



# **A Video Quality Test & Measurements Collection**

Version 4.1, May 2009

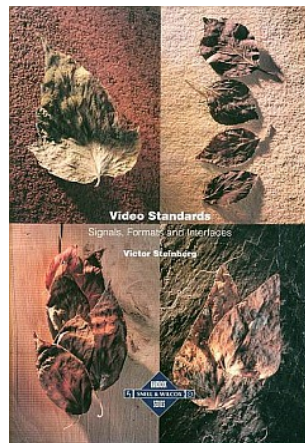
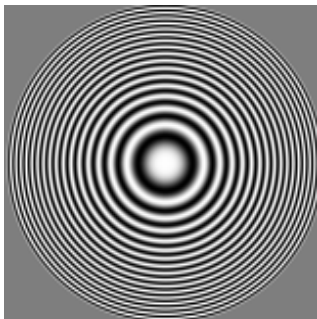


# VideoQ, Inc.

VideoQ is a California-based company, focused on video test & measurement and video enhancement technologies, products and services.

More than 50 man-years of award-winning experience in the field of Broadcast, Consumer Electronics, Transcoding and Video Data Compression.

Critical Picture Quality Technologies for Broadcast, Consumer Electronics, Transcoding, Video Data Compression, SDTV, HDTV, Digital Cinema, Mobile TV, IPTV.



# VideoQ Mission - Picture Quality Assurance

In a world of increasing video formats and resolutions and where the continued use of legacy standards such as analogue and interlace, there is a need to maintain quality through multiple de-interlacers, compression codecs, scalers etc.

It is VideoQ's mission to assist the development of quality-preserving system chains by highlighting the effects of concatenated filters of every type.

Comprehensive system analysis allows to investigate the most complicated issues, including modern multi-format, multi-resolution workflows with concatenated codecs/processors.

# **VideoQ = IP + Technologies**

## **Test Patterns Generation**

Unique set of tools generating extremely accurate deterministic and pseudo-random test components in YUV and RGB formats with precise sub-pixel positioning and sub-pixel motion profiles.

## **Video Quality Subjective Evaluation**

Guides, Tutorials, Scoring & Benchmarking Procedures

## **Video Data Path Objective Measurements**

Algorithms and Programs, including Automated Analysis Tools

# Who needs VQL?

## I **Video professionals:**

VQL is the same as X-Ray/MRI for medical practice – complicated or hidden video processing problems become instantly visible at glance

## I **Content providers and aggregators:**

Buying QC/QA products from VQL family you are buying peace of mind

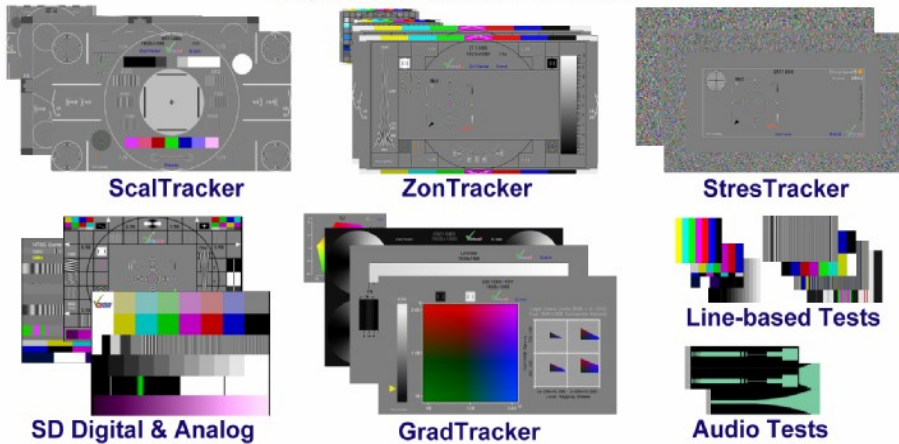
## I **Technology developers:**

VQL drastically reduces development and/or QA time and money – thanks to VQL days of tedious analysis became seconds

# VQL for Software and Hardware Applications



## VQL Collection Families



VQL Compatible Hardware Players/Generators



3Genie by NuMedia



VQS & VQTS by VideoQ



Other (3<sup>rd</sup> party) players

Software Coders, Transcoders,  
Players, Analyzers

# VideoQ Approach to VQL

VideoQ approach to VQL combines “classic” and “digital” methodologies, sharing same test patterns and covering all 3 levels of video quality control:

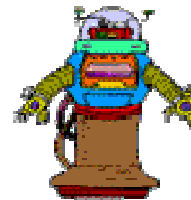
1. **Instant visual-aural Quality Estimation**



2. **Objective Measurements of video and audio performance**



3. **Fully automated (robotic) Quality Control**



# VQL Key Features

- VQL files are designed to be compatible with all commonly used software or hardware codecs and media players.
- Static and dynamic video test patterns are available in a variety of resolutions, interlace modes, aspect ratios and frame rates from QCIF up to 1080p60
- All test patterns remain suitable for accurate measurements even after low bitrate coding, heavy scaling and/or cropping, e.g. after down-conversion for mobile devices
- Full custom compressed and uncompressed test files and application-specific live video clips are available on request

# Available File Formats

## Video

Default video format is .YUV, available in multiple resolutions.

*List of available resolutions may vary within subsets*

**.YUV**, Uncompressed 4:2:2 UYVY raw video – single frame for static test charts or multiple frames for dynamic test patterns

Typical custom video formats:

1. **.AVI**, Uncompressed or compressed (lossless or Xvid compression) 4:2:2 UYVY, progressive, with specified frame rate
2. **.M2TS, .TS**, 4:2:2 or 4:2:0, MPEG2 or H264/AVC compression, MPEG transport stream wrapper with specified bitrate, frame rate and interlace mode

*Full Video Format and Test Patterns customization is also possible on request.*

# Available File Formats

## Still Images

**.BMP**, Uncompressed RGB, 24 bit/pixel

## Audio

Default audio format is:

**.WAV**, Uncompressed PCM, L&R Stereo, 16bits@48kHz

Typical custom audio formats:

1. **.MP3**, MPA1L3, Stereo, CBR, 128 kbps, 16bits@44.1 kHz
2. **.WAV**, LPCM, 5.1 Surround Sound
3. **.AAC**, 5.1 surround sound
4. **.AC3**, 5.1 surround sound

*Full Audio Format and Test Patterns customization is also possible on request.*

# VQL Structure

## 1. Static Basic Tests

Aimed at testing YUV/RGB levels and YUV/RGB frequency response

## 2. Static Advanced Tests

Aimed at checking display gamma, color space conversion (matrixing) and gradations linearity

## 3. Visual ScalTracker Test

Dynamic test aimed at testing cascaded scalers, aspect ratio convertors, and frame rate convertors

## 4. ZonTracker Test

Multi-purpose universal dynamic test to check overall video performance thru scalers, codecs, etc.

## 5. Dynamic Contrast Tests

Allows at glance assessment of luminance gradations rendition - static and dynamic, global and local

## 6. Color Space Explorer Test

Visualize color space transformations - smoothly going thru all 16 millions colors in 8 bit YUV space

## 7. Audio Tests

## 8. Tests for Automatic Analyzers, 3D Video and Compression

# 1. Static Basic Test Patterns

Resolutions: 720x480, 720x576, 1280x720, and 1920x1080

1.1. Color Bars 100/0/100/0

1.2. Color Bars 100/0/75/0

1.3. SMPTE Bars

1.4. Grayscale, 10steps with PLUGE

1.5. Y Ramp with PLUGE

1.6. Pulses and Bars

1.7. Y Sweep

1.8. Y Multiburst Digital

1.9. Blue-Yellow Sweep

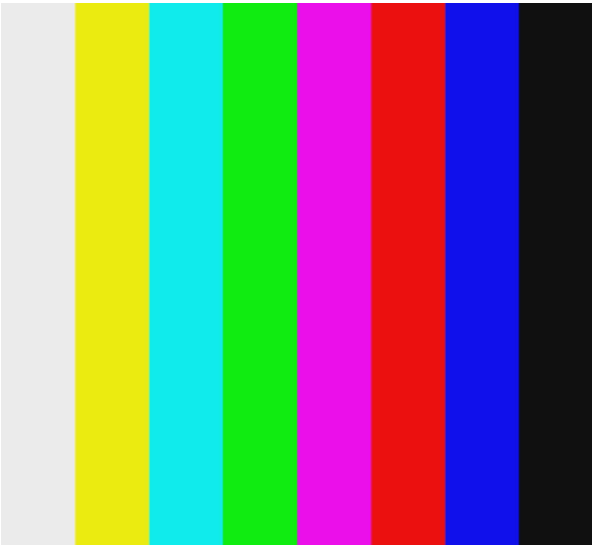
1.10. UV Sweep

1.11. UV Multiburst Digital

1.12. Valid Ramps

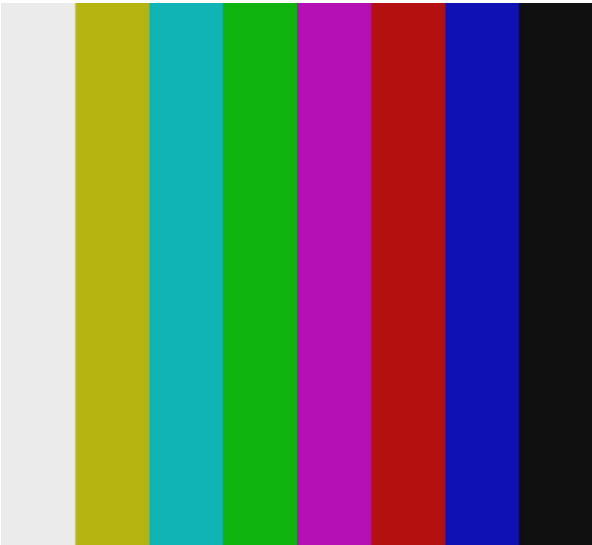
# Static Basic Test Patterns (1)

**1.1. Color Bars**  
**100/0/100/0**



*RGB range: 16-235*

**1.2. Color Bars**  
**100/0/75/0**



*RGB range: 16-235*

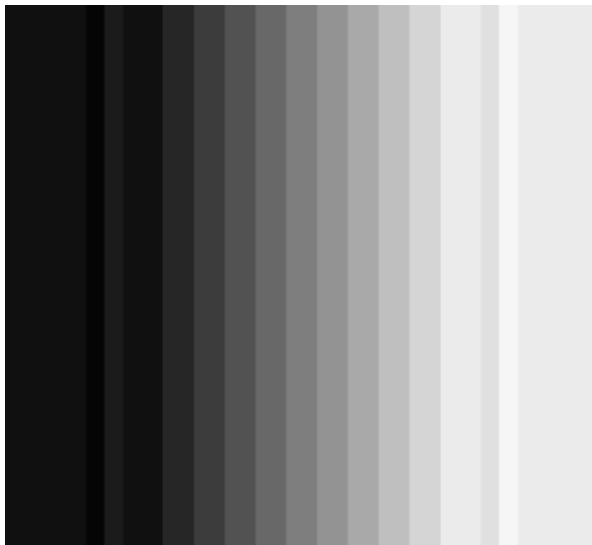
**1.3 SMPTE Bars**



*RGB range: 16-235*

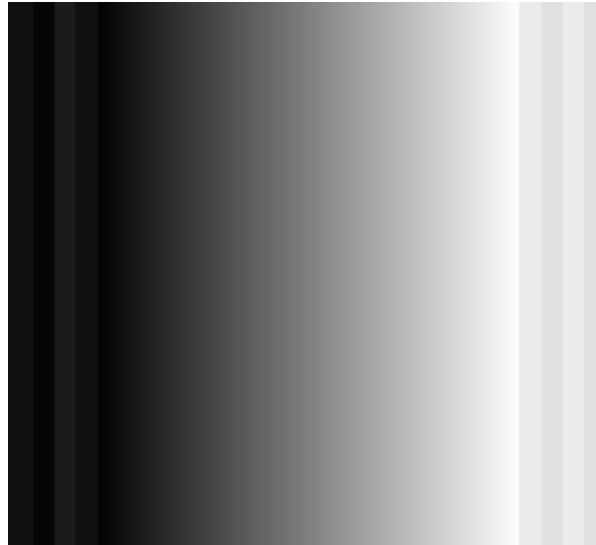
# Static Basic Test Patterns (2)

**1.4. Grayscale-10  
with PLUGE**



*Y range: 16-235*

**1.5. Y Ramp  
with PLUGE**



*Y range: 16-235*

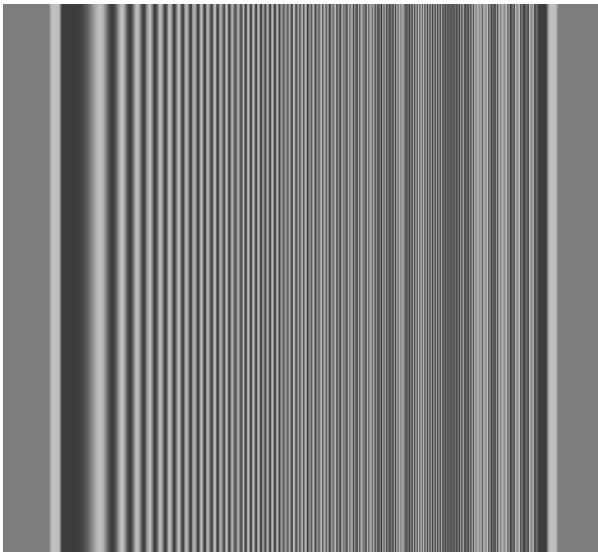
**1.6. Pulses and Bars**



*Y range: 16-235*

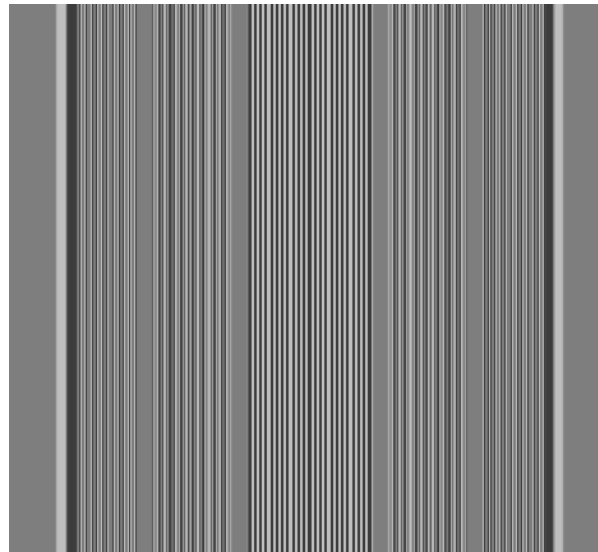
# Static Basic Test Patterns (3)

1.7. Y Sweep



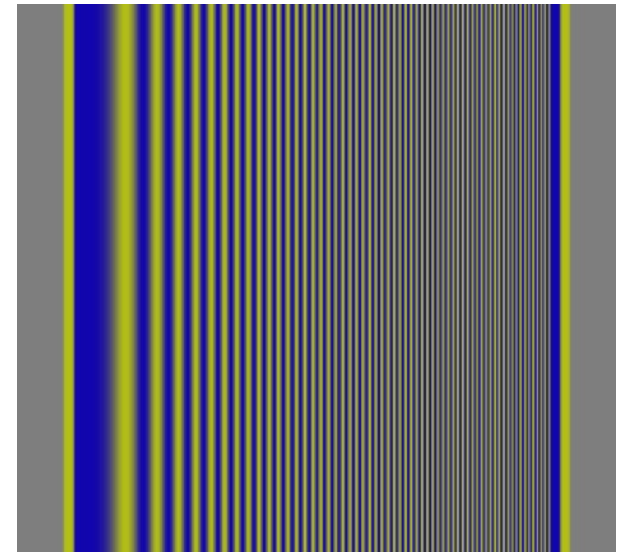
*Min Period: 2.5 Y pixels  
(Max Frequency  $0.4 \cdot FY$ )*

1.8. Y Multiburst Digital



*Periods: 2, 2.5, 4 Y pixels*

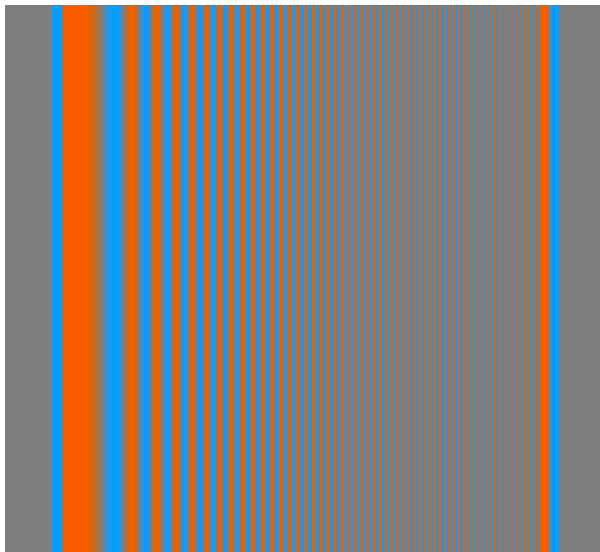
1.9 Blue-Yellow Sweep



*Min Period: 5 Y pixels  
(Max Frequency  $0.2 \cdot FY$ )*

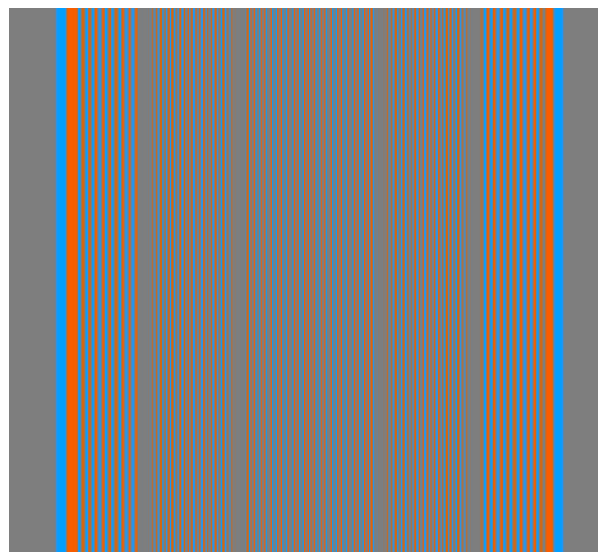
# Static Basic Test Patterns (4)

1.10. UV Sweep



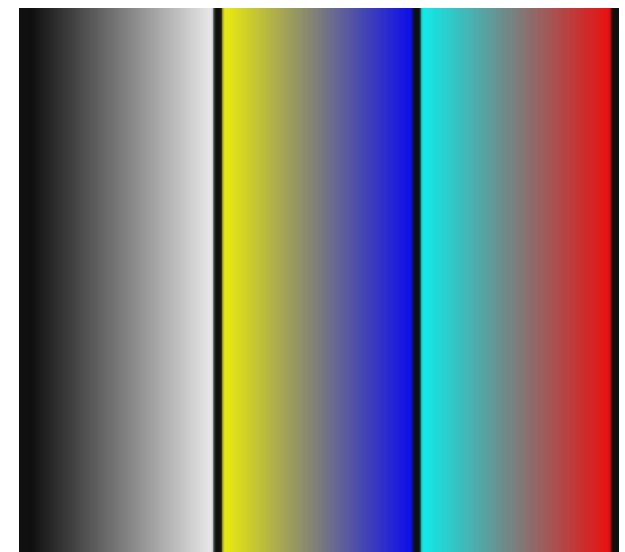
*Min Period: 5 Y pixels  
(Max Frequency  $0.2 \cdot FY$ )*

1.11. UV Multiburst Digital



*Periods: 4, 5, 8 Y pixels*

1.12. Valid Ramps



*RGB range: 16-235*

## 2. Static Advanced Tests

Resolution 1920x1080:

### 2.1. Split Color Bars, 4 Bands

RGB-to-YUV Matrices 709 and 601, levels schemes 16-235 and 0-255

### 2.2 Display Gamma Test

Visual Check Test, Gamma Range: 1 to 3.8, Y ranges: 0-50% and 0-75%

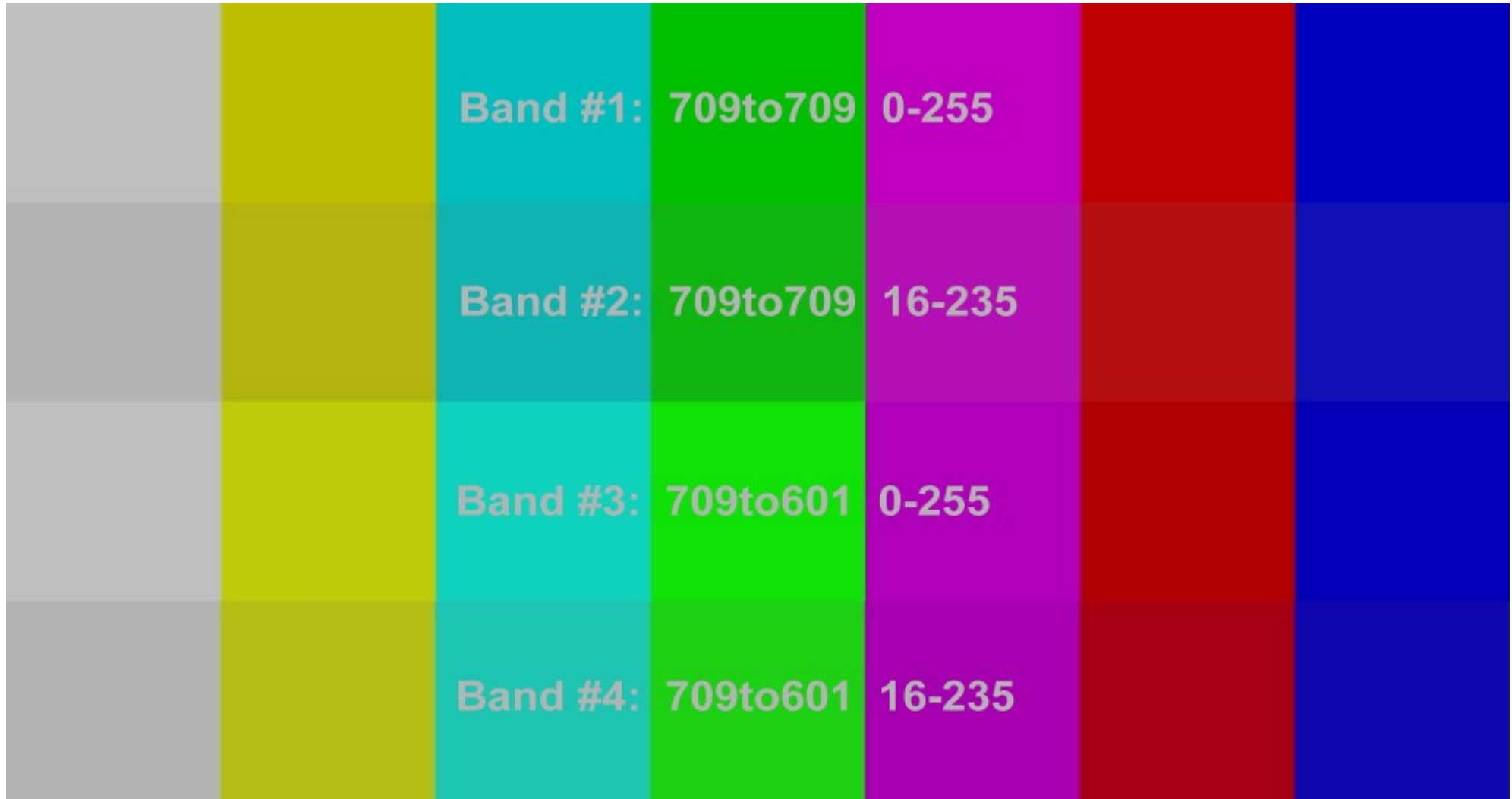
### 2.3 Luminance Linearity Test

Visual check of clipping & banding in three ranges: 215-255, 0-255 and 0-32

### 2.4 YRGB Gradations Test

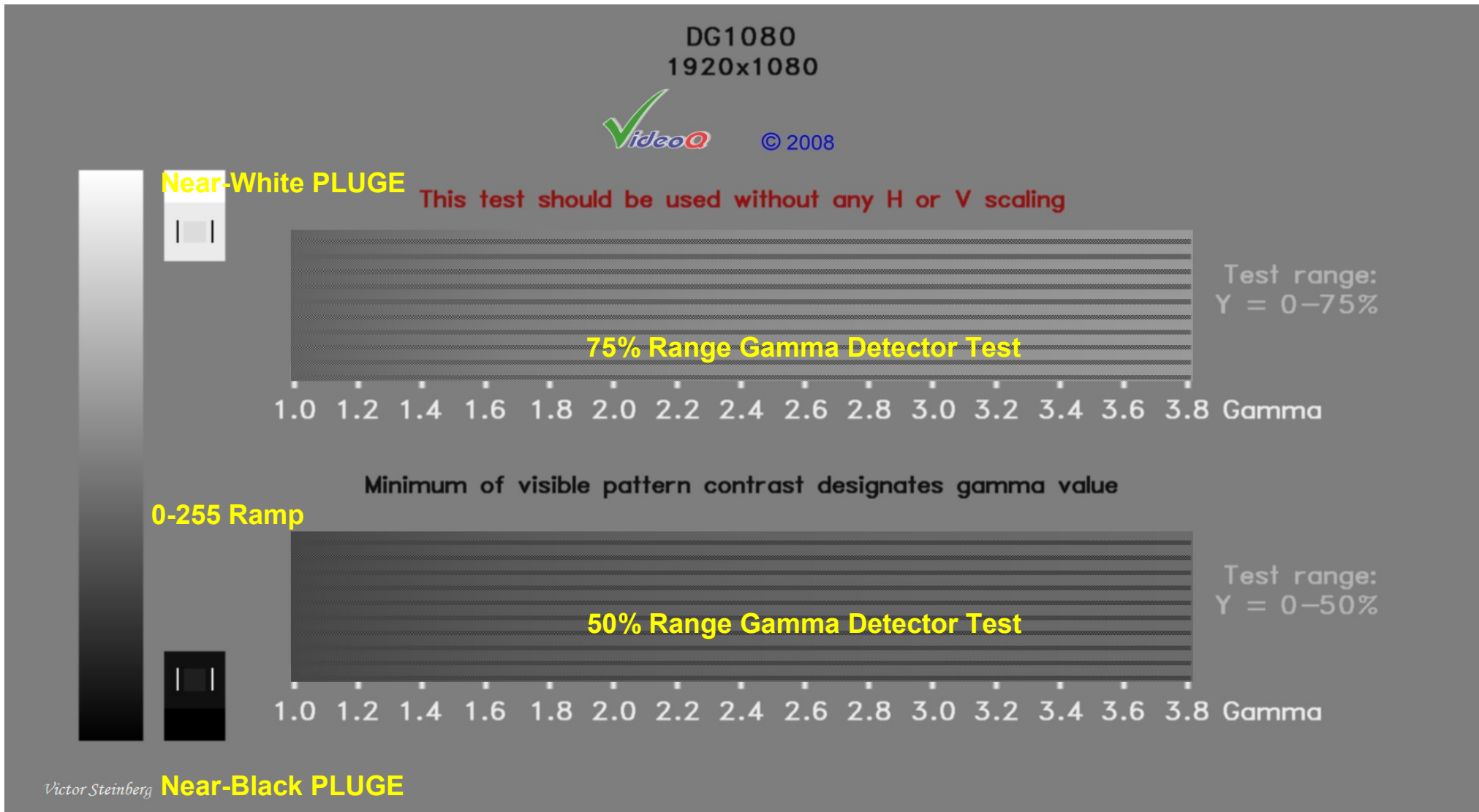
Visual check of clipping & banding, separately for Y, R, G, and B

## 2.1. Split Color Bars 75/0/75/0, 4 Bands



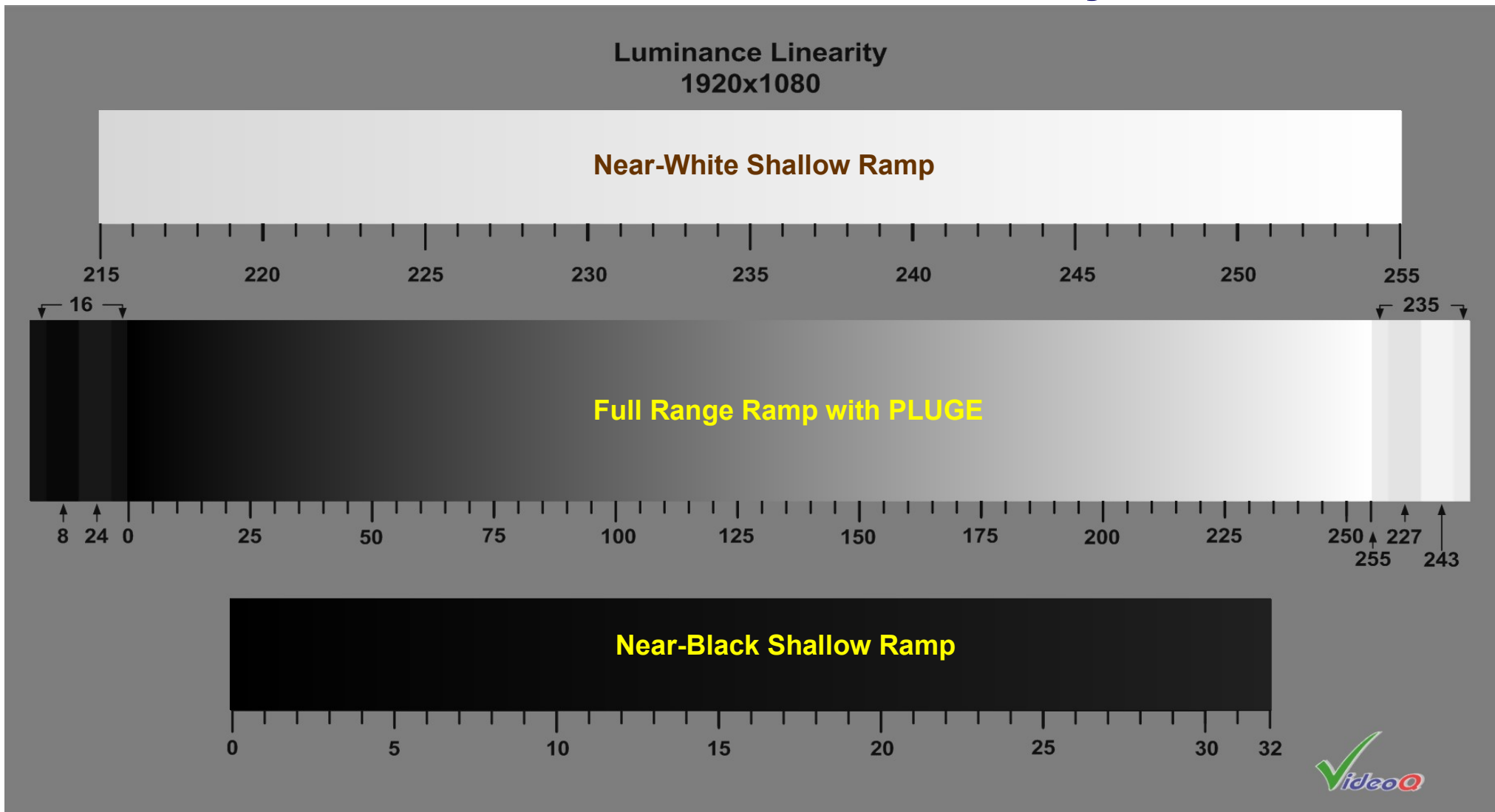
*RGB-to-YUV Matrices 709 & 601, levels schemes 16-235 and 0-255*

## 2.2. DG – Display Gamma Test



- Two multi-strip textured bands allow visual assessment of picture display gamma. These bands test gamma values for two corresponding critical sub-ranges of screen brightness: 0%-75% and 0%-50%
- Black and white PLUGE components and vertical luminance ramp facilitate proper display set-up prior to actual gamma assessment.

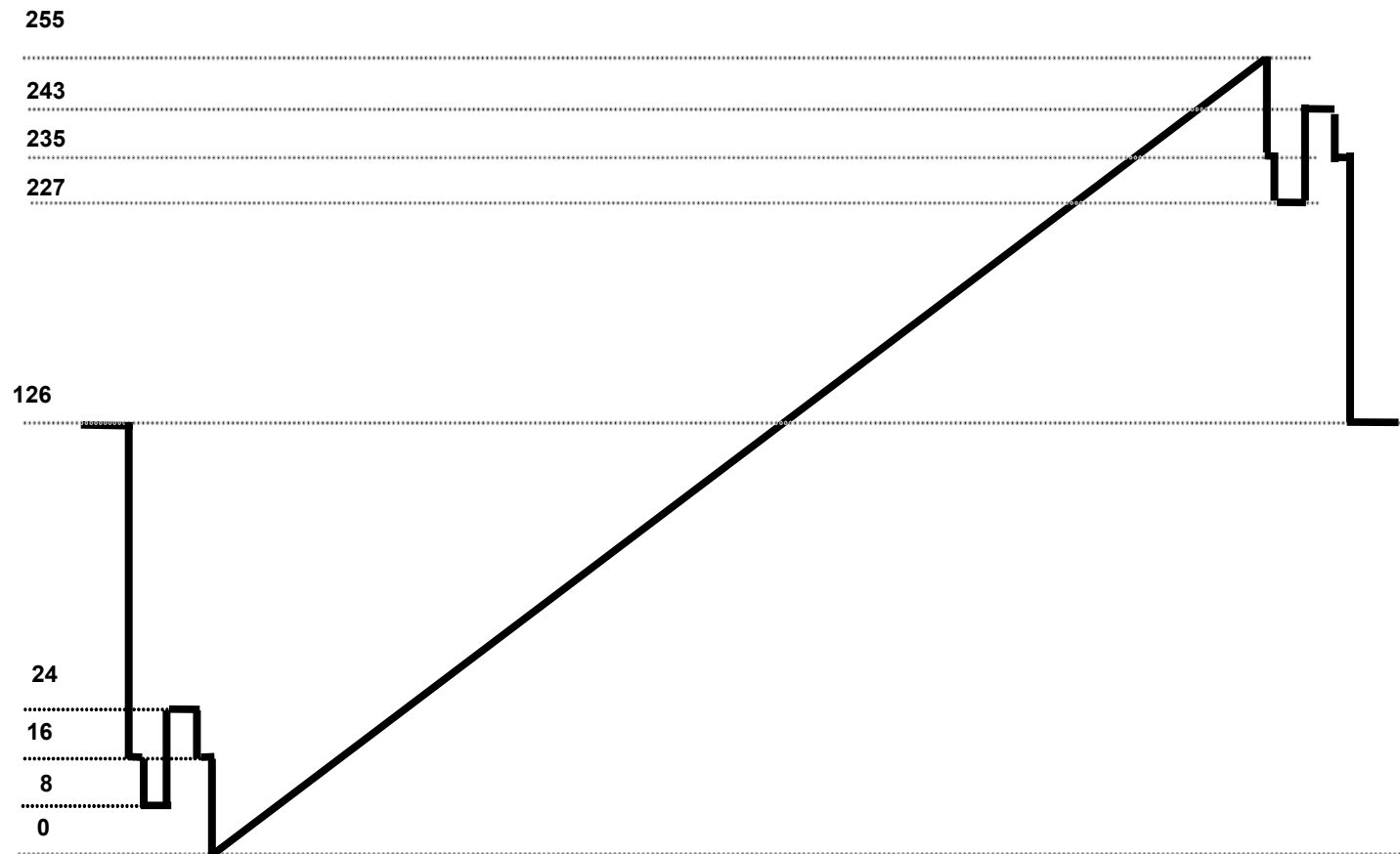
## 2.3. LIN – Luminance Linearity Test



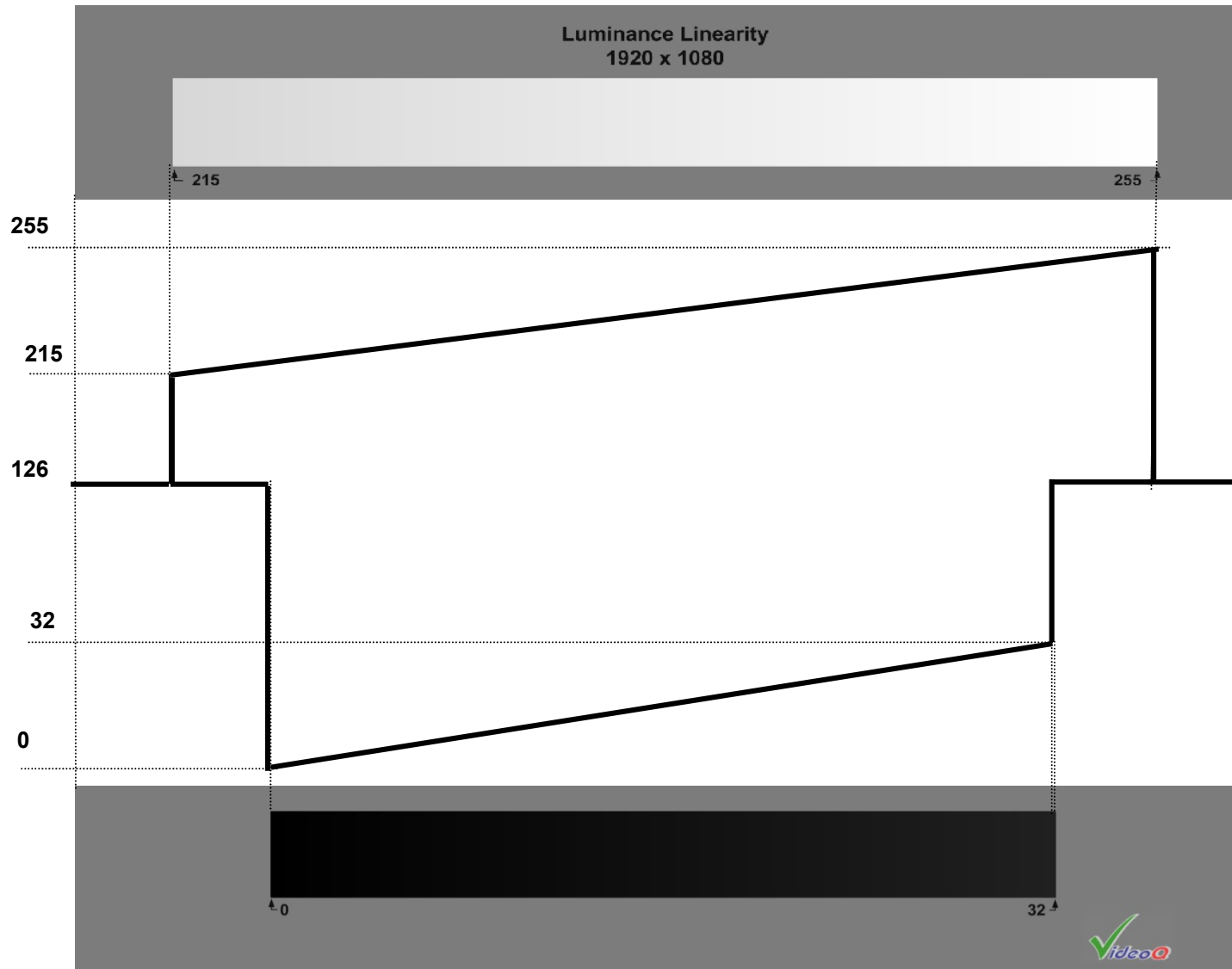
• HD static pattern suitable for Luminance Levels and Linearity Accuracy assessment.

• Featuring full luminance range (0-255) ramp and shallow luminance ramps for two sub-ranges near nominal black (16) and nominal white (235) video levels

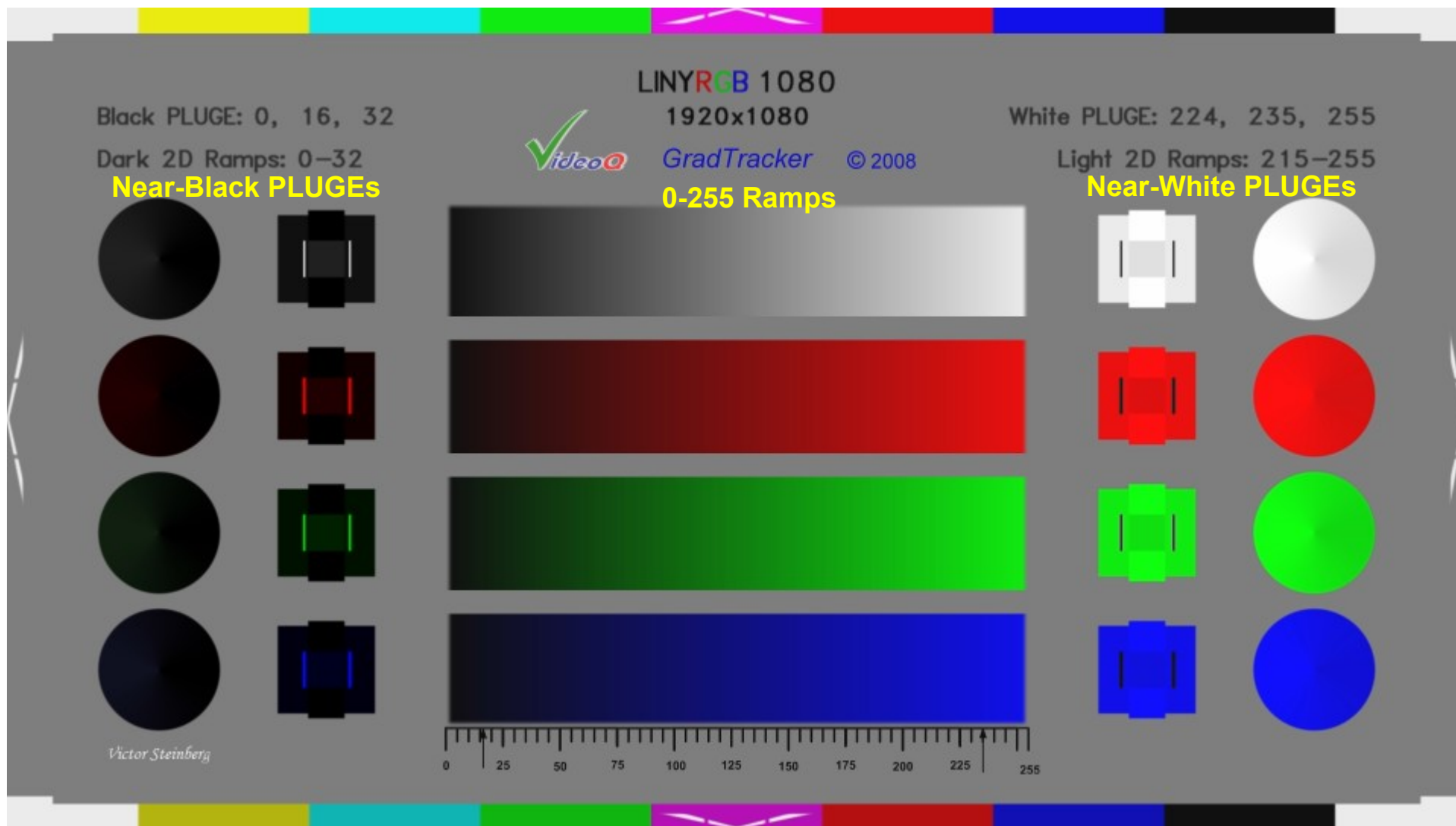
# LIN - Details Of Full Range Ramp with PLUGEs



# LIN - Details Of Shallow Luminance Ramps



## 2.4. LINYRGB – 4 Channels Gradation Test



- ÿ *HD static pattern suitable for Y, R, G and B Levels and Linearity Accuracy assessment*
- ÿ *Featuring 4 full range (0-255) ramps, 2x4 PLUGES and 2x4 2D (conical) shallow ramps*

# 3. VST – Visual ScalTracker

**VST** – *Visual ScalTracker*: Scaling, Cropping, De-interlacing Test

480i60, 480p60,

576i50, 576p50,

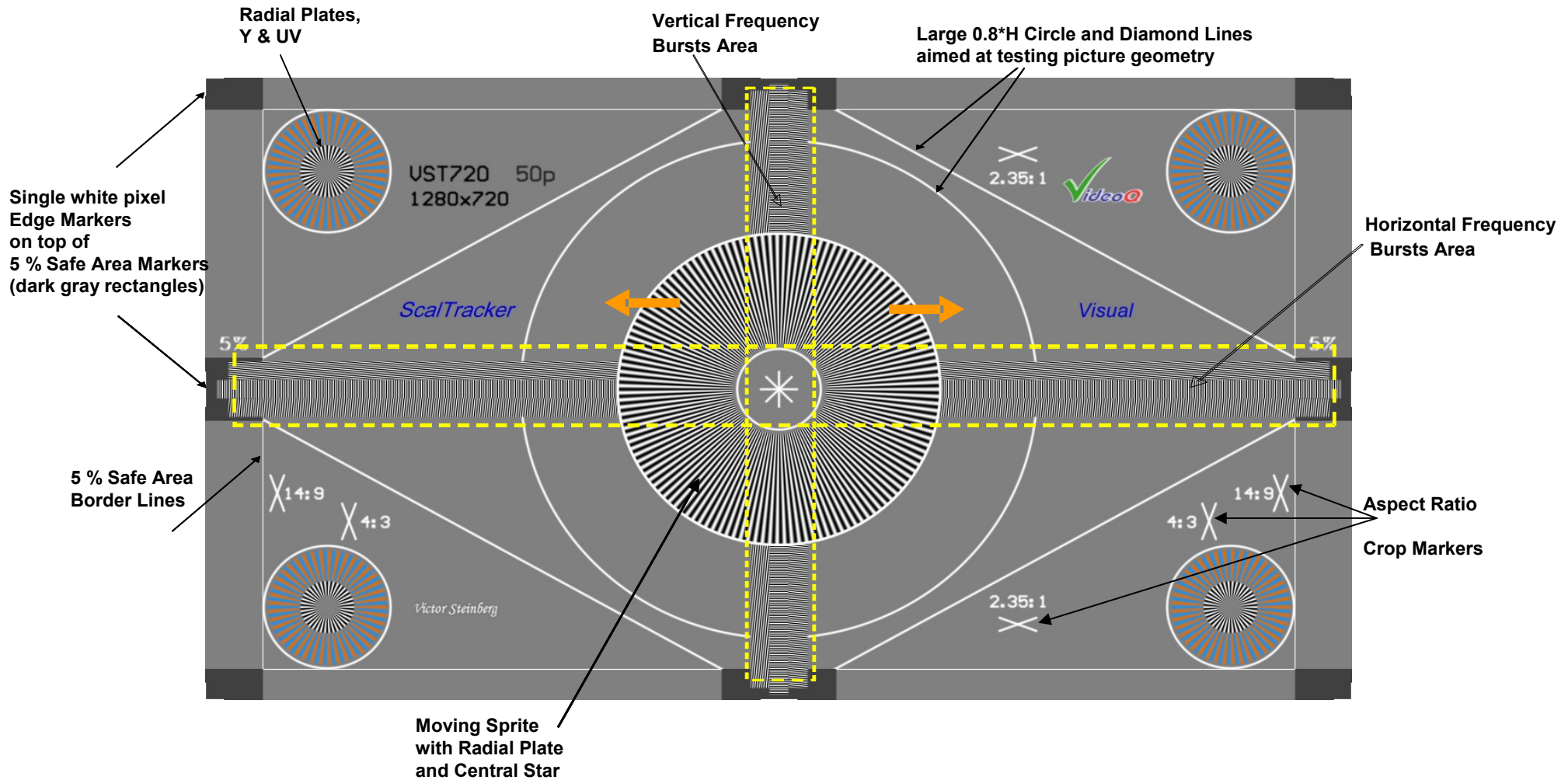
720p50, 720p60,

1080p24, 1080p30, 1080i50, 1080i60, 1080p50, 1080p60

Family of HD and SD, 16:9 and 4:3 dynamic patterns suitable for visual picture quality assessment; sub-patterns revealing critical image scaling problems at glance:

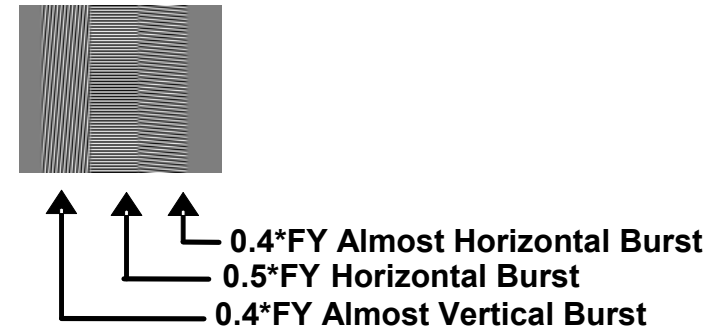
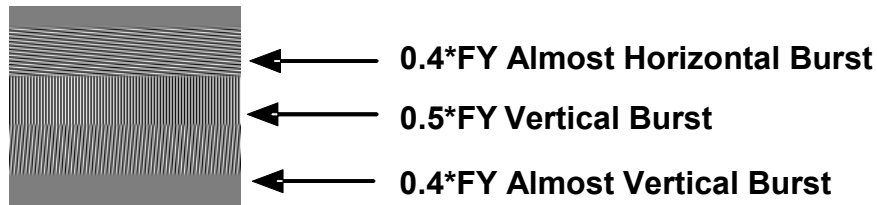
- H & V Pixel Mapping
- Pixel Phase
- Centering & Cropping
- Motion Adaptive De-interlacing artifacts
- Linear and Non-Linear Aspect Ratio Conversion
- Frame Rate Conversion artifacts
- Static and Dynamic Y Sharpness and 2D Frequency Response

# VST Test Pattern Composition



# VST Functional Components' Example

## Tri-band Frequency Burst Patterns



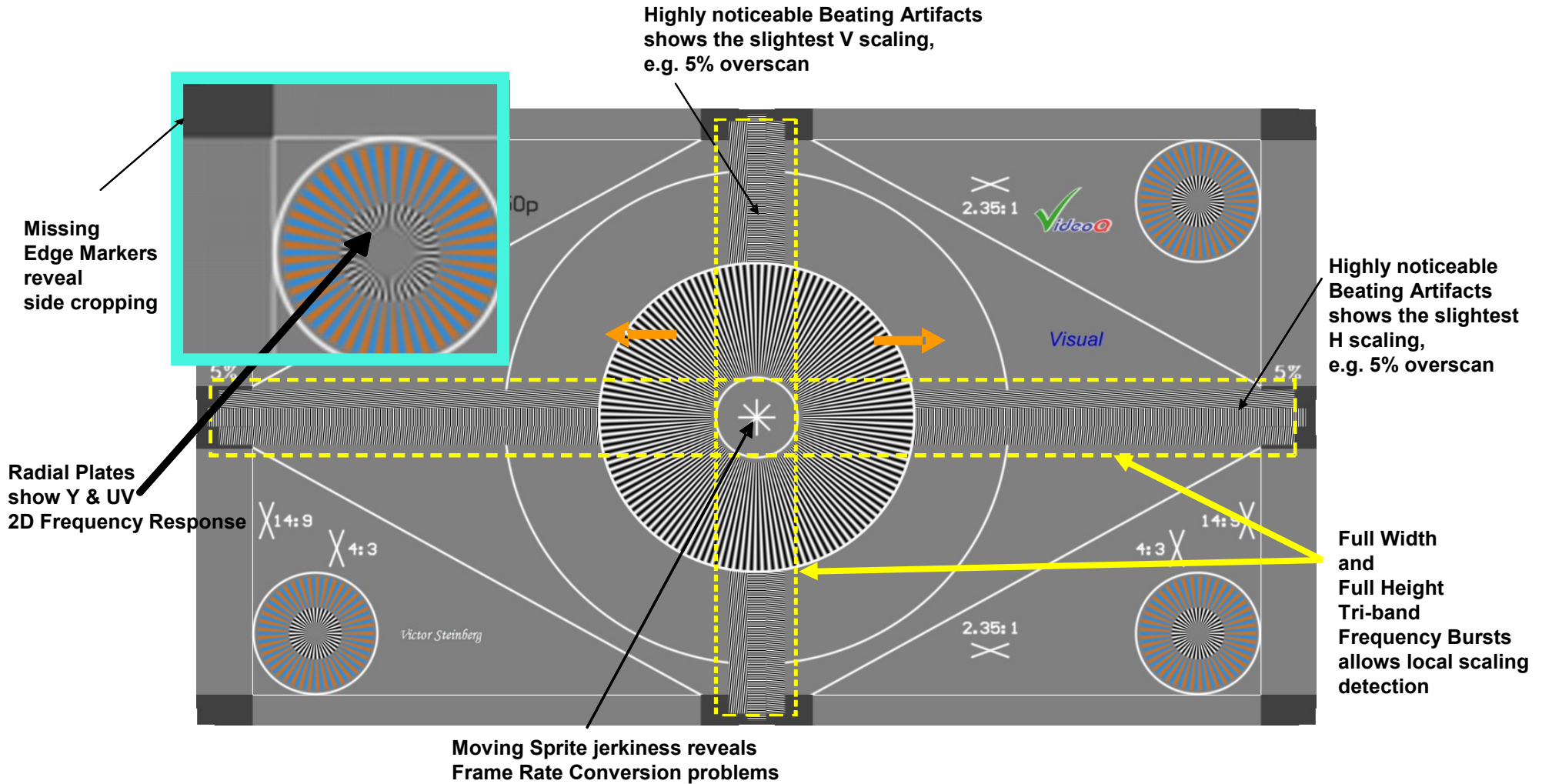
Tri-band Frequency Burst Patterns consist of **two groups of bursts** with frequencies proportional to luma pixels rate FY: **full width horizontal** and **full height vertical** bursts bands, each consisting of maximum luminance frequency of 0.5 FY in the middle with slightly oblique bands of 0.4 FY surrounding the middle burst.

The central 0.5 FY bands are especially sensitive to any errors in pixel clock, mapping or scaling. Two other bands allow differentiation between horizontal and vertical distortions thru the whole picture area – from left picture edge to the right picture edge and from top to bottom.

Vertical and almost vertical burst lines test horizontal frequencies, whilst horizontal and almost horizontal lines test vertical frequencies.

These large bursts are also used as background for moving sprite, thus allowing “at glance” detection of adaptive de-interlacing static and dynamic artifacts.

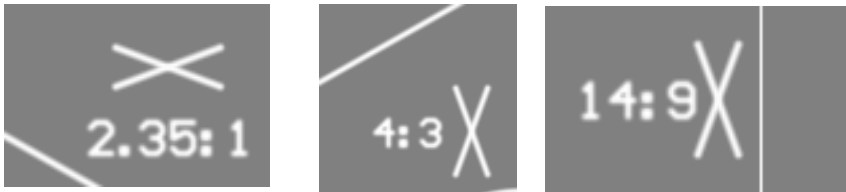
# VST Components Showing Scaling Problems



# VST Frame Format Markers

2.35:1 height crop, 4:3 or 14:9 width crop

## Crop Markers



## Examples of 4:3 Crop:

Correct 4:3 Crop



Wrong 4:3 Crop



VST 720 and VST 1080 patterns are designed for measurement in 16:9 frame format, as well as in 4:3, 14:9 and 2.35:1 frame formats. Cross-shaped Frame Format Markers indicate precise area for each corresponding Aspect Ratio.

## These are the most popular scale and crop modes:

- | *4:3 crop is used to display 16:9 content on legacy standard definition TV sets,*
- | *14:9 is a compromise (non-letterboxed) mode used in simulcast broadcasting to present 16:9 content on 4:3 and 16:9 screens,*
- | *2.35:1 is used to show letterboxed “cinemascope” movies on 16:9 screens.*

# 4. ZT – ZonTracker

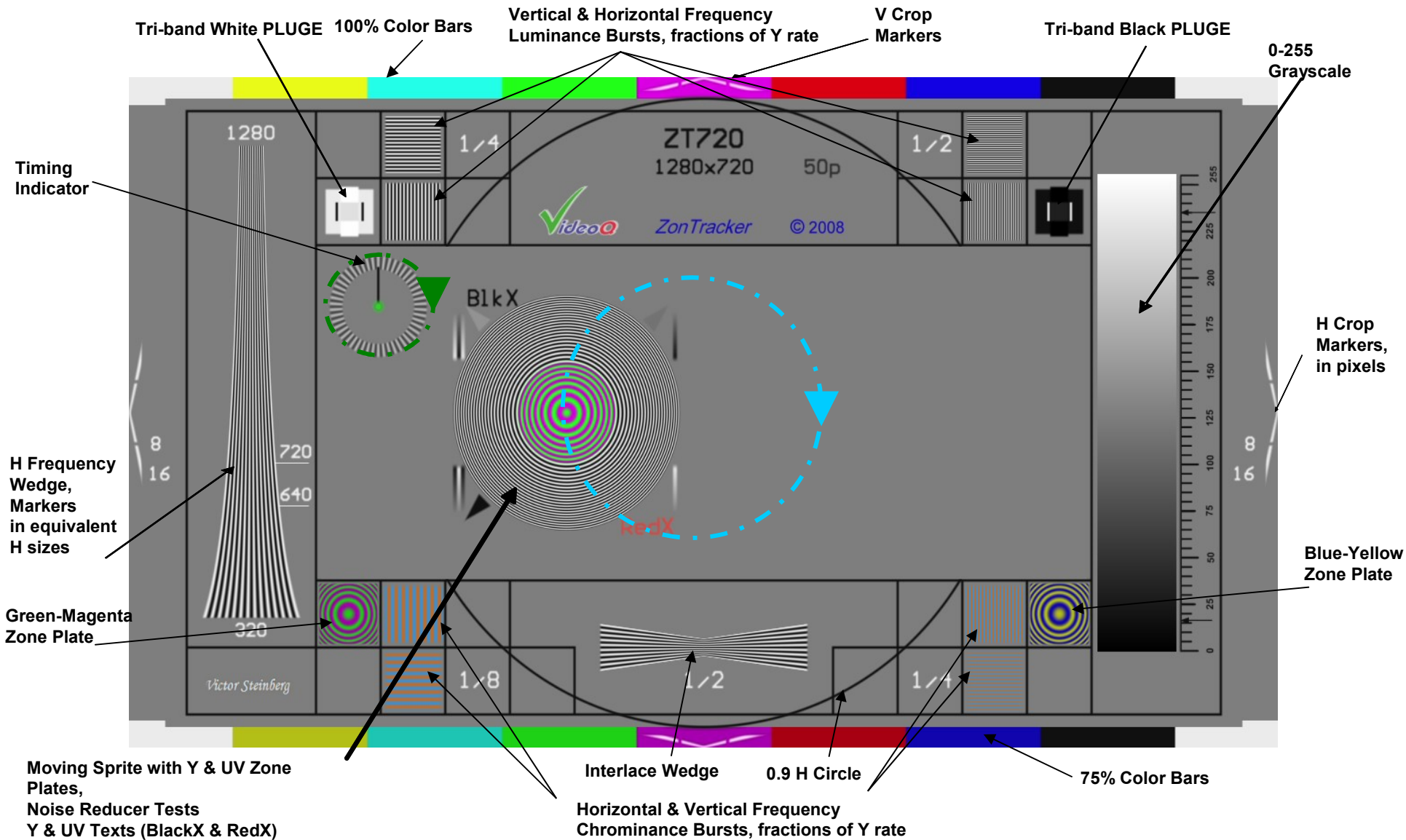
**ZT – ZonTracker:** Universal Multi-purpose Test

720p50, 720p60,  
1080p24, 1080p30, 1080i50, 1080i60, 1080p50, 1080p60

Family of HD 16:9 dynamic patterns, featuring moving multi-colored sprite with Y and UV zone plates, suitable for visual picture quality assessment; sub-patterns revealing critical image spatial and temporal scaling problems at glance:

- Static and Dynamic Y and UV Sharpness and 2D Frequency Response
- Frame Rate Conversion artifacts
- Timeline problems
- Y and UV Motion Adaptive De-interlacing artifacts
- Y Levels Conversion artifacts (Banding)
- Black & White Clipping
- Color Space Conversion (Matrixing) errors
- H & V Cropping
- Analog and Digital Noise and Interferences

# ZT Test Pattern Composition



# ZT Test Pattern Components

1. **Background** – 50% Gray (126d) with black 16:9 Grid Pattern, central area allocated for Moving Sprite
2. **Moving Sprite** – Luminance / Green-Magenta Zone Plate with variable contrast wedges, triangles, luminance and chrominance letters:
  - Estimates Y and UV 2D static and dynamic frequency response
  - Circular motion, two speeds with pauses
3. **Large Circle** – 0.9 Height Diameter in the center - Geometry and smoothness of curved lines indicator
4. **Timing Indicator** – clockwise handle rotation indicates frame rate:
  - One small increment (black to white strip) equals to 1 frame
  - Green flashes indicate one second increments.
5. **Crop Markers** on vertical & horizontal edges - estimation in pixels of horizontal and vertical cropping
6. **Color Bars** – 100% and 75% saturated strips at the top and bottom - Correct color indicators
7. **Tri-band PLUGE(s)** – Black (0, 16, 31) and White (224, 235, 255) levels clipping estimation
8. **Colored Zone Plates** – Green-Magenta and Yellow-Blue - 4:2:0 detection and Y/UV discrepancies
9. **Horizontal & Vertical Frequency Luminance Bursts** - Luminance H and V frequency response
11. **Horizontal & Vertical Frequency Chrominance Bursts** - Chrominance H and V frequency response
12. **Interlace Wedge** - Interlace and vertical scaling problems indications

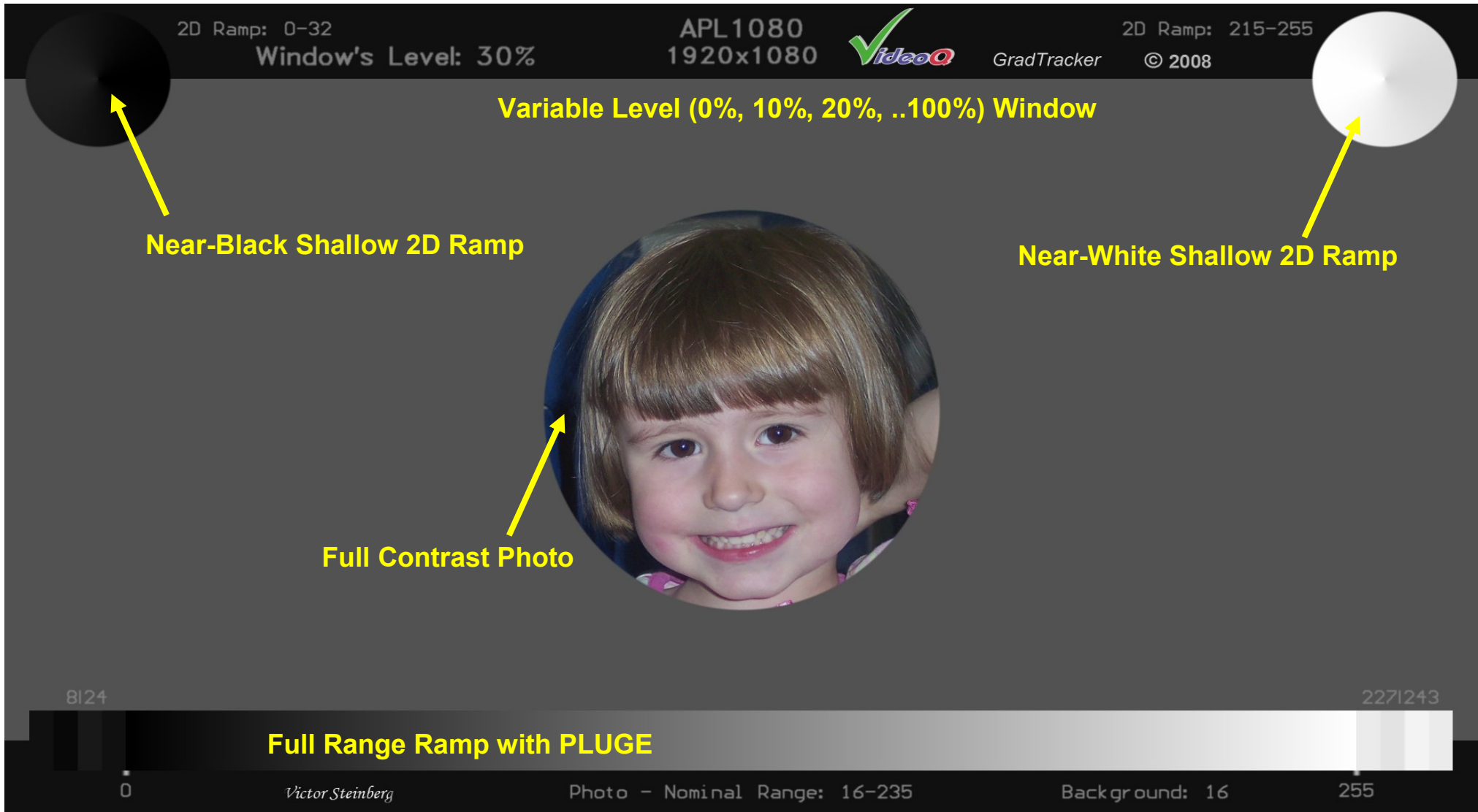
# 5. Dynamic Contrast Tests

**5.1. APL** – Average Picture Level Test: Y Levels, Black & White Clipping  
1080p30

**5.2. DP** – Dynamic 2D PLUGE & APL Test: Dynamic Y Levels Consistency  
1080p24

**5.3. DBL** – Dynamic Backlight Test: Local & Global Luminance Uniformity  
1080p24

# 5.1. APL – Average Picture Level Test



# 5.2. DP – Dynamic PLUGE Test

DP1080CG  
920x1080

GradTracker

### Dynamic PLUGE (DP) Pattern View at Start Moment

Variable & Flashing APL Background

Range: 0d - 255d

Range: 0d - 255d

Range: 16d - 34d = 0 - 8%

Background: 25d = +4%

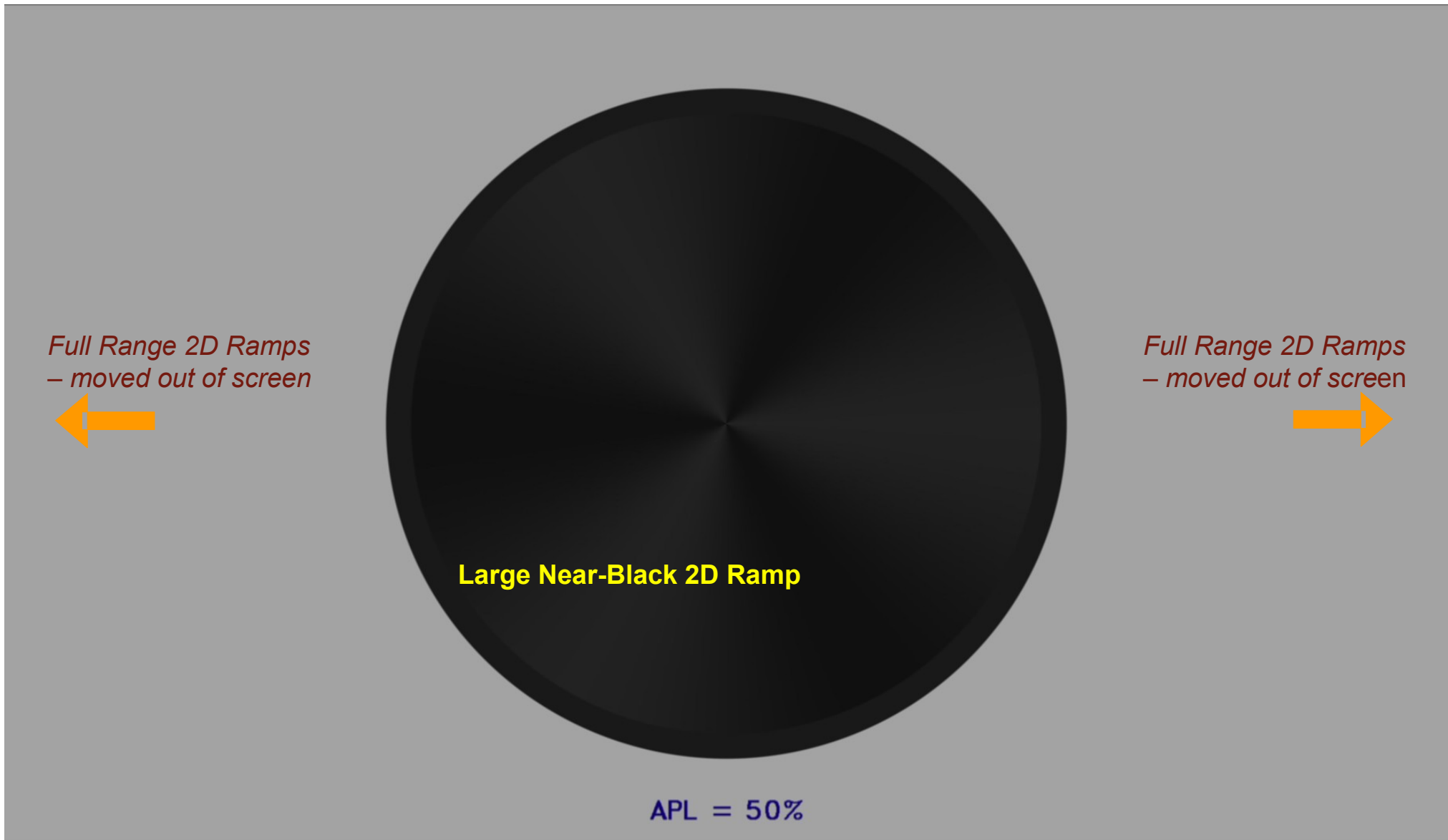
Moving Full Range 2D Ramp

Large Near-Black 2D Ramp

Moving Full Range 2D Ramp

© 2008 VideoQ  
Victor Steinberg

# DP Pattern View at 50% APL Segment



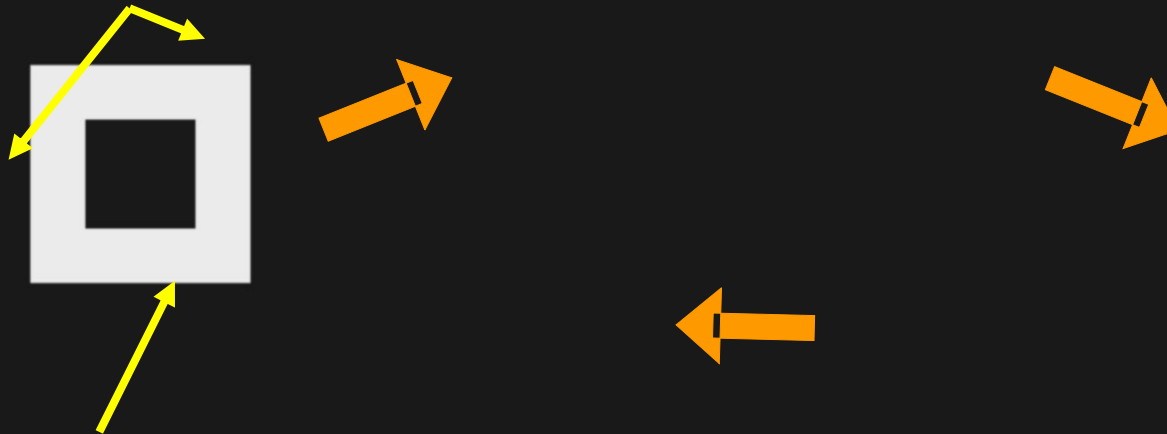
# 5.3. DBL – Dynamic Backlight Test

DBL1080  
920x1080

GradTracker

Dark Gray / White Background

Possible Halo Artifacts Areas – near the sprite



Moving Sprite changing colors:  
White on Black,  
Black on White,  
White on Black with Black in the center

Square Sprite: 235 or 25

Background: 25 or 235

© 2008   
Victor Steinberg

## 6. CSX – Color Space Explorer

**CSX** – Unique test aimed at visualization of color space conversion artifacts  
1080i60

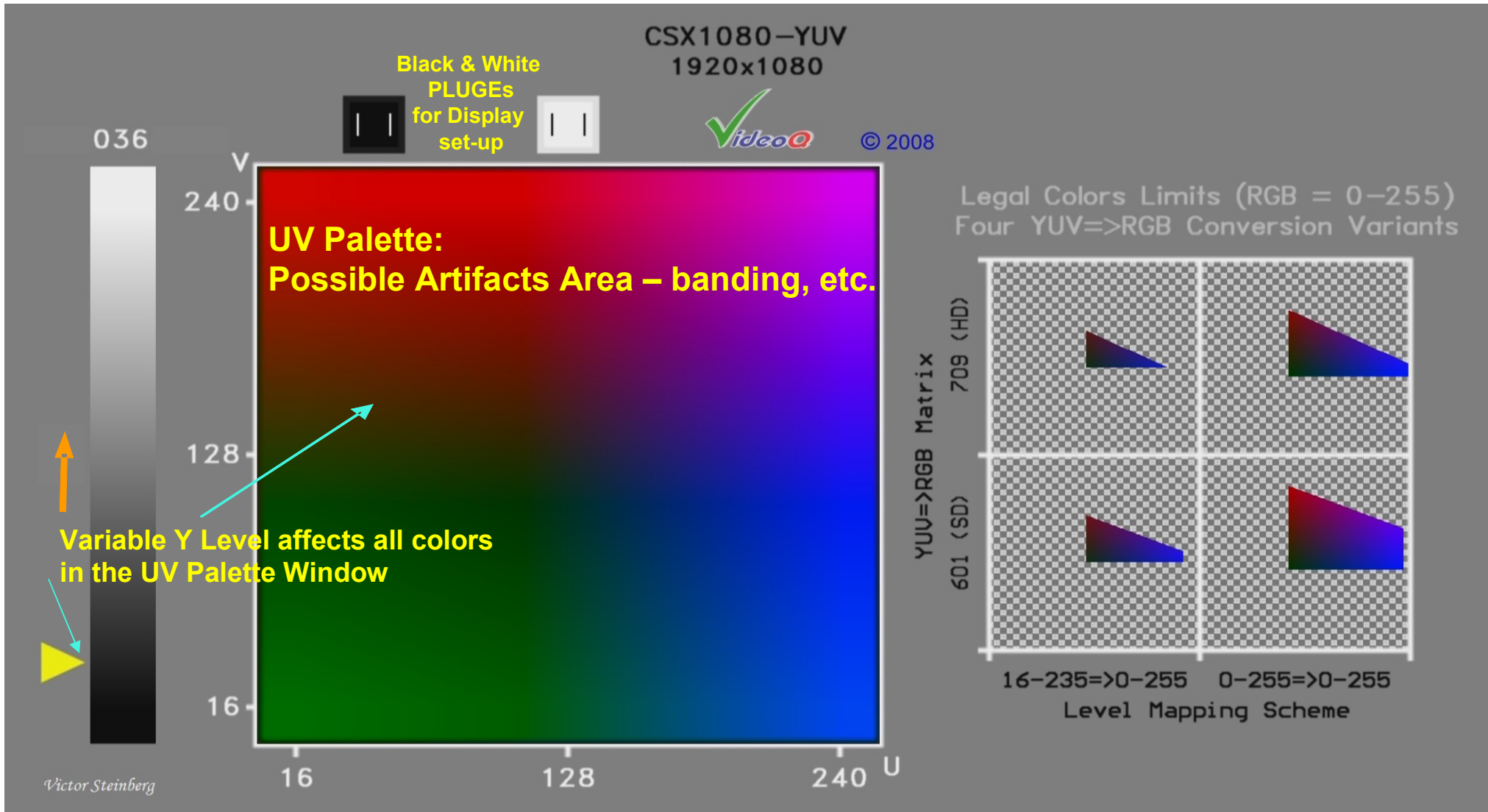
In 20 seconds this test going three times thru all  $256 \times 256 \times 256 = 16$  millions colors with accurate digital read-out of Y, U and V Levels.

Featuring large dynamic YUV palette and current Y level indicator.

Four-quadrant dynamic indication of RGB legal space boundaries for two level schemes (16-235 and 0-255) and two color matrixing schemes (601 and 709)

Black and white PLUGE components and vertical luminance ramp allow to check set-up prior to actual test.

# CSX Pattern View Example: Y=36d



# 7. Audio Tests

**7.1. AUD1 Combination Test:** WAV, MP3, L+R Stereo

**7.2. AUD2 Combination Test:** WAV, MP3, L+R Stereo

**7.3. Surround Sound 5.1 Channel Names:** AAC-ADTS, AC3,  
Multi-channel WAV

**7.4. Blank Audio:** MP3, L+R Stereo

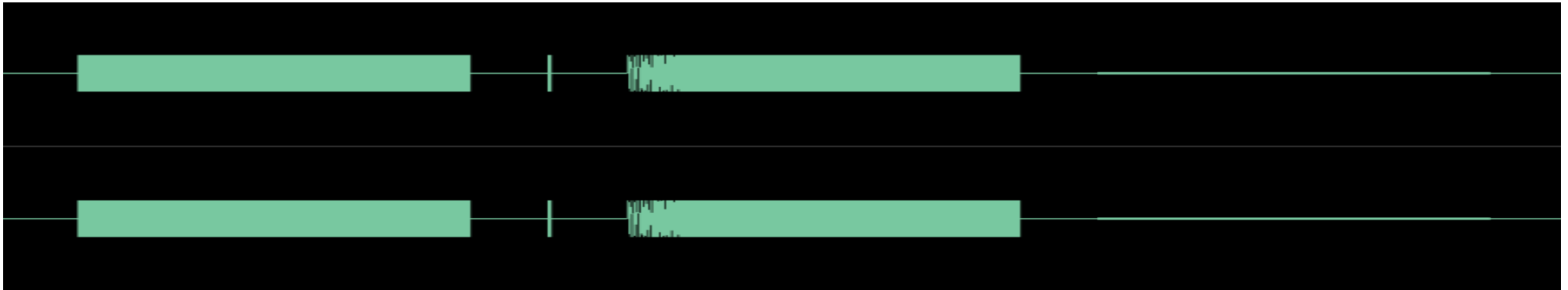
**7.5. White Noise:** 0 dBFs, WAV (not filtered) and MP3 (20-20000 bandpass)

**7.6 Pink Noise:** 0 dBFs, WAV (not filtered) and MP3 (20-20000 bandpass)

**7.7. Brown Noise:** 0 dBFs, WAV (not filtered) and MP3 (20-20000 bandpass)

# 7.1. AUD1 Sound Test

LR Stereo Test for Level Calibration, Frequency Response Measurement, Pulse Response Measurement, Dolby Low Level Noise & Distortion Check

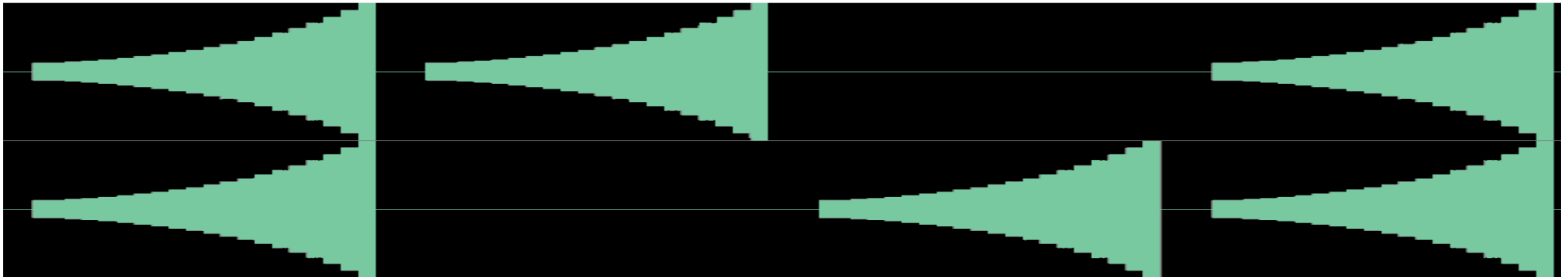


AUD1 Test Components Sequence (total length = 20 sec):

- 1 sec mute
- 5 sec of 1,000 Hz, -12 dBFs Tone
- 1 sec mute
- 0.02 sec of 1,000 Hz, -12 dBFs (Modulated Pulse = 1 TV frame in 50p)
- 1 sec mute
- 5 sec of Logarithmic Sweep: 2 octaves/sec, 10 octaves, 20-20,000 Hz, -12 dBFs
- 1 sec mute
- 5 sec 1kHz, -40 dBFs Tone
- 1 sec mute

## 7.2. AUD2 Sound Test

LR Stereo Test for Level Calibration, Channel Swap Check, Channel Polarity Check, Overload and Dynamic Range Test, including L-R difference channel



AUD2 Test Components Sequence (total length = 20 sec):

- 0.4 sec mute
- 4 sec of L & R 1,000 Hz, 18 steps Raiser from -18 dBFs to 0 dBFs
- 0.6 sec mute
- 4.4 sec of L only (R=mute) 1,000 Hz, 18 steps Raiser from -18 dBFs to 0 dBFs:
- 0.6 sec mute
- 4.4 sec of R only (L=mute) 1,000 Hz, 18 steps Raiser from -18 dBFs to 0 dBFs:
- 0.6 sec mute
- 4.4 sec of Inverted L & R 1,000 Hz, 18 steps Raiser from -18 dBFs to 0 dBFs
- 0.13 sec mute

# 8. Tests for Analyzers, 3D and Compression

## 8.1. VQMA Matrix Tests

Mature VideoQ product used by many customers of VQMA2 – automatic software analyzer

## 8.2. Robotic ScalTracker

Aimed at testing cascaded scalers, aspect ratio convertors and frame rate convertors of all sorts. For visual evaluation, instrumental measurements and fully automated (robotic) processing

## 8.3. 3D Static and Dynamic Video Tests

3D tests with calibrated parallaxes and moving Zone Plate, side-by-side and line-by-line formats

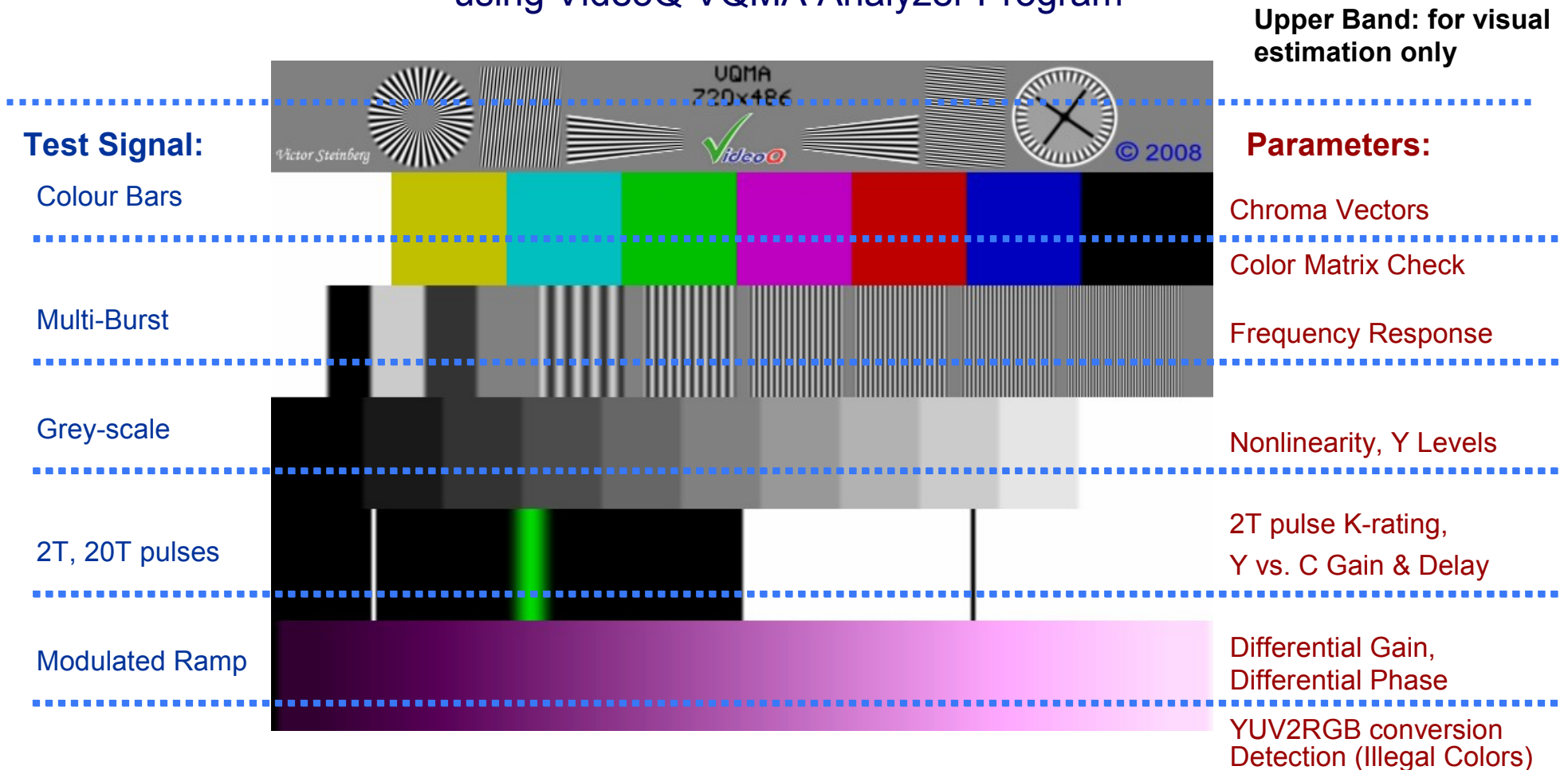
## 8.4. StresTracker

Advanced Dynamic Test for visual evaluation and instrumental estimation of compression codecs performance, including PSNR calculation

# 8.1. VQMA Test Pattern

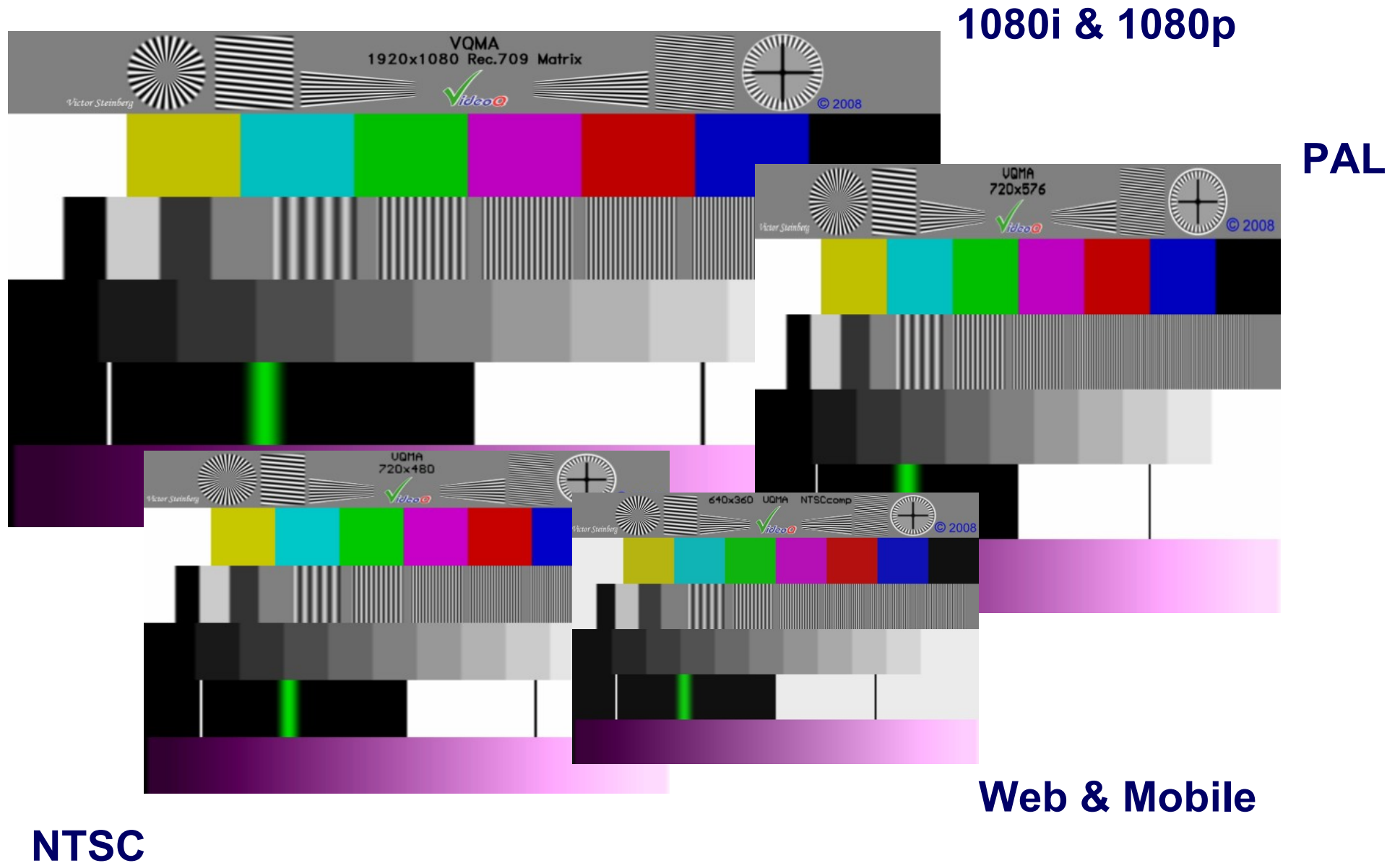
## All-In-One:

Single pattern allows automatically measure multiple video signal parameters using VideoQ VQMA Analyzer Program

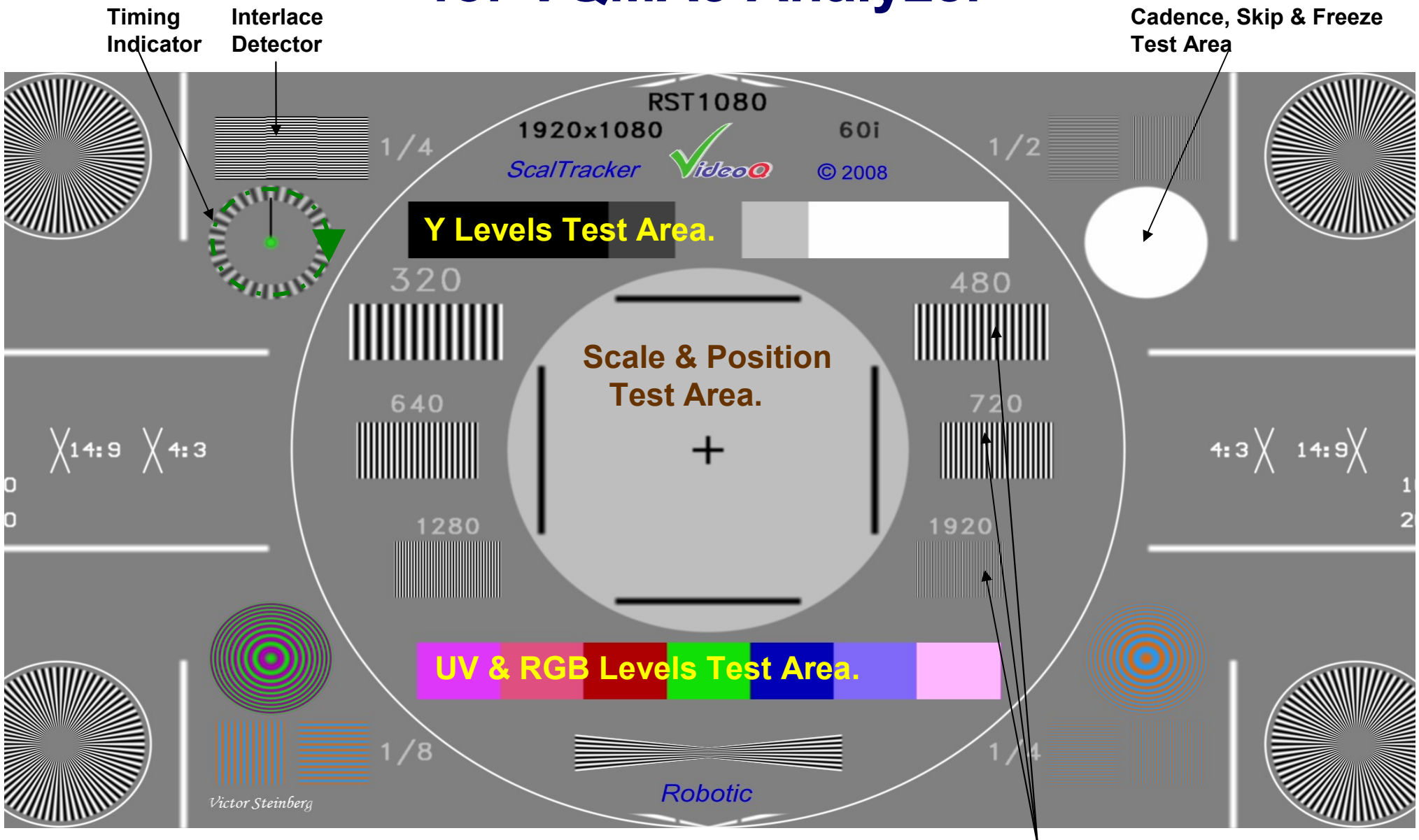


Noise & Interferences accurately measured by analysis of frame differences of mainly static video test.

# VQMA – Multi-resolution Test Pattern Family



# 8.2. RST – Robotic ScalTracker Test Pattern for VQMA3 Analyzer



Timing Indicator

Interlace Detector

Cadence, Skip & Freeze Test Area

Y Levels Test Area.

Scale & Position Test Area.

UV & RGB Levels Test Area.

Frequency Response Test Bursts

# RST - Test Pattern Features

Automated Measurement of:

1. Geometry: H & V positions and scaling factors
2. Levels: Y Black & White Levels, U & V Shift and Gain
3. Colorimetry: RGB-YUV Color Matrix Detection (1 bit Flag)
4. Frequency Response: on multiple H frequencies selected to match common Horizontal sizes
5. Letterbox and Pillar box Detection and Measurement:
6. Interlace Errors Detection: Field Swap/Field Pairing
7. Temporal Profile Detection: Frame Freeze/Frame Drop/Field Cadences

## 8.3. ZonTracker-3D

### *3D (Stereo) version of ZonTracker Test Pattern*

**ZT-3D** – Similar to normal (2D) ZT Test with extra components aimed at visualization and calibration of positive and negative parallaxes (Left-Right disparities)

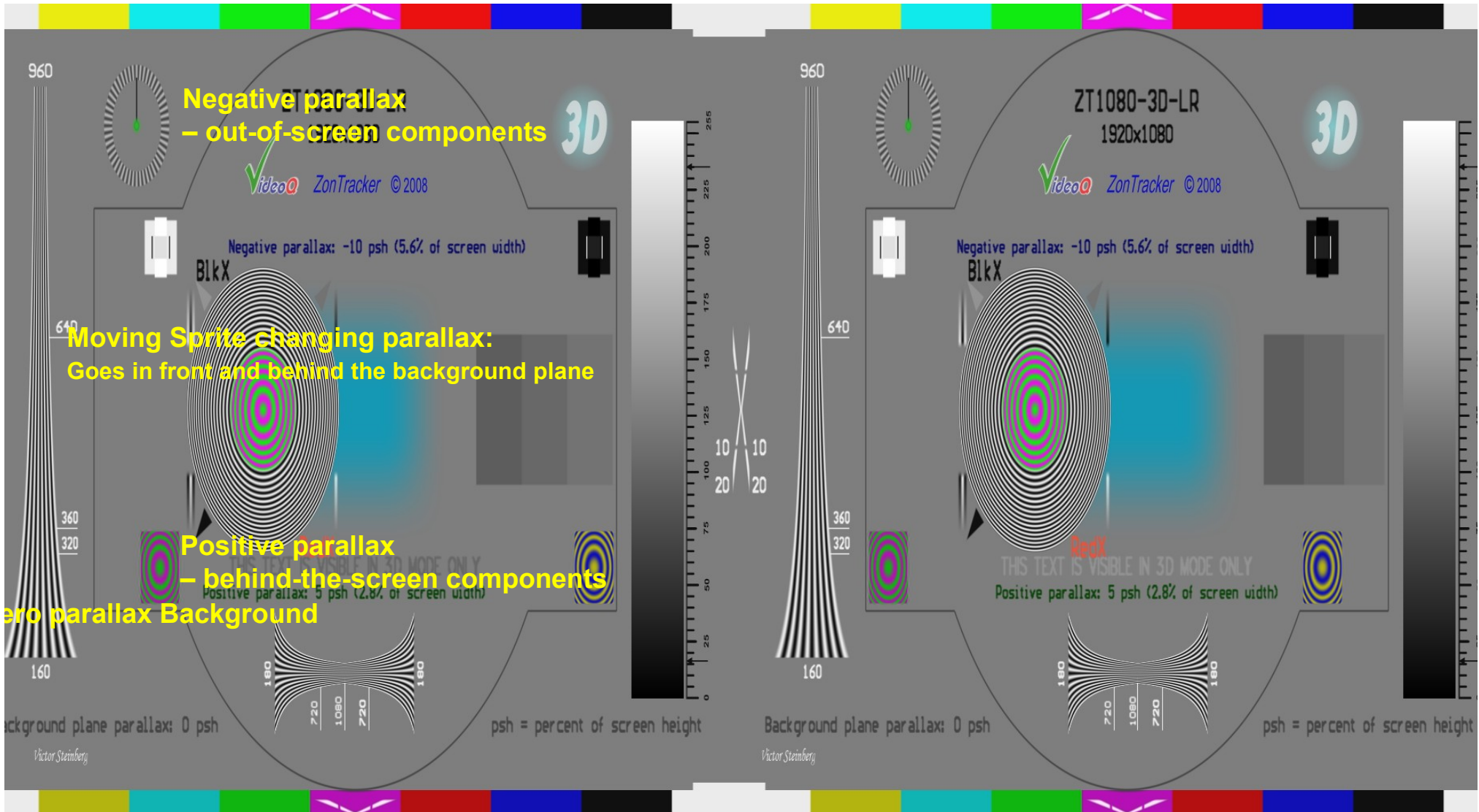
1080p60

Available in two formats:

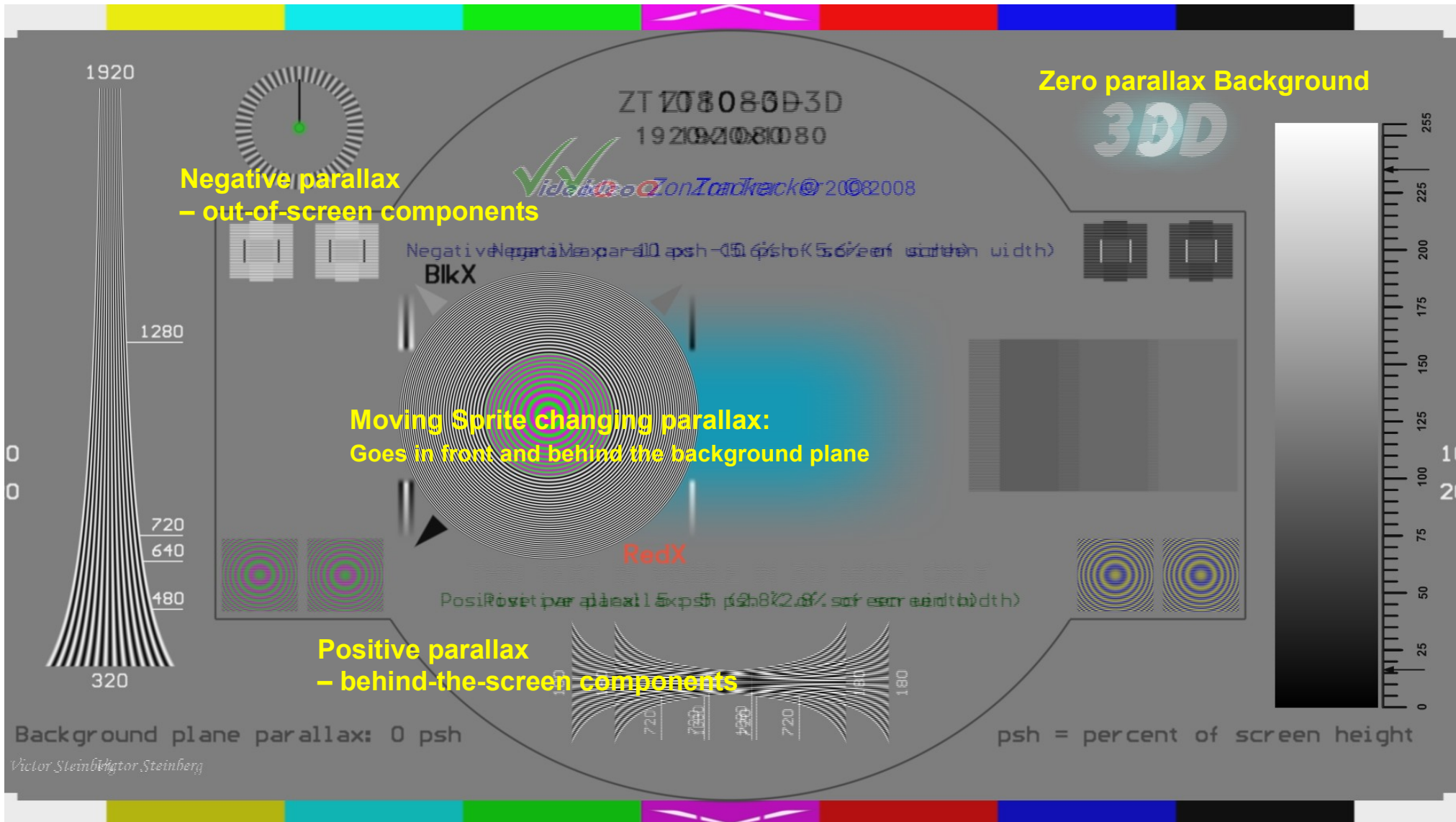
- Side-by-side (half horizontal resolution)
- Line-by-line (half vertical resolution)

Variants with L-R images swapped to match the parallax polarity of the target 3D display

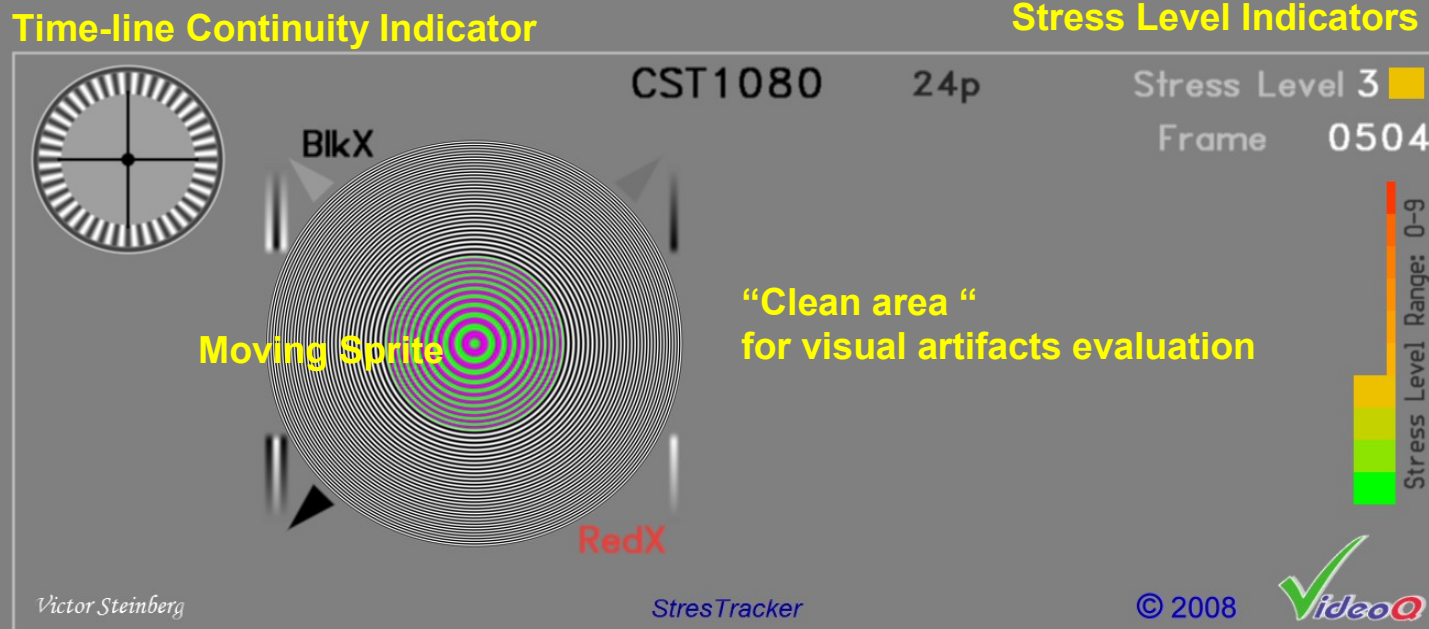
# ZT-3D Test Pattern - side-by-side format



# ZT-3D Test Pattern - line-by-line format



# 8.4. CST – StresTracker Test for Compression Engines



Stress Area of variable size and contrast

## Other VQL-related VideoQ Products



# VQS-200 – Reference HDMI/SPDIF Source

- | **Ultra-compact AV Test Source**
- | **SD and HD playback, user selectable HDMI output format:**
  - 480p@60, 576p@50, 720p@50, 720p@60
  - 1080i@50, 1080i@60, 1080p@24, 1080p@50, 1080p@60
- | **Slide-show with adjustable speed:**  
BMP images, including Static Test Patterns
- | **HDMI 1.3 output:** 16-235 and 0-255 level schemes switchable by test file selection
- | **Flexible pixels mapping and scaling:**
  - No scaling (dot-by-dot), if file resolution matches HDMI resolution
  - Up- and down- scaling to match the HDMI resolution, if AutoScaling=On
- | **Easy expansion with any external USB storage device**  
(live clips, user content, etc.)
- | **Codecs & Formats:** MP2, MP4, H264/AVC; AVI, MP4, VOB, TS, M2TS
- | **Easy Navigation:** thru straight forward folders and files with Remote Control
- | **SPDIF 5.1. and Analog Audio (L+R ) out, AC3 & MP3**
- | **Auxiliary CVBS output (NTSC/PAL)**



# VQTS – PC-based Generator-Analyzer

- I **Target Applications:**
  - I R&D Labs Development, Verification & QA
  - I Factory Automation & QA/QC
- I **Modular architecture, containing:**
  - I VQL Test Files Library
  - I VQMA Family of SW Analyzers
- I **Multi-standard, multi-format VQL test library payout:**
  - I HDMI/DVI, VGA, YPrPb, CVBS
  - I HDSDI - option
- I **Multi-standard, multi-format video capture:**
  - I HDMI/DVI, VGA, YPrPb, CVBS
  - I HDSDI - option
- I **Full Custom SW Automation Shell**



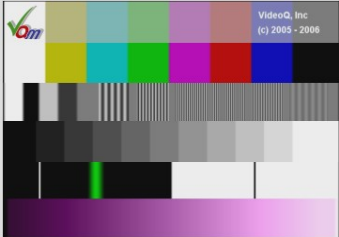
# VQMA2 – The software tool to measure video processors

C:\vq\NTSC Tuner 1mV.avi - VQM

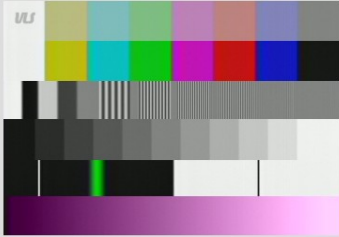
File BitStream View Aperture Help

VQM Test Failed Fri Mar 31 12:12:20 2006: X Video Quality Test Summary Averaged of 50 x 32 lines of 32 frames

Parameter	Measurement	Unit	Target	Pass
Black Level	3.5 % (23.6)	%, (8 bits)	-5.0 -- +5.0 %	✓
White Level	101.6 % (238.5)	%, (8 bits)	95.0 -- 105.0 %	✓
Unfiltered Y SNR	35.79	dB	> 40 dB	✗
K Rating on 2T Pulse	1.47	%	< 3 %	✓
Chroma vs Luma Gain	1.58	dB	0.0 -- +0.0 dB	✗
Chroma vs Luma Delay	287	ns	-40 -- +40 ns	✗
Differential Gain	5.76	%	< 5 %	✗
Differential Phase	1.1	degree	< 5 degree	✓
Freq. Response @ 1.00 MHz	-0.04	dB	-1.0 -- +1.0 dB	✓
Freq. Response @ 2.00 MHz	-1.11	dB	-1.0 -- +1.0 dB	✗
Freq. Response @ 3.00 MHz	-3.06	dB	-3.0 -- +1.0 dB	✗
Freq. Response @ 3.58 MHz	-7.41	dB	-4.0 -- +1.0 dB	✗
Freq. Response @ 4.20 MHz	-26.16	dB	-6.0 -- +1.0 dB	✗
Freq. Response @ 5.80 MHz	-31.43	dB	-20.0 -- +1.0 dB	✗



Reference



Test

C:\vq\NTSC Tuner 1mV.avi

Y Noise Level RMS 3.56 (8 bit level)

Y SNR unfiltered 35.79 dB

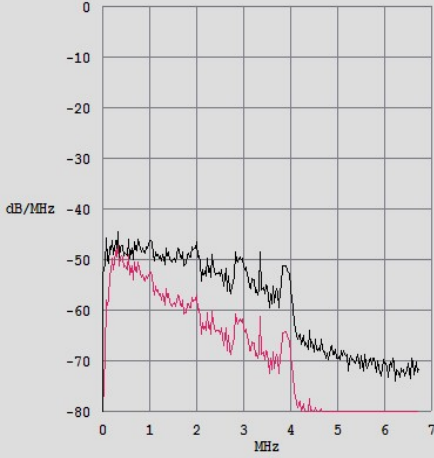
Y SNR 4.2 MHz 36.13 dB

Y SNR 6.0 MHz 36.10 dB

UV SNR 1.5 MHz 43.36 dB


Y SNR 4.2 MHz weighted 42.08 dB

Y SNR 6.0 MHz weighted 42.07 dB



Noise Spectrum

Noise weighted in red



8 x Noise



# VQB – Video Quality Benchmarking Tool

VQB is a sophisticated video benchmarking tool for multiple segments of IPTV, PC and CE industries. It is targeted at:

- | Industry analysts
- | Computers, video servers and related hardware manufacturers
- | GPU and CPU suppliers
- | Software developers
- | System integrators
- | PC-based home theatre installers and customers
- | PC users interested in getting top video performance

