

### Visual Verification of Digital Video Quality



The award-winning Visualizer™ Digital Video Test Pattern\* is an uncompressed video sequence that enables visual testing for processing and transmission errors throughout the entire digital video signal chain. Employing this easy-to-interpret, visual test pattern enables accurate evaluation and calibration of a wide range of digital video systems. From simplifying equipment configuration to measuring compression performance, Sarnoff's Visualizer takes the guesswork out of digital video quality control.



### Unique Visual Capabilities

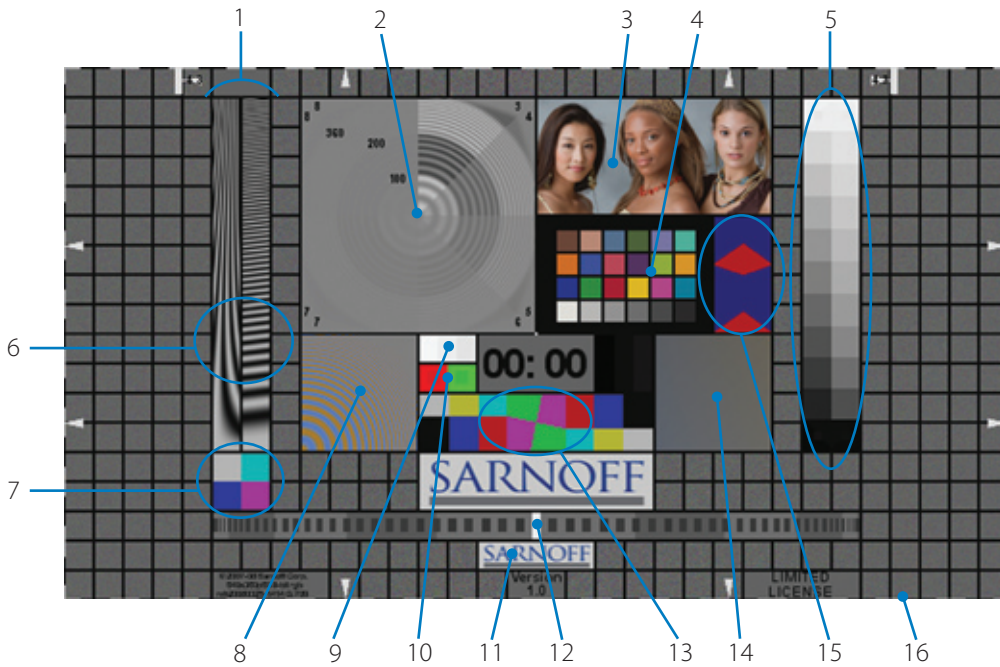
- » **Lip-sync**– Measure and quantify the synchronization offset between audio and video
- » **Compression Fidelity**– Measure and quantify compression levels numerically in real time
- » **Color Matrix Mismatch**– Determine HD (709) and SD (601) color space conversion errors instantly
- » **Field Dominance**– Definitively determine field order reversal
- » **Chroma Motion Error**– Demonstrate incorrect processing of Chroma in interlaced 4:2:0 systems
- » **Closed Caption Synchronization**– Confirm caption timing along the signal chain
- » **Format Conversion**– Reveal errors accumulated along the signal chain
- » **Chroma Sub-sampling**– Determine the Chroma sub-sampling being used (4:2:2, 4:2:0, 4:1:1...)
- » **Highlight Clipping**– Indicate lowlight and highlight clipping in signal processing and LCD displays
- » **Bit Depth**– Detect 10 bit to 8 bit truncation

### Applications

- » Broadcast operations
- » Post production
- » Encoder and decoder testing
- » Video over cellular networks
- » Satellite and cable television
- » Video distribution networks
- » IPTV
- » D-Cinema



## Key



1. Format conversion
2. Compression fidelity
3. Skin tones
4. Reference colors
5. Linearity and gamma
6. Frequency response
7. Chroma gain/phase
8. Chroma subsampling
9. Highlight clipping
10. Color matrix mismatch
11. Logo customization
12. Lip-sync
13. Chroma/luma phase
14. Bit depth: 8/10
15. Frame drops
16. Edge-pixel marquee

## Formats

- » Off-the-shelf formats:
  - Uncompressed Y'CbCr
  - 10-bit 4:2:2
  - 29.97: 1080i, 720p, 480i
  - 25: 1080i, 720p, 576i
- » Custom formats available:
  - Any resolution
  - R'GB', X'Y'Z'
  - 8 to 16 bits
  - 3G
  - 416 x 240p30 (ATSC Mobile DTV)

## Options

- » Customized logo
- » 720 x 486i 29.97
- » EIA-608 closed caption sync

## Measurement Capabilities

- » Compression: bit depth and resolution
- » Color matrix mismatch
- » Lip-sync offset: to one field-time
- » Closed caption sync: to one field-time
- » Format conversion
- » Frequency response
- » Chroma subsampling:
  - 4:4:4, 4:2:2, 4:1:1
- » Chroma aliasing
- » Luma aliasing
- » Skin tone reproduction
- » Color accuracy
- » Frame drops/repeats
- » Black level offset (pluge)
- » Color phase and gain
- » Linearity
- » Field dominance error
- » Highlight clipping >235
- » Gamma
- » Bit depth
  - 10 bit/8 bit
- » Dithering/error diffusion
- » 4:2:0 int/pro error
- » 4:2:2, 4:2:0 luma alignment
- » Instrumented lip-sync
- » Edge pixel loss