

# VQC – VideoQ Colorator™

VideoQ **HDR** ⇔ **SDR** Conversion Tool

Software tool for on premise and cloud tasks

*December 2024*



[www.videoq.com](http://www.videoq.com)

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# HDR–SDR Conversion – Criteria for Success

*The only criteria of success is a Happy Viewer and a visual impact of wonderful video images.*

Modern HDR cameras and display screens are much better than their prior-art SDR counterparts.

However the content quality and its availability is dragging behind.



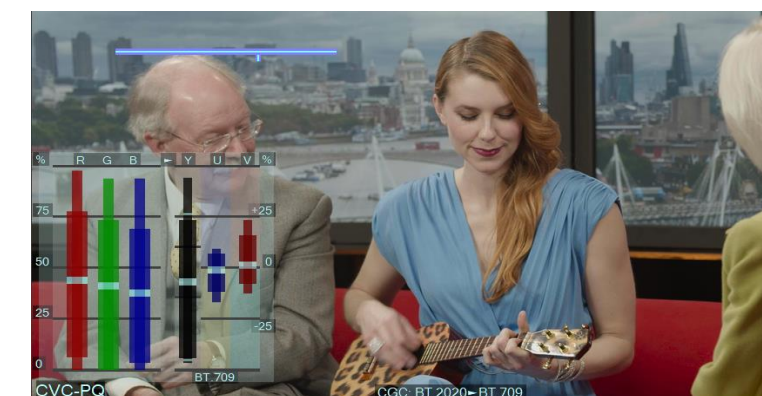
Important facts are:

- **SDR content** made via **HDR to SDR down-conversion** is significantly better than regular SDR content.
- **HDR content** made via **SDR to HDR up-conversion** is nearly as good as regular HDR content, but the **production cost** is order of magnitude **lower**.

There are only **two valid questions**:

1. Are **Video Data Levels** and **Light Levels** suitable for the **distribution context**, e.g. for **streams switching** and **adverts/captions insertion**?
2. Do the converted **images at the workflow output look good** to millions of viewers?

HDR⇒SDR Conversion by VQC



We **should not** compare **fundamentally different** video images of *the same object*.

- Original HDR (*WCG*) or SDR image (*WCG UHD or NCG HD*),
- Down-converted HDR to SDR image (*WCG UHD or NCG HD*),
- Up-converted SDR to HDR image (*WCG to WCG or NCG to WCG*),

Why? Because they belong to at least **three** quite different **workflows** and quite different **viewing conditions**.

# Dynamic Range Conversion – Necessity & Options



- **Mixed SDR/HDR environment** requires SW and HW engines for the up, down and cross-conversion within and/or between all formats, with additional appropriate resolution/detail management.
- This functionality is also related to the optimal choice of a mezzanine Dynamic Range format, coupled with equipment choice in a mixed SDR/HDR environment.

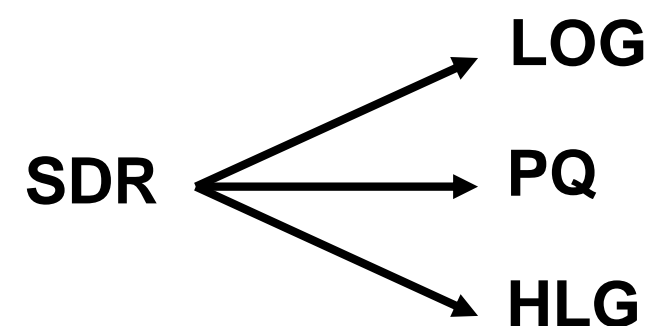
## HDR 10



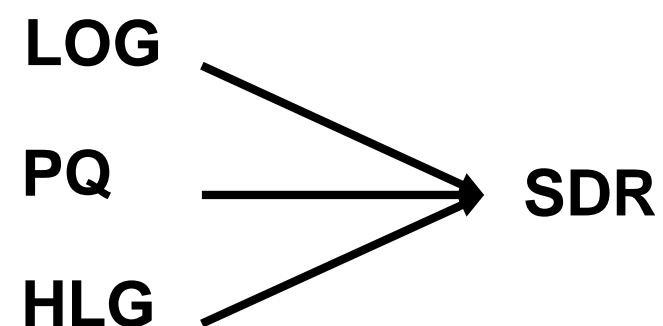
## HDR 10+



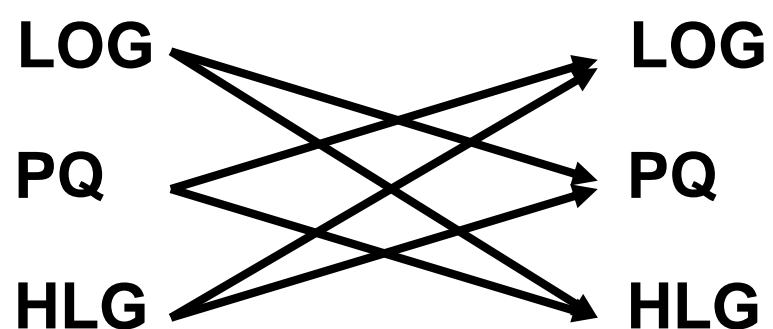
### DR Up-conversion



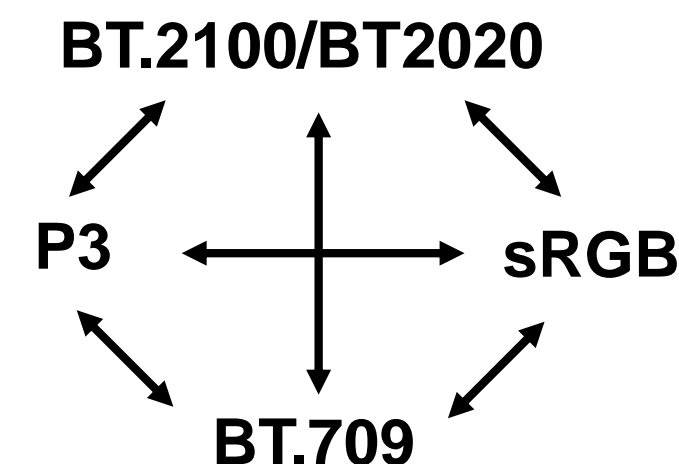
### DR Down-conversion



### DR Cross-conversion



### And Color Space Conversion





# VQC – Dynamic Range and Color Space Converter

VQC is a Windows/Linux CLI program that reads a media file or sequence of **image files**, measures its video frames parameters, **converts** the content to the specified **dynamic range** and **color space** format, then creates a **Report** in **JSON** format and optionally plot the output LL profile in **PNG** format.

Supported input and output **dynamic range** formats:

- SDR,
- HDR-PQ,
- HDR-HLG

Supported **color primaries**:

- **BT.709** (*aka NCG = Narrow Color Gamut*),
- **BT.2020** (*aka WCG = Wide Color Gamut*),
- **P3** (*aka ECG = Expanded Color Gamut*)

Supported **frame sizes**:

from **1920x1080** (HD)  
to **8192x4096** (8K)

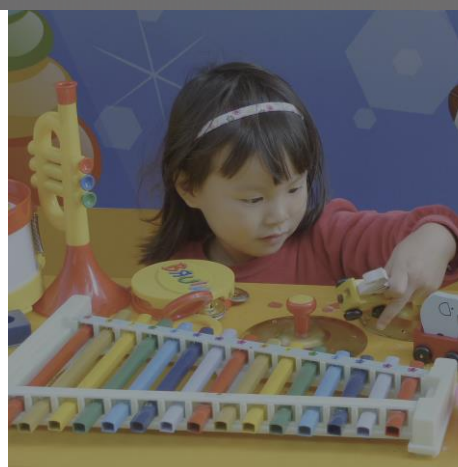
Learn more about **VQC Colorator™**

<http://www.videoq.com/vqc.html>

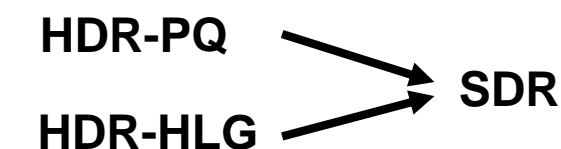
SDR BT709 422p10



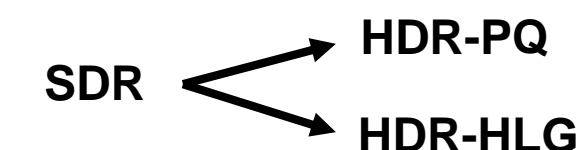
SDR⇒HDR Conversion with CVC  
HDR10 P3 BT2020 422p10



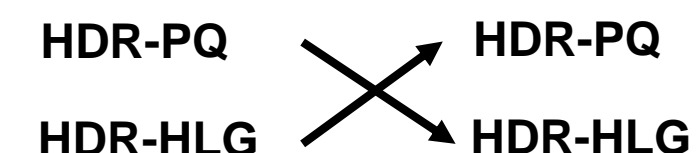
*DR Down-conversion*



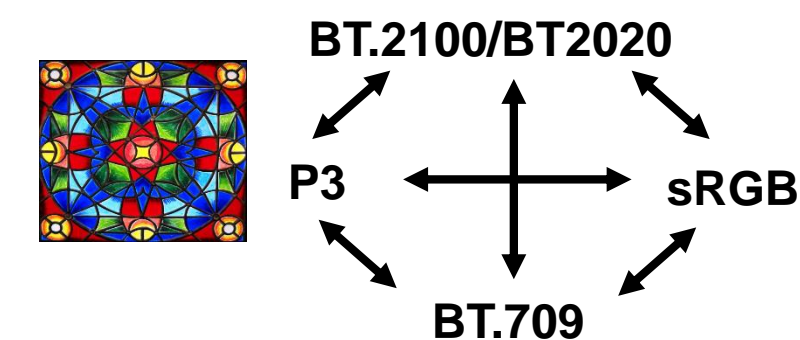
*DR Up-conversion*



*DR Cross-conversion*



*And Color Space Conversion*



# VQC Demo Samples for Online Preview and Download

## 1. Example of HDR-PQ to SDR conversion

Click to start DropBox Preview/Download:



- [HDR Source](#): UHD 16:9 120fps **HDR10** BT.2020, 4 min long fragment of Netflix Open Content 'Nocturne' MP4 clip
- [SDR Output](#): HD 16:9 60fps, **SDR** BT.709, 4 min long MP4 clip

## 2. Example of SDR to HDR-PQ conversion

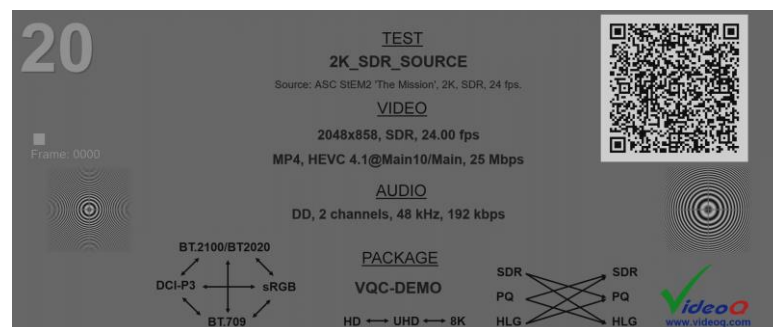
Click to start DropBox Preview/Download:



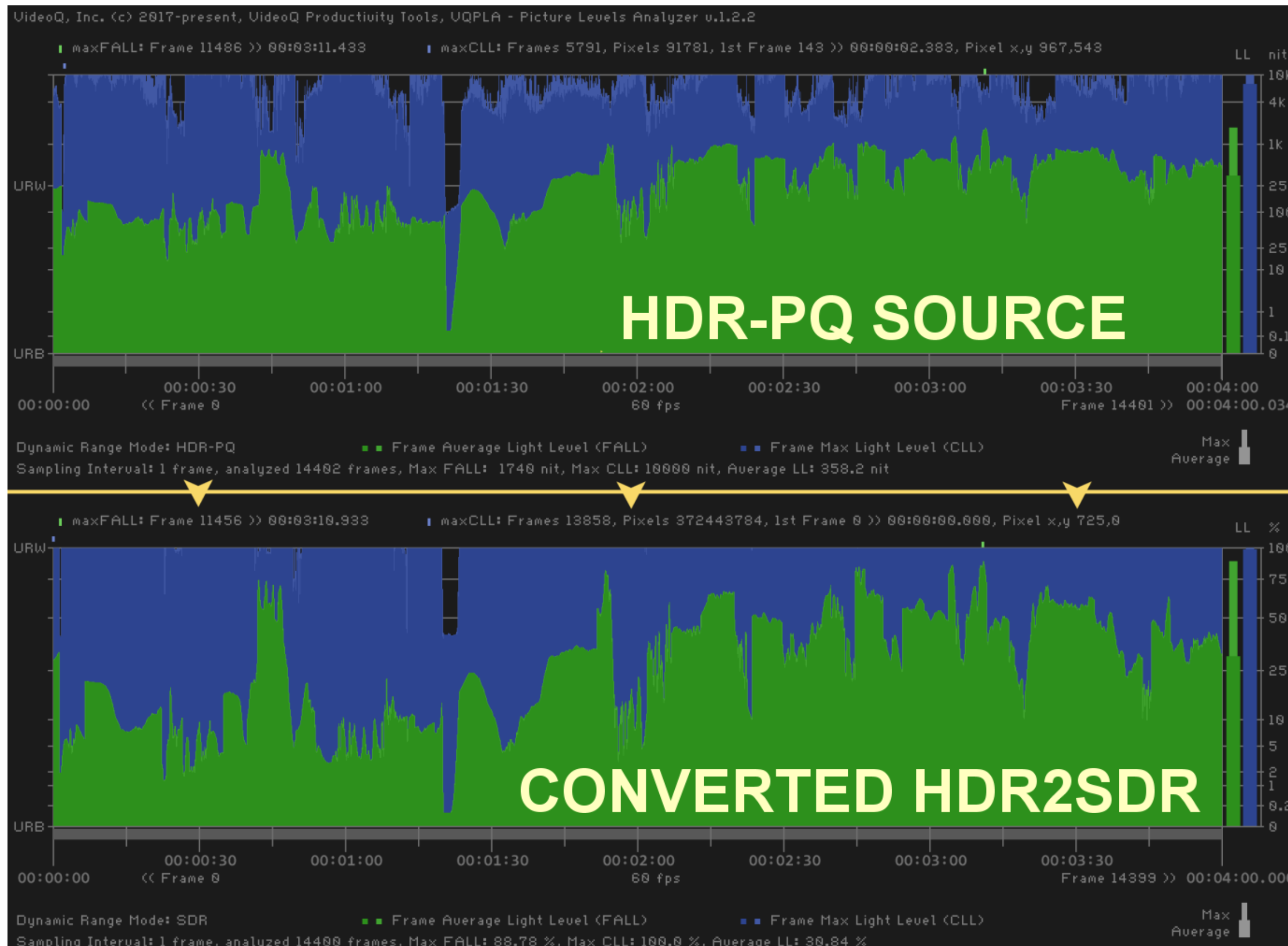
- [SDR Source](#): 2K 2.39:1 (2028x858) 24fps **SDR** BT.709, 5 min long fragment of ASC StEM2 'The Mission' MP4 clip
- [HDR Output](#): 2K 2.39:1 (2028x858) 24fps, **HDR10** BT.2020, 5 min long MP4 clip

Each demo clip starts with contains standard VideoQ 20s long leader, consisting of: 10s long Text Box with QR code, 8s of VQCB Test Pattern and 2s Black.

<http://www.videoq.com/vqcb.html>



# VQC Demo Files Part 1 – From HDR to SDR



The **top half** of the image on the left is the **Light Levels Profile** of Netflix ‘Nocturne’ clip, UHD HDR-PQ 4 min long **input** fragment aka **HDR-PQ Source**.

The PNG plots are created by VideoQ **VQPLA** analyzer.

- X axis is timeline, time code values are printed underneath
- Y axis logarithmic scale is in PQ LL nits (cd/sq.m) or SDR LL percents.

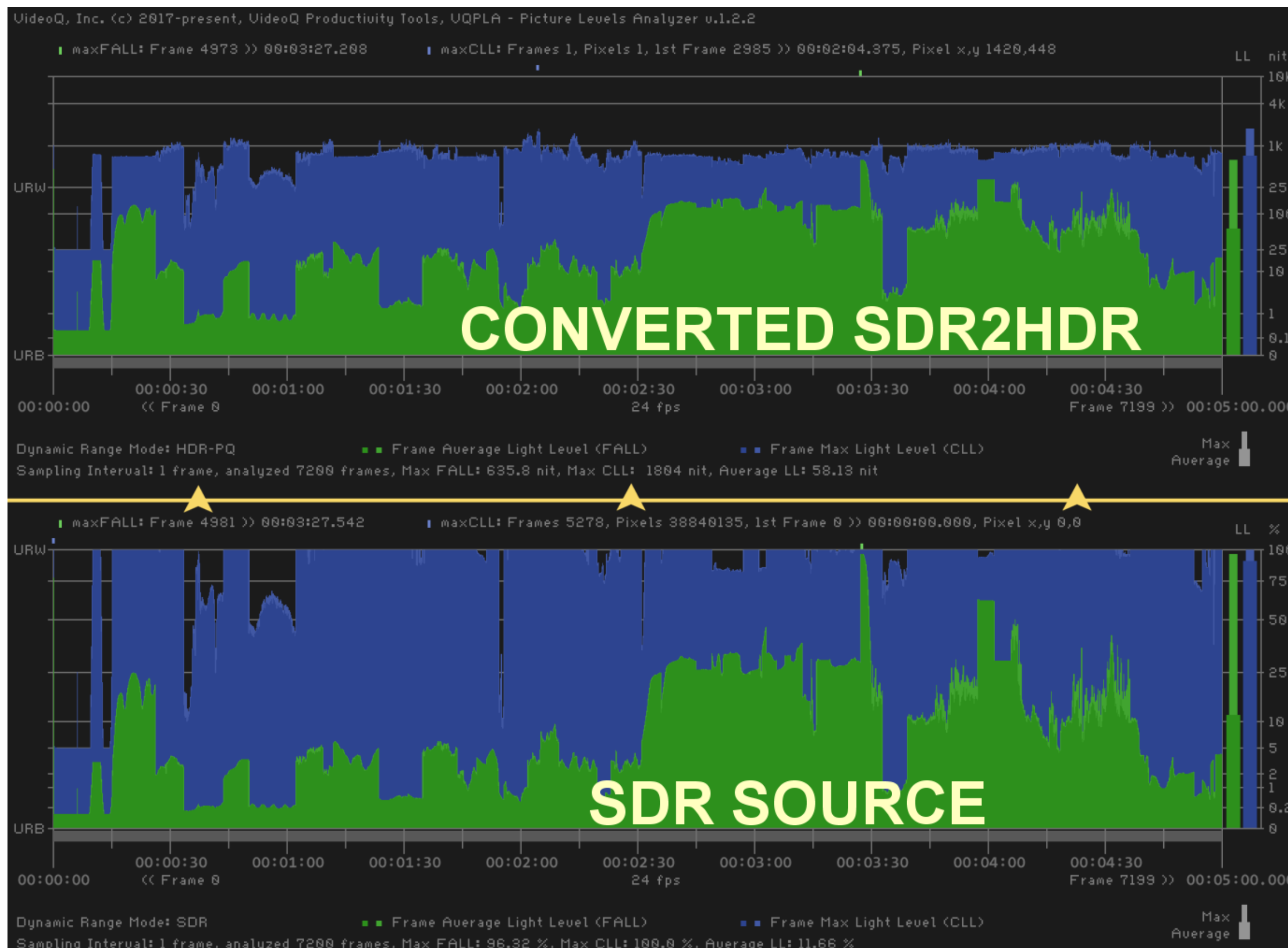
Light Levels are calculated frame-by-frame. **FALL** values are in **Green**, **CLL** values are in **Blue**.

Bars on the right show statistical Max and Average values for FALL and CLL profiles.

The **bottom half** of the image on the left is the **Light Levels Profile** of Netflix ‘Nocturne’ clip, HD SDR 4 min long **output** fragment aka **Converted HDR2SDR**.



# VQC Demo Files Part 2 – From SDR to HDR



The **top half** of the image on the left is the **Light Levels Profile** of StEM2 'The Mission' clip, HD HRD-PQ 5 min long **output** fragment aka **Converted SDR2HDR**.

The PNG plots are created by VideoQ **VQPLA** analyzer.

- X axis is timeline, time code values are printed underneath
- Y axis logarithmic scale is in PQ LL nits (cd/sq.m) or SDR LL percents.

Light Levels are calculated frame-by-frame. **FALL** values are in **Green**, **CLL** values are in **Blue**.

Bars on the right show statistical Max and Average values for FALL and CLL profiles.

The **bottom half** of the image on the left is the **Light Levels Profile** of StEM2 'The Mission' clip, HD SDR 5 min long **input** fragment aka **SDR Source**.



# VQC Usage Info Helper

Launching VQC executable without any parameters, or with `-h` flag, brings up the following help message:

Usage (see more in ReadMe):

```
vqc [-c configFilePath] -i inPath -o outPath
```

Order of flags and parameters is mandatory and cannot be changed

Other user controls and parameters are stored in the **\*.INI** config file

If **[-c configFilePath]** is omitted, then VQC uses **VQC.INI** file co-sited with vqc executable

If VQC.INI file is not found, then it will be auto-created with the default control values

Path string can be path to file or folder: **Path\FileName.EXT** or **Path to folder**

If inPath is a folder, then VQC finds and opens a sequence of numbered image files

VQC can open **all common image file formats**, e.g. 0001.TIFF, 0002.TIFF, ...

VQC can also open **raw YUV/RGB video files**, e.g. 0000.RGB, 0001.RGB, ...

If **outPath is a folder**, then VQC writes a sequence of numbered `rgb48le 08d.TIFF` files

**JSON Report** file is created automatically as `outPath\FileName.EXT.vqc.json` or `outPath\vqc.json`

**Optional Plot file** is created automatically as `outPath\FileName.EXT.vqc.png` or `outPath\vqc.png`

If Path or FileName contains spaces or special characters use double quotes

All File names, Report and Log files are in multi-lingual UTF-8 encoding format

# VQC Configuration File Structure

```
;VideoQ VQC.INI file created 2023-04-20T17:39:27.937Z
;VQC: VideoQ Colorator(TM) - Dynamic Range and Color Space Converter
;User can edit or replace this file as needed, add your note here:
;
[ConfiguredBy]
ConfiguredBy=Victor Steinberg
[Source_DR_Type]
Source_DR_Type=AUTO
[Source_DR_Primitives]
Source_DR_Primitives=AUTO
[Target_DR_Type]
Target_DR_Type=PQ
[Target_DR_Primitives]
Target_DR_Primitives=P3
[SDR2PQ_RefWhite_nit]
SDR2PQ_RefWhite_nit=400
[SDR2HLG_RefWhite_pct]
SDR2HLG_RefWhite_pct=75
[PQ2SDR_Range_nit]
PQ2SDR_Range_nit=1000
[HLG2SDR_Range_pct]
HLG2SDR_Range_pct=100
[InputRawVideoFrameSize]
InputRawVideoFrameSize=1920x1080
[InputRawYUVPixelFormat]
InputRawYUVPixelFormat=yuv444p12le
[InputRawRGBPixelFormat]
InputRawRGBPixelFormat=rgb48le
[OutputFileExtension]
OutputFileExtension=MP4
[OutputFileCodec]
OutputFileCodec=h265
[OutputPixelFormat]
OutputPixelFormat=420p10le
[TimelineProfile]
TimelineProfile=YES
[PlotFileOut]
PlotFileOut=YES
```

# VQC and Related VideoQ Tools

Other VideoQ products with HDR support:

**VQV** – HDR / SDR Multi-format Media Files Viewer/Player/Analyzer/Converter

<http://www.videoq.com/vqv.html>

**VQMP** – Advanced QA/QC Media Player compatible with **VQV** Viewer-Analyzer

<http://www.videoq.com/vqmp.html>

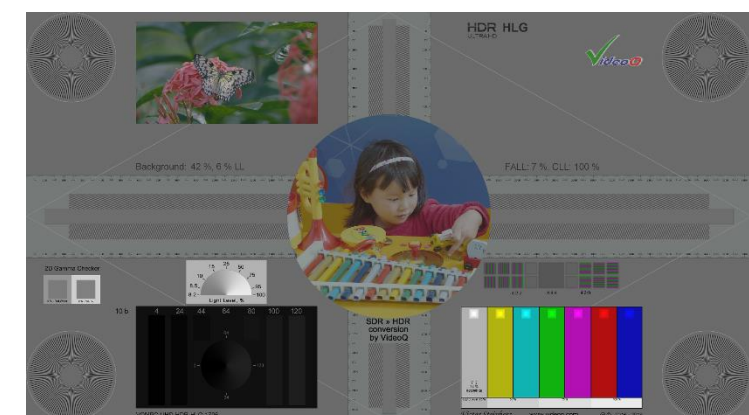
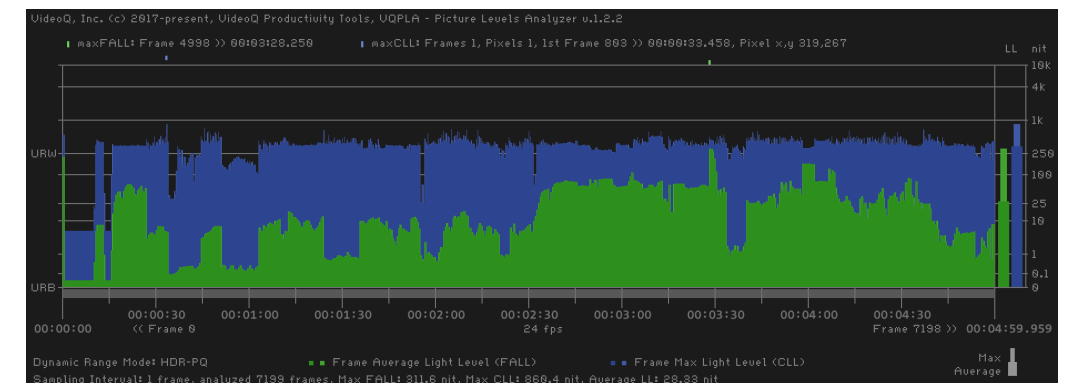
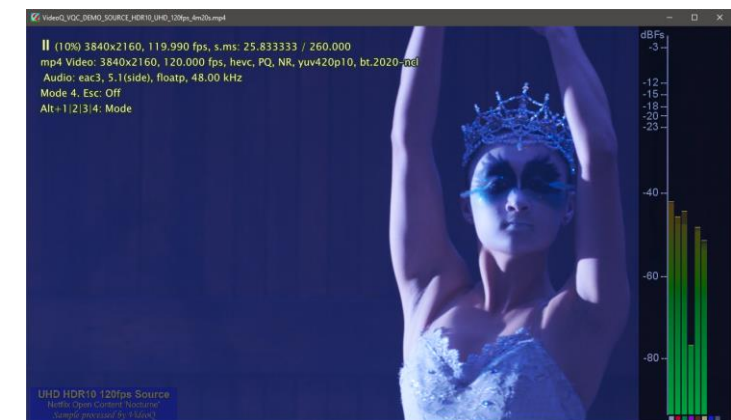
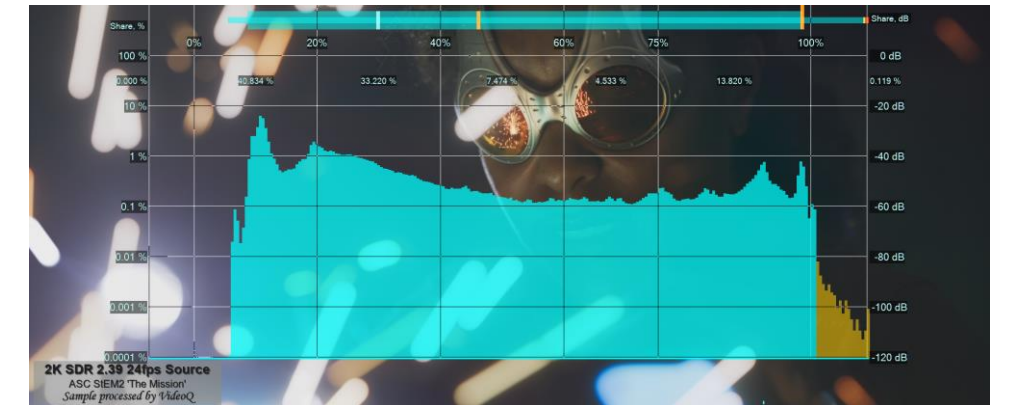
**VQPT** – VideoQ Productivity Tools, suite of analysis and processing software modules

<http://www.videoq.com/vqpt.html>

**VQPLA** – Picture Levels Analyzer (**VQPT** module)

**VQL** – Comprehensive Library of sophisticated Test Patterns and Sequences

<http://www.videoq.com/vql.html>





# About VideoQ

## Customers & Partners



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