



H.264/AVC Analyzer for
Professionals and researchers.

H264Visa

H.264/AVC analysis software

User Manual

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H264Visa Customer Support

If you have any questions concerning this software, please write an email to:

support@h264visa.com



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1. Introduction

H264Visa is a powerful real-time analytical tool for H.264/AVC for Consumer, Mobile, PC and internet streaming Products. It can analyze baseline/main/extended profile H.264/AVC streams based on ITU-T Rec. H.264 (03/2005).

H264Visa provides users with a unique visual representation of the encoded video features and stream structure analysis.

Here is the list for main features:

Main Features

- Profiles & Levels:
 - + Baseline/Main/Extended/High profiles on all levels for standard version.
 - + Baseline/Main/Extended/High profiles on all levels, Frame-only, for Mobile version.
 - + Baseline profile on all levels for Baseline version.
- File formats:
 - + H.264 Byte Stream format(Annex B)
 - + H.264 in RTP format
 - + flash flv/f4v file formats
 - + MKV(Matroska Video) file formats
 - + MP4/3GP/M4V file formats.
 - + mpeg2 ts file format, including mpeg2 ts for ISDB-T 1seg
- Full Playback Mode, including :
 - + Display Order Playback: Play/Pause/FF/FR/StepForward/StepBackward.
 - + Decoding Order Playback: Play/Pause/FF/StepForward.
- Fully Support for Data Partitions.
- I/P/B MB insight analysis, including:
 - + mb type
 - + intra/inter prediction info
 - + ref list
 - + LP filter strength info
 - + I/P/B MB mode overlay display
 - + **MB Search**, can locate and count the number of MB type by MB type/group, mb bits etc.
- MB pixel info and **picture display in all decoding stages**, including:
 - + Finally decoded pixels and picture display
 - + Pixels before Deblocking Filter and display
 - + Predicted Pixels and display
 - + Pixels info from residual data and display
 - + IDCT coefficients
 - + Pixels in Reference YUV and display



- + The pixel difference between Reference YUV and finally decoded picture, and display
- **Detailed statistics info**
 - + Bit numbers for the picture & encoding rate
 - + Average MB bits & Average QP
 - + MB bit histogram per mb type
 - + Encoding tools detection
- Overlay display on
 - + Bit numbers for each MB
 - + QP/QPC for each MB
 - + Block Structures
 - + Motion Vectors
- Header Info, including:
 - + SPS tree
 - + PPS tree
 - + SEI tree
 - + Slice Header tree
- File Structure Analysis, including:
 - + MPEG2 TS packet tree
 - + MPEG2 PES packet tree
 - + MP4/3GP Box tree
 - + FLV tag tree
 - + MKV(Matroska) element tree
- Dump decoded YUV output/Pixel/MB/NAL/SPS/PPS/SEI/Slice Header info into file.
- **ISDB-T 1Seg spec check on H.264/AVC Video.**



2. Intended Applications

Users of **H264Visa** include:

- **semiconductor device designers and manufacturers**
- **video over internet**
- **video conferencing & communications**
- **corporate and training video**
- **mobile video**
- **video applications software**
- **education**



3. Software/Hardware and User Pre-requirements

H264Visa has the following minimum hardware and software requirements:

- SSE-enhanced CPU (Intel® Pentium III or above, Celeron, AMD® Athlon, Opteron etc.)
- DirectX 7.0 (or higher) compatible VGA card with 32-bit display at 1024 x768 resolution or higher
- Windows® 2000/XP/Vista
- 1G RAM or higher



4. Installation and Licensing

All the installing, copying, updating **H264Visa** must follow and agree to the terms of **H264Visa** End-User License Agreement("EULA").

For purchasing and registration, please access

<http://wwwh264visa.com/buy.html>

After downloading H264Visa Setup Package, please follow the installation instruction to install it.

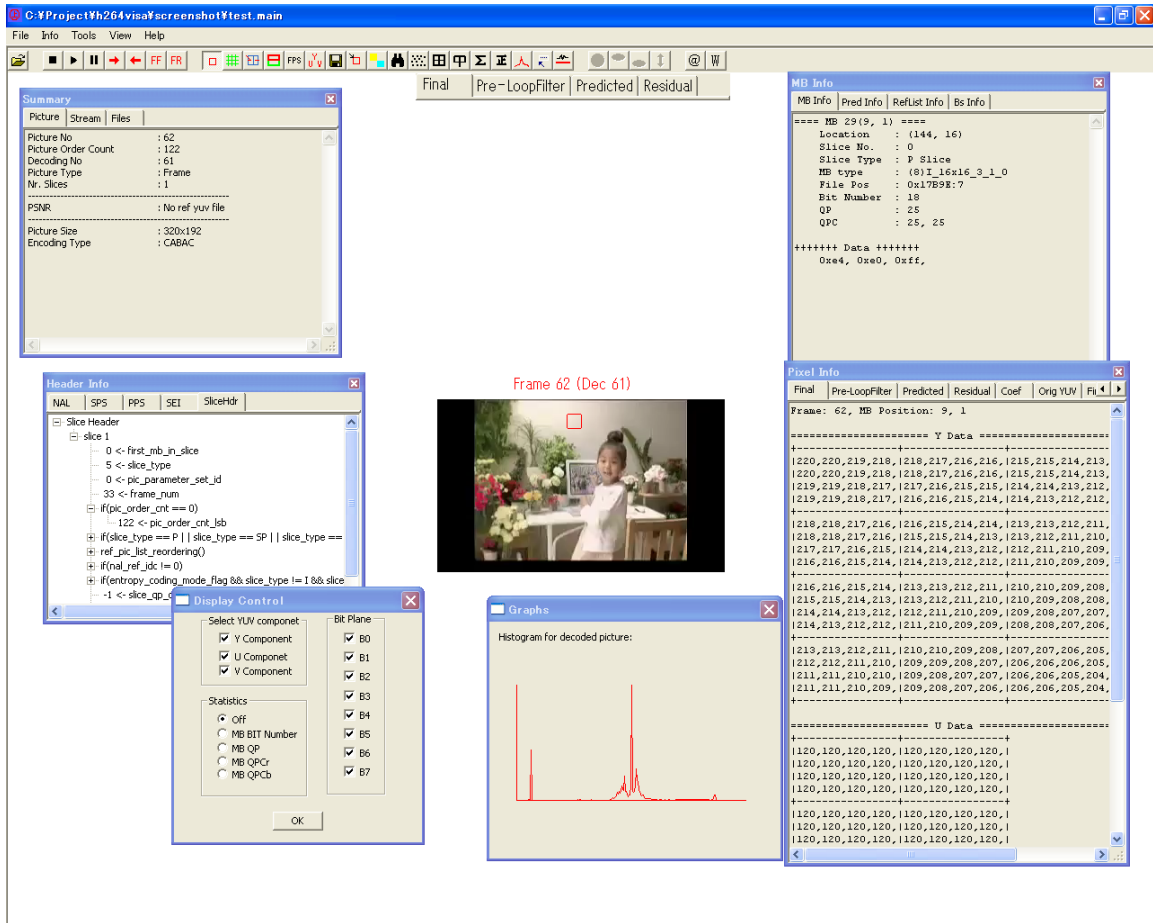
The registration is done only after **H264Visa** is installed, with the following steps:

1. Run **H264Visa**,
2. Input the registration key in the "Register H264Visa" dialog.
3. Push "OK" button

Or you can register it later at H264Visa->[Help Menu]->Register

5. Use of H264Visa

5.1 Window Elements



The screenshot displays the H.264/AVC Analyzer software interface with several windows open:

- Summary:** Shows metadata for the current picture, including Picture No. (62), Picture Order Count (122), Decoding No. (61), Picture Type (Frame), and Nr. Slices (1). It also indicates PSNR (No ref yuv file) and Picture Size (320x192).
- Header Info:** Displays the Slice Header information, including NAL, SPS, PPS, SEI, and SliceHdr details.
- Display Control:** Allows users to select YUV components (Y, U, V) and bit planes (B0-B7) for analysis.
- Pixel Info:** Shows the current frame (62, Dec 61) and provides a detailed view of the Y and U data for a specific pixel location (9, 1).
- Graphs:** Displays a histogram for the decoded picture, showing the distribution of pixel values.

5.2 Open a file

H264Visa supports files with three stream types: H.264/AVC Annex B raw data, Mpeg2 TS data, and mp4/3gp data. For the last two stream types, **H264Visa** will retrieve the H.264/AVC data and save to H.264/AVC Annex B raw data file first and then open the saved data for further analysis.

New files can be opened from the file menu, the open icon in the tool bar, or dragging directly into **H264Visa**.

5.3 Playback Modes

H264Visa supports STOP, PLAY, STEP Forward, STEP Backward, FF and FR playback modes. Here is the explanation on those play modes:



with the following meaning(from left to right): **Stop, Play, Pause, Step Forward, Step Backward, Fast Forward, Fast Rewind**



5.4 Stream Info

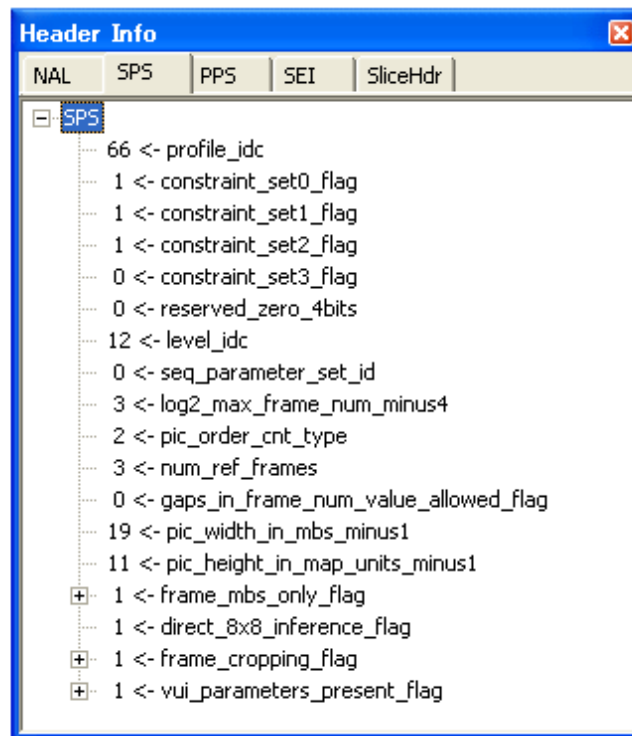
H264Visa exports the four info types: **stream Header Info, MB Info, MB Pixel Info** and **Stream Summary Info**. All of them will be explained the each sections.

5.4.1 Header Info

H264Visa will display each NAL, SPS, PPS and Slice Header in their own info tree, besides that it also exports Picture Timing SEI and Buffering Period SEI and Pan Scan SEI.

The format of each item in the info tree is: Value <- parameter name

Here is an example of SPS tree:



5.4.2 MB Info

H264Visa organizes MB in four categories:

- **General Info**, for MB type, location, bit number, stream data, etc.
- **Pred Info**, for detailed Inter/Intra prediction information.
- **Reflist Info**, for detailed reference list of the current slice.



- **BS Info(if there is)**, for the Boundary Strength list of current MB .

Here is a screen shot of Pred Info:

```
MB Info
----- MB 26(6, 1) -----
Location      : (96, 16),
Slice No.     : 0
Slice Type    : I Slice
MB Type       : (0)I_4x4
NumMbPart    : 1
MbPartSize   : (16, 16)

++++ Intra Mode Info +++++
Y is Intra4x4PredMode
(7)VertLeft   (7)VertLeft   (7)VertLeft   (5)VertRight
(0)Vertical   (2)DC                 (2)DC          (3)DiagDownLeft
(4)DiagDownRight (2)DC                 (3)DiagDownLeft (2)DC
(7)VertLeft   (0)Vertical   (2)DC          (0)Vertical

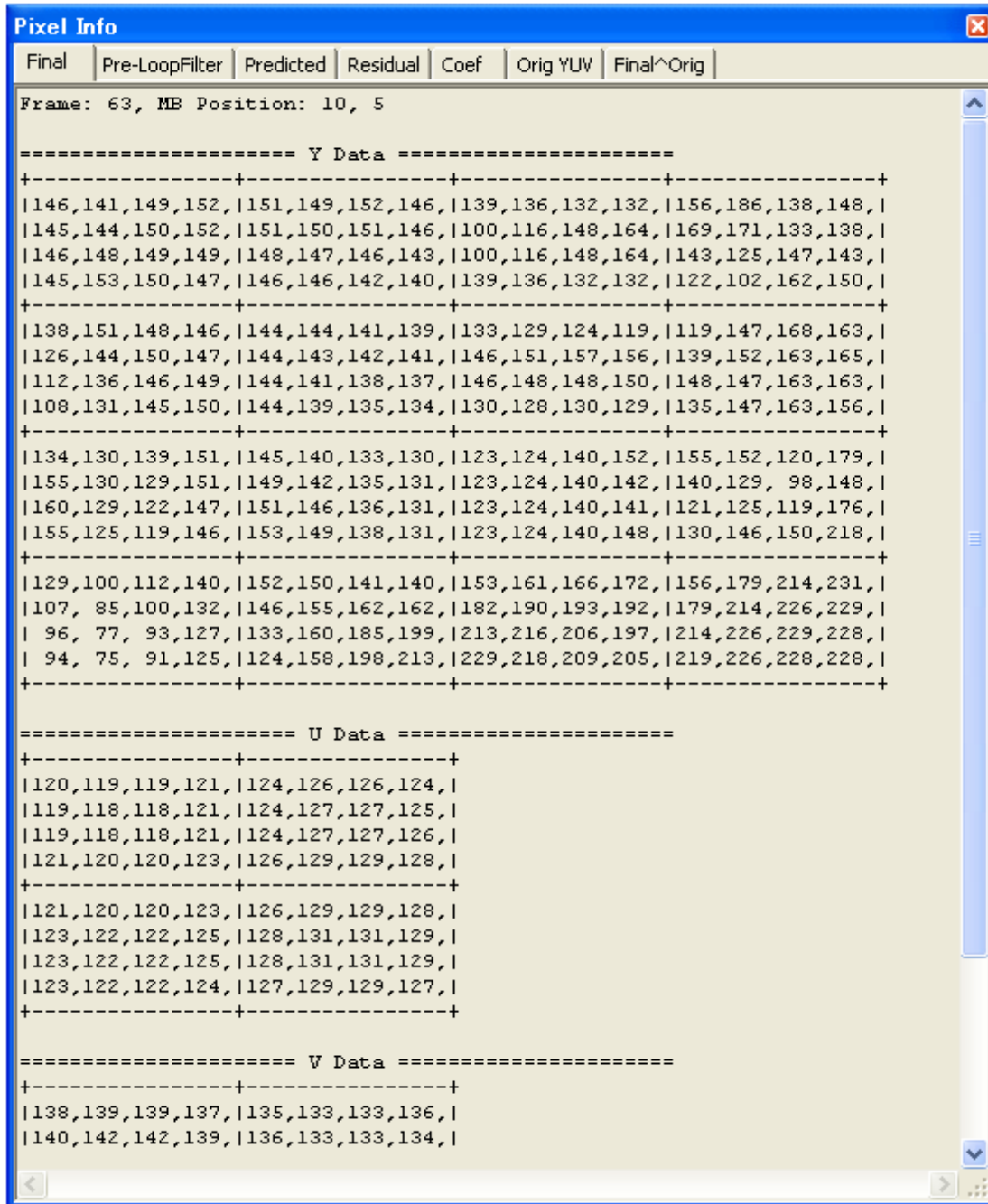
U/V are (0)8x8 Chroma DC
```

5.4.3 Pixel Info

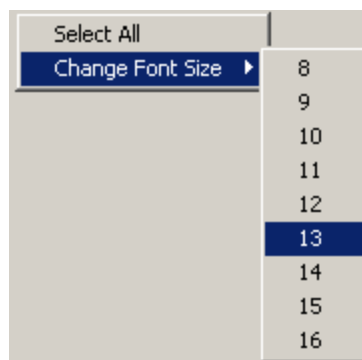
H264Visa provides very detailed pixel info for each Macroblock. Seven categories are currently supported:

- **Final Decoded Pixel info,**
- **Pixel info before Deblocking Filter,**
- **Predicted Pixel info,**
- **Residual Pixel info,**
- **DCT Coefficient info,**
- **Original Reference YUV Pixel info,**
- **Difference between Finally Decoded Pixel and the Original Reference YUV Pixel info.**

Here is a picture of Predicted Pixel info:



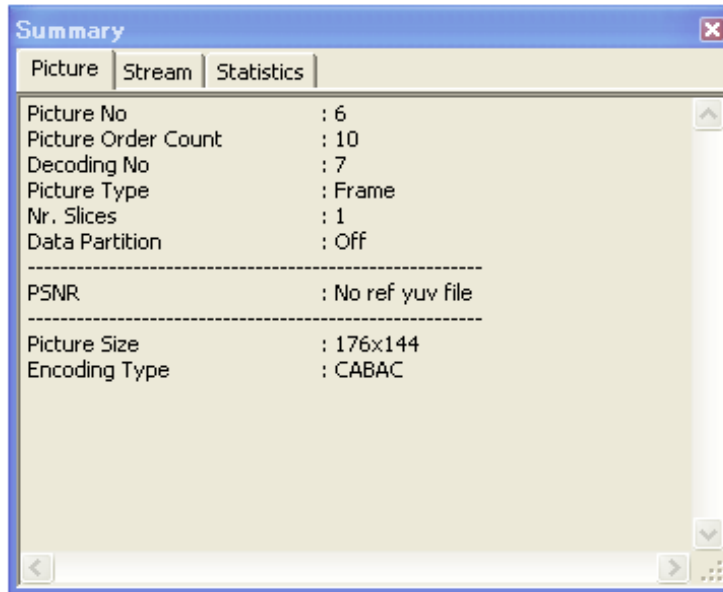
Note: For viewing convenience, **H264Visa** provides font size changing for pixel info dialog too, here is the screenshot for font size changing from popup menu(right click):



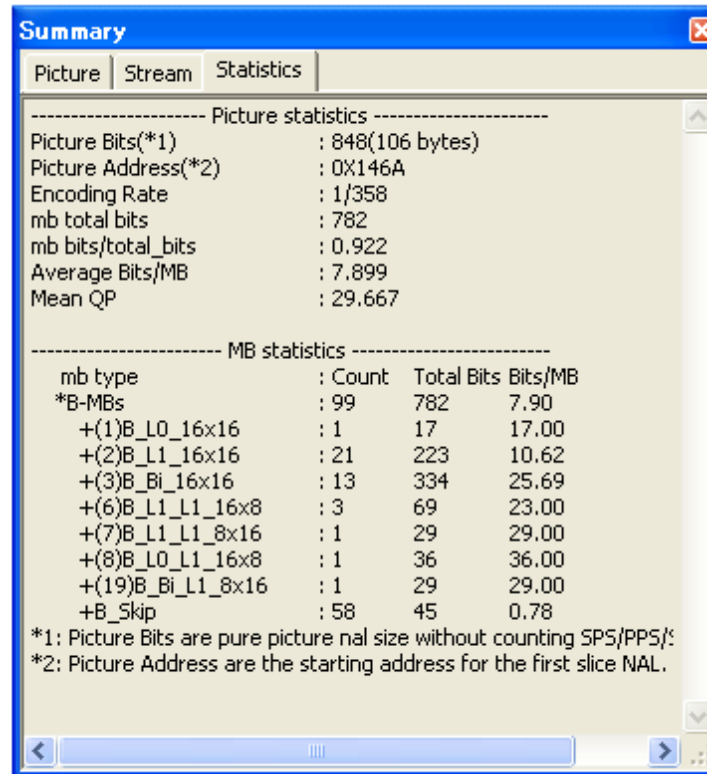


5.4.4 Stream Summary Info

H264Visa exports some stream parameters as well as some statistics info based on them into Summary Dialog for convenience. Here is a picture of Picture Summary:



Here is a picture of Statistics Summary for Standard and Mobile Solution ver:



5.5 Display on difference decoding stages

H264Visa provides the unique feature of displaying those intermediate picture reconstructed in different decoding stages. Now 4 stages are supported:

- **Finally Decoded Picture,**
- **Picture before Deblocking Filter,**
- **Predicted Picture, and**
- **Residual Picture(with visual enhancement).**

Besides that, **H264Visa** also provides the display on

- **Original Reference YUV Picture**
- **Difference between Finally Decoded Picture and Reference YUV Picture.**

If the user provide the reference YUV Picture.

Here are some screen shots of this feature on the same decoded frame:

- **Final Decoded Picture**



Frame 62



- **Picture before Deblocking Filter**

Frame 62



- **Predicted Picture**

Frame 62



- **Residual Picture**



Frame 62

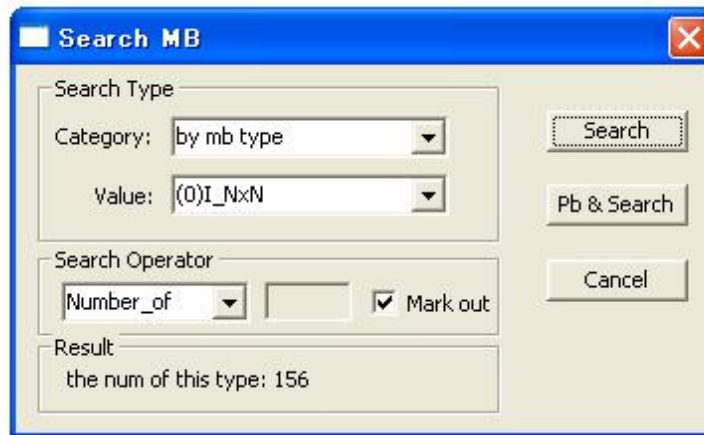


5.6 MB Search

H264Visa supports search on MB level with the following criteria:

- **MB types**, like I_NxN, P_Skip etc.
- **statistic values**, with mb bits, QP value.
- **and MB group**, with I MBs, P MBs, etc.

Here is a screen shot(search on I_NxN with markout):



5.7 Screen Overlays

H264Visa supports Screen Overlays on MB Bits, Motion Vectors, MB structures, MB Types.

Here is the screen shot for Motion Vectors:

frame 66



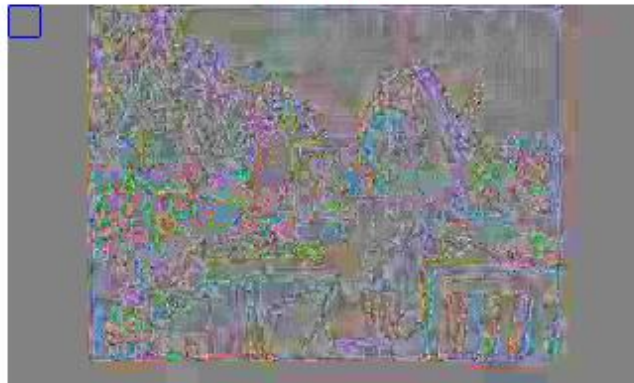
Here is the screen shot for Slice Group Type 2(foreground/leftover slice group):



5.8 Comparison with reference YUV files

H264Visa supports the comparison between the original Reference YUV picture and finally decoded YUV picture, as well as the related PNSR calculation. Here is the screen shot for the difference between encoded picture and the original YUV picture:

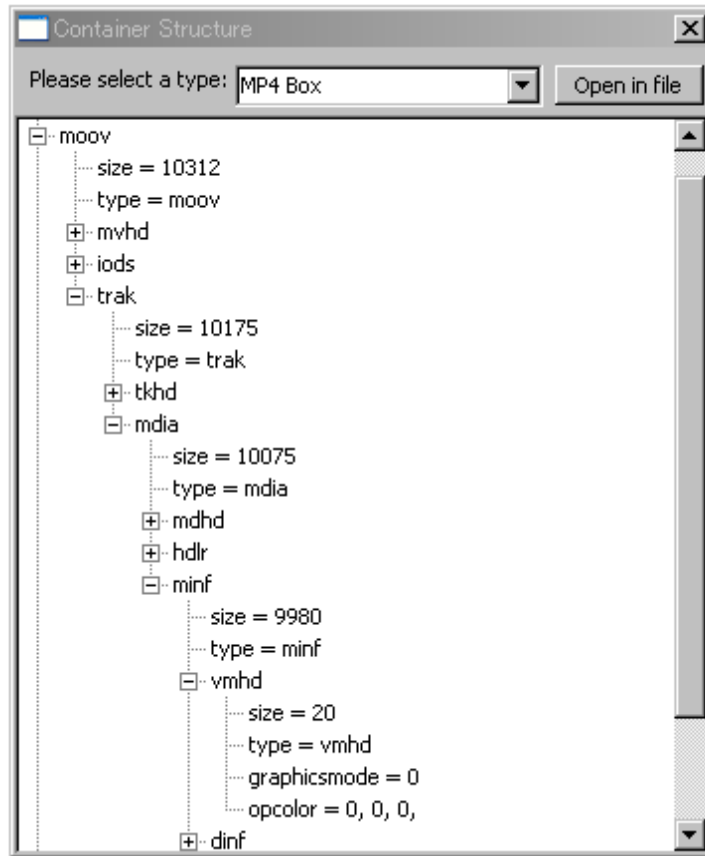
Frame 62



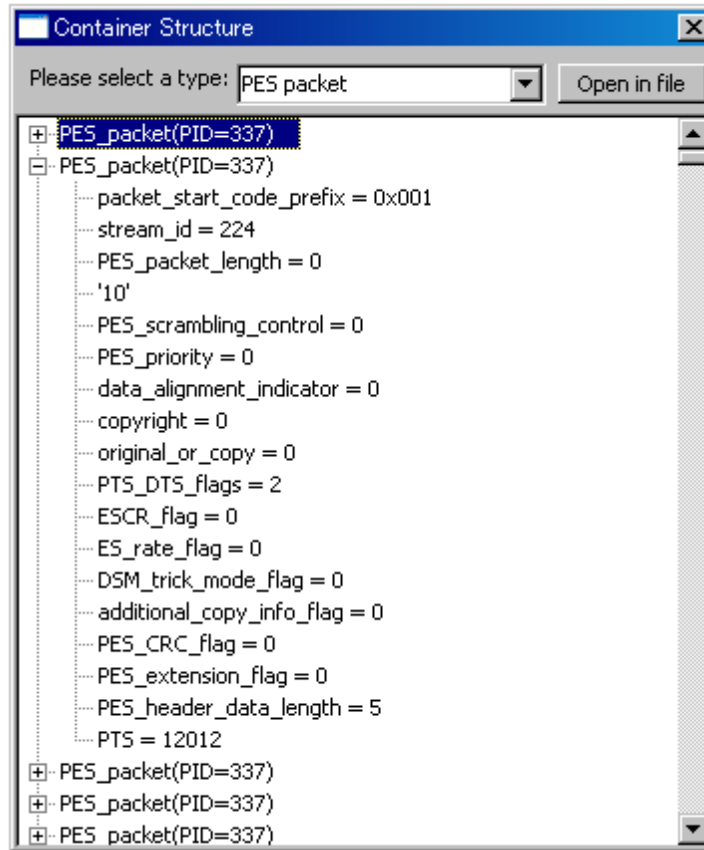
5.9 Container File Structures

H264Visa provides detailed Container File Structures for mpeg2 ts file, mp3/3gp file and flv/f4v file.

Here is the screen shot for a mp4 file structure:

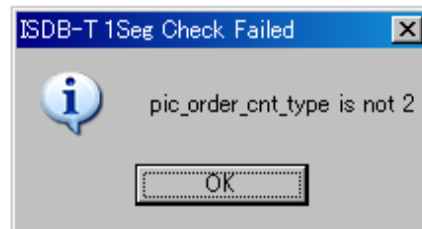


Here is the screen shot for mpeg2 TS PES structure:



5.10 ISDB-T 1Seg Spec Check

H264Visa supports spec check for ISDB-T 1Seg DTV video. Here is the check result screen shot for a non-ISDB-T 1Seg h.264/AVC video.



5.11 Field Display(Standard Version only)

H264Visa Standard Version supports field display. Here are the buttons associated with this feature:



Meaning of those buttons are(from left to right): Frame display, Top Field, Bottom Field, Vertical Scale for Field Displas.

Those buttons are valid for streams with field picture inside.

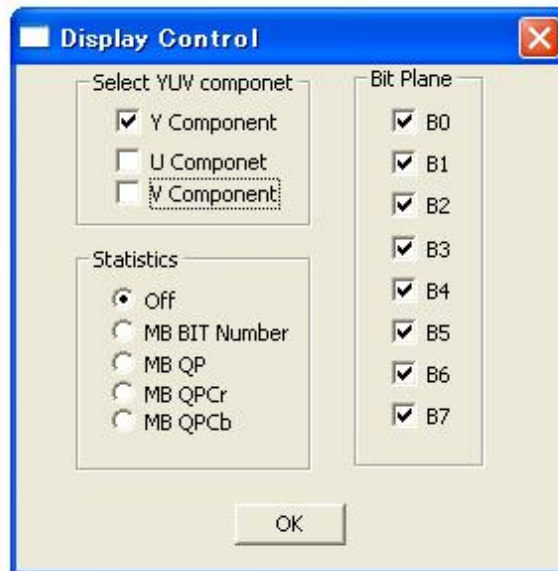


5.12 Other Features

5.12.1 Picture Component Analyzer

H264Visa can analyze pixels on YUV component, or on bit plane base. Here is an screen shot on Y-only analysis.

Frame 62

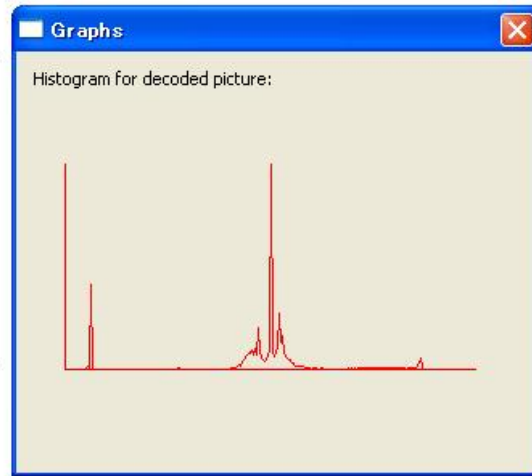


5.12.2 Histogram Graph

H264Visa supports histogram on frame basis for video quality enhancement. Here is a screen shot.



Frame 62



5.12.3 Main Popup Menu

The following is the Popup Menu for **H264Visa** main window:

