PC Tools

User Manual

Issue **04**

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About This Document

Purpose

The PC Tool is used to adjust the images processed by the image signal processor (ISP) during secondary development. Its component ISP tool supports previewing, snapshot, and recording. It also allows you to set ISP parameters and obtain parameter values by using the ISP control component. After setting ISP parameters, you can preview images.

Related Version

The following table lists the product version related to this document.

Product Name	Version
Hi3518	V100

Intended Audience

This document is intended for:

- Technical support personnel
- Software development engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Alerts you to a high risk hazard that could, if not avoided, result in serious injury or death.
WARNING	Alerts you to a medium or low risk hazard that could, if not avoided, result in moderate or minor injury.

Symbol	Description
CAUTION	Alerts you to a potentially hazardous situation that could, if not avoided, result in equipment damage, data loss, performance deterioration, or unanticipated results.
TIP	Provides a tip that may help you solve a problem or save time.
NOTE	Provides additional information to emphasize or supplement important points in the main text.

Change History

Changes between document issues are cumulative. Therefore, the latest document issue contains all changes made in previous issues.

Issue 04 (2013-09-25)

This issue is the fourth official release, which incorporates the following changes:

Chapter 3 Using the ISP Tool

The screenshot of the ISP main window is changed.

The screenshot of the **IspControl** dialog box is added.

The descriptions of ISPControl gamma is updated.

The descriptions of ISPControl FPN is added.

Issue 03 (2013-06-30)

This issue is the third official release, which incorporates the following changes:

Chapter 2 Installing the ISP Tool

The steps of installing the ISP tool on the board are updated.

Chapter 3 Using the ISP Tool

In section 3.5, the 10-bit raw data snapshot is added.

In section 3.6.1, the GUI of the ISP Control is updated.

Issue 02 (2013-03-31)

This issue is the second official release, which incorporates the following changes:

Chapter 3 Using the ISP Tool

In section 3.5, the descriptions of YUV snapshots are added.

In section 3.6.1, the **IspControl** dialog box is modified.

Issue 01 (2013-02-05)

This issue is the first official release, which incorporates the following changes:

Chapter 3 Using the ISP Tool

In section 3.5, the descriptions of JEPG snapshots are added.

In section 3.6.1, the **IspControl** dialog box is modified.

Issue 00B03 (2012-11-25)

This issue is the third draft release, which incorporates the following changes:

Chapter 2 Installing the ISP Tool

Step 5 is deleted and the descriptions of step 4 are added.

Issue 00B02 (2012-10-30)

This issue is the second draft release, which incorporates the following changes:

Chapter 3 Using the ISP Tool

In section 3.5, the note for selecting the snapshot format is updated.

Issue 00B01 (2012-09-20)

This issue is the first draft release.

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1 Introduction to the ISP Tool

The PC Tool is used to adjust the images processed by the ISP during secondary development. Its component ISP tool supports previewing, snapshot, and recording. It also allows you to set ISP parameters and obtain parameter values by using the ISP control component. After setting ISP parameters, you can preview images.

The ISP parameters include **Exposure**, **White Balance**, **Focus**, **Iris**, **Firmware**, **Gamma**, **Shading**, **Sharpen**, and **Denoise**.

2 Installing the ISP Tool

You can install the ISP tool on the PC or board.

- To install the ISP tool on the PC, double-click **HiPCTools_Setup.exe**, and install it by following the installation wizard.
- To install the ISP tool on the board, perform the following steps:

Step 1 Load all .ko drivers in the Hi3518 software development kit (SDK) on the board. For details, see the *Description of the Installation and Upgrade of the Hi3518 SDK.txt.*

Step 2 Decompress **HiPCTools_Board.rar** to a directory of the network file system (NFS).

Step 3 On the command line interface (CLI), enter **mount –t nfs –o nolock –o tcp,rsize=1024 xx.xx.xx.xx.xx:/Development directory name/mnt**.

Step 4 In the **release_hi3518** directory, run the **HiIspTool.sh** script by running the following commands:

```
/ HiIspTool.sh  sns_name  image_size  sns_mode
image_size: 720p|1080p|1.3m|3m|5m
sns_mode : wdr|line
eg:
ar0130 720p line
ar0130 1.3m line
9m034 720p line|wdr
ov9712 720p line
mn34031 720p line
icx692 720p line
imx104 720p line
imx122 1080p line
SOIH22 720p line
imx138 720p line
ov2710 1080p line
(To use the AR0130 sensor, run ./HiIspTool.sh  ar0130  720p  line.)
```

----End

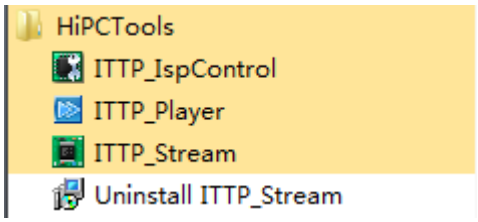
3 Using the ISP Tool

3.1 Component Descriptions

After **HiPCTools_Setup.exe** is installed, three components are displayed, as shown in Figure 3-1.

- ITTP_Stream: the main program. It provides various functions including stream on demand, recording, snapshot, image control, and statistics.
- ITTP_IspControl: a dedicated tool for controlling and adjusting image quality. The **ISP control** menu of the ITTP_Stream can be used to control images. For details, see section 3.6 "Picture Control."
- ITTP_Player: a player. It plays the H.264 streams recorded by ITTP_Stream.

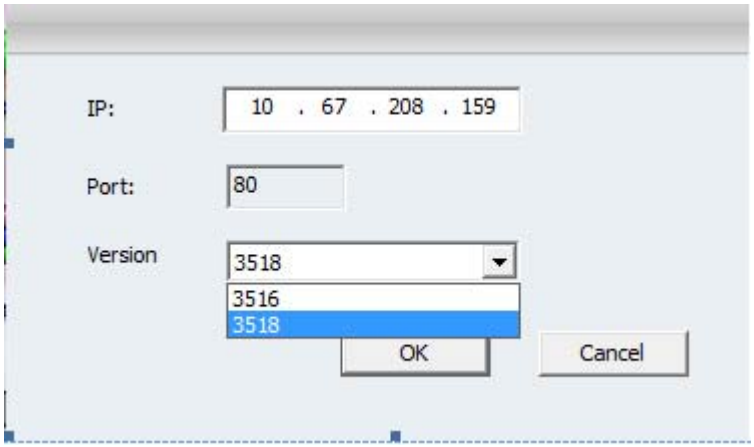
Figure 3-1 HiPCTools components



3.2 GUI

After the ITTP_Stream starts, the **Login** dialog box shown in Figure 3-2 is displayed.

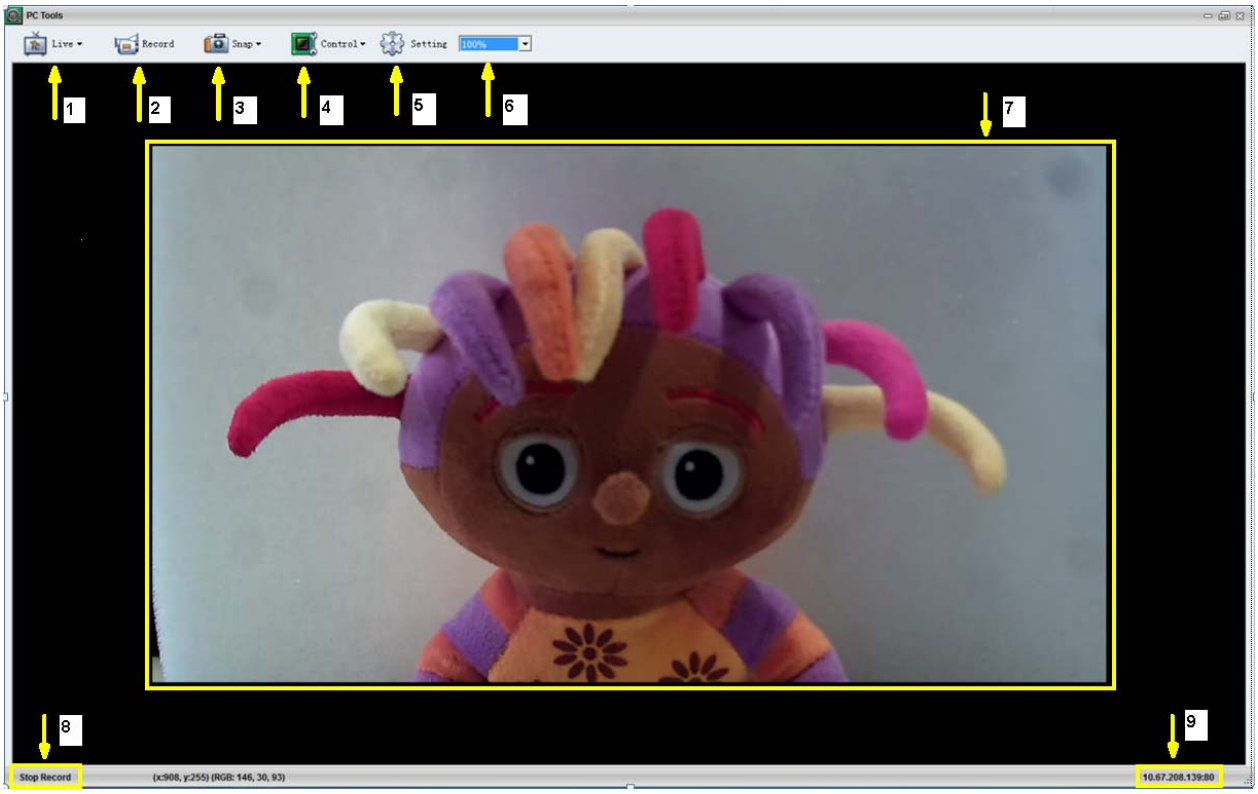
Figure 3-2 Login dialog box



Enter the IP address of the board to be connected, select the version of the board to be connected, and click **OK**. The system checks whether a valid board can be connected.

- If the ISP tool does not start, or the IP address is invalid, a status message (marked with 8) shown in Figure 3-3 is displayed.
- If a board is successfully connected, click **OK**. Then the home screen shown in Figure 3-3 is displayed.

Figure 3-3 Home screen



The following describes the functions of buttons, menus, or areas on the home screen:

NOTE

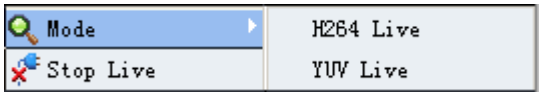
For details about functions, see the following sections.

- 1: Preview
- 2: Record
- 3: Snapshot
- 4: Control
- 5: Setting
- 6: Preview window scale
- 7: Preview window
- 8: Current status
- 9: IP address for the board over which the current video is transferred

3.3 Preview

The preview menu shown in Figure 3-4 (marked with 1 in Figure 3-3) is used to select the preview mode or stop previewing. Two preview modes, H264 live mode and YUV live mode, are supported.

Figure 3-4 Preview menu



When the ISP tool starts, it connects to the board whose IP address is entered in the login dialog box. The connection status is displayed in the lower left corner (marked with 8 in Figure 3-3). A video is displayed in the preview window (marked with 7 in Figure 3-3) after successful connection.

NOTE

- The H264 live mode is selected by default when a video starts to play.
- The YUV images are processed by the ISP.

The **Preview Window Scale** drop-down list (marked with 6 in Figure 3-3) allows you to select a scale. The scale of 30%, 50%, 80%, or 100% is supported. If the video cannot be completely displayed, drag the scroll bars or drag the lower right corner of the preview window. Figure 3-5 and Figure 3-6 show the preview windows when the scale is 100% and 50% respectively.

Figure 3-5 100% preview window

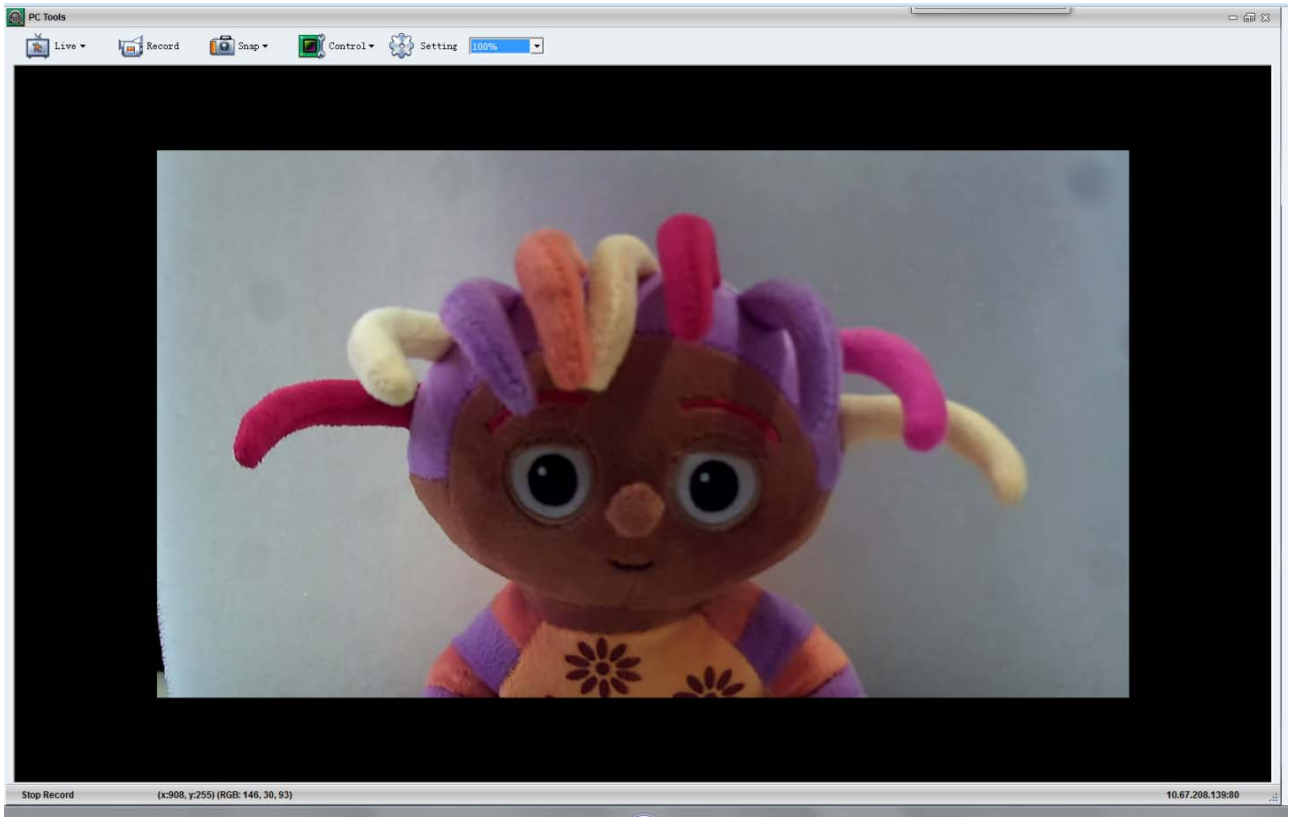
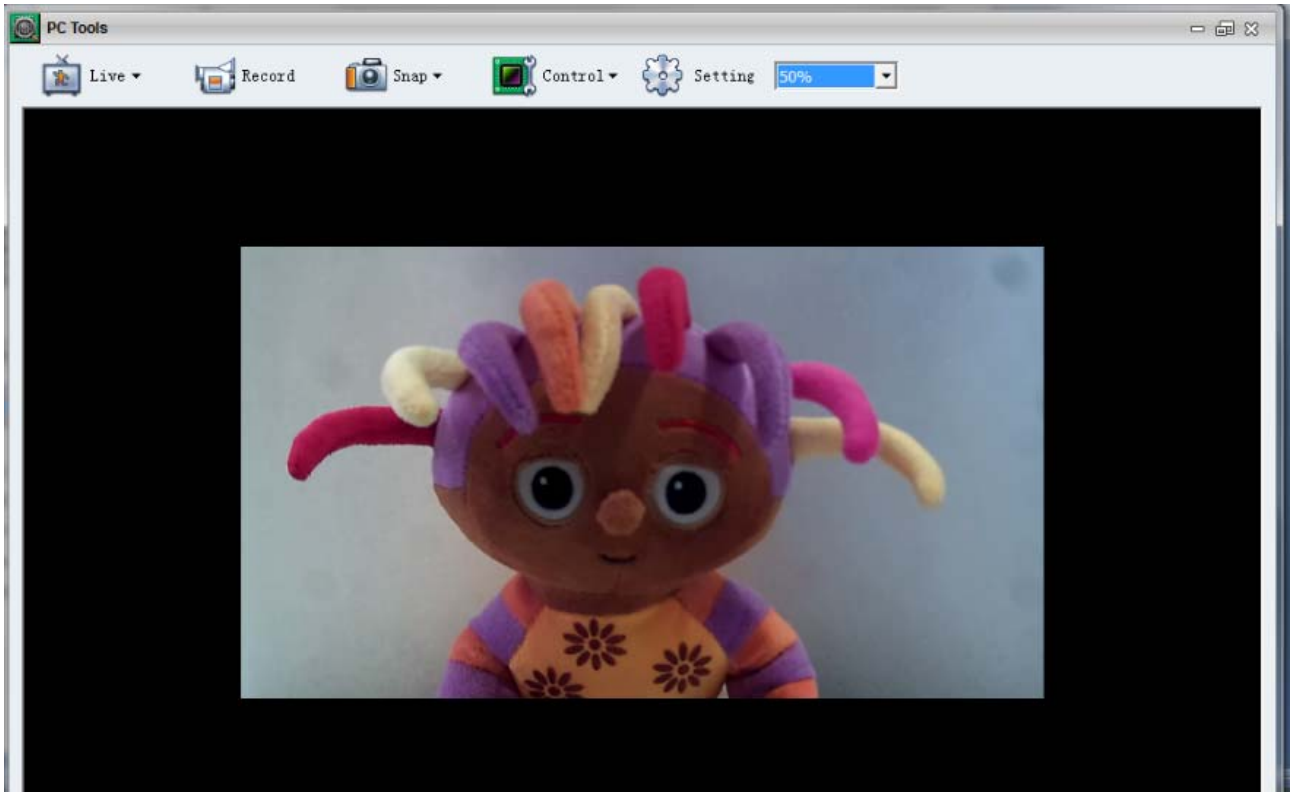


Figure 3-6 50% preview window



3.4 Record

Click the **Record** button (marked with 2 in Figure 3-3) to start or stop recording. If you click the **Record** button when a video is being played normally, recording starts and the button changes to 

. If you click 

, recording stops, and the button is restored to 

.

To set a save path for the recorded videos, click the **Setting** button (marked with 5 in Figure 3-3).

NOTE

Recording is not supported in YUV live preview mode.

3.5 Snapshot

Snapshots can be taken from videos in raw data, JEPG, or YUV format.

- Snapshots taken from the videos in raw data format

CAUTION

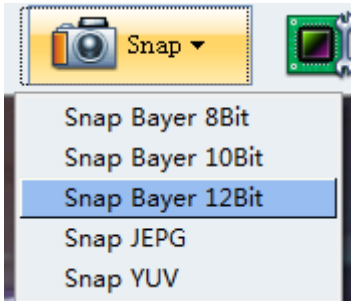
Snapshots can be taken from the videos in raw data format that are not processed by the ISP.

Click the **Snap** button (marked with 3 in Figure 3-3) to take snapshots in the background and send back data. The snapshots can be in 8-bit, 10-bit, or 12-bit raw data format, as shown in Figure 3-7.

NOTE

Select the raw data snapshot format based on the application scenario. For example, select the 12-bit format for parameter correction and select the 8-bit format for fault locating.

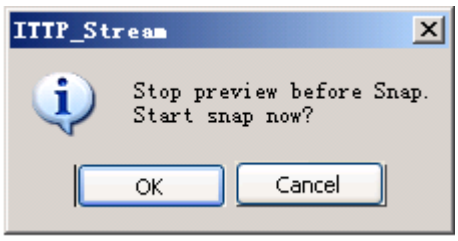
Figure 3-7 Snapshot menu (in raw data format)



CAUTION

Previewing is stopped when snapshots are taken from the videos in raw data format. When you click the Snap button, a dialog box shown in Figure 3-8 is displayed, asking you whether to stop previewing for taking a snapshot.

Figure 3-8 Whether to stop previewing for taking a snapshot



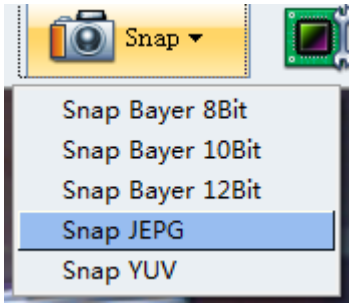
If you click **OK**, previewing stops, a snapshot is taken, and a dialog box is displayed, asking you to specify a save path and enter a file name. The snapshot information is displayed in the lower left corner marked with 8 in Figure 3-3).

When snapshots are being taken, the snapshot menus, **Preview** button, and **Basic Picture Control** menu are unavailable until snapshot taking is complete.

- Snapshots taken from videos in JEPG format

Click **Snap**, and choose **Snap JEPG** from the Snapshot menu to take snapshots in the background, and the on-demand screen is not affected.

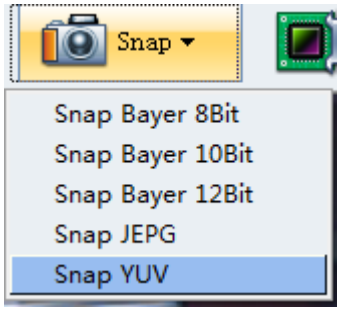
Figure 3-9 Snapshot menu (in JEPG format)



- Snapshots taken from the videos in YUV format

  Click **Snap**, and choose **Snap JEPG** from the Snapshot menu to take YUV snapshots in the background, and the on-demand screen is not affected. The YUV snapshots are processed by the ISP but are not encoded.

Figure 3-10 Snapshot menu (in YUV format)

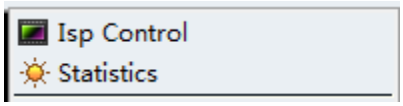


3.6 Picture Control

The **Control** menu 

(marked with 4 in Figure 3-3 includes the **ISP Control**, **Statistical**, and **Download/Upload Config File** submenus, as shown in Figure 3-11.

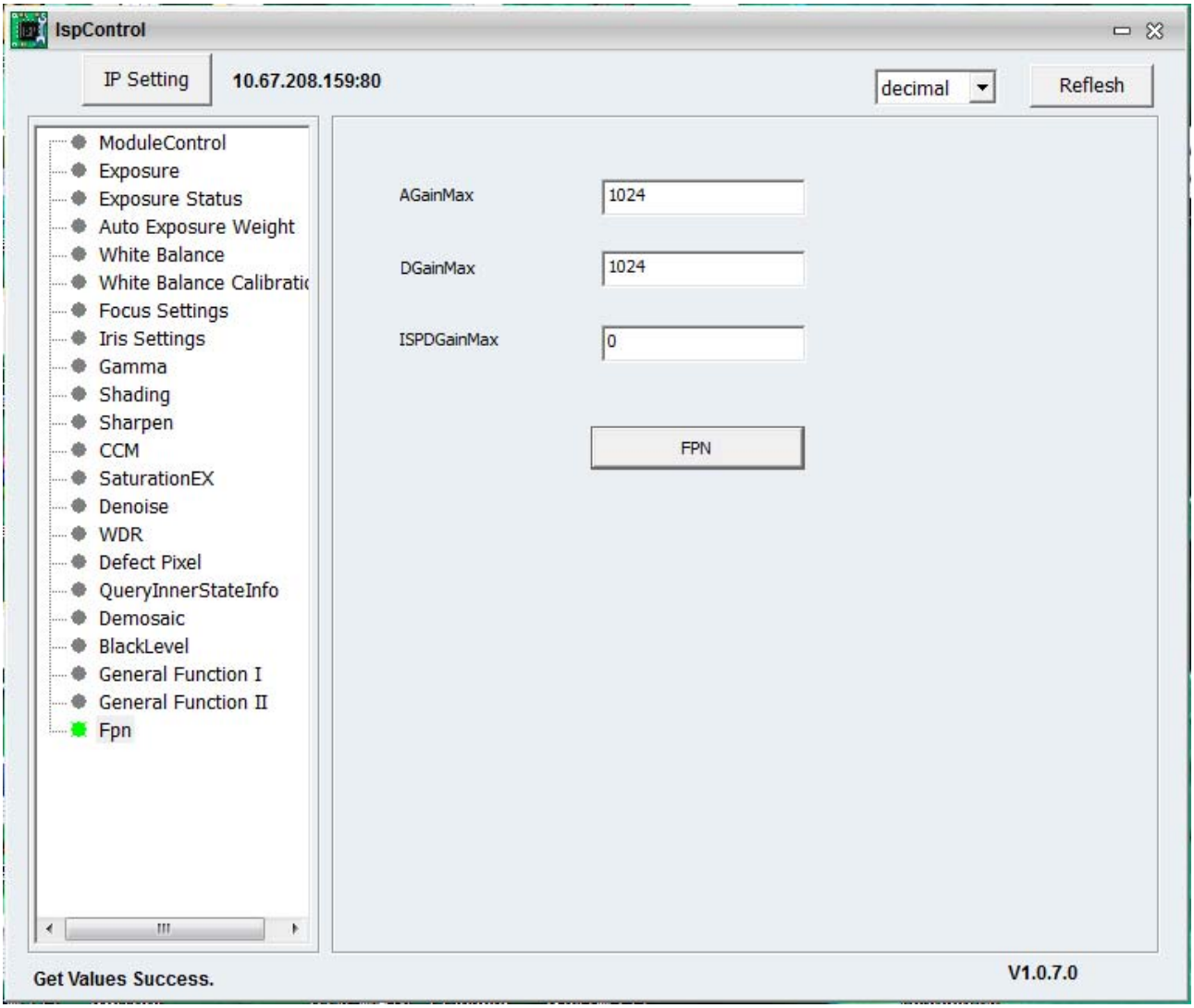
Figure 3-11 Control submenus



3.6.1 ISP Control

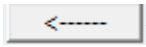
The ISP Control tool connects to the board over the User Datagram Protocol (UDP). You can adjust the values of picture quality parameters in the **IspControl** dialog box shown in Figure 3-12. The **IspControl** dialog box has multiple tab pages. When you move the pointer over a tab page name, the corresponding page is displayed. Each time a parameter is set, the status bar on the bottom shows whether the setting is successful.

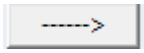
Figure 3-12 IspControl dialog box



The tab pages include **ModuleControl, Exposure, Exposure Status, Auto Exposure Weight, White Balance, Focus Settings, Iris Settings, Gamma, Shading, Sharpen, CCM, SaturationEx, Denoise, WDR, Defect Pixel, QueryInnerStateInfo, Demosaic, General Function I, General Function II.** The following describes their functions:

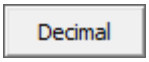
- ModuleControl: Allows you to control the module.
- Exposure: Allows you to set the automatic and manual exposure parameters and set the permission on exposure areas.

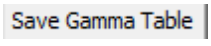
- Exposure Status: Allows you to set the parameters such as **AE Target Histogram** and **Average Lum**.
- Auto Exposure Weight: Allows you to obtain exposure attributes.
- White Balance: Allows you to set the white balance status parameters, red-green (RG) strength, and blue-green (BG).
- Focus Setting: Allows you to set the parameters such as **Auto/Manual Focus** and **Focus Status Info**.
- Iris Settings: Allows you to set iris control parameters.
- Gamma: Allows you to set the gamma curve (see Figure 3-13) and gamma table (see Figure 3-14).
  - There is no limitation on the number of curve points.
  - Right-clicking the mouse cancels the current point.
  - Pressing the arrow keys slightly adjusts the current point.
  - When a curve is dragged, the data is displayed in the right table in real time, and the board is configured based on the data.
  - CURVE_USER_DEFINE is a user-defined mode in which you can modify the curve, the other modes such as CURVE_1_6 are fixed modes.
  - 

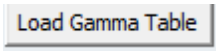
button: Clicking this button generates a curve on the left based on the 257 points in the gamma table.
  - 

button: Clicking this button to generate data in the gamma table on the right based on the left gamma curve.
  - 

button: After you modify the data in the gamma table, clicking this button configures the board based on the modified data.
  - 

button: Clicking this button displays the data in the gamma table in hexadecimal format.
  - 

button: Clicking this button displays the data in the gamma table in decimal format.
  - 

button: Clicking this button saves the data in the gamma table as a .txt file.
  - 

button: Clicking this button loads data from a .txt file to the gamma table.
- Shading: Allows you to set lens shading correction parameters.
- Sharpen: Allows you to set the sharpening parameters and edge enhancement parameters before encoding.
- CCM: Allows you to set lens shading correction parameters.
- SaturationEx: Allows you to set the color saturation parameters.
- Denoise: Allows you to set denoising parameters.
- WDR: Allows you to set WDR parameters.
- Defect Pixel: Allows you to set defect pixel correction parameters.
- QueryInnerStateInfo: Allows you to query ISP information.
- Demosaic: Allows you to implement the demosaic function.

- General Function I: Includes chrominance and luminance interference, anti-fog, and anti-false color.
- General Function II: Includes anti-flicker.
- FPN: Clicking this button sets the fixed pattern noise (FPN) mode. Set **AgainMax**, **DgainMax**, and **ISPDGainMax** to generate a YUV snapshot file. Set FPN parameters, as shown in Figure 3-12. Manually input the values of **AgainMax**, **DgainMax**, and **ISPDGainMax** and click **Next**, as shown in Figure 3-15.

CAUTION

FPN processing takes about 90s.

Figure 3-13 Setting the gamma curve

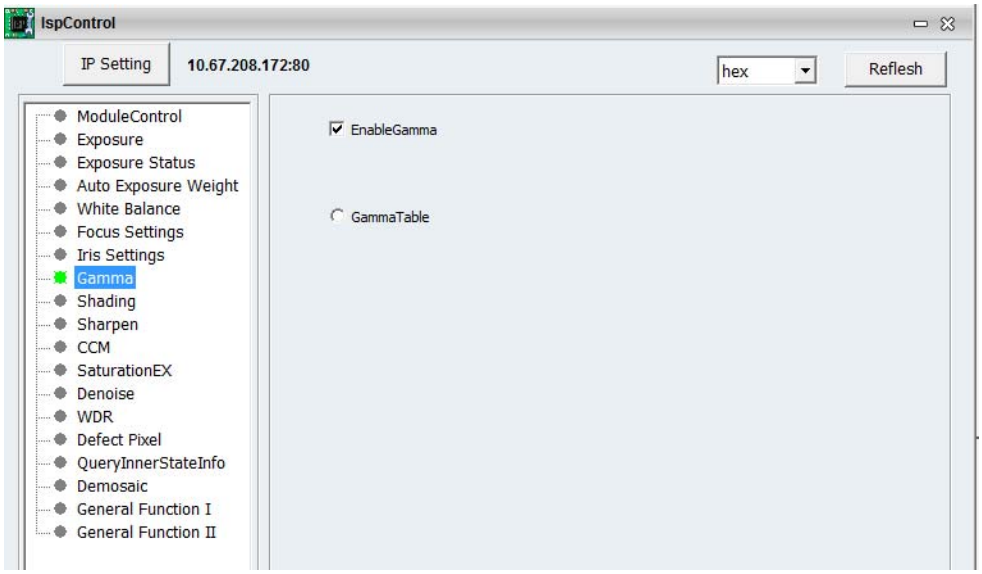
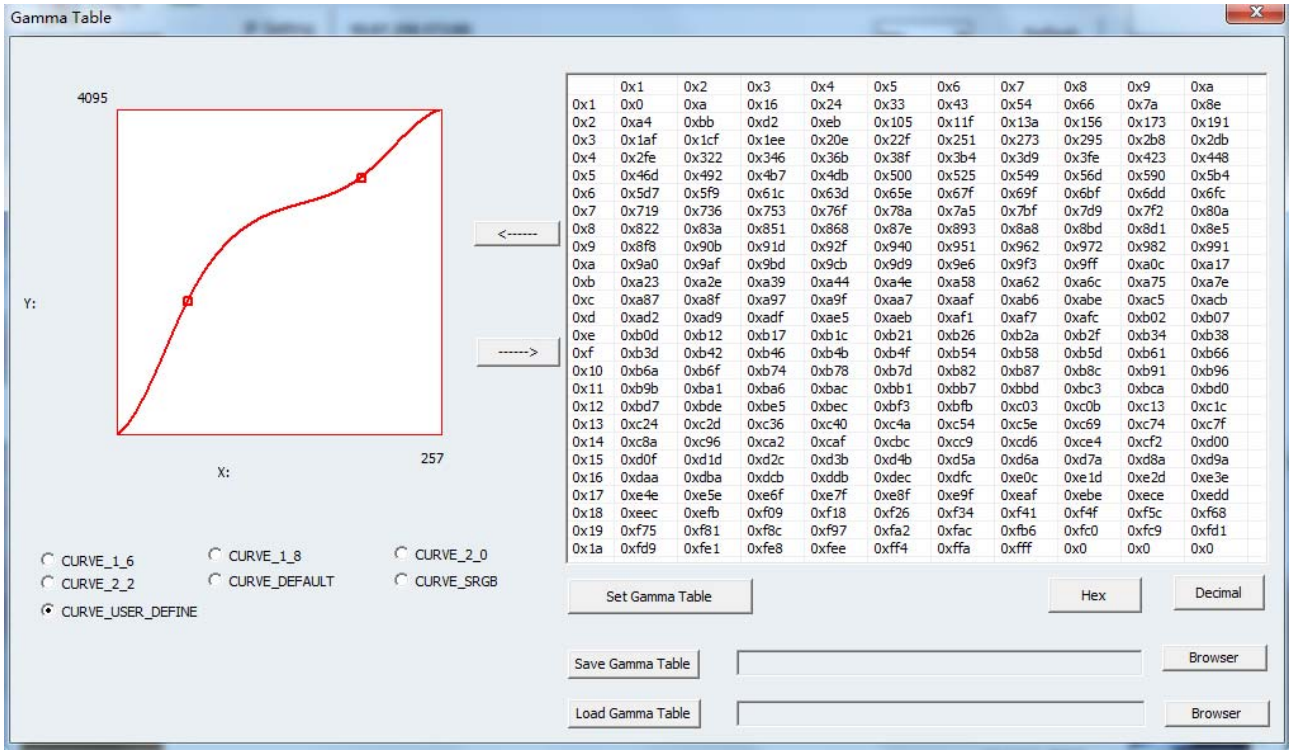
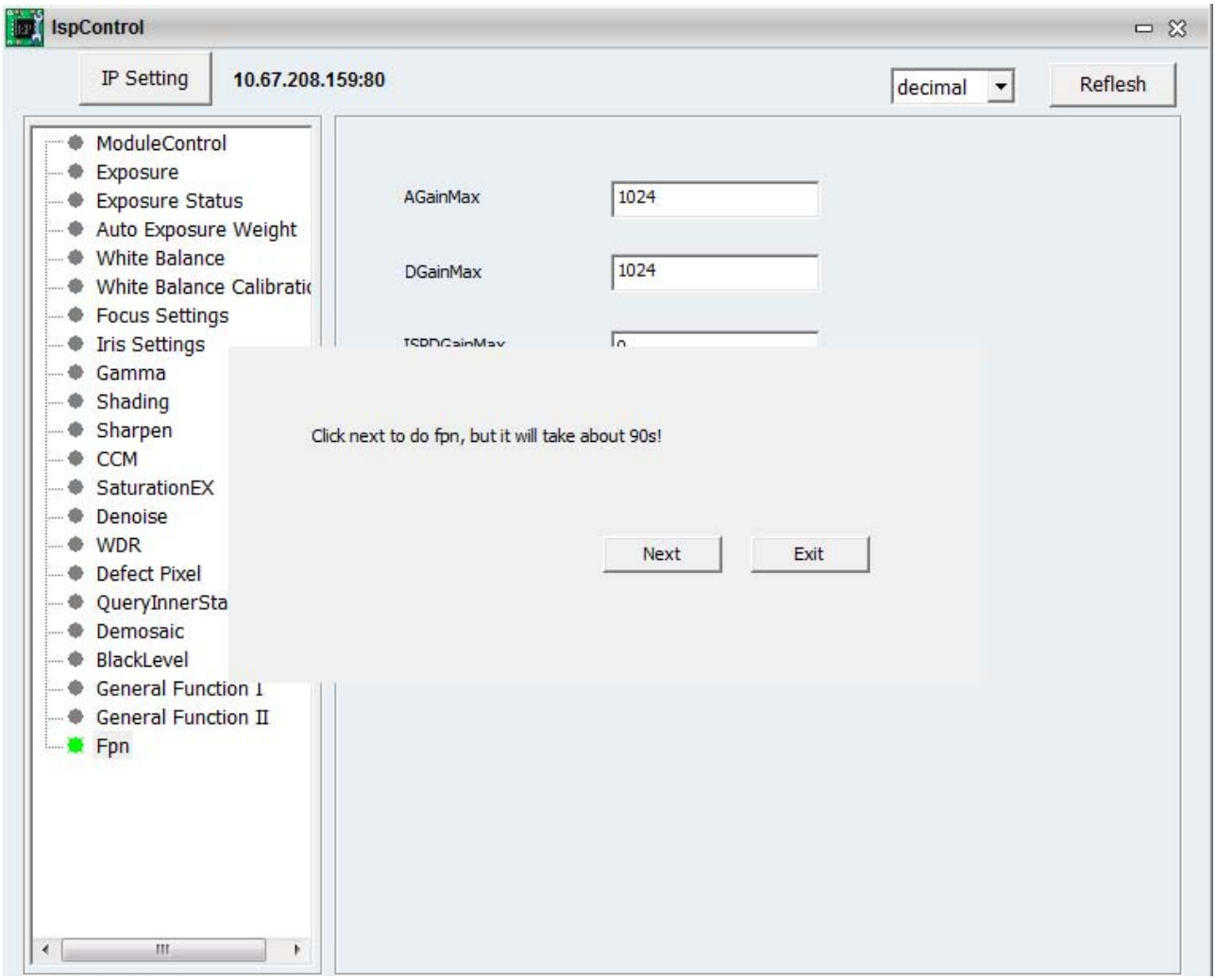


Figure 3-14 Gamma table



	0x1	0x2	0x3	0x4	0x5	0x6	0x7	0x8	0x9	0xa
0x1	0x0	0xa	0x16	0x24	0x33	0x43	0x54	0x66	0x7a	0x8e
0x2	0xa4	0xbb	0xd2	0xeb	0x105	0x11f	0x13a	0x156	0x173	0x191
0x3	0x1af	0x1cf	0x1ee	0x20e	0x22f	0x251	0x273	0x295	0x2b8	0x2db
0x4	0x2fe	0x322	0x346	0x36b	0x38f	0x3b4	0x3d9	0x3fe	0x423	0x448
0x5	0x46d	0x492	0x4b7	0x4db	0x500	0x525	0x549	0x56d	0x590	0x5b4
0x6	0x5d7	0x5f9	0x61c	0x63d	0x65e	0x67f	0x69f	0x6bf	0x6dd	0x6fc
0x7	0x719	0x736	0x753	0x76f	0x78a	0x7a5	0x7bf	0x7d9	0x7f2	0x80a
0x8	0x822	0x83a	0x851	0x868	0x87e	0x893	0x8a8	0x8bd	0x8d1	0x8e5
0x9	0x8f8	0x90b	0x91d	0x92f	0x940	0x951	0x962	0x972	0x982	0x991
0xa	0x9a0	0x9af	0x9bd	0x9cb	0x9d9	0x9e6	0x9f3	0x9ff	0xa0c	0xa17
0xb	0xa23	0xa2e	0xa39	0xa44	0xa4e	0xa58	0xa62	0xa6c	0xa75	0xa7e
0xc	0xa87	0xa8f	0xa97	0xa9f	0xaa7	0xaaf	0xab6	0xabe	0xac5	0xacb
0xd	0xad2	0xad9	0xadf	0xae5	0xaeb	0xaf1	0xaf7	0xafc	0xb02	0xb07
0xe	0xb0d	0xb12	0xb17	0xb1c	0xb21	0xb26	0xb2a	0xb2f	0xb34	0xb38
0xf	0xb3d	0xb42	0xb46	0xb4b	0xb4f	0xb54	0xb58	0xb5d	0xb61	0xb66
0x10	0xb6a	0xb6f	0xb74	0xb78	0xb7d	0xb82	0xb87	0xb8c	0xb91	0xb96
0x11	0xb9b	0xba1	0xba6	0xbac	0xbb1	0xbb7	0xbbd	0xbc3	0xbca	0xbd0
0x12	0xbd7	0xbde	0xbe5	0xbec	0xbf3	0xbfb	0xc03	0xc0b	0xc13	0xc1c
0x13	0xc24	0xc2d	0xc36	0xc40	0xc4a	0xc54	0xc5e	0xc69	0xc74	0xc7f
0x14	0xc8a	0xc96	0xca2	0xcaf	0xcbc	0xcc9	0xcd6	0xce4	0xcf2	0xd00
0x15	0xd0f	0xd1d	0xd2c	0xd3b	0xd4b	0xd5a	0xd6a	0xd7a	0xd8a	0xd9a
0x16	0xdaa	0xdba	0xdcb	0xddb	0xdec	0xdfc	0xe0c	0xe1d	0xe2d	0xe3e
0x17	0xe4e	0xe5e	0xe6f	0xe7f	0xe8f	0xe9f	0xeaf	0xebe	0xece	0xedd
0x18	0xeec	0xefb	0xf09	0xf18	0xf26	0xf34	0xf41	0xf4f	0xf5c	0xf68
0x19	0xf75	0xf81	0xf8c	0xf97	0xfa2	0xfac	0xfb6	0xfc0	0xfc9	0xfd1
0x1a	0xfd9	0xfe1	0xfe8	0xfee	0xff4	0xffa	0xffff	0x0	0x0	0x0

Figure 3-15 FPN

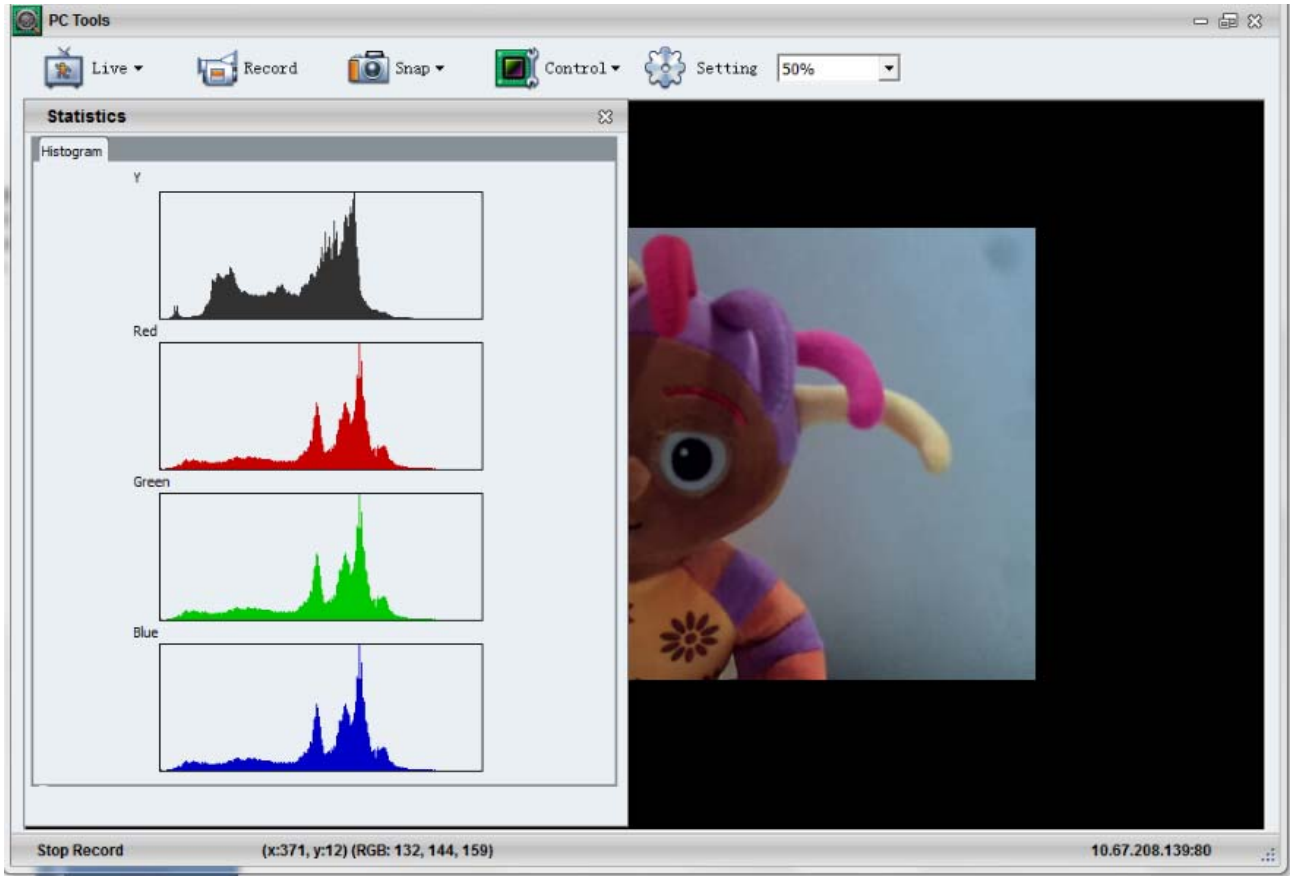


3.6.2 Statistics

When you choose **Statistics**, a statistics window is displayed. Figure 3-15 shows the statistics on the decoded Y, R, G, and B components in histograms.

When you move the pointer over the video, the current RGB information is displayed in the status bar at the bottom of the main window. The information helps you to adjust the picture quality.

Figure 3-16 Histogram tab page



3.7 Setting

Click the **Setting** button 

(marked with 5 in Figure 3-3) to change the IP address the board that transfers the video or change the save path for recorded videos. Note that the port number of the board cannot be changed.

After the IP address changes, video previewing stops, and the new IP address is verified. If the network is normal, click **OK** to close the **Setting** dialog box, and choose a preview mode to connect the PC to the board again.

The current connection status is displayed in the area marked with 8 in Figure 3-3, and the IP address is displayed in the area marked with 9 in Figure 3-3. If the new IP address is invalid, a message is display in the lower left corner, as shown in Figure 3-16.

Figure 3-17 Setting dialog box