VQLA – Levels Alignment HDR Test Pattern

Visual **Aural**
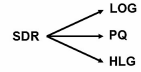
Objective Automated

HDR 10
DR Up-conversion
LOG
SDR → PQ
HLG

DR Down-conversion
LOG
PQ → SDR
HLG

HDR 10+
DR Cross-conversion
LOG → LOG
PQ → PQ
HLG → HLG
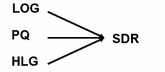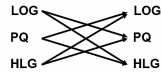
And Color Space Conversion
BT.2100/BT2020
DCI-P3 ↔ sRGB
BT.709
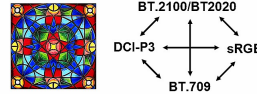
- Static test pattern for levels alignment, metadata handling, displayed light levels range and tone-mapping performance check
- Mixed HDR / SDR environments require software and hardware engines for verification, optional manual and / or automated enhancement, up, down, and cross-conversion within and/or between all HDR / SDR formats and color spaces
- Simple and repeatable QA / QC procedures should be based on the implementation of the same Reference Levels

VQLA-PQ Test Composition

10 Two-tones Patches
and 14 **Overload Indicators**
aimed at testing
Display Clipping Levels

7 White SPLUGE
Conical Grayscales
aimed at testing
Display Clipping Levels

Special set of **HDR Color Bars**
aimed at testing
Display Light Output Profile
and **Color Space Conversion**

Black PLUGE rectangles and
Black SPLUGE Conical Grayscale
on **Reference Black** background
aimed at testing
Display Min Brightness

Valid Range 10 bit Linear Ramp
with critical levels markers
aimed at testing
Display Tone-mapping Uniformity ("Banding")

Precise **FALL & CLL r**eadout
aimed at calibration & testing of
Content Levels Analyzers

Special **HDR Grayscales**
(light and signal levels set)
aimed at testing
Display Light Output Profile
and **Clipping Levels**

Levels Alignment Test
FALL: 400 nt · CLL: 10,000 nt
Victor Steinberg www.videoq.com

VQLA-HLG Test Composition

VQLA-HLG version of the test pattern looks like the simplified variant of the PQ version.

There are no color space conversion test components and there is only one Conical Grayscale (White SPLUGE).

This makes VQLA-HLG version more suitable for fast setup and spot checks in live events coverage conditions.

Important fact is that both PQ and HLG versions of the VQLA test pattern share the same **Unified Reference White** (**URW**) concept.

URW does not rely on any particular HDR flavor, display type or display gamma.

Upper half of HLG test is occupied by traditional **75% Color Bars**:
HLG **Light Level 26.5%**, 10 bit value **720**.

Bottom half is occupied by the **74% Color Bars** (**25% Light Level**), compatible with the PQ and SDR versions in accordance with the **URW** concept.

Note that the 1000 nit value is used only for HLG level scaling purposes, **NOT** as a target HLG device specification.

A commonly accepted **Reference White** is needed for content production, post-production, distribution and product verification.

Levels Alignment Test
FALL: 22 % · CLL: 100 %
Victor Steinberg www.videoq.com

HDR Unified Reference White (URW) Video Data Levels are:

- **60%** of **PQ** Data Range, Light Level **250 nit** (2.5%), 10 bit value **592**
- **74%** of **HLG** Data Range, Light Level **25%**, 10 bit value **710**

For the widespread HLG 1000 nit display case both URW values correspond to the same **250 nit** Video Content Light Level.

info@videoq.com • www.videoq.com

VQLA – Levels Alignment HDR Test Pattern

Features

- Dynamic Range Modes: HDR-PQ and HDR-HLG versions
- Unified Reference White (URW) and other critical RGB/YUV levels
- Color Space: BT.2100, PQ version includes special BT.709 and DCI-P3 bars
- Suitable for:
  - Visual quality assessment
  - Instrumental measurements
- Calibration and verification tools for:
  - Video installers
  - R&D labs
  - Production, post-production and content distribution facilities

Frame Size

3840x2160

Frame Rate

From **23.976 fps** to **60 fps**

Raw Video File Format

YUV: planar 4:4:4, 10 bit, single frame

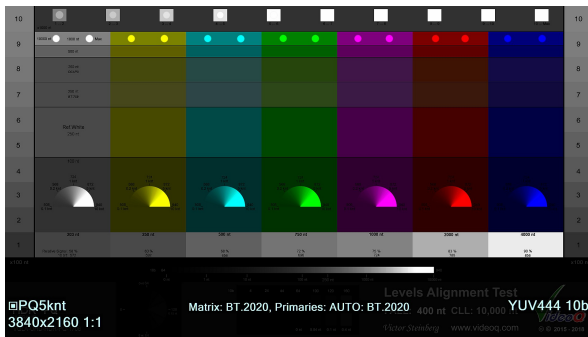## Encoded Media File Formats

MOV: High bitrate 444 ProRes
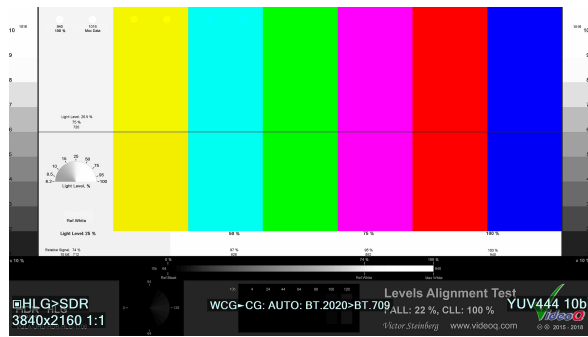
MP4: 4:2:2 or 4:2:0, 10 bit

Other formats, e.g. 48 bit Narrow Range RGB TIFF, are available on request

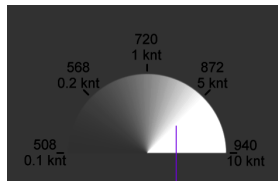## VQLA Test Usage Examples (VideoQ VQV Screenshots)

VQLA-PQ rendered to TDMB 5000 nit range

VQLA-HLG WCG converted to SDR BT.709

VQLA-PQ rendered to TDMB 5000 nit range

0.1 ...10 knt White SPLUGE:
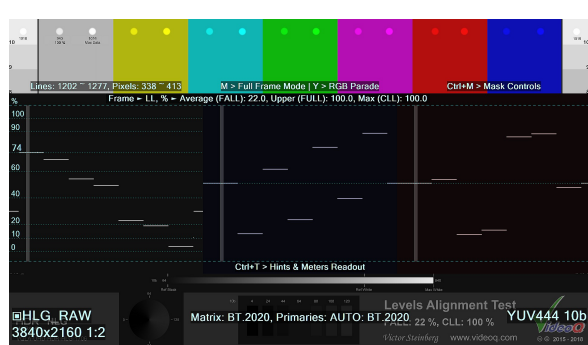shows clipping boundary at 5 knt

4 ... 5 knt and 5 … 6 knt Two-tones Patches:
5 knt Circle within 4 knt Square is visible,
6 knt Circle within 5 knt Square is not visible,
i.e. Light Levels are clipped at about 5 knt

Brightness Control Fine Tuning (SPLUGE)

VQLA-HLG URW Color Bars YUV Waveform

VideoQ, Inc. – Critical Picture Quality Technologies for Broadcast, Consumer Electronics, Transcoding, Video Data Compression, HDR, UHD, WCG, SDR, SD, HD, Digital Cinema, CDN, Mobile TV, IPTV.

We make tools for you to do the best work within the most complicated modern HDR / WCG / SDR video supply chains and multi-format, multi-resolution workflows. We make automatable software for Video Formats Conversion, Video Parameters Normalization, Video Processing Chain Integrity & Performance Validation.

Detailed Training Presentations and more information are available from VideoQ website, VideoQ Technical Blog and VideoQ YouTube Channel.
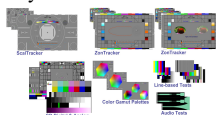
Related VideoQ products:

VQMA	**VQL**	**VQV**
Video Analyzer and Scope	Library of Advanced Test Patterns	Media Files Viewer-Analyzer