------|-----|--------|-----|
| NC | 1 | RTS | 4 | DTR | 7 |
| TX | 2 | GND | 5 | DSR | 8 |
| RX | 3 | CTS | 6 | NC | 9 |

44-pin Data and Synchro Connector

Camera connector type: D-Sub HD 44-pin female.

Warning: **Unused pins must be kept open.**

When used in Single (multiplexed) output, the multiplexed data are output in place of ODD data.

Table 14. 44-pin Data and Synchro Connector when Used in 12-bit Output Format (S = 0)

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|-----|-----------|-----|-----------|-----|---------|-----|---------|
| 1 | GND | 12 | – | 23 | ODD-03+ | 34 | ODD-06- |
| 2 | CLOCK_IN+ | 13 | – | 24 | ODD-08+ | 35 | ODD-07+ |
| 3 | ODD-04- | 14 | LVAL+ | 25 | ODD-10- | 36 | ODD-01+ |
| 4 | ODD-05- | 15 | STROBE+ | 26 | ODD-11- | 37 | ODD-02+ |
| 5 | ODD-07- | 16 | CLOCK_IN- | 27 | – | 38 | ODD-03- |
| 6 | ODD-00+ | 17 | TRIG1+ | 28 | – | 39 | ODD-09+ |
| 7 | ODD-02- | 18 | TRIG1- | 29 | LVAL- | 40 | ODD-10+ |
| 8 | ODD-08- | 19 | ODD-05+ | 30 | STROBE- | 41 | – |
| 9 | ODD-09- | 20 | ODD-06+ | 31 | TRIG2- | 42 | – |
| 10 | ODD-11+ | 21 | ODD-00- | 32 | TRIG2+ | 43 | – |
| 11 | – | 22 | ODD-01- | 33 | ODD-04+ | 44 | GND |

Table 15. 44-pin Data and Synchro Connector when Used in 10-bit Output Format (S = 1)

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|-----|-----------|-----|-----------|-----|---------|-----|---------|
| 1 | GND | 12 | – | 23 | ODD-03+ | 34 | ODD-06- |
| 2 | CLOCK_IN+ | 13 | – | 24 | ODD-08+ | 35 | ODD-07+ |
| 3 | ODD-04- | 14 | LVAL+ | 25 | – | 36 | ODD-01+ |
| 4 | ODD-05- | 15 | STROBE+ | 26 | – | 37 | ODD-02+ |
| 5 | ODD-07- | 16 | CLOCK_IN- | 27 | – | 38 | ODD-03- |
| 6 | ODD-00+ | 17 | TRIG1+ | 28 | – | 39 | ODD-09+ |
| 7 | ODD-02- | 18 | TRIG1- | 29 | LVAL- | 40 | – |
| 8 | ODD-08- | 19 | ODD-05+ | 30 | STROBE- | 41 | – |
| 9 | ODD-09- | 20 | ODD-06+ | 31 | TRIG2- | 42 | – |
| 10 | – | 21 | ODD-00- | 32 | TRIG2+ | 43 | – |
| 11 | – | 22 | ODD-01- | 33 | ODD-04+ | 44 | GND |

Table 16. 44-pin Data and Synchro Connector when Used in 8-bit Output Format (S = 2)

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|-----|-----------|-----|-----------|-----|---------|-----|---------|
| 1 | GND | 12 | – | 23 | ODD-03+ | 34 | ODD-06- |
| 2 | CLOCK_IN+ | 13 | – | 24 | – | 35 | ODD-07+ |
| 3 | ODD-04- | 14 | LVAL+ | 25 | – | 36 | ODD-01+ |
| 4 | ODD-05- | 15 | STROBE+ | 26 | – | 37 | ODD-02+ |
| 5 | ODD-07- | 16 | CLOCK_IN- | 27 | – | 38 | ODD-03- |
| 6 | ODD-00+ | 17 | TRIG1+ | 28 | – | 39 | – |
| 7 | ODD-02- | 18 | TRIG1- | 29 | LVAL- | 40 | – |
| 8 | – | 19 | ODD-05+ | 30 | STROBE- | 41 | – |
| 9 | – | 20 | ODD-06+ | 31 | TRIG2- | 42 | – |
| 10 | – | 21 | ODD-00- | 32 | TRIG2+ | 43 | – |
| 11 | – | 22 | ODD-01- | 33 | ODD-04+ | 44 | GND |

Table 17. 44-pin Data and Synchro Connector when Used in Special 2 x 8-bit Output on a Single Connector (Y = 1)

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|-----|-----------|-----|-----------|-----|----------|-----|----------|
| 1 | GND | 12 | EVEN-06- | 23 | ODD-03+ | 34 | ODD-06- |
| 2 | CLOCK_IN+ | 13 | EVEN-07- | 24 | EVEN-00+ | 35 | ODD-07+ |
| 3 | ODD-04- | 14 | LVAL+ | 25 | EVEN-02- | 36 | ODD-01+ |
| 4 | ODD-05- | 15 | STROBE+ | 26 | EVEN-03- | 37 | ODD-02+ |
| 5 | ODD-07- | 16 | CLOCK_IN- | 27 | EVEN-05+ | 38 | ODD-03- |
| 6 | ODD-00+ | 17 | TRIG1+ | 28 | EVEN-06+ | 39 | EVEN-01+ |
| 7 | ODD-02- | 18 | TRIG1- | 29 | LVAL- | 40 | EVEN-02+ |
| 8 | EVEN-00- | 19 | ODD-05+ | 30 | STROBE- | 41 | EVEN-04- |
| 9 | EVEN-01- | 20 | ODD-06+ | 31 | TRIG2- | 42 | EVEN-05- |
| 10 | EVEN-03+ | 21 | ODD-00- | 32 | TRIG2+ | 43 | EVEN-07+ |
| 11 | EVEN-04+ | 22 | ODD-01- | 33 | ODD-04+ | 44 | GND |

26-pin Data Connector

Camera connector type: D-Sub HD 26-pin female.

In case of single (multiplexed) or special 2 x 8-bit mode, the output on this connector are all fixed to low level.

Table 18. 26-pin Data Connector when Used in 12-bit Output Format (S = 0)

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|-----|----------|-----|----------|-----|----------|-----|----------|
| 1 | GND | 8 | EVEN-10+ | 15 | EVEN-07+ | 22 | EVEN-05+ |
| 2 | EVEN-01- | 9 | EVEN-11- | 16 | EVEN-08+ | 23 | EVEN-06+ |
| 3 | EVEN-03+ | 10 | EVEN-00- | 17 | EVEN-10- | 24 | EVEN-08- |
| 4 | EVEN-04+ | 11 | EVEN-01+ | 18 | EVEN-11+ | 25 | EVEN-09- |
| 5 | EVEN-06- | 12 | EVEN-02+ | 19 | EVEN-00+ | 26 | GND |
| 6 | EVEN-07- | 13 | EVEN-04- | 20 | EVEN-02- | | |
| 7 | EVEN-09+ | 14 | EVEN-05- | 21 | EVEN-03- | | |

Table 19. 26-pin Data Connector when Used in 10-bit Output Format (S = 1)

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|-----|----------|-----|----------|-----|----------|-----|----------|
| 1 | GND | 8 | – | 15 | EVEN-07+ | 22 | EVEN-05+ |
| 2 | EVEN-01- | 9 | – | 16 | EVEN-08+ | 23 | EVEN-06+ |
| 3 | EVEN-03+ | 10 | EVEN-00- | 17 | – | 24 | EVEN-08- |
| 4 | EVEN-04+ | 11 | EVEN-01+ | 18 | – | 25 | EVEN-09- |
| 5 | EVEN-06- | 12 | EVEN-02+ | 19 | EVEN-00+ | 26 | GND |
| 6 | EVEN-07- | 13 | EVEN-04- | 20 | EVEN-02- | | |
| 7 | EVEN-09+ | 14 | EVEN-05- | 21 | EVEN-03- | | |

Table 20. 26-pin Data Connector when Used in 8-bit Output Format (S = 2)

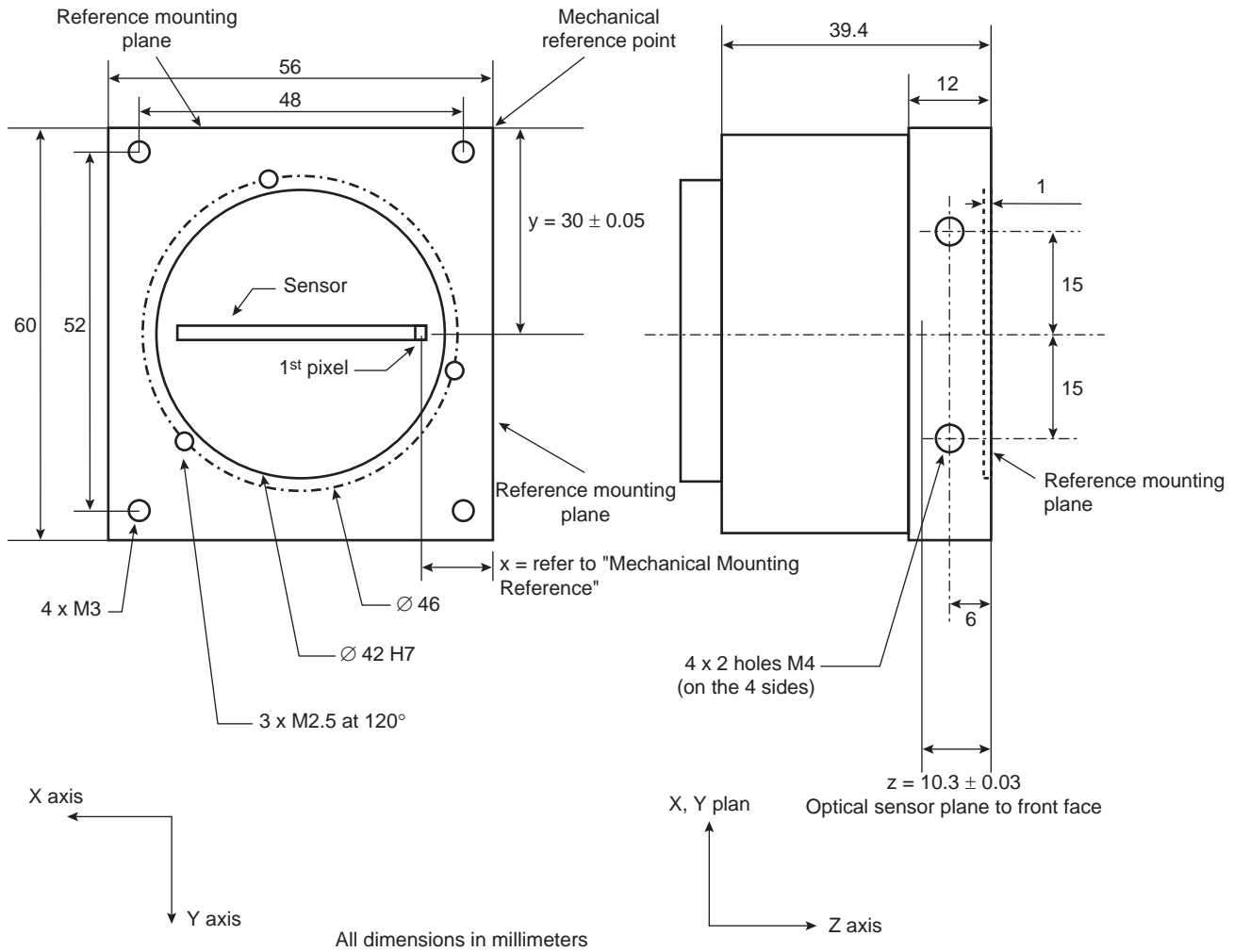
| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|-----|----------|-----|----------|-----|----------|-----|----------|
| 1 | GND | 8 | – | 15 | EVEN-07+ | 22 | EVEN-05+ |
| 2 | EVEN-01- | 9 | – | 16 | – | 23 | EVEN-06+ |
| 3 | EVEN-03+ | 10 | EVEN-00- | 17 | – | 24 | – |
| 4 | EVEN-04+ | 11 | EVEN-01+ | 18 | – | 25 | – |
| 5 | EVEN-06- | 12 | EVEN-02+ | 19 | EVEN-00+ | 26 | GND |
| 6 | EVEN-07- | 13 | EVEN-04- | 20 | EVEN-02- | | |
| 7 | – | 14 | EVEN-05- | 21 | EVEN-03- | | |

Mechanical Characteristics

Weight The camera typical weight (without lens nor lens adapter) is 220 g/7.7 ounces (typical).

Dimensions The camera dimensions (without lens) are W = 56 mm, H = 60 mm, L = 39.4 mm.

Figure 8. Mechanical Box Drawing and Dimensions



Mechanical Mounting Reference

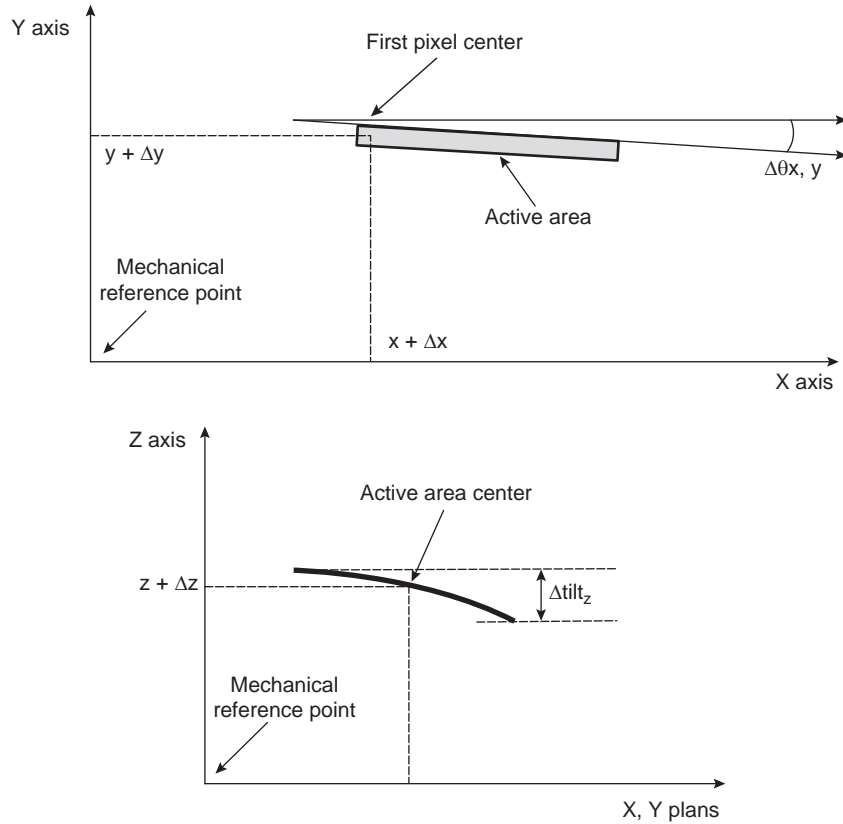
The front panel mechanical part is designed to support the mounting of the camera. On this mechanical part, three surfaces are considered as mounting reference surface: i.e. the distance between these surfaces and the first active pixel are known very precisely (better than $\pm 50 \mu\text{m}$).

Table 21. Mechanical Mounting Reference

| Number of Pixel | 512 | 1024 | 2048 | 4096 |
|-------------------------------------|--------|--------|--------|-------|
| x with 14 μm sensor (nm) | 24.416 | 20.832 | 13.664 | – |
| x with 10 μm sensor (nm) | – | 22.880 | 17.760 | 7.520 |

Sensor Alignment

Figure 9. Sensor Alignment Diagram



Lens Mounting (Lens Not Supplied)

The camera can be provided with three different lens adapter, corresponding to three different options. The customer has to selected the correct adapter. The following table gives recommendation according to the sensor size.

Table 22. Lens Mounting

| Number of Pixel | 512/14 μm | 1024/10 μm | 1024/14 μm | 2048/10 μm | 2048/14 μm | 4096/10 μm |
|-----------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| C mount | OK | OK | ~OK ⁽¹⁾ | ~OK ⁽¹⁾ | not usable | not usable |
| F mount | OK | OK | OK | OK | OK | OK |

Note: 1. Depends on the lens quality.

Heat-sink Mounting

In order to improve the power dissipation, the camera can be delivered with heat-sink to be mounted by the user on the side faces of the camera. The delivery of the heat-sinks corresponds to a dedicated option.

Ordering Code

Table 23. Ordering Code

| Part Number | Resolution | Pixels size | Description |
|--------------------|------------|-------------|---|
| AT71M2LV1010-BA0 | 1K | 10 µm | AViiVA M2 LV 1010 |
| AT71M2LV2010-BA0 | 2K | 10 µm | AViiVA M2 LV 2010 |
| AT71M2LV4010-BA0 | 4K | 10 µm | AViiVA M2 LV 4010 |
| AT71M2LV0514-BA0 | 512 | 14 µm | AViiVA M2 LV 0514 |
| AT71M2LV1014-BA0 | 1K | 14 µm | AViiVA M2 LV 1014 |
| AT71M2LV2014-BA0 | 2K | 14 µm | AViiVA M2 LV 2014 |
| AT71KFPAVIVA-ABA | – | – | F mount (NIKON) |
| AT71KFPAVIVA-AKA | – | – | T2 mount (M42 x 0.75) |
| AT71KFPAVIVA-ADA | – | – | M42 x 1 mount |
| AT71KFPAVIVA-ACA | – | – | C mount |
| AT71KAVIVAP2C0D4A0 | – | – | Cables kit: 10m power supply and 5m LVDS data transmission cables |



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