IMPERX™

HD-SDI Express User Training

J.Egri 4/09

IMPERX™

Features

- SDI interface
- Supports 720p, 1080i and 1080p formats.
- Supports SMPTE 292M serial interface operating at 1.485 Gbps.
- Supports SMPTE 274M and 296M framing.
- 75 ohm BNC coaxial connector.

- ExpressCard Interface
- 54mm form factor.
- PCIe x1 interface providing 235 Mbytes/sec of throughput.
- Scatter/Gather DMA (Direct Memory Access) engine using 4K pages.
- Flow-thru pipelined architecture for low latency.

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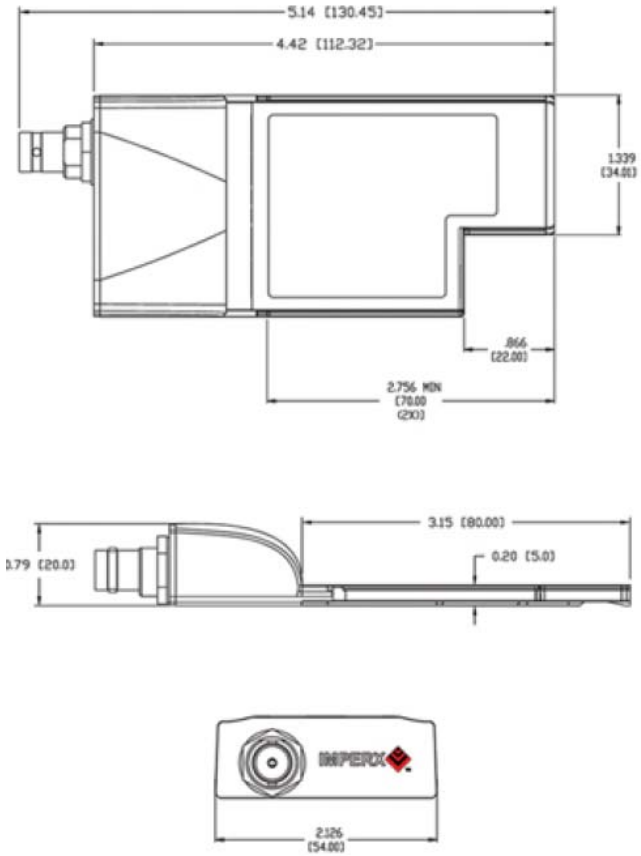
Features (cont.)

- Features
- Operates in either YCrCb 4:2:2 - 20 bit, YCrCb 4:2:2 - 16 bit or RGB - 24 bit modes.
- Hardware based YCrCb 4:2:2 to RGB-24 color space conversion.
- Hardware based RGB gain/offset with auto-white balance.
- Hardware based RGB Lookup table with Gamma correction.
- Histograms.
- Hex pixel dump.
- Capture single frame, multiple frames or AVI clips.
- Save RAW, BMP, TIFF, JPEG or AVI files.
- Firmware ‘Remote Upgrade’ capability.

Features (cont.)

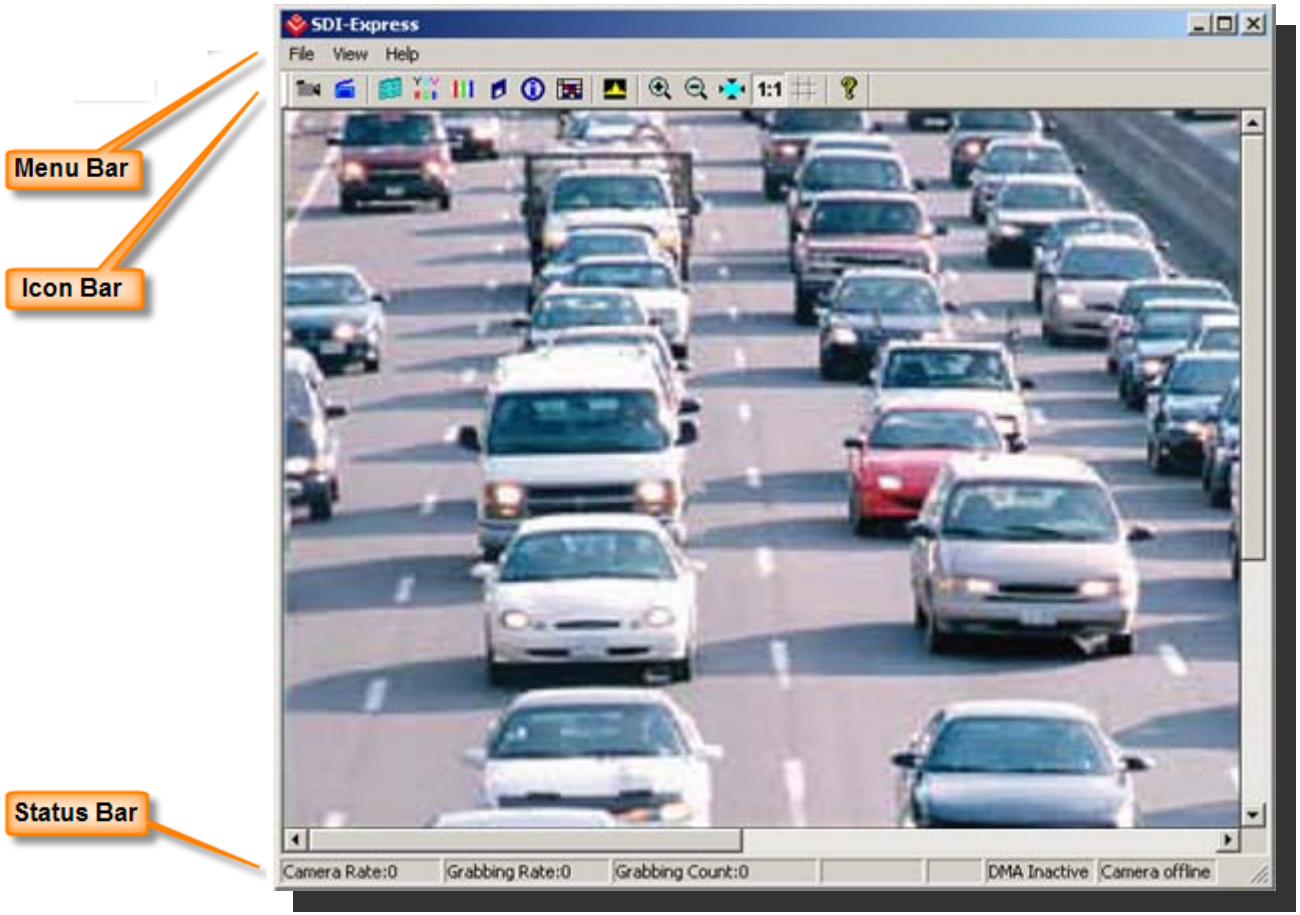
- Mechanical
- ExpressCard 54mm form factor.
- 38 mm I/O extension.
- 5.1” x 2.1” x 0.8” overall size.
- 1.91 oz. (53.6 g).

- Power
- 3.3 VDC +/- 5%.
- 500 mA steady current.
- 1.65 W constant power.



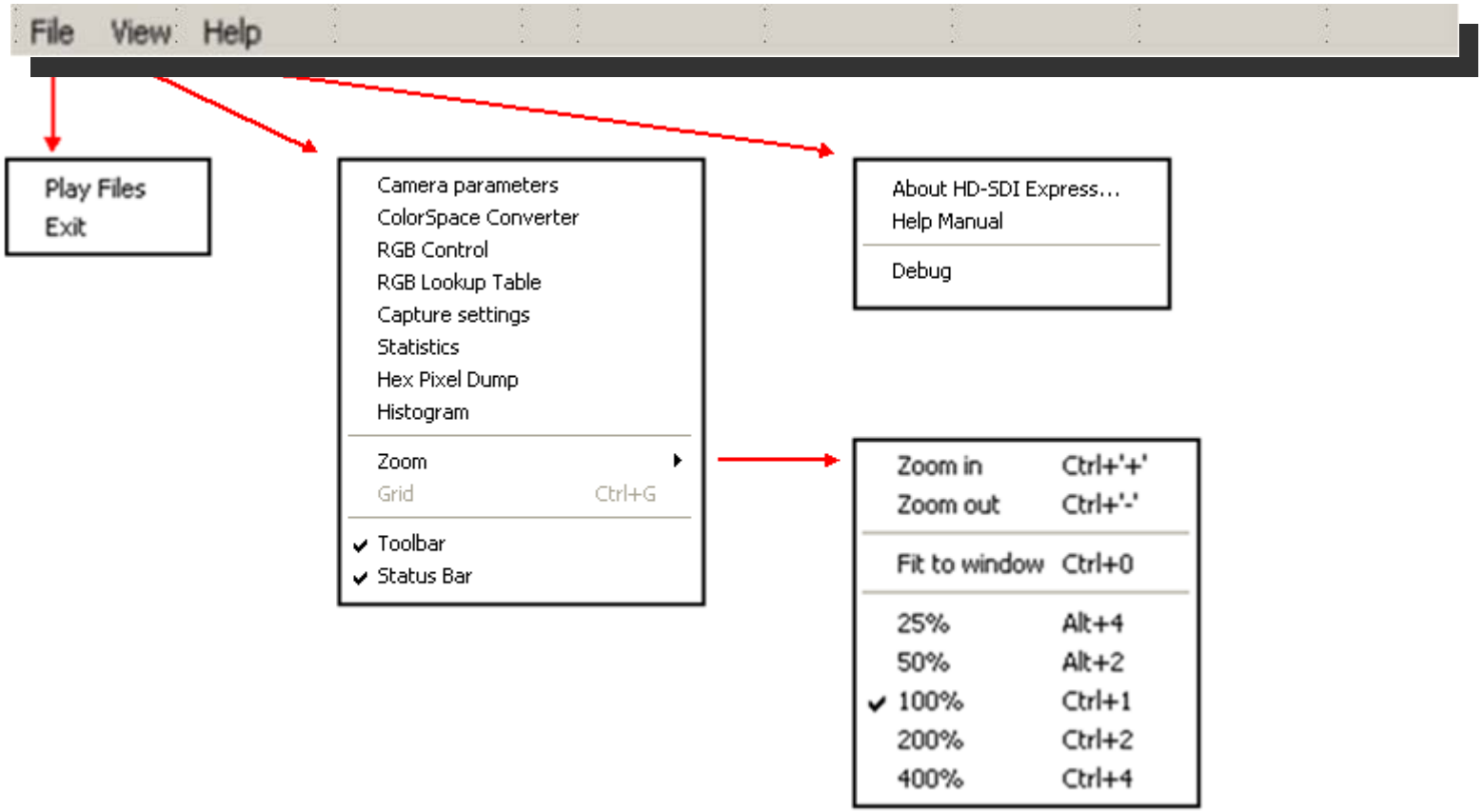
Main Menu

- Consists of a Menu bar, an Icon bar and a Status bar.



IMPERX TM

Menu Bar



Icon Bar

- Start/stop continuous **Grab**
- **Snap** single frame
- Start/stop **Capture** to disk
- Open **Camera Parameters** dialog
- Open **Color Space Converter** dialog
- Open **RGB Control** dialog
- Open **RGB Lookup Table** dialog
- Open **Capture Settings** dialog
- Open **Statistics** dialog
- Open **Hex Pixel Dump** dialog
- Open **Histogram** dialog
- **Zoom In**
- **Zoom Out**
- **Fit to Window**
- **Zoom 1:1**
- Turn **Grid** on/off
- **Help**

Status Bar

- **Camera Rate** Displays the real-time frame rate of the attached camera as measured at the input of the HD-SDI Express card.
- **Grabbing Rate** Displays the real-time rate at which frames are being transferred from the card into host memory.
- **Grabbing Count** Displays a running count of the total number of frames transferred into system memory. This counter is reset when 'grabbing' is stopped.
- **Pixel Coordinates** Indicates the x,y coordinates of the pixel at the current cursor position.
- **Pixel Value** Indicates the value (grayscale or RGB) of the pixel at the current cursor position.
- **DMA Status** Displays the real-time status of the DMA process as being either : '**active**' or '**inactive**'.
  '**Active**' indicates that the user has commanded the HD-SDI Express to acquire video data by clicking on the 'Start Grab' button and that the camera is providing valid framing.

  '**Inactive**' indicates that either the user has commanded the HD-SDI Express to stop acquiring video data by clicking on the 'Stop Grab' button or that grabbing is enabled but

  the camera is not providing valid framing.
- **Camera Status** Displays the real-time status of the attached camera as being either : '**online**' or '**offline**'.

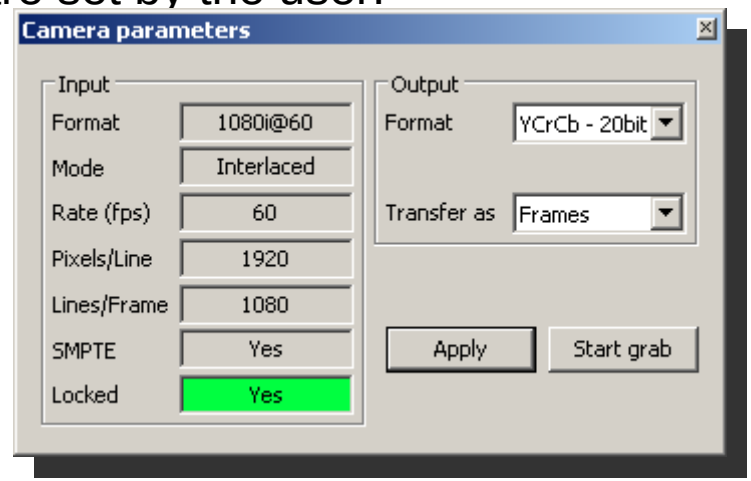
  '**Online**' indicates that the camera is powered on, attached and providing a video clock via the SDI interface.

  '**Offline**' indicates that the HD-SDI Express card is not receiving a video clock from the camera either because the camera is powered off or the SDI cable is disconnected.

Camera Parameters

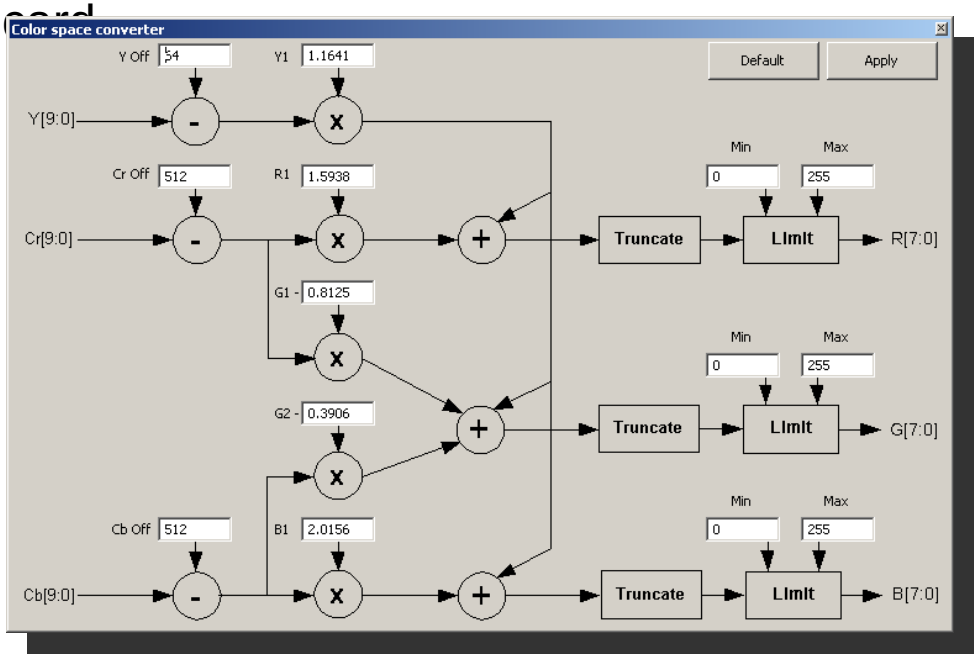
- ‘Input’ section
- Reports the operating parameters of the attached camera.
- Is automatically discovered by the card and populated by the application program.
- ‘Output’ section
- Indicates how the card should format the video data prior to transferring

  it into host system memory.
- Parameters are set by the user.



Color Space Converter

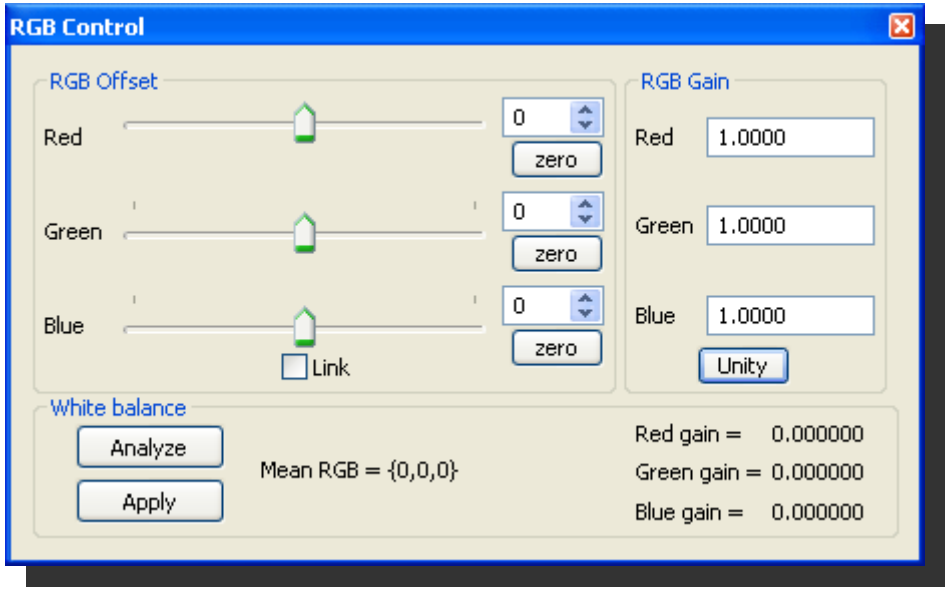
- This function is responsible for converting from YCrCb video data to the RGB-24 format.
- User can adjust the behavior of the color space converter function.
- If RGB-24 mode is selected, then the CSC is performed on the card and RGB-24 data is delivered from the card into host memory.
- If either the YCrCb-20 or YCrCb-16 modes are selected, then YCrCb data is delivered from the card into host memory and the CSC is performed by host software.



RGB Control

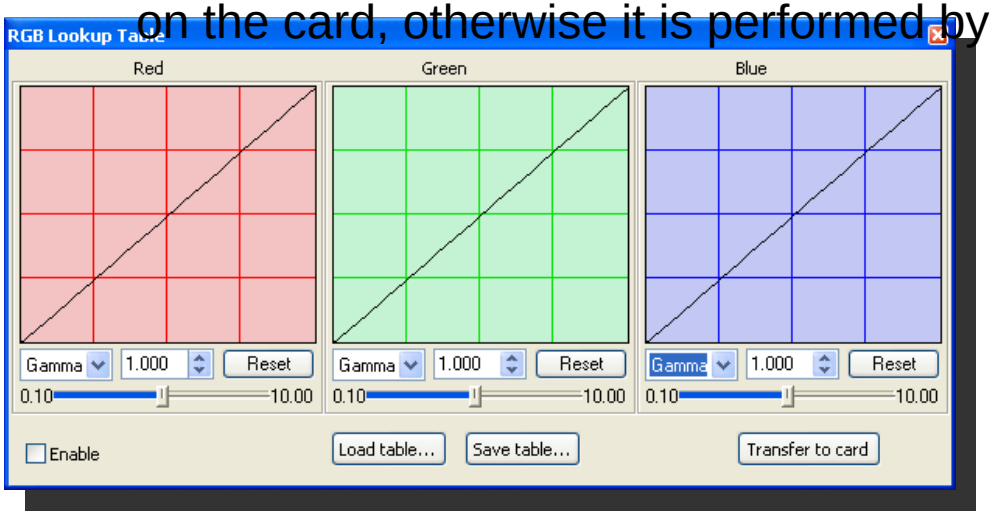
- Programmable RGB Gain and Offset.
- Automatic White Balance feature computes RGB gains.
- If RGB-24 mode is selected then the RGB gain and offset are performed

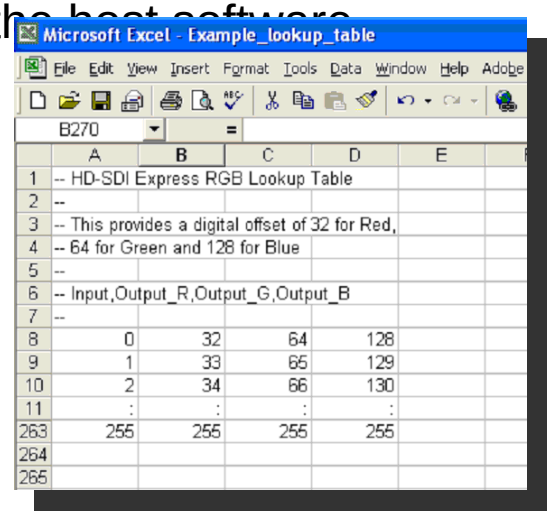
  on the card, otherwise they are performed by the host software.



RGB Lookup Table

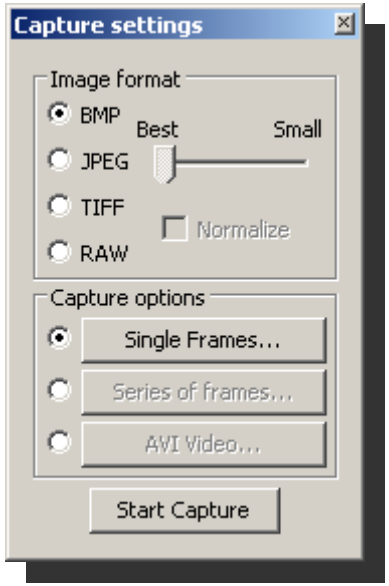
- Modifies and transform the original video data into any arbitrary value.
- The ‘Gamma’ mode allows the user to select Gamma correction values for each of the R, G, B components.
- The ‘Pencil’ mode allows the user to draw the desired transfer function for each of the R, G, B components.
- LUT files can be created with Excel or any ASCII editor.
- If RGB-24 mode is selected then the RGB lookup table is performed on the card, otherwise it is performed by the host software.





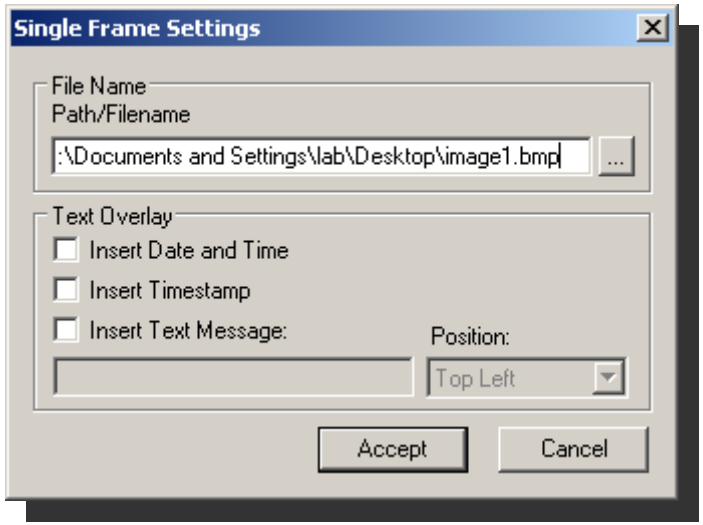
Capture Settings

- Specifies file format for images saved to disk.
- Specifies capture mode.



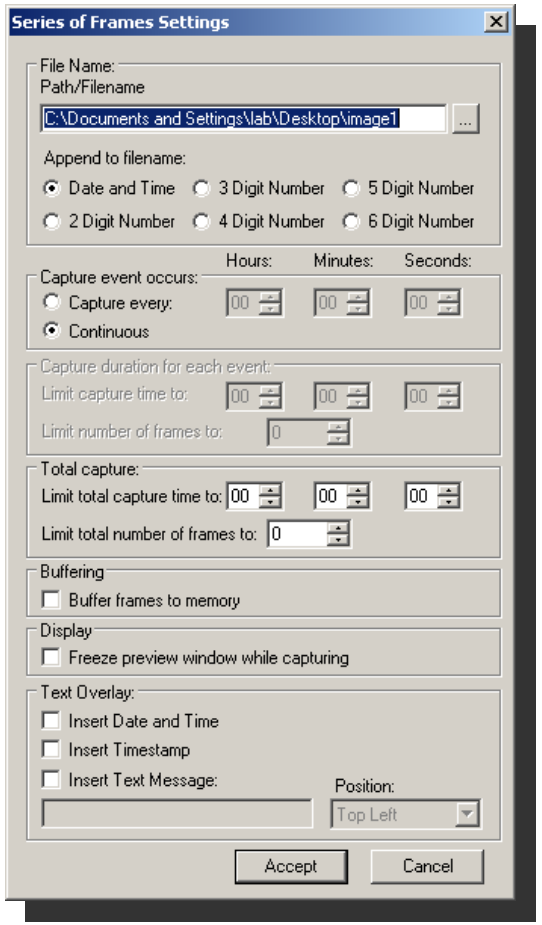
Single Frames

- Used to record one frame only.
- Specify the path and filename for the recorded file.
- Insert optional date/time/timestamp/text to be overlayed on image saved.
- The overlay text is destructive (i.e. persistent) to the image saved.



Series of Frames

- Used to record multiple frames.
- Specify the path and filename for the recorded file.
- Insert optional date/time/timestamp/text to be overlayed on images saved.
- The overlay text is destructive (i.e. persistent) to the image saved.
- Specify capture event frequency.
- Specify capture duration for each event.
- Specify capture limits.



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Series of Frames Examples

- **Example #1:** To capture 5 frames, every 1.5 hours, over a 12 hour period.

Capture event occurs: Capture every: 01 Hr 30 Min 00 Sec
Capture duration for each event: Limit number of frames to: 5
Total capture: Limit total capture time to: 12 Hr 00 Min 00 Sec

- **Example #2:** To capture 5 minutes worth of images, every 15 minutes and not to exceed a total of 250 images.

Capture event occurs: Capture every: 00 Hr 15 Min 00 Sec
Capture duration for each event: Limit capture time to: 00 Hr 05 Min 00 Sec
Total capture: Limit total number of frames to: 250

- **Example #3:** To capture 10 frames, every 1 hour, over a 6 hour period and not to exceed a total of 300 images.

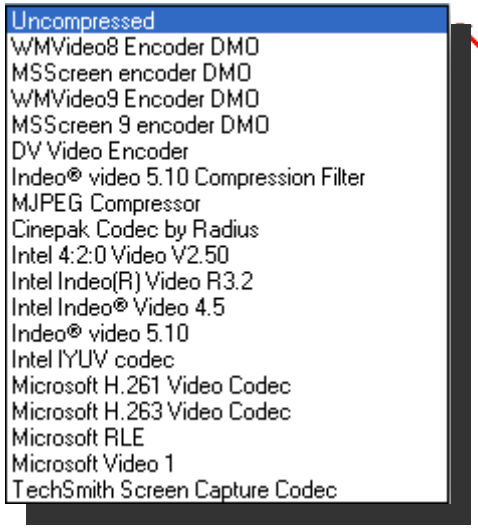
Capture event occurs: Capture every: 01 Hr 00 Min 00 Sec
Capture duration for each event: Limit number of frames to: 10
Total capture: Limit total capture time to: 06 Hr 00 Min 00 Sec
Limit total number of frames to: 300

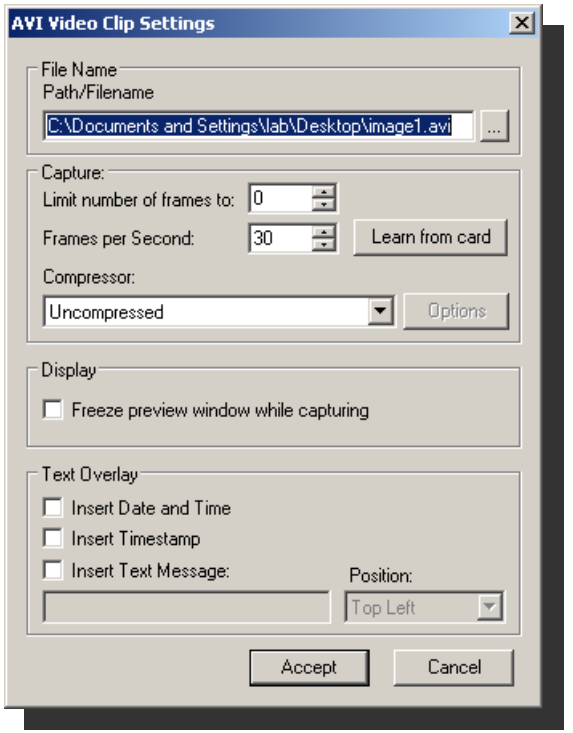
- **Example #4:** To capture continuously for a period of 2 hours and not to exceed a total of 100 images.

Capture event occurs: Continuous
Total capture: Limit total capture time to: 02 Hr 00 Min 00 Sec
Limit total number of frames to: 100

AVI Capture

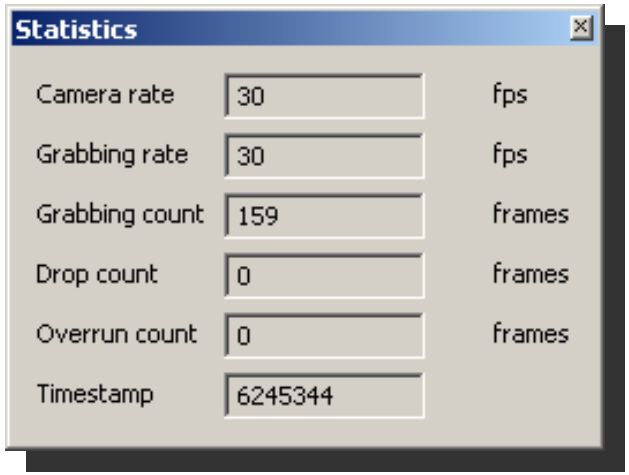
- Used to record AVI movies.
- Specify the path and filename for the recorded file.
- Insert optional date/time/timestamp/text to be overlayed on images saved.
- The overlay text is destructive (i.e. persistent) to the image saved.
- Specify capture limits.
- Specify codec compressor.
- Searches hard drive for all installed compressors.





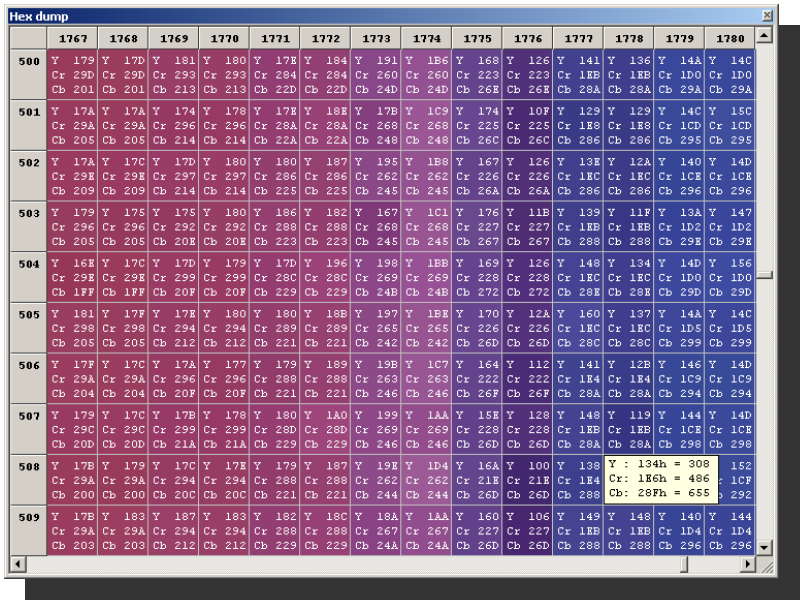
Statistics

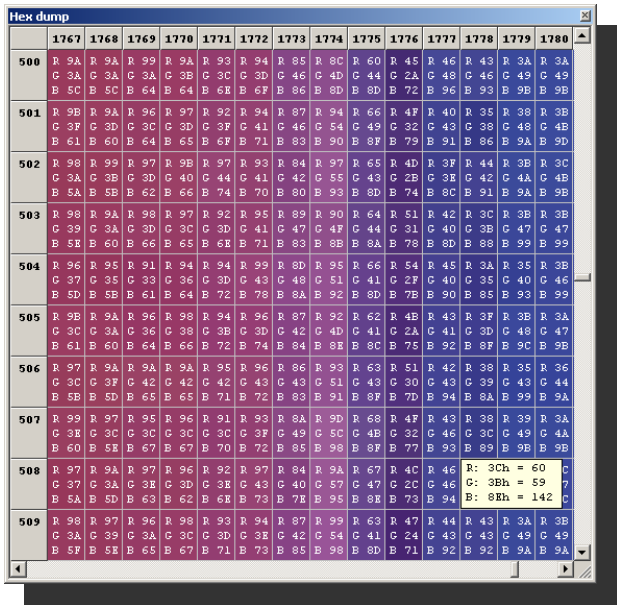
- Displays real time camera performance attributes.
- Displays real time frame grabber performance attributes.
- Useful in determining if frame grabber can keep up with the camera.



Hex Pixel Dump

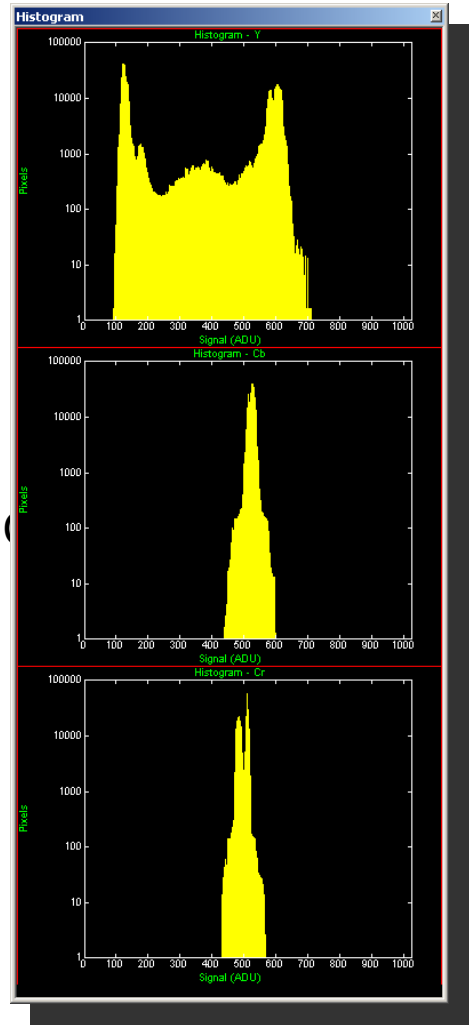
- Displays a two-dimensional table of real-time pixel values, plotting row (Y) vs. column (X), for a bounded region of pixels.
- The YCrCb or RGB-24 pixel values are displayed depending on the operating mode.
- The background color of each cell is color coded.
- Hovering the mouse over a given pixel reveals both the pixel's hexadecimal and integer component values.





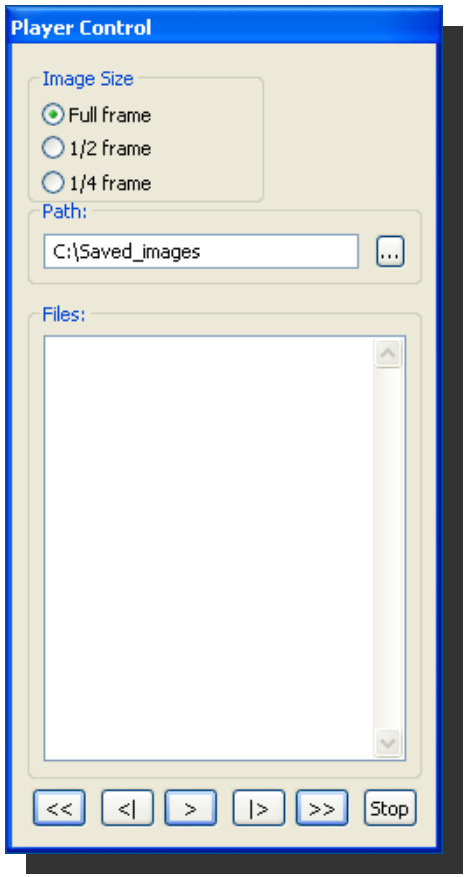
Histogram

- Plots the histogram of the live image as a function of pixel frequency (Y-axis) vs. pixel value (X-axis).
- The range of the pixel value, in the X-axis, depends on the mode selected.
- Displays three graphs: one per component.
- When the YCrCb-20 or YCrCb-16 modes are selected, it will display plots for the Y, Cr and C components.
- When the RGB-24 mode is selected, it will display plots for the R, G and B components.



Player

- Allows the user to select pre-recorded images to view.
- VCR-like controls are provided.



Remote Upgrade

- Card contains two non-volatile firmware images: ‘Factory’ and ‘Application’.
- Both images are programmed into the card during manufacturing.
- Card loads the ‘factory’ image on power-on, which then runs and loads the ‘application’ image (if a valid ‘application’ image is present).
- A ‘Remote Upgrade’ utility allows the user to upgrade the card’s ‘application’ firmware image in the field.
- User is supplied with a self-executable remote upgrade utility with the ‘application’ firmware image embedded in it.