VideoQ Viewer

Media Files Player / Viewer / Analyzer / Converter

Training Presentation

May 2018

www.videoq.com

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Video images – courtesy of artbeats.com, newsbyte.co.uk, BBC, Katering Productions

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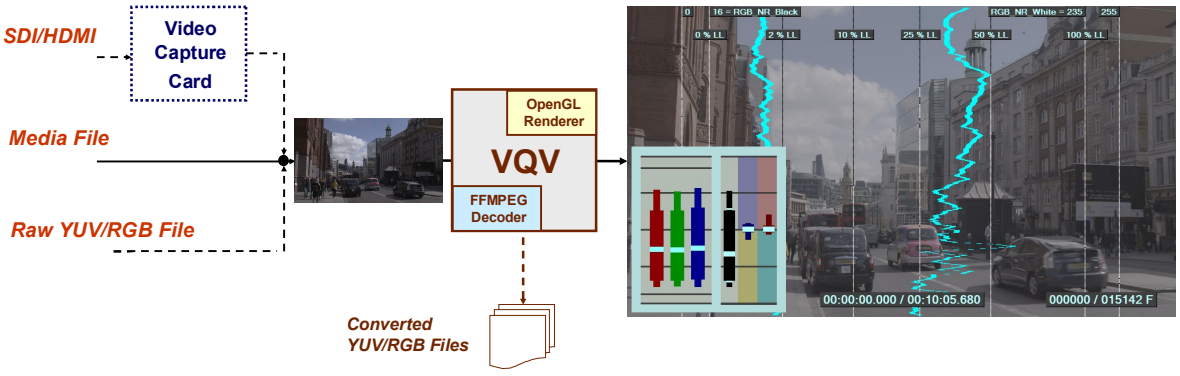
General

- VQV is an easy-to-use software tool, instantly revealing your video camera, codec, scaler, converter or other video HW and/or SW device/workflow performance
- Unique video data analysis and fidelity verification tool for the file-based environment
- The ideal tool for production and post-production facilities, CDN and IPTV systems, development labs, software developers and high volume manufacturers
- An essential QA/QC tool for broadcast, prosumer and consumer video systems with LAN/WAN connectivity
- VQV displays images and parameters of all compressed video files in a variety of formats, including MOV, MXF, MP4, AVI, TS, M2TS, etc.
- In addition, VQV reads, plays, converts and outputs uncompressed video material data in YUV/RGB/BMP formats, *bit by bit, pixel by pixel, frame by frame*

The Top Level Workflow Diagram

A rendered image with the unique VQV readout and VQV filters/meters overlays



UHD HDR10 sample video – courtesy of newsbyte.co.uk

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VQV Features 1

- An offline (non-real-time) video player with sophisticated viewer/analyzer/converter functionality
- Covers a wide range of frame sizes, input and output formats, up to **DC** and **UHD**, including variety of **HDR** formats (**PQ**, **HLG**, and **LOG**, several user-selectable **rendering modes**)
- VQV displays frame by frame:
  - XY positions, YUV & RGB Levels and expected (as by selected model) Light Levels of every pixel, line, frame or segment
  - GOP structure, frame type, bitrate statistics for the selected frame or selected timeline segment
  - Light Levels (LL) values in **perceived nits** (= *cd/m² only on shades of Gray*) or **%** of selected **T**arget **D**evice **M**ax **B**rightness
- Uses fast intuitive controls for timeline position, zoom, signal gain, filter mask size and position
- Contains built-in high-gain spatial and temporal high-pass filters r*evealing even hardly visible artefacts*
- The user can choose:
  RGB, Y, UV, R, G, B or LL view channels, color matrices, level schemes and SDR/HDR Rendering Modes
- A right-click submenu allows fast creation of snapshots or thumbnail .BMP images
- VQV also contains a powerful “Export as" file and data format converter
- Provides for quick frames/profiles comparison and benchmarking by running multiple VQV instances

VQV Features 2 (continued)

- For R&D and product verification work, VQV can be launched in a **Windows GUI Mode**
- For semi-automatic QA/QC operation VQV provides multiple GUI instances via **Command Line Mode**
- VQV opens and decodes any wrapped/compressed video file (*all formats supported by ffmpeg*)
- VQV opens static image file in a variety of formats – JPG, PNG, TIF, etc.
- VQV opens single YUV/BMP file, folder with numbered frame files, or large multi-frame YUV/Y4M files
- Video data export processing provide for:
  - Frame cadence change: N:1 decimation, 3:2 repeat, 1:N frame repeat, and/or A-B fragment repeat
  - Color space and pixel format conversion: **SDR ⇔ HDR**, **YUV ⇔ BMP/RGB**, **YUV ⇔ Y4M**, **UYVY ⇔ Planar YUV**
- Resolutions supported:
  from **192x108** to **4096x3112**, **8**, **10, 12** or **16** bits per component
- Repeat full duration (loop) or selected fragment (**A-B loop**) playout
- Shuttle/Jog playout modes, variable forward and backward playout speed (non-real-time):
  from **–x512** to **+x512,** *actual frames-per-second speed depends on CPU/GPU power and video frame size*

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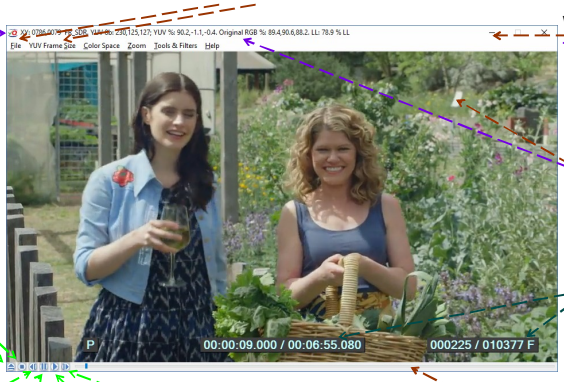
VQV Features 3 (continued)

- **SDR/HDR** (Standard Dynamic Range/High Dynamic Range) Modes supported:
  - **SDR** – Conventional YUV/RGB data format, selectable rendering modes
  - **HDR-PQ** (Perceptual Quantizer), selectable rendering modes, including RAW video data image
  - **HDR-HLG** (Hybrid Log Gamma), selectable rendering modes, including RAW video data image
  - **HDR LOG** (Camera LOG and DPX LOG), selectable rendering modes, including RAW video data image
- Auto and manual selection of YUV ⇔ RGB and XYZ ⇒ RGB matrices:
  - **UHD** (BT.2020-NCL, BT.2021-NCL and DCP XYZ)
  - **HD** (BT.709, BT.2021-NCL and DCP XYZ)
  - **SD** (BT.601)
- Switchable YUV ⇔ RGB levels mapping:
  - **Full Range (FR)**, e.g. 8 bit YUV 16-235 to 16-235 RGB rendering
  - **Narrow Range (NR)**, e.g. 8 bit YUV 16-235 to 0-255 RGB rendering, or 0-255 RGB to YUV 16-235 export
- Variety of Input and output YUV / RGB formats:
  - Interleaved, e.g. 422 UYVY (default raw data YUV format) or BGR48 – interleaved 16b RGB
  - Planar 444 RGB and YUV, 422, 411 and 420 YUV *(.YUV raw data file format or .Y4M file format with header)*
  - Proprietary VideoQ YUV or RGB interleaved 444_16LE 48bpp, accommodating up to 16b per component raw data

VQV GUI: Menus & Controls

Top level menus: **File**, **Frame Size**, **Color Space**, **Zoom**, **Tools & Filters**, **Help**



Title Bar Band
shows messages about:
- media file format,
- selected modes of operation,
- current timeline position,
- measured parameters values

Stop Button forces **Jog Mode**, current frame number set to **0**. All filters and overlays set to **Off**.

Eject Button
Close (release) media file, 2nd click will re-open closed file

When **Mouse Cursor** is within the **Title Bar**, **Title Bar Message** shows the file name/format:

VQMA_1280x720_8frms_UYVY_8b.YUV

MP4[AVC] 540p25 8b 0.535 Mbps Frame: 9924 / 15142

When **Mouse Cursor** is within the **Active Image Area**
S key toggles the **Title Bar Message**
e.g. between **current pixel** parameters and **current frame** levels statistics

Timeline Position Overlay Messages

Frame Back Button
Also stops playout

Frame Forward Button
Also stops playout

Navigation Slider Band:
When **Mouse Cursor** is in this band the **Title Bar Message** shows media format info, current timeline position and playout speed.
Press **S** key to cycle thru the message modes, e.g.:

540p59.94 8b "B" 0.010 bpp 0.317 Mbps 235 / 3634 00:00:03.921 / 00:01:00.627

540p59.94 8b "B" 662 bytes 235 / 3634 00;00;03;55 / 00;01;00;36

Pause Button
Click twice to show
L Bargraph & Statistics Overlays

Play Button toggles Play/Pause.
Playout speed is controlled by **Mouse Wheel**:
-512…,-16,-8,-4,-2.-1, 0, +1,+2,…+512

SDR sample video – courtesy of Kate McCartney & Kate McLennan, Australia

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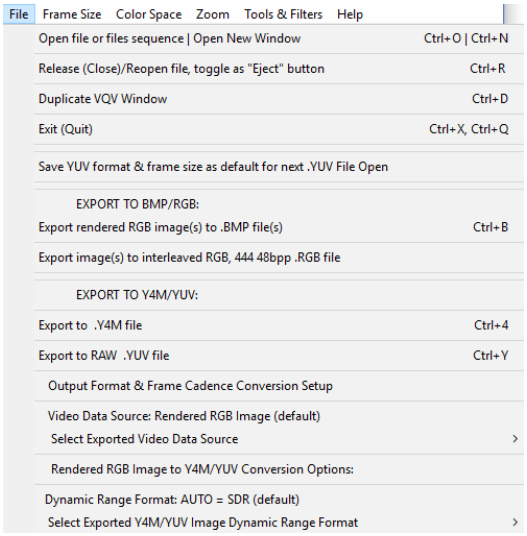
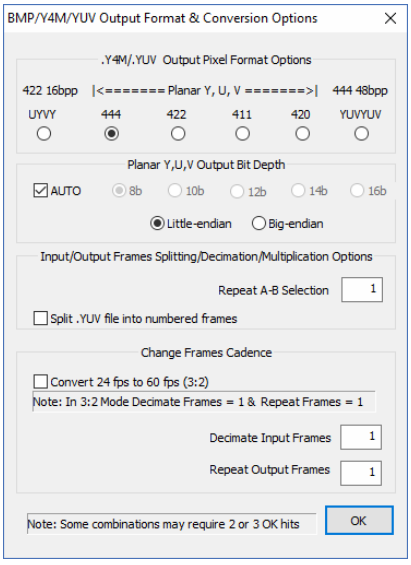
File Menu



This menu is sub-divided into 3 sections:

- Media File Open/Close/Quit Section:
  - Ctrl+O brings up standard File Open Dialog, Ctrl+N does the same, but the selected file opens in new window. Ctr+D duplicates current VQV window.
  - Released (closed) file can be reopened, e.g. for iterative video codec settings optimization. Ctrl+R shortcut is a toggle control for this process.
  - Eject Button also toggles between File Close / File Reopen.
    Reopen operation restores previous timeline position, but all tools, overlays and controls will be reset to defaults.
    Ctrl + Eject Button brings up standard File Open Dialog (same as Ctrl+O).
- Export to BMP/RGB Section:
  - Serves to export rendered RGB data “as is”, without any modification. Multi-frame content can be saved as a folder with numbered BMP frames or as a single multi-frame RGB file (16b per component, 48b per pixel).
- Export to Y4M/YUV Section. This section offers several conversion options:
  - Data source selector:
    Input YUV/RGB data or rendered (processed) RGB values
  - Output Dynamic Range selector:
    AUTO, SDR, HDR-PQ, HDR-HLG, LOG
  - See next slide for Y4M/YUV Export Options Dialog, which serves to configure YUV pixel format and optional frame cadence change

BMP/Y4M/YUV Output Format & Conversion Options



This pop-up dialog windows can be launched from File menu. It provides for handy YUV formatting & conversion options:

- YUV output pixel format selection:
  - UYVY (aka “interleaved 422”), compatible with widespread SDI stream format
  - Widespread planar 444, 422, 411, and 420 YUV formats, 8bpc … 16bpc, LE or BE
  - VideoQ/GrayMeta proprietary 444 interleaved 48b (16b per component) format
- Frame sequence splitting/multiplication options (BMP & YUV):
  - Repeat pre-selected A-B segment of media file several times. It is useful, e.g. for creation of dynamic video by repetition of a single static frame
  - Split selected A-B segment into a set of numbered frames (UYVY format only)
- Frame cadence conversion controls (BMP & YUV):
  - It is possible to simulate 24 fps to 60 fps frame rate conversion (3:2 cadence) by checking the corresponding box. In such case all even-numbered source frames will be repeated 3 times and all odd-numbered frames will be repeated 2 times, thus two input frames will be converted to 5 output frames.
  - Combining “Decimate” and “Repeat” numbers provides for the creation of custom frame cadences, e.g. Decimate = 2 and Repeat = 1 will simulate 50 fps to 25 fps (or 60 fps to 30 fps) frame rate reduction.

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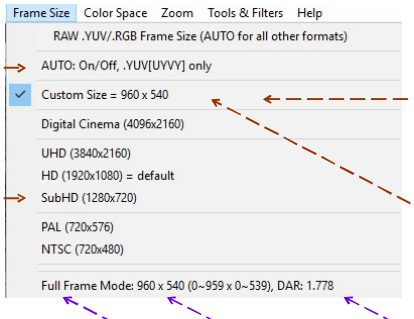
Frame Size Menu

Manual selection of **Frame Size** is required only for **Raw YUV/RGB** input format.

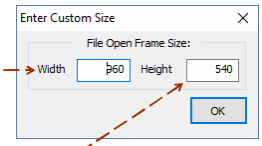
*For all other input formats Frame Size is set **automatically** and the Frame Size menu used only as **info message***

*Only for **UYVY** format:*
*if the actual Raw YUV frame size is **unknown**,*
then it makes sense to enable AUTO detection (smart guess) mode

It is recommended to select correct frame size **before** opening **Raw YUV/RGB** files.



Click on **Custom Size** will bring up this dialog pop-up window



Manual selection of **Custom Frame Size**, the values set are used only for **Raw YUV/RGB** input format.

Info Message showing currently selected **Frame Mode, Active Frame Size** & **Display Aspect Ratio** resulting from Black Bands (**Letterbox** / **Pillarbox**) detection and media file metadata processing.

*The control switching Full Frame Mode / Active Frame Mode is not in this menu – it is in Tool & Filters menu (Shortcut: **Ctrl+A**).*

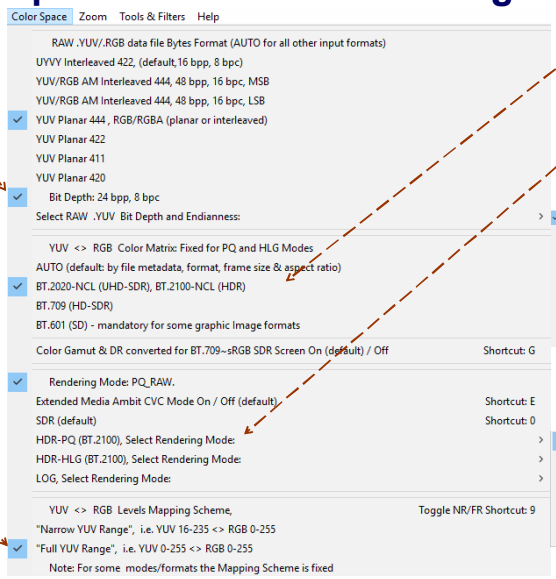
Color Space Menu and Rendering Mode Submenu

YUV/RGB Pixel Format:
Except Raw YUV/RGB files
YUV format is set automatically,
so this menu used for info only

Select
YUV ⇔ RGB
Range Conversion Type

For **SDR** Mode
user can choose between
"**Narrow**" and "**Full**" Range,

but for some **HDR** Modes
the selection is fixed (AUTO),
so it can not be changed by user



YUV ⇔ RGB Color Matrix:
Matrix can be set automatically or manually

Select **Dynamic Range Type** used for rendering and measurements.
Default = SDR

Select **HDR-PQ Raw Mode** or select **TDMB** value (Target Device Max Brightness)

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Tools & Filters Menu

Tools Section:
Controls built-in **meters & analyzers** and the corresponding **overlays** showing the analysis results.
See next slides for more details

Filters Section:

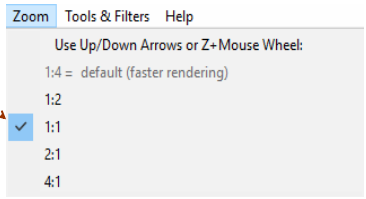
- **Filter Mask** (adjustable square or full screen)
- **R, G, B, Y, UV, LL** color channels selection
- **MSB/LSB** image selection (if input > 8b)
- **Display Gain** (contrast): x1, x2, x4, x8, x16
- **XY (spatial) Filter**: HPF (details) or LPF (blur)
- **T (temporal) Filter** shows frames differences

XY Filter can be combined with T Filter, e.g. T HPF cascaded with XY LPF.

See next slides for more details.

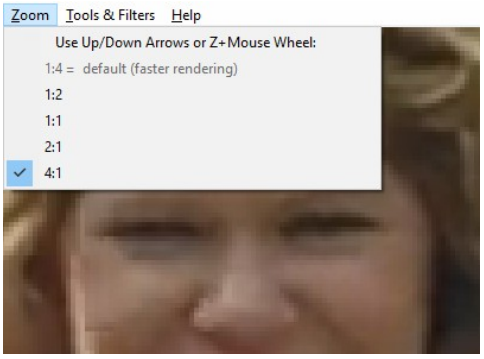
Zoom and Pan Controls

Select Rendered Image **Zoom Ratio**
Depending on Frame Size some ratios (too small or too big) could be excluded, and the corresponding menu line grayed out, e.g. for 960x540 frame size 1:4 zoom ratio is not available.



Zoom Ratio can be changed in three ways:

- Click on the desired line in **Zoom menu**
- Press **Up/Down Arrows** (*image centered zoom*)
- Point the cursor to an area of interest, press and hold '**Z**' key, then rotate **Mouse Wheel** (*cursor centered zoom*)



If zoomed image is larger than VQV active window dimensions (which depends on PC monitor resolution), then press and hold **Left Mouse Button** and move the mouse cursor in the desired direction to move the whole image (Pan control).

For ratios greater than 1:1, image is magnified by simple pixel repetition without any smoothening filter, thus making artifacts even more visible.
For example, the image on the left is damaged by camera overexposure, probably caused by sunlight reflections.

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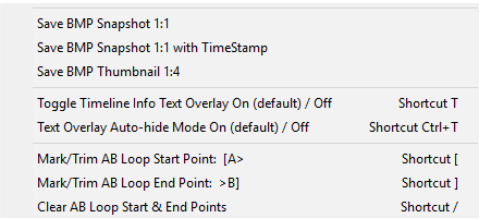
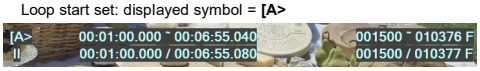
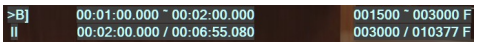
Right-click Context Menu



Loop start set: displayed symbol = **[A>**

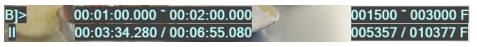


Loop end set: displayed symbol = **>B]**



Time position within the loop limits: displayed symbol = **[AB]**

Time position outside the loop limits: displayed symbol = **B]>**



This pop-up window can be invoked by pressing **Mouse Right Button** whilst cursor is in the **Active Image Area**.

The menu contains 3 sections allowing to:

- Save current rendered frame **snapshot** in BMP format, full size or ¼ size
- Control Timeline & Info **Text Overlay**
- Mark **A-B loop** timeline segment boundaries (Start and End points)

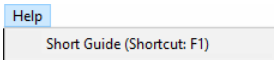
Snapshot file name is automatically appended by current frame number and frames count, e.g. "TestSDR_frame_225_of_10377_thm.BMP" for thumbnail (¼ size) file.

Full size BMP snapshot file name can be optionally appended by PC local date and time, e.g. "TestSDR_frame_225_of_10377_20170308_205801.BMP"

There are 3 modes of Text Overlay presentation: **On**, **Off**, and **Auto-hide**.
In Auto-hide Mode two lines of Text Overlay are displayed only when mouse cursor is above or below active image, e.g. in the timeline slider area.

Default AB Loop limits (frame numbers) are:
A = 0, B = frames_count -1, so it is possible to mark just one side.
For example if frames_count = 100, and user marked only A point = 20, then loop playout will start at frame 20, continue until frame 100 and restart at frame 20.

Help Menu – Short Guide Pop-up



Fixed size Short Guide pop-up window can be invoked via Help menu or by pressing keyboard F1 button.

It contains version and copyright details as well as brief instructions how to use menus and shortcuts.

See full list of shortcuts in a separate section of this presentation.

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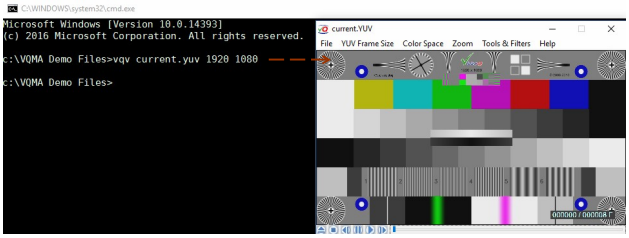
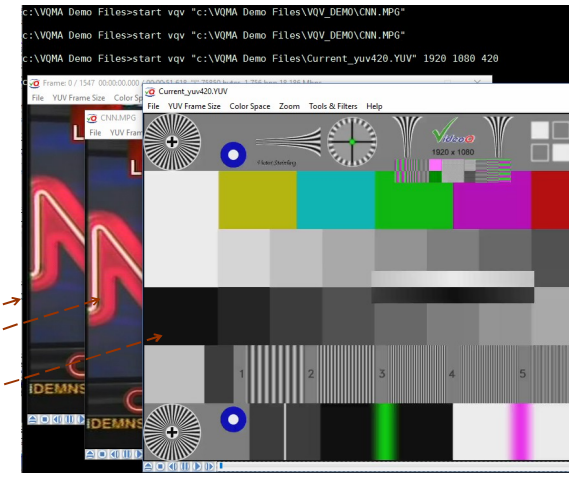
Opening Media File via CLI 1

Simple Example: Single raw UYVY data .YUV file opened via command line interface





Advanced Example: Launch multiple VQV instances, using "start" prefix:

Open several files or open the same file in several separate windows

start vqv "c:\VQMA Demo Files\VQV_DEMO\CNN.MPG"

start vqv "c:\VQMA Demo Files\VQV_DEMO\CNN.MPG"

start vqv "c:\VQMA Demo Files\Current_yuv420.YUV" 1920 1080 420

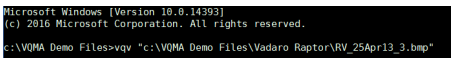
Such batch opening is very useful for benchmarking and iterative tests – because it allows side-by-side comparison of "before and after" variants.

Opening Media File via CLI 2 (continued)

If Input Name is a FOLDER, containing **numbered YUV or BMP files**, then the file with the **lowest number** belonging to the **numbered frame sequence** found **within the folder** will be opened first, and the whole sequence can be played, e.g.

vqv "c:\VQMA Demo Files\Vadaro Raptor"

If Input Name designates **any numbered file** within a folder, then the file with the **lowest number** belonging to the **numbered frame sequence** will be found, and the whole sequence can be played, e.g. the command line **vqv "c:\VQMA Demo Files\Vadaro Raptor\RV_25Apr13_3.bmp"** produces the same result as the command line above



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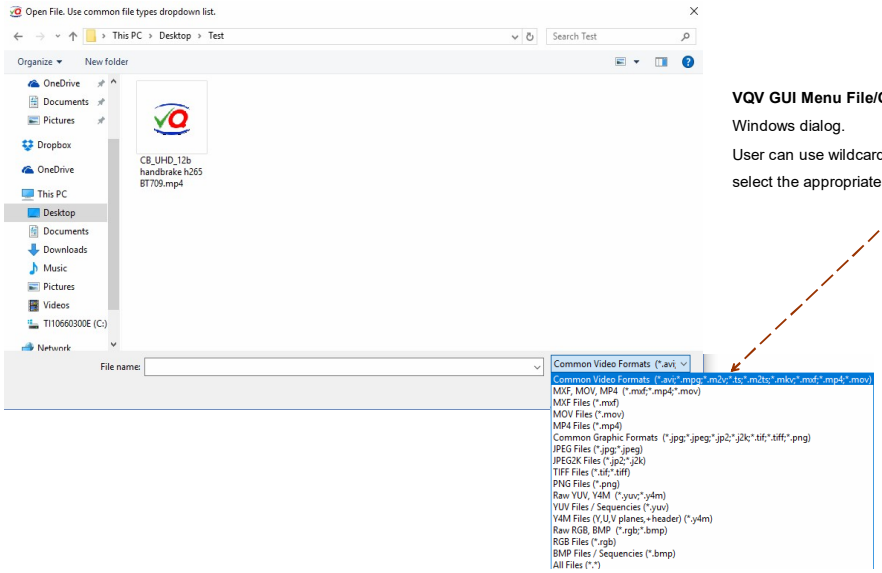
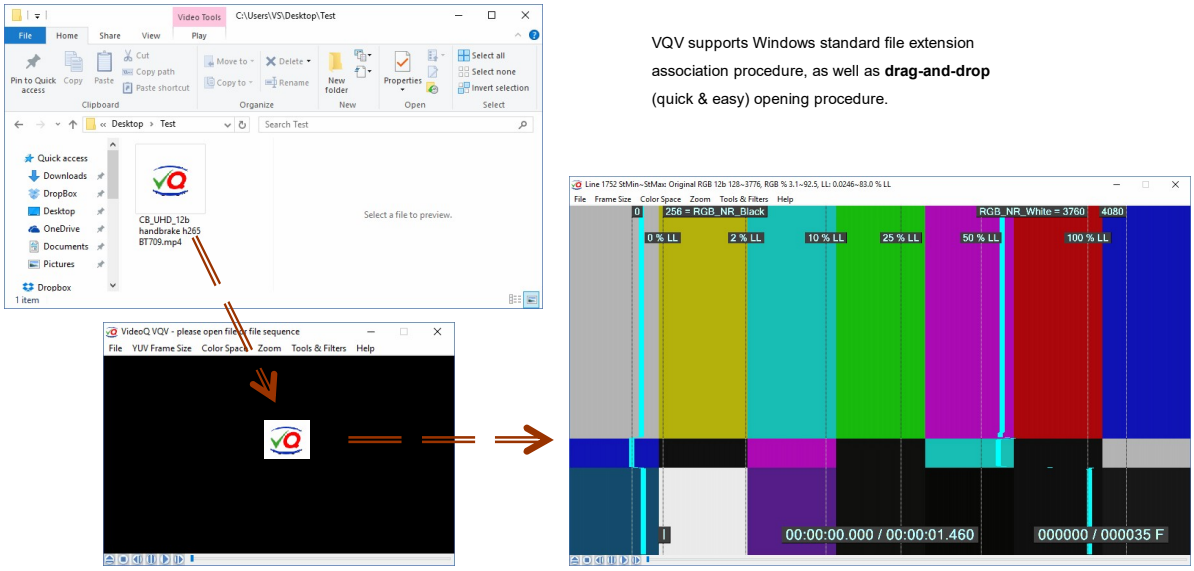
Opening Media File via Windows GUI Dialog



VQV GUI Menu File/Open (Shortcut Ctrl+O) brings up standard Windows dialog.

User can use wildcards, type specific file type, e.g. *.mp4, or select the appropriate line from **drop-down list**.

Opening Media File via Drag-And-Drop



VQV supports Windows standard file extension association procedure, as well as **drag-and-drop** (quick & easy) opening procedure.

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Timeline Navigation and Playout

Current speed, frame number and time code are shown in the **Title Bar** *independent of the* **Text Info Overlay** *shown at the bottom of Active Image*

Current playout speed
from – 512 to +512 (Shuttle Mode);
pause symbol **II** means Jog Mode

Current Frame Type
(shown only for compressed video),
e.g. 'I', 'P', 'B'

DR Mode & Scanning Standard
- Selected Dynamic Range Mode
- Frame Height, Interlace, Rate
(both hidden on playout)

Jog Mode Timeline Navigation
(Fixed Step Size Controls)

• **Mouse Wheel**	**+/- 1 frame**
• **Right/Left Arrows**	**+/- 1 frame**
• **Ctrl + Right/Left Arrows**	**+/- 10 frames**
• **PgDn/PgUp**	**+/- 1 s**
• **Shift + PgDn/PgUp**	**+/- 10 s**
• **Ctrl + PgDn/PgUp**	**+/- 1 m**
• **Ctrl + Shift + PgDn/PgUp**	**+/- 10 m**

Timeline Position & Zoom
- CurrentTimeCode/DurationTimeCode
- CurrentFrameNo/TotalFramesCount
- Zoom Ratio *(hidden on playout)*

Press **T** key to toggle
Text Info overlays On/Off,
Ctrl + T toggles Auto-hide Mode

Timeline Position can be changed by moving the **Slider** or clicking **Mouse Left Button** somewhere on the slider band in the desired direction ("big jumps").
This action also enables Jog Mode (Pause).

Play Button, Space Bar and **Mouse Middle Button** toggle between:
- **Play** (aka **Shuttle Mode**)
- **Pause** (aka **Jog Mode**)

Jog Mode is also forced by **Pause**, **Back** and **Forward** buttons.

Play speed is controlled by **Mouse Wheel**
Every video frame is decoded and displayed at speed values **-1**, **0** and **+1**.
Any other speed means decimation, e.g. speed +4 means that every 4th frame is shown.

SDR sample video – courtesy of Kate McCartney & Kate McLennan, Australia

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Tools & Meters

- VQV analyzers and meters can be sorted out into 3 categories:
  - YUV & RGB **Levels Analyzers**, providing for several secondary analyzers, such as **Frame Lines RGB Range Profile**, **Video Volume Meter**, **VectorScope**, **ChromaScope**, etc.
  - Intra-frame Activity and Inter-frame **Activity Analyzers**, also providing for **Noise Level Meter**
  - **Bitrate Statistics Analyzers**
- For all 3 categories the analysis results are presented in two formats:
  - **Graphical overlays** – Bargraphs, Waveforms and VectorScope Display formats
  - **Numerical readouts**, shown as Title Bar Message and/or Text Overlay
- Some analyzers, filters and overlays can be combined, some others are mutually exclusive
- See next slides for detailed description of:
  - Active Image Size Meter
  - Video Volume Meter – VV-Bars™
  - VectorScope
  - ChromaScope
  - Frame Profile and Line Parade RGB/YUV Waveforms
  - RGB/Light Levels Histograms
  - RGB/Light Levels Frame Statistics Analyzer – L-Bar™
  - Bitrate Analyzer – C-Bar™
  - Noise Meter

VideoQ, Inc. VQV Training Presentation

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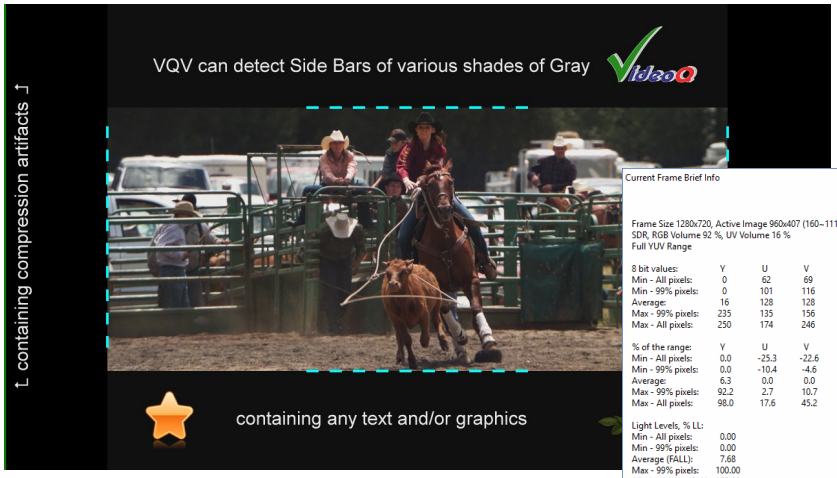
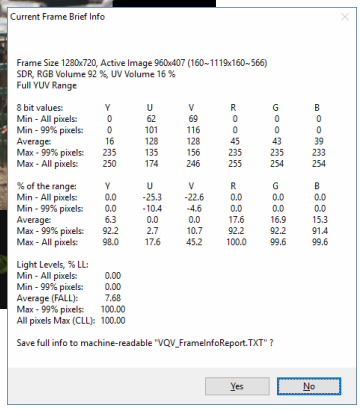
Active Image Frame Size Meter

Press **Ctrl + A**
to detect once / reset
Active Image Size

Also used as Statistics Analysis Area
***Full Frame / Active Image** switch*

Press **Shift + A**
to show/hide
Active Image Size
Markers



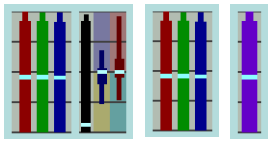


***Active Image Size Detection** affects the results of **all other Meters** because the black bands (Letterbox, Pillarbox, PostStamp), if present, may significantly affect image levels and activities statistics.*

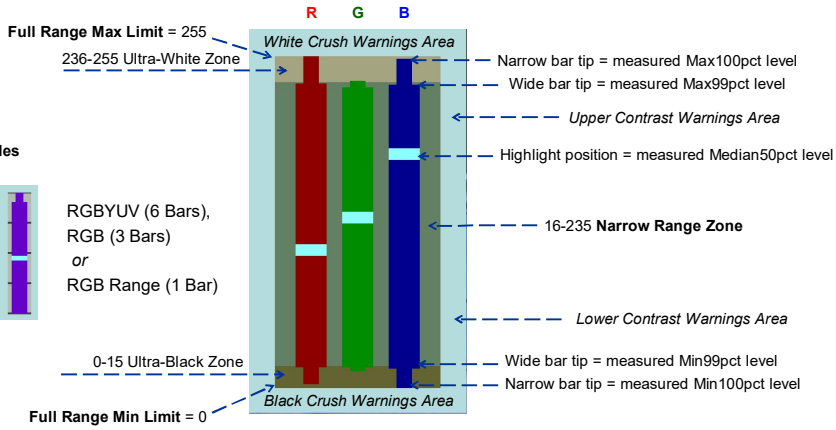
Video Volume Bars™ – VV-Bars™ Overlay

Press **V**
to toggle On/Off
VV Bars Overlay

Press **Shift + V**
to cycle thru **6/3/1 VV Bars Modes**



RGBYUV (6 Bars),
RGB (3 Bars)
or
RGB Range (1 Bar)



Each **Wide Bar** represents the color component range for **reliable 98%** of current frame pixels, ignoring specular highlights, whilst corresponding **Narrow Bar** shows ***extreme*** values for **all (100%)** pixels - they are nearly random and may vary a lot.

This explains the drastic difference in the dynamic behavior of two bars on live video playout:
Wide Bar size and position typically do not change significantly from frame to frame, but Narrow Bar tips are moving very fast.

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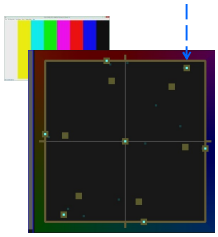
Smart VectorScope

Press **Ctrl + V**
to toggle On/Off
VectorScope Overlay

*If Test Pattern input detected, the rectangle limits are auto-adjusted to **measured** UV levels.*
***Target boxes** (dark yellow) designate 75% & 100% Color Bars*

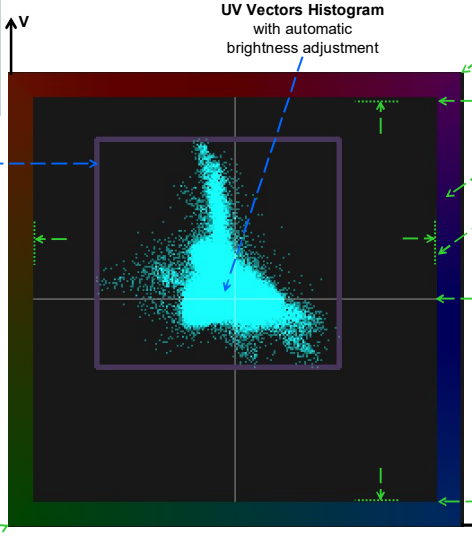


Peak Levels Marker
Rectangle limited by:
U & V
Min & Max values

4 Display Modes

Press **S** whilst
Mouse Cursor
is in VectorScope area
to change
display modes

UV Vectors Histogram
with automatic
brightness adjustment



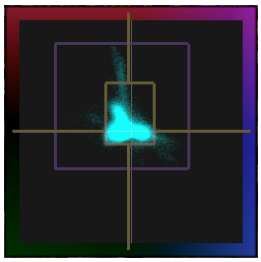
U = 255, V = 255
U = 240, V = 240
Rectangular **Palette** is a visual hint for UV vectors hues.
Inner Palette edge serves as a boundary marker for Nominal Range Area (U & V from 16 to 240)
U = 240, V = 128
U = 240, V =16
U = 0, V = 0

VectorScope Modes

4 Display Modes: Press **S** whilst **Mouse Cursor** is in the VectorScope area to change the display mode

Target Boxes
are enabled automatically
by Color Bars Detector

Mode 1: (default) - **AUTO**

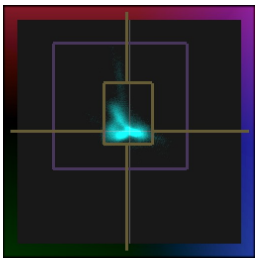


Suitable for **majority of use cases**.

Waveform brightness (Gain) is auto-adjusted to fit measured Chroma Volume limits.

Due to the built-in **Color Bars Detector** Mode 1 automatically switches to Mode 4 if Color Bars or similar test patterns are presented, so there is no need to switch modes manually.

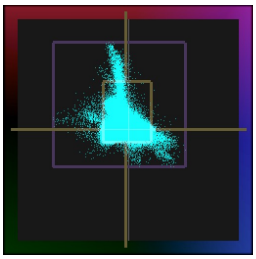
Mode 2: **Fixed Gain x1**



x1 Gain provides for better visibility of **dominant colors distribution** (2D contour shape).

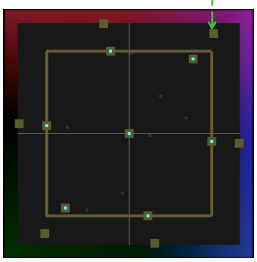
However, in this Mode low probability colors (e.g. colors of small size objects) are hardly noticeable.

Mode 3: **Fixed Gain x8**



x8 Gain provides for better visibility of **low probability colors** (e.g. colors of small size objects).

Mode 4: **Color Bars**



Mode 4 enables **Color Bars Target Boxes** (dark yellow squares) for:
SD (BT.601), HD (BT.709), UHD (BT.2100), 75% **and** 100% Color Bars

Also Gain value is adjusted and spot size increased providing for better visibility of actual Color Bars UV values and reduced visibility of spurious low probability colors, such as transitions and overshoots.

Medians and 100% peaks display disabled.

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Smart ChromaScope

Press **Ctrl + C**
to toggle On/Off
ChromaScope Overlay

Low contrast semi-transparent image of CIE 1931 xy Chromaticity Diagram showing all colors within the spectral locus

Cyan colored overlay:
Video Image Chromaticity Histogram
(depends on the Color Space selection)

File **Metadata Info** relevant for ChromaScope:
Color Matrix, **Primaries** and **Transfer** function

Select **Color Space** via main "Color Space" and ChromaScope "Primaries" menus:

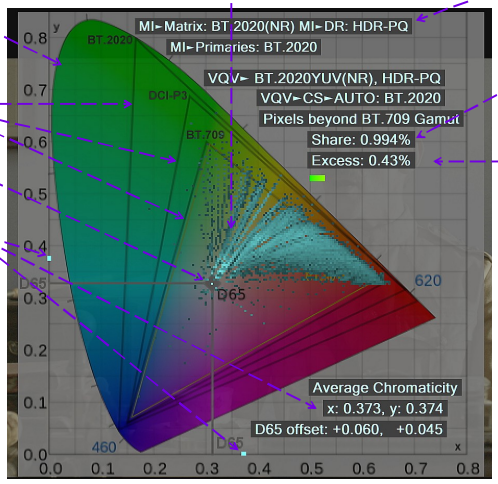
BT.2020, **DCI-P3**, **BT.709** and **BT.601 Primaries** (color triangles)

White point is not selectable, always **D65**

ChromaScope calculates and displays the **x** and **y** values of **Average Chromaticity** point and the offset of this point vs. the **D65 Reference White** point.

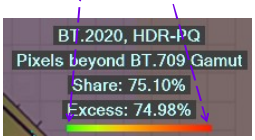
Moving **D65 Offset Markers** on x and y axes are helpful for at-glance detection of the significant color shifts.

Typical color balanced video images have Average Chromaticity rather close to the D65 point, but for the example shown the dominance of red-yellow colors is clearly visible.



If the selected Color Space is **BT.2020** or **DCI-P3** ChromaScope calculates and displays the **Share** of pixels having chromaticity beyond the limits of **BT.709** triangle – i.e. colors illegal for the ubiquitous HD color space.

The integrated **Excess** value helps to estimate the relevance of such pixels. For fast estimation the Excess value is also displayed as color-coded **Bargraph** – from green to red.

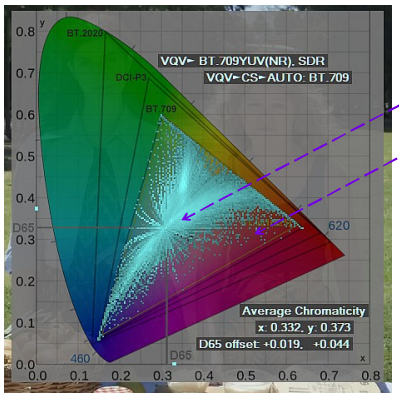


ChromaScope Display Modes

Press **S**
to change
the **Display Mode**

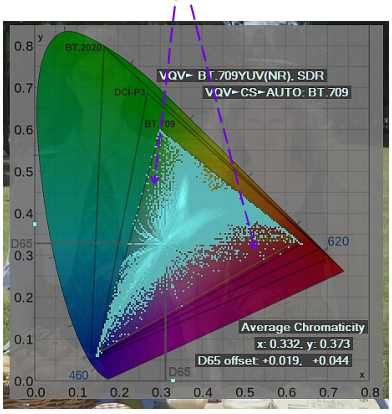
In the default **Display Mode 0** the overlay color intensity is proportional to the logarithm of the probability (events frequency). Total range is 100 dB (5 decimal orders).

In **Display Mode 1** the overlay color intensity logarithmic range is reduced and minimum brightness is lifted up; even very low probability events are clearly visible.



High probability events look much brighter, thus allowing to see 2D distribution profile,

but extremely low probability events could be difficult to see.



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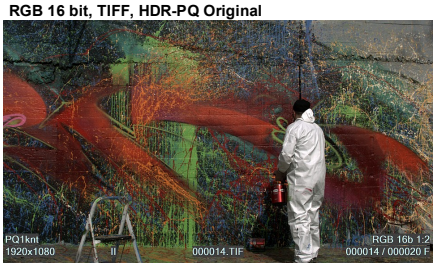
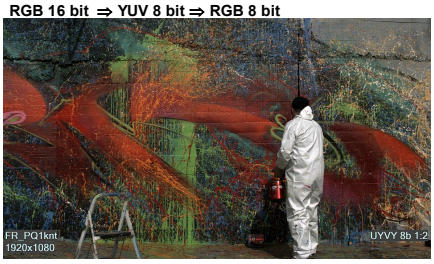
ChromaScope HDR Application Example

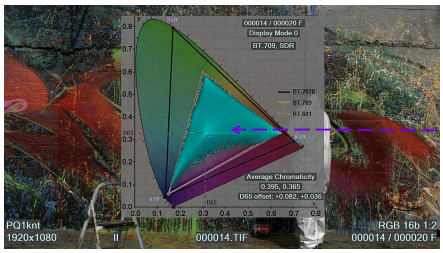
RGB 16 bit, TIFF, HDR-PQ Original



Original and converted RGB images looks very similar.

RGB 16 bit ⇒ YUV 8 bit ⇒ RGB 8 bit

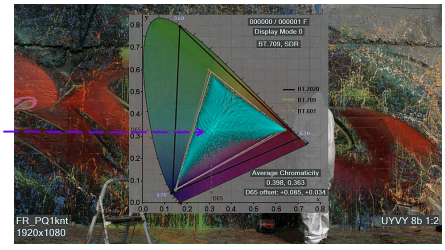




Magic bit!

VQV ChromaScope reveals YUV coarse quantization artifacts:

Smooth distribution on the left vs. "herringbone" pattern on the right

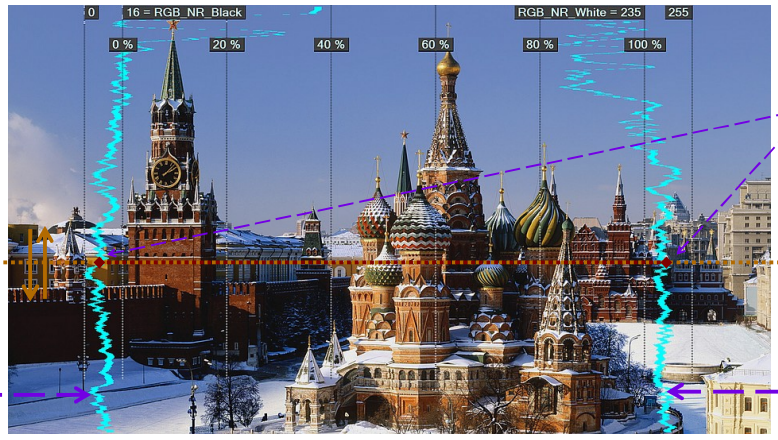


HDR sample video – courtesy of Sony

Frame Profile Waveform

Press **W** key to toggle On the **Waveforms Overlay**. The default **WF Mode** is **Frame Profile**

Line Number and the corresponding **Title Bar Numerical Readout** values are defined by the **Mouse Cursor vertical position**



Frame Profile Waveform shows the **Current Line RGB / LL Range** *from Min(R,G,B) to Max(R,G,B)*

RGB / LL **Line Statistics Min value** updated line-by-line

RGB / LL **Line Statistics Max value** updated line-by-line

The **Graticule** vertical lines positions can be switched from **RGB Levels** in **percents** of the Reference White to **Light Levels** in **nits** or **percents** – Shortcut: **Ctrl + U**.

In **SDR** mode the graticule lines are simply from 0% to 100%. In **HDR RAW** modes the graticule vertical dotted lines represents BT.2100 light levels.

In down- and cross- conversion modes 100% line represents **TDMB** (**T**arget **D**evice **M**ax **B**rightness).

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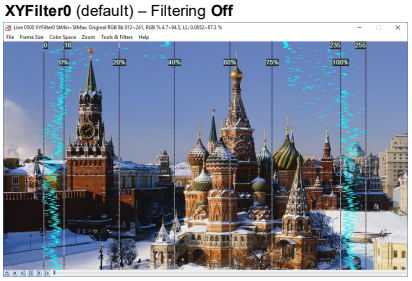
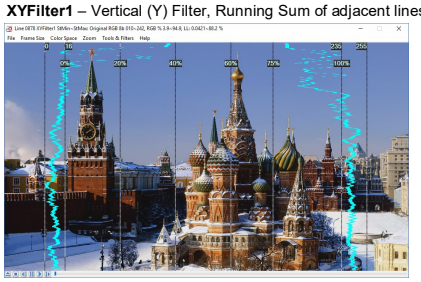
Frame Profile Waveform Filtering Options

Press **F** key
to cycle through the
Frame Profile
Filtering Options

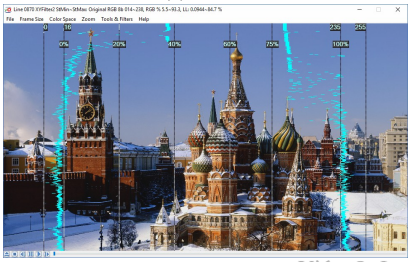
XYFilter0 (default) – Filtering **Off**



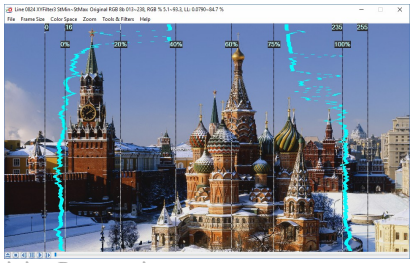
XYFilter1 – Vertical (Y) Filter, Running Sum of adjacent lines



XYFilter2 – Horizontal (X) Filter, Relevant Statistics Pixels



XYFilter3 – Both X & Y Filters On

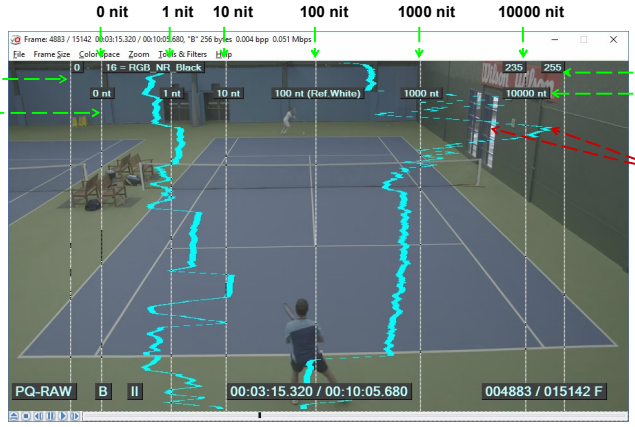


HDR Light Levels Frame Profile Example

Press **1**
to enable the
PQ-RAW Mode

Press **W**
to toggle On the
Frame Lines Profile
Waveform Overlay

Light Levels Reference Markers (dotted lines) overlay



Checking HDR10 content. HDR10 metadata specify Narrow YUV Range and TDMB = 1000 nit

Analysis conclusion: Though, this is a valid **HDR-PQ** clip, formatted into **Narrow Range YUV**, and on average **matching** the declared **1,000 nit TDMB** limit, but in this particular frame the lightest pixels are not only above **1,000 nit**, but above the **10,000 nit** limit of the **Narrow Range YUV format**.

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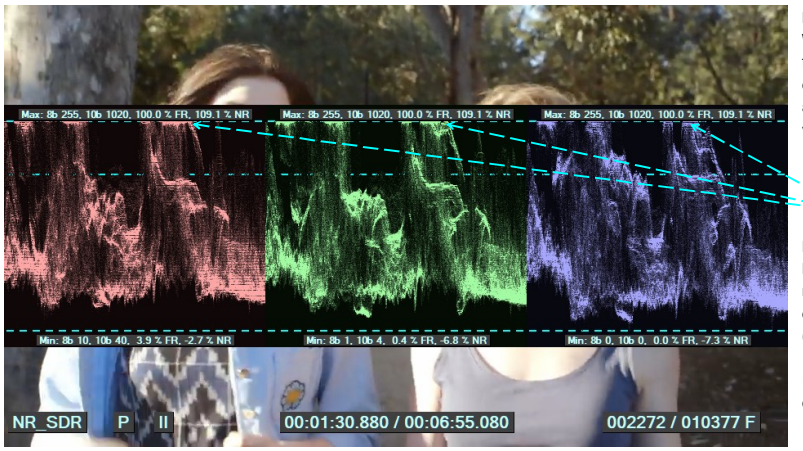
Line Parade Waveform – Visual Detection Tool

Press **W**
to toggle On the
Waveforms Overlay

Press **P**
to toggle On the
Line Parade Waveform
instead of the default
Frame Profile Waveform



RGB Line Parade Waveform Mode provides for easy **correlation** of the object **horizontal position** and the corresponding video **signal levels**

Note the **high levels** of **Red** & **Green Waveforms** near the top (100%) marker of the Graticule (*not so strong for **Blue***).

It means massive clipping of white and yellow tones

Line Parade Waveform Options

Press **W**
to toggle On the
Waveforms Overlay

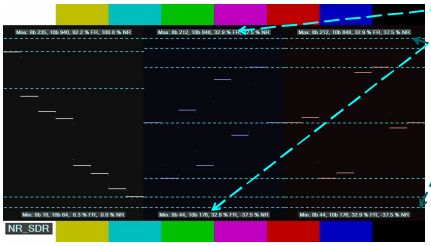
Press **P**
to toggle On the
Line Parade Waveform
instead of the default
Frame Profile Waveform

Y
In Line Parade Mode
toggles
RGB / **YUV**

9 key
toggles
Full / **Narrow**
YUV Range Mode

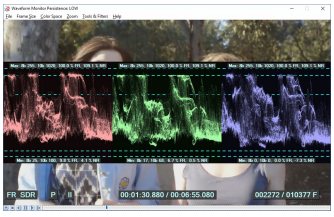
Shift + W
controls the
Persistence
strength:
Low / **Medium** / **High**

YUV Narrow Range Line Parade, 75% UHD Color Bars

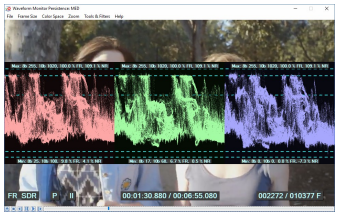


Waveform Monitor displays the **numerical readouts** of:
Min & Max values for **R**, **G**, **B**, **Y**, **U** and **V** channels in **8b**, **10b**, and **percents**.

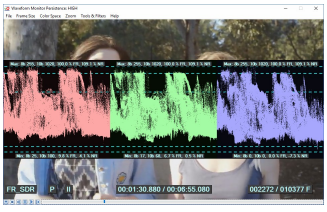
Critical Reference Levels Markers (cyan dotted lines):
- **Full Range Limits:** from **8b 0** to **8b 255**,
- **Narrow Range Limits:**
  Y: from **8b 16** (*10b 64, 0%*) to **8b 235** (*10b 940, 100%*),
  UV: from **8b 16** (*10b 64, -50%*) to **8b 240** (*10b 960, +50%*),
- **75% Sub-range Limits** (*for HLG Reference White and Color Bars*):
  Y: 8b 180 (*10b 720, 75%*),
  UV: from **8b 44** (*10b 176, -37.5%*), to **8b 212** (*10b 848, +37.5%*)



Low Persistence (default mode) is useful for the **general assessment**,
e.g. for the "white crush" check



Medium Persistence reveals pixel values of a **lower occurrence rate** (smaller objects)



High Persistence reveals pixel values of the **lowest occurrence rate** (the smallest objects)

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Line Select Mode

Press **W**
to toggle On the
Waveforms Overlay

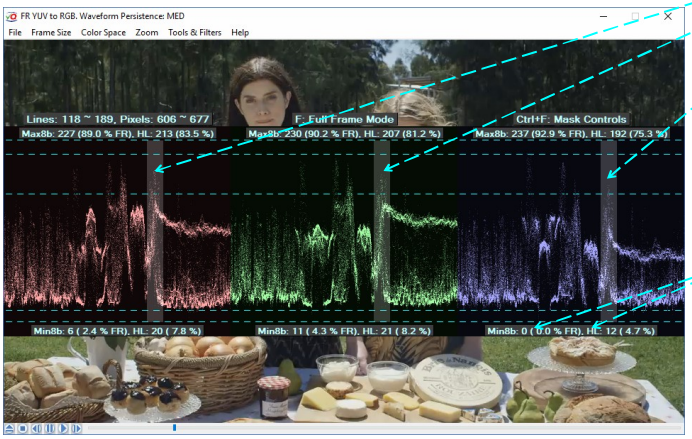
Press **P**
to toggle On the
Line Parade Waveform
instead of the default
Frame Profile Waveform

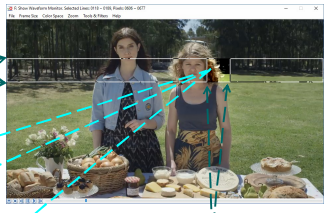
F — Step 2
In Line Parade Mode
toggles
Full Frame / **Line Select**
Modes

Ctrl + F — Step 1
enables **Mask Controls**

Line Range Mask
(Vertical Position):
Mouse Cursor

Mask Size:
Mouse Wheel.





Square Area Highlighted Mask
Pixel Number Range
(Horizontal Position):
Mouse Cursor

In Line Select Mode
the **R**, **G**, and **B** (or Y, U, V)
Min and **Max** values
are calculated separately:

- for the **Full Frame Area**
- for the **Square Mask Area:**
  i.e. for the highlighted Pixels
  within the highlighted Line Range

.

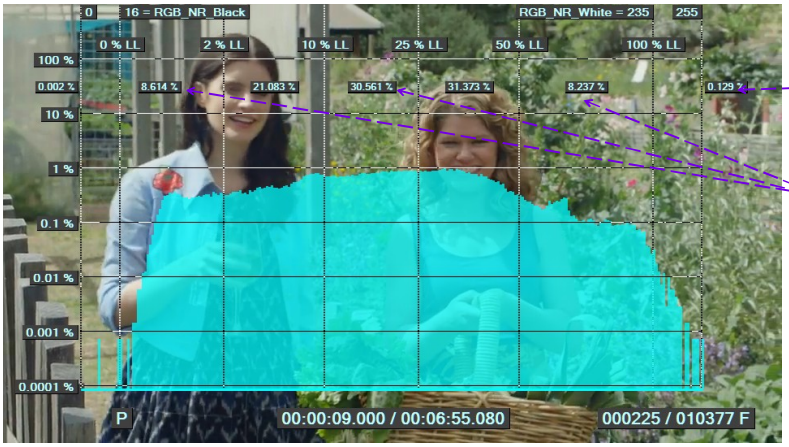
Frame Histogram Overlay

Press **H**
to toggle On the
Frame Histogram
Overlay

Digits keys *are shortcuts*
to some common
Dynamic Range Modes:

0 *– SDR = default mode*
1 *– HDR-PQ RAW*
2 *– HDR-PQ 1000 nt*
3 *– HLG-RAW*
4 *– HLG-100%*
5 *– LOG-RAW*
6 *– LOG>HLG*
7 *– LOG>SDR*
8 – reserved for future use
9 *– YUV range toggle*

E.g. press **0**
to enable the default
SDR RAW Mode



Some **white clipping**
takes place,
but **0.129 %** of the total
screen area
is an **acceptable** value

All sub-ranges are
more or less
evenly populated.

It means
good SDR image

The default **Histogram Overlay Mode** is the **Light Levels Histogram** shown above

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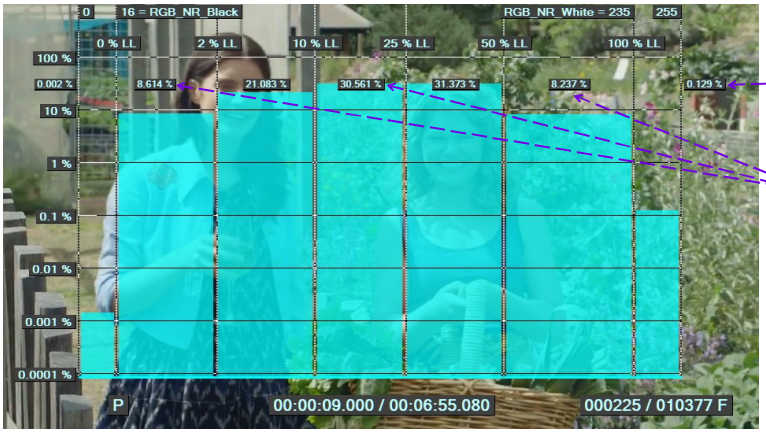
Sub-ranges Histogram

Press **H**
to toggle On the
Frame Histogram Overlay

Press **Ctrl + H**
to toggle On the
Alternative Sub-ranges Histogram

Press **Ctrl + U**
to toggle the
RGB / Light Levels
Units & Graticules

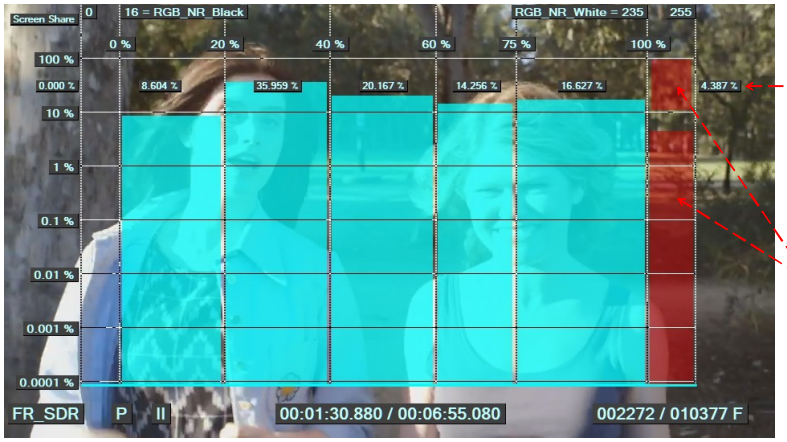


Some **white clipping** takes place, but **0.129 %** of the total screen area is an **acceptable** value

All sub-ranges are more or less **evenly populated**.

It means **good** SDR image

Sub-ranges Histogram Alarms



Strong white clipping *("White Crush")* takes place.

4.4 % of the screen area is above the **4 %** **Red Alarm Threshold**

Red Alarm Highlighter indicates the affected sub-range above 100% White

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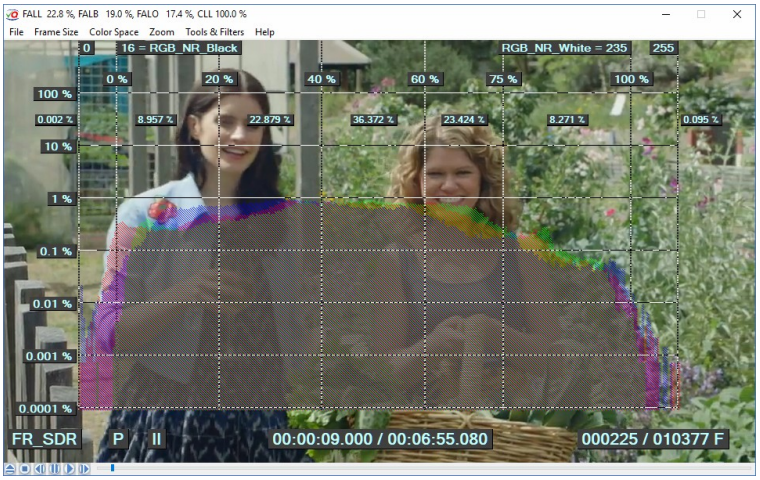
RGB Logarithmic Histogram

Press **H**
to toggle On the
Histogram Overlay

Press **Shift + H**
to toggle On the
RGB Logarithmic Histogram

*Press **Shift + H***
again to restore
LL Histogram

Shift + H toggles LL / RGB



Patterned Gray central area designate the case where all 3 **R**, **G** and **B** histogram **channels overlap**.

Colored areas shows the **dominant color channel(s)**, e.g. transparent **green** color means that for **this level** the **G** channel has **more hits** than two other channels, i.e. **R** and **B**.

Yellow area color means that **both R** and **G** have **more hits** than **B**. Magenta color means that for these levels G channel has less hits than R and B, etc.

Big advantage of this mode is the **logarithmic vertical scale**, so the events of **very low occurrence rate** (few pixels per frame) are still visible.

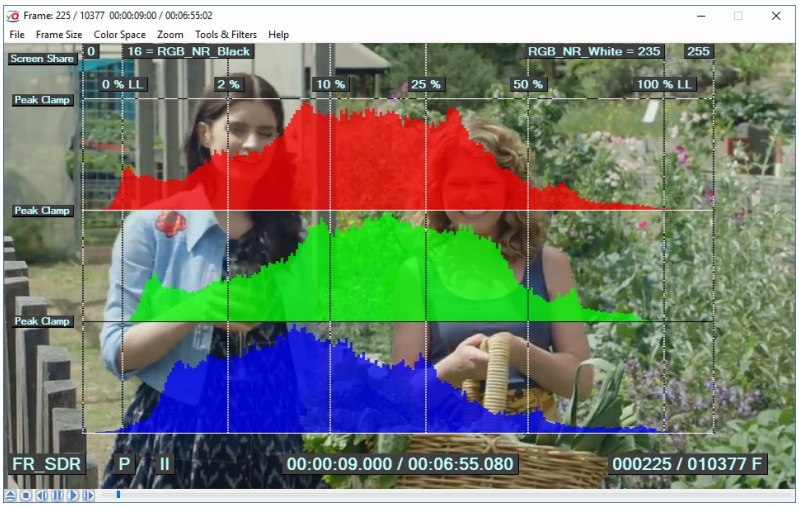
RGB Linear Histograms

Press **H**
to toggle On the
Histogram Overlay

Press **Ctrl + H**
to enable the
Alternative Histogram Mode

Press **Shift + H**
to enable
3 separate R, G, B Linear Histograms

Shift + H toggles LL / RGB



This mode serves mainly for **general assessment** of R, G and B levels distribution **shape**, **horizontal position** and **horizontal extent**.

All 3 (R, G and B) histograms are separately **normalized** to the corresponding **peak values**.

R, G and B levels are presented in a **relative linear scale**.

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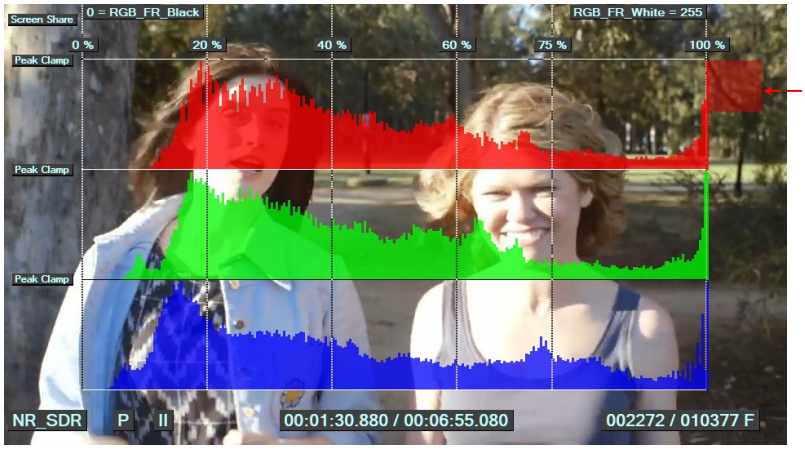
RGB Linear Histograms Alarms

Note the **high probabilities** of **Red** & **Green** histograms near the 100% limit on the right side (*not so strong for **Blue***).

It means massive clipping of white and yellow tones

.



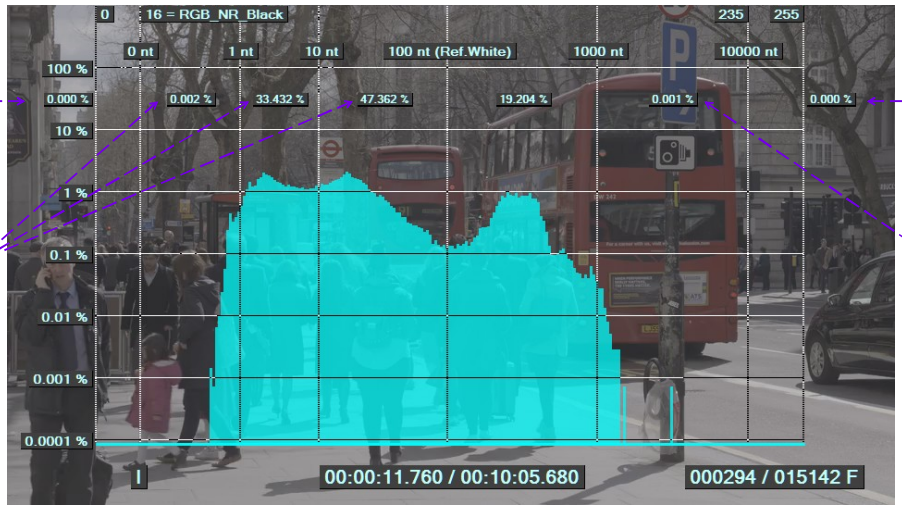
Strong white clipping (*"White Crush"*) takes place, **Red Alarm Flag** is raised

HDR10 Light Levels Histogram Example

Press **1** to enable: **PQ-RAW** Mode

The ***below black*** **sub-range** is measured *to check for "Black Crush"*

VQV calculates shares of **screen area** for several **sub-ranges** of a Histogram



The ***above white*** **sub-range** is measured *to check for "White Crush"*

0.001 % value means that there are not so many pixels **above 1000 nt**, i.e. ***no TDMB overload***

Logarithmic scale of histogram bins display covers very large range of values
from 100 % of screen area (in case of solid flat color the bin count may be in millions) down to 0.0001 % (even single pixel events are visible)

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L-Bar™ – Levels Statistics Visual Summary

Press **L** to toggle On the **L-Bar**.

Press **Play Button** to start collecting **Segment Statistics Data.**

At the end of wanted segment press the **Pause Button twice.**

Statistic Report will be printed as text overlay.

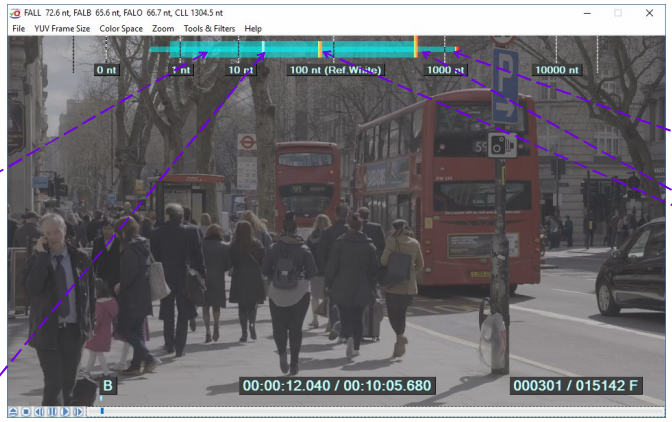
To save it press **Ctrl + P**

L-Bar:

Narrow Bar shows 100% of pixels (full frame RGB range) Min & Max limits,

Wide Bar shows 99% of pixels (most relevant RGB range) Min & Max limits,

Cyan Highlight shows Median Level (50% of frame pixels)



Current Frame **Statistically Relevant Light Levels**

Yellow Marker: **Frame Max Light Level (CLL)** of the current frame updated frame-by-frame

Yellow Markers: **Frame Average Light Level (FALL)** & **Frame Upper Light Level** of the current frame updated frame-by-frame

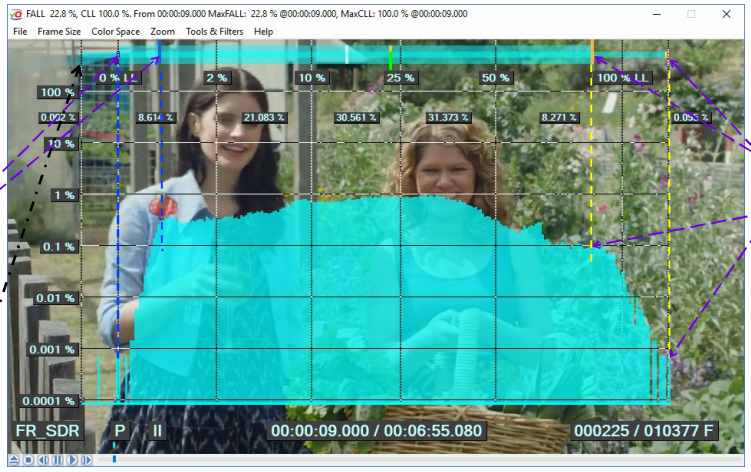
L-Bar & Light Levels Histogram

Use **H, Ctrl + H, Shift + H, Ctrl + U** to select the desired Histogram Mode, e.g. **Light Levels Histogram**

Then press **L** to enable. **L-Bar**

Absolute LL Min and Relevant LL Min **Blue Markers** always correlate with the left edge of **LL Histogram** profile.

But min (R, G, B) value, i.e. **Narrow Bar left edge**, may go lower than the **LL Histogram left edge**, e.g. on **colored shadows**



Frame Light Level Relevant Max and Absolute Max (aka CLL) **Yellow Markers** always correlate with the right edge of **LL Histogram** profile

L-Bar provides for **fast and reliable** RGB and LL parameters **assessment** even when the actual histogram is **hidden**

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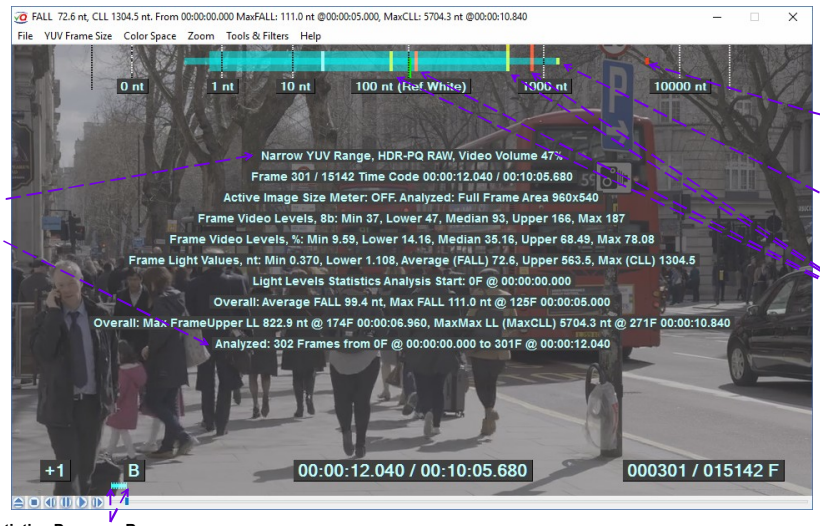
L-Bar & Video Segment Statistics Example



Text Messages

RGB & Light Levels Current Frame Statistics & Global Statistics
up to the current frame

Statistics Progress Bar:
From the selected start frame to the current frame

Light Levels Profile Markers:

Red Marker:
MaxCLL
up to the current frame
updated frame-by-frame

Yellow Marker:
CLL
of the current frame
updated frame-by-frame

Yellow Markers:
FALL & **FULL**
of the current frame
updated frame-by-frame

Red Markers:
MaxFALL & **MaxFULL**
up to the current frame
updated frame-by-frame

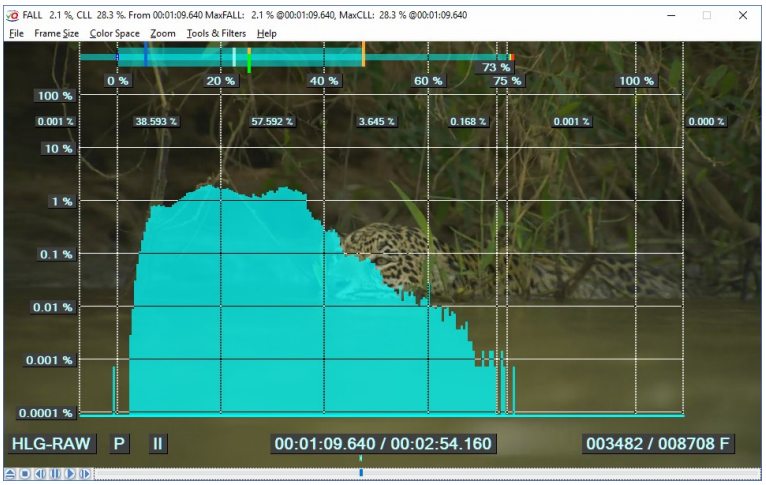
Green Marker:
Global Average LL
up to the current frame

L-Bar & Histogram of HLG Video

Press **3**
to enable the
HLG-RAW mode

Press **L** and **H**
to enable the
L-Bar + Histogram
combination

Press **U**
to select the
desired Graticule Units
e.g. **RGB Range %** mode



VQV calculates screen area in percents for several **sub-ranges**. The **most populated** RGB signal **sub-range** is **20% to 40%,** it occupies 57.6 % of screen area.
Such histogram distribution means that on "compatible" SDR display a viewer will see rather **dark image**.
Note that there are no practically **no pixels** related to two bands **above Reference White** Level (75% signal, 26 % LL) – histogram counts are 0.001% and 0 %.

UHD HLG sample video – courtesy of BBC

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C-Bar™ – Compressed Video Analyzer Overlay

Press **C** to enable the Compression Video Analyzer tool overlay

Critical Bitrates

Blue Stripe Marker:
Video Stream Average Bitrate
From stream metadata

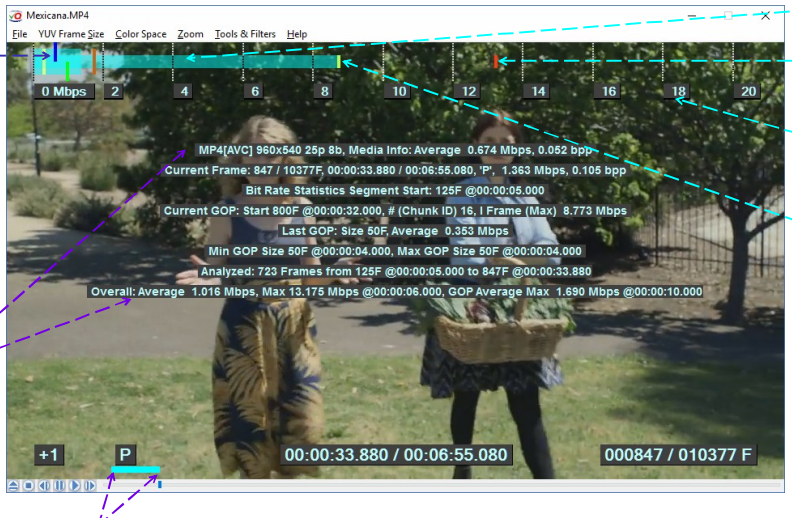
Green Stripe Marker:
Integrated Average Bitrate
up to the current frame

Yellow Stripe Marker:
Last GOP Average Bitrate

Brown Stripe Marker:
Global Max of GOP Average Bitrate
up to the current GOP

Text Message

Codec Info & Compressed Data Statistics
up to the current frame



Statistics Progress Bar:
From the start frame to the current frame

C-Bar Overlay
Narrow Bar: 'I' Frame Bitrate,
Wide Bar: 'P'/'B' Frame Bitrate

Red Stripe Marker:
Global Max Bitrate
updated frame-by-frame

Bitrate Graticule
kbps/Mbps auto-fit

Current GOP Max Bitrate
typically = I-frame Bitrate

Press **C** key,
then **Play Button**
to collect
Bitrate Statistics Data.
At the wanted segment end
press **Pause Button**.
Statistic Report will be printed as text overlay; to save it
press **Ctrl + P**

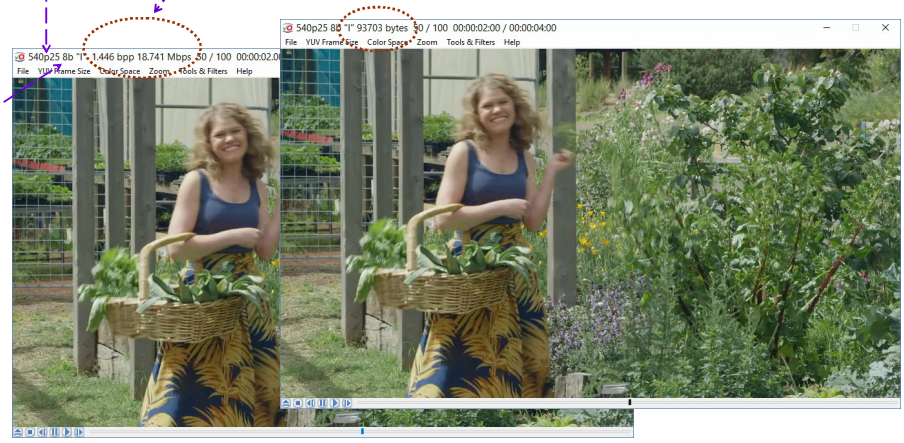
Compressed Video Parameters & Title Bar Messages

Frame Size,
Frame Rate,
Interlace symbol

Frame Type,
Bits Per Pixel,
current Bitrate, Mbps

Message Display option (press **S**):
Compressed frame size, bytes

Bits Per Component (Bit Depth)



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Tools Combinations

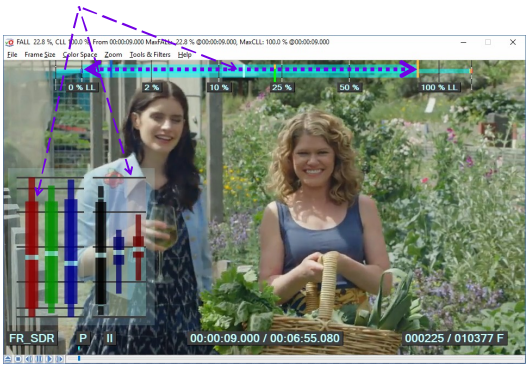
Press **L** and **V**
to enable two overlays:
L-Bar & **VV-Bars**

Press **9**
to switch between two
YUV to RGB Range Mapping Modes:
Full Range (FR) vs. **Narrow Range (NR)**

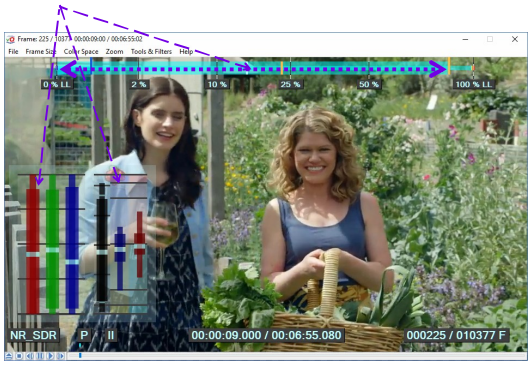
***C-Bar, L-Bar**, **VV-Bars** and **VectorScope** can be used together in any combination, but not in combination with the **Frame Profile Waveform**.*

*The **Histogram** overlay can be used together with **L-Bar**, but not with the **C-Bar, VV-Bars**, **VectorScope** or **Waveform.***

Full YUV Range Mode means
reduced contrast of **rendered RGB** image



Narrow YUV Range Mode means
higher (normal) **contrast** of **rendered RGB** image



L-Bar combined with VV-Bars

SDR RAW – Full Range (QC) Mode

Press **9**
to switch between two
RGB<> YUV Level Mapping Modes:
Full vs. **Narrow**

SDR – Narrow Range (Regular Viewing) Mode

R channel **Upper Level** is
at the Full Range Max Limit Level,
i.e. above the White Crush threshold

B channel **Lower Level** is
slightly below the Narrow Range Min Limit Level
Black Crush is possible

White Crush Markers are On in all 3 channels,
R is the most affected channel

B channel:
Medium strength **Black Crush Marker**

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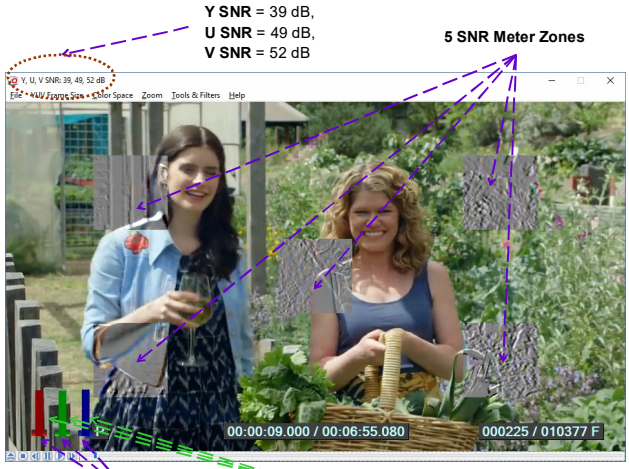
Noise & Inter-frame Activity Meter

Press **Shift + N**
to toggle On the
Noise Meter



Relatively poor Y SNR value is probably caused by strong Intra-frame and Inter-frame Activities creating problems for the camera noise reducer

Displayed Image Filters

- VQV displayed image filters can be sorted out into 4 categories:
  - Color Components selector: RGB, R, G, B, Y, UV or LL images.
  - Digital Levels Filters: Gain, Brightness offset, MSB/LSB selector
  - Spatial Filter: HPF (High Pass Filter) or LPF (Low Pass Filter)
  - Temporal Filter: HPF (High Pass Filter)
- Filters can be applied to:
  - Screen area limited by square mask with adjustable size and position
  - Full screen area
- **Shift + M** toggles between Mask / Full Screen modes, the default mode is Mask
- **Hold M** and use **Mouse Wheel** to adjust Mask size
- To change mask position: put cursor in the mask area, **hold Mouse Left Button** and move the mask
- **Shift + D** or **Stop Button**, as well as media file opening or re-opening, **reset** all filter controls to the **default** (off) state
- **Shift + F** toggles On/Off all filters, ***preserving*** all filter controls and settings
- **I** key cycles thru 3 de-interlaced display modes:
  - Interleaved Fields,
  - Top-Bottom Fields
  - Fields Difference
- Display filters can be combined, but filters concatenation order is fixed and can not be changed
- See next slides for detailed description and examples.

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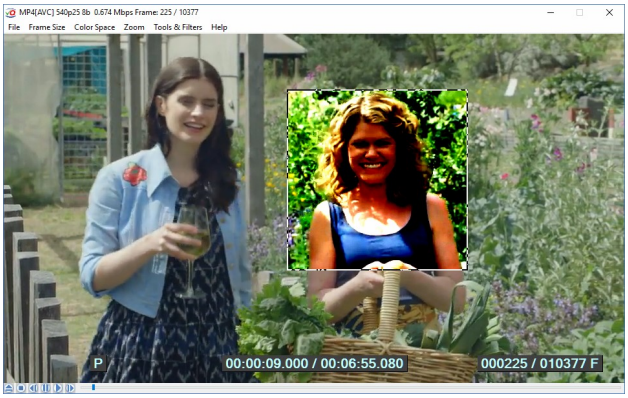
Gain Filter

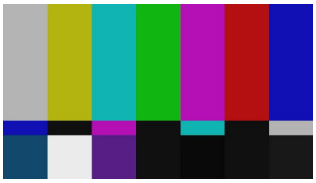
Shift + Mouse Wheel (and **Shift + Up/Down Arrows**) controls displayed image Gain (contrast): x1, x2, x4, x16.
Example below: Gain = **x4** within the Mask area.



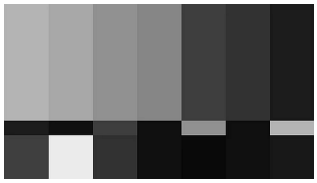
*If necessary, use **Ctrl + Shift + Mouse Wheel** to adjust the Slicing Level (brightness offset)*

Color Components Filter

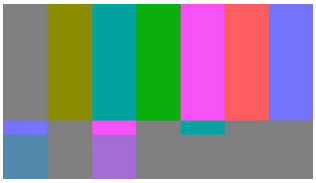
Shift + D: Default RGB Image



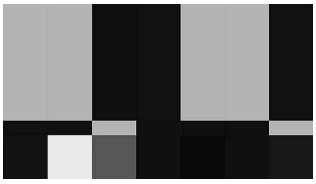
Shift + Y: Luminance



Shift + U: Chrominance (UV)



Shift + R: Red Component



Shift + G: Green Component

Shift + B: Blue Component

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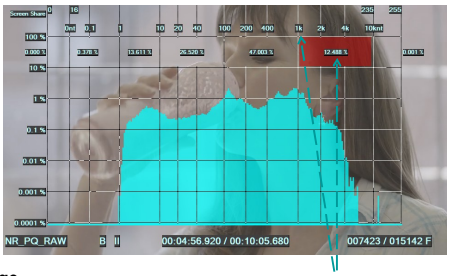
Color Components Filter – Light Levels Image

Overexposed HDR-PQ Image

Press **1**
to enable the
PQ-Raw Mode

Press **H**
to toggle On the
Frame Histogram Overlay

Light Levels Histogram



More than 12%
of pixels are above
1knt threshold

Light Levels (MaxRGB) Image

Shift + L:
Light Levels (MaxRGB)
Image

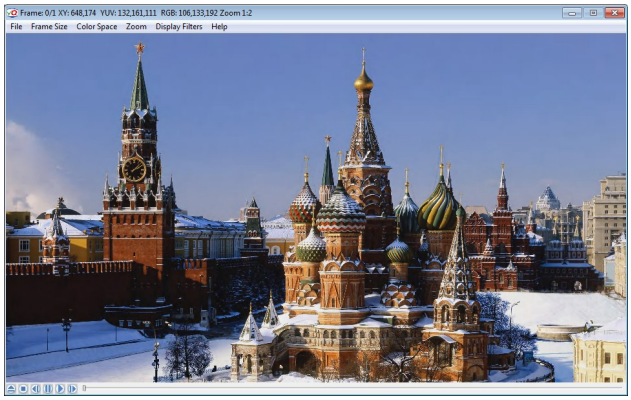
Ctrl + Shift + H:
Raw Video
Overexposed Pixels Highlighter

Overexposed areas
are clearly visible

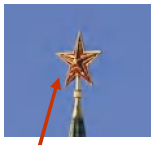
Combined Color, Gain and Mask Filters Example

1. Press **Shift + Y** to select Y color component,
2. Adjust mask size (**M + Mouse Wheel**) and position (**Mouse Left Button + Mouse Move**),
3. Adjust zoom ratio (cursor centered): **Z + Mouse Wheel**,
4. Adjust the gain: **Shift + Mouse Wheel**

1920x1080 image, decoded lossy JP2K, Zoom 1:2

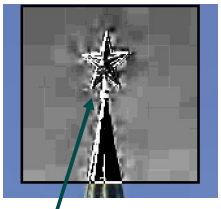


Zoom 2:1



Just noticeable compression artefacts

Zoom 2:1, Y, Gain x16



Clearly visible compression artefacts

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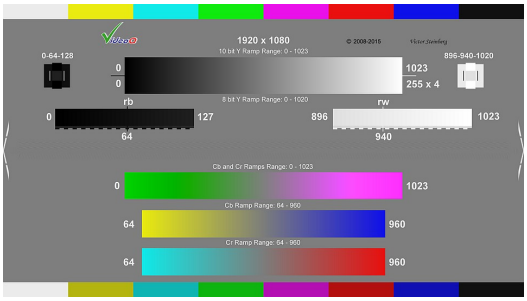
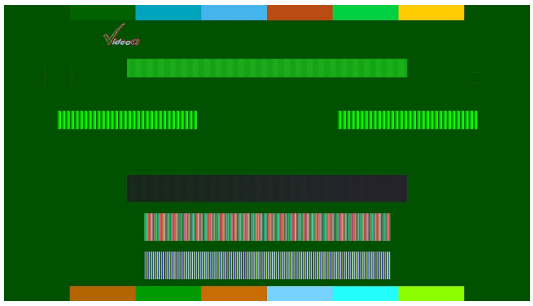
MSB/LSB Filter

Ctrl + 8 toggles between MSB and LSB images (*only if the input bit depth is greater than 8 bit*)

MSB: 8b RGB image derived from 16b RAW YUV media file



LSB: 8b RGB image derived from 16b RAW YUV media file

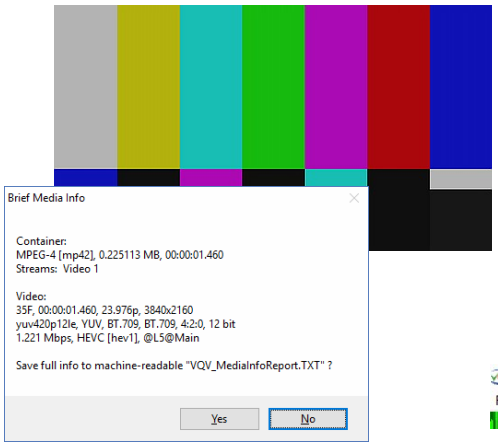


Both MSB and LSB images are equally suitable for VQV filters/meters. For example it s possible to select color components, display video data values of any pixel, apply spatial HPF, etc

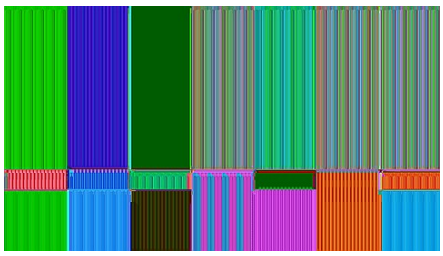
MSB/LSB Filter Application Example

Ctrl + 8 toggles between MSB and LSB images (*only if the input bit depth is greater than 8b*)

MSB: 8b RGB image derived from 12b UHD media file

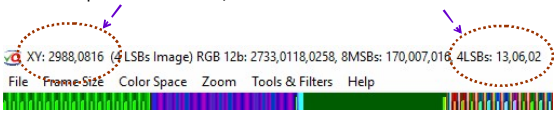


LSB: 8b RGB image derived from 12b UHD media file



Pixel position XY: **2988, 0816**

4 LSBs: **13, 06, 02**



This example shows that used encoder (UHD HEVC) is far from being 12 bit accurate:
even on relatively easy flat color objects 4 LSB values are in fact random – pixel-by-pixel readout displays various numbers from 0 to 15.

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De-interlaced Display Filter

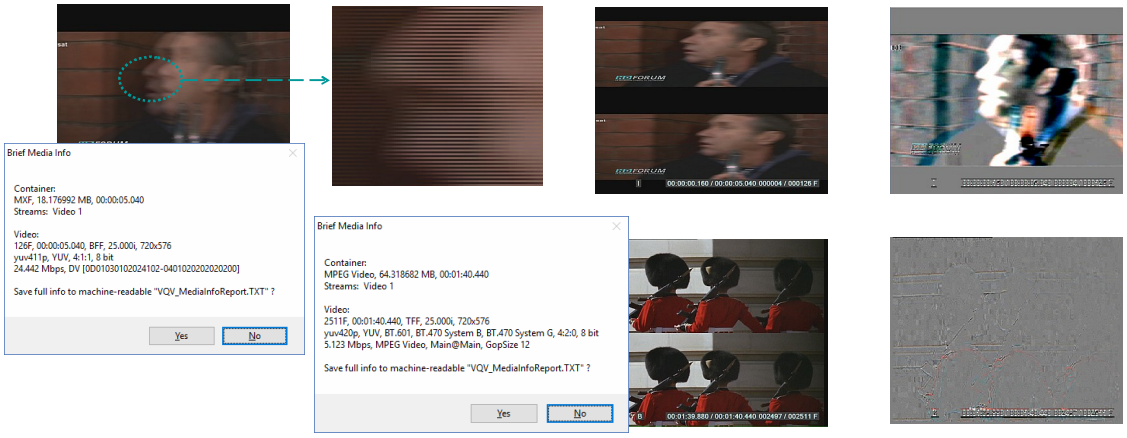
Press **I** to cycle thru 3 de-interlaced display modes: Interleaved Fields (default), Top-Bottom Fields, Fields Difference

Interleaved Fields

Zoom 4:1 (fragment)

Top-Bottom Fields

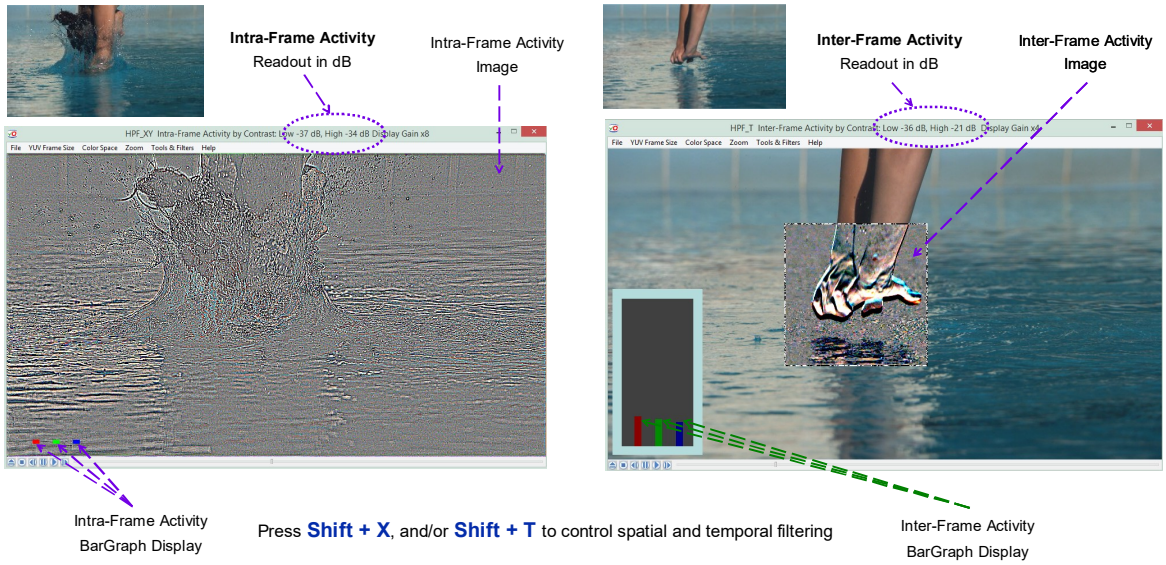
Fields Difference



This example shows that despite **the same 25i** declared format, only the content in the1st row is **truly interlaced**,

The 2nd row images are in fact **25psf** (Progressively Scanned Fields), i.e. 25p original was converted to 25i – probably, for distribution purposes.

Spatial and Temporal Filters



Press **Shift + X**, and/or **Shift + T** to control spatial and temporal filtering

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Reports and Log Files

VQV can display two specific reports as pop-up windows:

- **Media Info Report** (**Ctrl + M**), optionally saved in **VQV_MediaInfoReport.TXT**
- **Frame Info Report** (**Ctrl + F**), optionally saved in **VQV_FrameInfoReport.TXT**

Report file names are fixed and can not be changed.

Each time the existing report will be overwritten, then opened in minimized Notepad window.
If necessary, user can edit/save/rename this text file.

VQV user can also create/append VQV.Log text file; Press **Ctrl + P** to store in VQV.Log any textual information currently displayed in the Title Bar Message or as an Overlay.

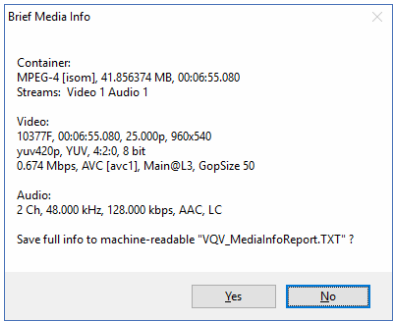
Each time VQV.Log will be immediately opened in minimized Notepad window.

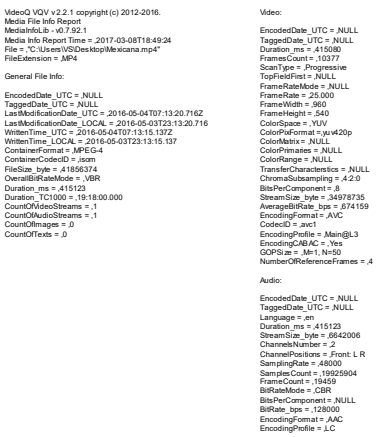
If necessary, user can edit/save/rename this text file.

Media Info Report

Press **Ctrl + M**

to get **Brief Media Info Report** in pop-up window,
More text data can be optionally saved in **VQV_MediaInfoReport.TXT** and opened in minimized Notepad window.





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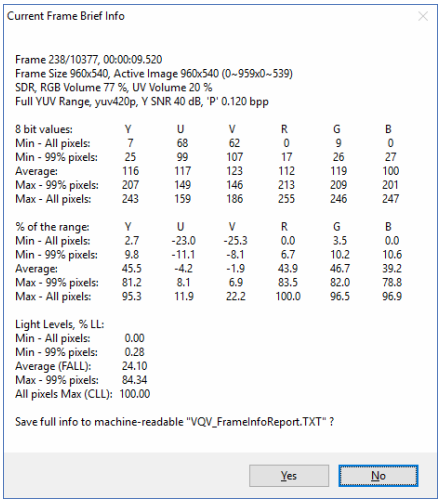
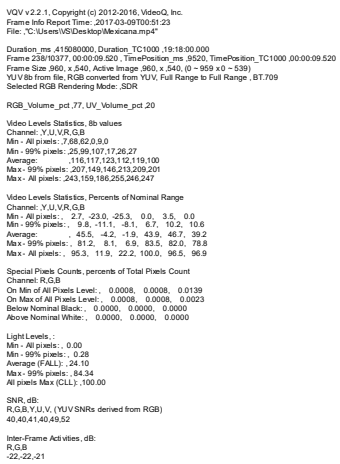
Frame Info Report

Press **Ctrl + F**

to get **Brief Frame Info Report** in pop-up window,

More text data can be optionally saved in **VQV_FrameInfoReport.TXT** and opened in minimized Notepad window.





```
VQV v 2.2.1, Copyright (c) 2012-2016, VideoQ, Inc.
Frame Info Report Time: ,2017-03-09T00:51:23
File: "C:\Users\VS\Desktop\Mexicana.mp4"

Duration_ms ,41508000, Duration_TC1000 ,19:18:00.000
Frame 238/10377, 00:00:09.520 , TimePosition_ms ,9520, TimePosition_TC1000 ,00:00:09.520
Frame Size ,960, x ,540, Active Image ,960, x ,540, (0 ~ 959 x0 ~ 539)
YUV 8b from file, RGB converted from YUV, Full Range to Full Range , BT.709
Selected RGB Rendering Mode: ,SDR

RGB_Volume_pct ,77, UV_Volume_pct ,20

Video Levels Statistics, 8b values
Channel: ,Y,U,V,R,G,B
Min - All pixels: ,7,68,62,0,9,0
Min - 99% pixels: ,25,99,107,17,26,27
Average: ,116,117,123,112,119,100
Max - 99% pixels: ,207,149,146,213,209,201
Max - All pixels: ,243,159,186,255,246,247

Video Levels Statistics, Percents of Nominal Range
Channel: ,Y,U,V,R,G,B
Min - All pixels: , 2.7, -23.0, -25.3, 0.0, 3.5, 0.0
Min - 99% pixels: , 9.8, -11.1, -8.1, 6.7, 10.2, 10.6
Average: , 45.5, -4.2, -1.9, 43.9, 46.7, 39.2
Max - 99% pixels: , 81.2, 8.1, 6.9, 83.5, 82.0, 78.8
Max - All pixels: , 95.3, 11.9, 22.2, 100.0, 96.5, 96.9

Special Pixels Counts, percents of Total Pixels Count
Channel: R,G,B
On Min of All Pixels Level: , 0.0008, 0.0008, 0.0139
On Max of All Pixels Level: , 0.0008, 0.0008, 0.0023
Below Nominal Black: , 0.0000, 0.0000, 0.0000
Above Nominal White: , 0.0000, 0.0000, 0.0000

Light Levels, :
Min - All pixels: , 0.00
Min - 99% pixels: , 0.28
Average (FALL): , 24.10
Max - 99% pixels: , 84.34
All pixels Max (CLL): ,100.00

SNR, dB:
R,G,B,Y,U,V, (YUV SNRs derived from RGB)
40,40,41,40,49,52

Inter-Frame Activities, dB:
R,G,B
-22,-22,-21
```


VQV.Log Report

Press **Ctrl + P**

to create/append **VQV.Log** and store in it any text currently displayed in the Title Bar Message or as an Overlay;

VQV.Log will be immediately opened in minimized Notepad window.

```
VQV v 2.2.1. Copyright (c) 2012-2017 VideoQ, Inc.
Selected Analysis Data Items Log Created: 2017-03-09T01:03:05

File Open Time: 2017-03-09T01:03:05
File: "C:\Users\VS\Desktop\Mexicana.mp4"
Item: 0, FrameNo: 325
 Full YUV Range, SDR, Video Volume 77%
 Frame 325 / 10377 Time Code 00:00:13.000 / 00:06:55.080
 Active Image Size Meter: OFF , Analyzed: Full Frame Area 960x540
 Frame Video Levels, 8b: Min 0, Lower 21, Median 114, Upper 217, Max 255
 Frame Video Levels, %: Min -7.31, Lower 2.28, Median 44.75, Upper 91.78, Max 109.13
 Frame Light Values, %: Min 0.000, Lower 0.217, Average (FALL) 23.2, Upper 84.3, Max (CLL) 100.0
 Light Levels Statistics Analysis Start: 238F @ 00:00:09.520
 Overall: Average FALL 26.5 %, Max FALL 28.1 % @ 261F 00:00:10.440
 Overall: Max FrameUpper LL 100.0 % @ 249F 00:00:09.960, MaxMax LL (MaxCLL) 100.0 % @ 238F 00:00:09.520
 Analyzed: 88 Frames from 238F @ 00:00:09.520 to 325F @ 00:00:13.000
Item: 1, FrameNo: 325
Line 0260 StMin~StMax: Original RGB 8b 009~246, RGB % 3.5~96.5, LL: 0.0327~91.7 % LL
Item: 2, FrameNo: 470
 MP4[AVC] 960x540 25p 8b, Media Info: Average 0.674 Mbps, 0.052 bpp
 Current Frame: 470 / 10377F, 00:00:18.800 / 00:06:55.080, 'P', 0.223 Mbps, 0.017 bpp
 Bit Rate Statistics Segment Start: 325F @00:00:13.000
 Current GOP: Start 450F @00:00:18.000, # (Chunk ID) 9, I Frame (Max) 8.859 Mbps
 Last GOP: Size 50F, Average 1.175 Mbps
 Min GOP Size 50F @00:00:12.000, Max GOP Size 50F @00:00:12.000
 Analyzed: 146 Frames from 325F @00:00:13.000 to 470F @00:00:18.800
 Overall: Average 1.197 Mbps, Max 12.501 Mbps @00:00:16.000, GOP Average Max 1.381 Mbps @00:00:16.000

File Open Time: 2017-03-09T01:15:02
File: "C:\Users\VS\Desktop\HDR_10minutes_test_960x540_1000nit_p3.MP4"
Item: 0, FrameNo: 0
 Narrow YUV Range, HDR-PQ Max 1000 nt to SDR, Video Volume 73%
 Frame 0 / 15142 Time Code 00:00:00.000 / 00:10:05.680
 Active Image Size Meter: OFF , Analyzed: Full Frame Area 960x540
 Frame Video Levels, 8b: Min 5, Lower 9, Median 65, Upper 195, Max 255
 Frame Video Levels, %: Min 1.96, Lower 3.53, Median 25.49, Upper 76.47, Max 100.00
 Frame Light Values, nt: Min 0.080, Lower 0.421, Average (FALL) 86.9, Upper 525.3, Max (CLL) 1000.0
```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Full List of VQV Shortcuts 1

Key	Result	Shift + Key	Ctrl + Key	Ctrl + Shift + Key
Mouse Wheel	Jog Mode: **+/- 1 frame**, Shuttle Mode: **Speed** up/down,	Display **Gain**: up/down		Display Gain Filter Brightness **Offset**: up/down
Mouse Move	In Active Image: **Pixel Value** readout, In Mask Area: **Masked Filter** readout			
Mouse Middle Button	In Slider Area: **Jog/Shuttle** toggle			
Mouse Left Button + Mouse Move	In Active Image: **Image Position** In Mask Area: **Mask Position**			
M + Mouse Wheel	**Mask Size** up/down			
Z + Mouse Wheel	**Zoom** up/down *(cursor centered)*			
Mouse Right Button	In Active Image: **Context Menu**			
Up/Down Arrows	**Zoom** up/down *(image centered)*	Display **Gain**: up/down		
Right/Left Arrows	Jog Mode: **+/- 1 frame**, Shuttle Mode: **Pause ⇒ +/- 1 frame**		Jog Mode: **+/- 10 frames**	
PageDown/PageUp	Jog Mode: **+/- 1 s**	Jog Mode: **+/- 10 s**	Jog Mode: **+/- 1 m**	Jog Mode: **+/- 10 m**
0	**SDR RAW**			
1	**HDR-PQ RAW**			
2	**HDR-PQ ⇒ SDR**, Max **1000 nt**			
3	**HDR-HLG RAW**			
4	**HDR-HLG ⇒ SDR**, Max **100% LL**		**Export** to **Y4M** file	

Full List of VQV Shortcuts 2 (continued)

Key	Result	Shift + Key	Ctrl + Key	Ctrl + Shift + Key
5	**HDR-LOG RAW**			
6	**HDR-LOG ⇒ HLG Compatible SDR**			
7	**HDR-LOG ⇒ SDR**, Max = **Ref.White**			
8			**MSB / LSB Image** toggle (if media file > 8 bit)	
9	**Full / Narrow YUV Range** toggle (RGB <> YUV conversion mode)			
Space Bar	**Jog / Shuttle** Modes toggle *(same as Play Button)*			
A		Active Image Size **Markers** Show / Hide toggle	Active Image Size **Detector** Detect Once / Reset ***Also selects Statistics Analysis Area: Full Frame / Active Image***	
B		**B** component Image (**Blue**)	**Export** to **BMP** file(s)	
C	**C-Bar** (Compression) toggle On/Off		**ChromaScope** On/Off	
D		All **Filters Off** *(settings reset to defaults)*	**Duplicate** currently opened file in new VQV window	
E	**Enhanced Rendering** toggle On/Off VideoQ Auto DR Processing - **DRAE**		**AV Sync Error** Meter (on *MPC Test Pattern)*	
F	Frame Profile Waveform **Filtering Modes**, *or* Line Parade **Full Frame/Line Select** toggle	All **Filters Disable / Enable** *(settings preserved)*	**Frame Info** Report pop-up, *or* **Line Range Selection Mask**	
G		**G** component Image (**Green**)		
H	**Histogram** Overlay toggle On/Off	**RGB / Light Levels Histogram** toggle	**Histogram Mode** toggle	Raw Video Overexposed Pixels **Highlighter** On/Off

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Full List of VQV Shortcuts 3 (continued)

Key	Result	Shift + Key	Ctrl + Key	Ctrl + Shift + Key
I	Cycle thru 3 **Deinterlacing Modes**			
L	**L-Bar** toggle On/Off	**Light Levels** (MaxRGB) Image		
M		**Mask / Full Screen** toggle	**Media Info** Report pop-up	
N		**Noise Meter** toggle On/Off	File Open in **New** Window	
O			File **Open** Dialog	
P	**Line Parade** vs. **Frame Profile** toggle		**Print** text data **to VQV.Log**	
Q			**Quit** (Exit) VQV	
R		**R** component Image (**Red**)	**Release / Reopen** media file *same as 'Eject' button*	
S	Cycle thru the **Text Message** types		*Select **Video Stream #*** *if the number of video streams > 1*	
T	**Timeline Info Overlay** toggle On/Off	**T-Filte**r (Temporal High Pass)	**Overlay Auto-hide** On/Off	
U		**UV** components Image	Graticule Grid **Units** toggle: ***RGB** % vs. **Light Level** % or nits*	
V	**VV-Bars** toggle On/Off	Cycle thru 3 **VV Bars Modes**	**VectorScope** toggle On/Off	
W	**Waveform Overlay** On/Off	**Line Parade Persistence**: Low, Medium, High		
X		**XY-Filter** (Spatial HPF/LPF)	**Exit** (Quit) VQV	
Y	In Line Parade Mode WF: **RGB/YUV** toggle	**Y** components Image	**Export** to RAW **YUV** file	
Z	**Zoom** with **Mouse Wheel** – *see above*			

About VideoQ

Company History

- Founded in 2005
- Formed by an Engineering Awards winning team sharing between them decades of global video technology.
- VideoQ is a renown player in calibration and benchmarking of Video Processors, Transcoders and Displays, providing tools and technologies instantly revealing artifacts, problems and deficiencies, thus raising the bar in productivity and video quality experience.
- VideoQ products and services cover all aspects of video processing and quality assurance - from visual picture quality estimation and quality control to fully automated processing, utilizing advanced VideoQ algorithms and robotic video quality analyzers, including latest UHD and HDR developments.

Operations

- Headquarters in Sunnyvale, CA, USA
- Software developers in Silicon Valley and worldwide
- Distributors and partners in several countries
- Sales & support offices in USA, UK

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