

Matrox Meteor-II/Camera Link

Camera Interface Application Note

DALSA P2-4x-0xk40

May 23, 2002

*Basics about the
camera*

*Mode of operations as
per Matrox Imaging (in
parentheses as per
camera manufacturer)*

*Basics about the
interface modes*

Camera Descriptions

- Effective resolution: up to 8192 pixels/line @ 18.6k lines per second.
- Camera Link MEDIUM interface (four channels).
- Internal and external sync.
- Internal or external exposure control.
- 40 MHz pixel clock rate.

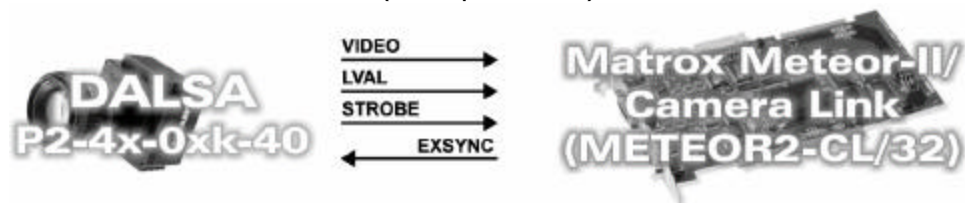
Interface Modes

- Fixed line scan (Smart EXSYNC Mode)
- Variable line scan (Smart EXSYNC Mode)

Camera Interface Briefs

Mode 1: Fixed line scan (Smart EXSYNC Mode)

- Up to 8192 pixels/line @ 4.76k lines per second.
- Camera Link MEDIUM interface (four channels).
- DCF configured for 800 lines per virtual frame.
- Line scan rate is fixed and determined by the frequency of the EXPOSURE1 (EXSYNC) signal.
- Matrox Meteor-II/Camera Link sending periodic EXPOSURE1 (EXSYNC) signal to camera.
- Matrox Meteor-II/Camera Link receiving HSYNC (LVAL), PIXEL CLOCK (STROBE @ 40 MHz) and video data from camera.
- DCF used: [P24X6KLP.DCF](#) (6144 pixels/line)
- DCF used: [P24X8KLP.DCF](#) (8192 pixels/line)



Mode 2: Variable line scan (Smart EXSYNC Mode)

- Up to 8192 pixels/line.
- Camera Link MEDIUM interface (four channels).
- DCF configured for 800 lines per virtual frame.
- Line scan rate is variable and determined by the frequency of the external trigger signal.
- Matrox Meteor-II/Camera Link receiving external TTL trigger signal.
- Matrox Meteor-II/Camera Link sending periodic EXPOSURE1 (EXSYNC) signal to camera.
- Matrox Meteor-II/Camera Link receiving HSYNC (LVAL), PIXEL CLOCK (STROBE @ 40 MHz) and video data from camera.

Continued...

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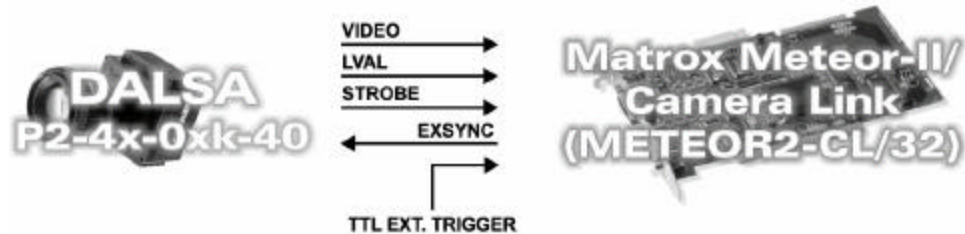
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Basics about the
interface modes

Camera Interface Briefs (cont.)

Mode 2: Variable line scan (Smart EXSYNC Mode)

- DCF used: [P24X6KLV.DCF](#) (6144 pixels/line)
- DCF used: [P24X8KLV.DCF](#) (8192 pixels/line)



Specifics about the
interface modes

Camera Interface Details

Mode 1: Fixed line scan (Smart EXSYNC Mode)

- **Line rate:** The frequency of the periodic EXPOSURE1 (EXSYNC) signal controls the camera's line rate. The EXPOSURE1 (EXSYNC) signal period for this mode is set to **210 ms** which translates into a **4.76 kHz** line rate. The maximum line rate equals **18.6/24.4 kHz** respectively for the 8k/6k models. **NOTE:** Capture to the Matrox Meteor-II/Camera Link on-board memory is necessary when grabbing at rates above approximately 80 MB/sec. (system dependent). Moreover, when grabbing to on-board memory, a limit of roughly 5400/4000 lines (6K/8K model respectively) can be acquired before the on-board memory fills up and the grab will need to be halted to allow a data transfer to the host in order to free up the on-board memory. At a lower rate (e.g. long exposure or a slower external trigger frequency), it will be possible to grab directly and continuously into system memory.
- **Exposure time:** Exposure time is the active (high level) period between the rising and falling edges of the EXPOSURE1 (EXSYNC) signal. The default exposure time for this mode is **100 ms**. The exposure time can be modified in the DCF using Matrox Intellicam or with the MIL MdigControl() function. Refer to the respective manual for more information.
- **Maximum/Minimum:** Since the Matrox Meteor-II/Camera Link timer is 16-bit wide, the maximum exposure time for this dcf is calculated to be $65536/20\text{MHz} = 3.28 \text{ ms}$. When the exposure time equals **100 ms**, the maximum line rate can be calculated to be exposure time + line read out + internal delay or $100 \text{ ms} + 38.4 \text{ ms} + 1.52 \text{ ms} = 139.92 \text{ ms}$ or **7.15kHz** for the 6k model (**6.50 kHz** for the 8k model). The pixel clock is the reference clock in which the exposure time is being set by, therefore the smallest time increment equals **50 ns**.

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Specifics about the
interface modes

Camera Interface Details (cont.)

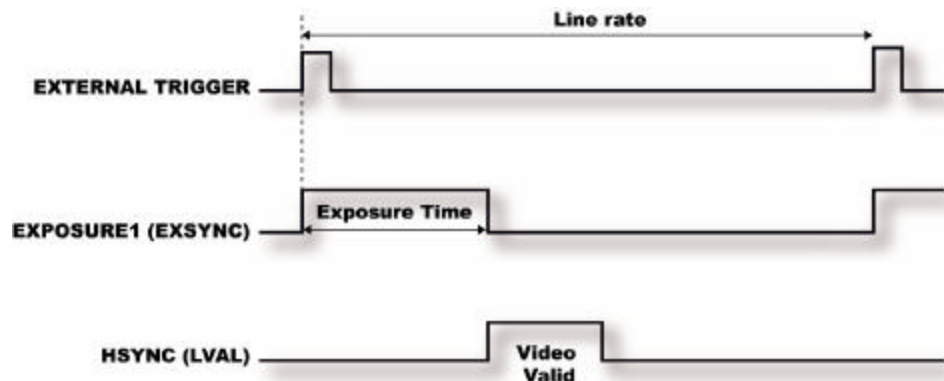
Mode 1: Fixed line scan (Smart EXSYNC Mode)

- **Inverted tap output:** The tap output configuration features mirrored taps which will need to be inverted. Additional processing time will be required in order to invert the 3rd and 4th taps. For a sample program or additional information, contact Matrox Imaging Technical Support.
- **Camera Communications:** Refer to the camera manual for additional information. The following camera configuration is set via the Camera Link Serial communication:

Command	Short Form	Parameter	Description
set_exposure_mode	sem	4	SMART EXSYNC mode

Mode 2: Variable line scan (Smart EXSYNC Mode)

- **Line rate:** The line rate is variable and determined by the frequency of the external trigger signal. The external TTL trigger signal period must be larger than the total duration of the exposure time (high level duration of the timer), the internal delay of the camera (1.52 μ s) and the line rate (38.4 μ s for the 6k model or 51.2 μ s for the 8k model). **NOTE:** Capture to the Matrox Meteor-II/Camera Link on-board memory is necessary when grabbing at rates above approximately 80 MB/sec. (system dependent). Moreover, when grabbing to on-board memory, a limit of roughly 5400/4000 lines (6K/8K model respectively) can be acquired before the on-board memory fills up and the grab will need to be halted to allow a data transfer to the host in order to free up the on-board memory. At a lower rate (e.g. long exposure or a slower external trigger frequency), it will be possible to grab directly and continuously into system memory.
- **Exposure time:** Same as in Mode 1: Fixed line scan.
- **Maximum/Minimum:** Same as in Mode 1: Fixed line scan.
- **Inverted tap output:** Same as in Mode 1: Fixed line scan.
- **Camera Communications:** Same as in Mode 1: Fixed line scan.
- **Timing diagram:**



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Cabling details for the
interface modes

Cabling Requirements

Mode 1: Fixed line scan (Smart EXSYNC Mode)

- **Cable and Connection:** Standard Camera Link cable.

Mode 2: Variable line scan (Smart EXSYNC Mode)

- **Cable and Connection:** Standard Camera Link.
- **External trigger:** External trigger should be connected to the OPTO TRIG input of the DB9 connector (pins 2 and 7) on the Expanded I/O adapter bracket.

EXPANDED I/O BRACKET (DB9 connector)

External Trigger Source

OPTOTRIG +	07	←	SIGNAL	--
OPTOTRIG -	02	←	GROUND	--

The DCF(s) mentioned in this application note can be found on our FTP site (<ftp.matrox.com/pub/imaging/>). The information furnished by Matrox Electronics System, Ltd. is believed to be accurate and reliable. Please verify all interface connections with camera documentation or manual. Contact your local sales representative or Matrox Sales office or Matrox Imaging Applications at 514-822-6061 for assistance.

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MET2-CID-107

