2015 Product Catalog

Video Test and Monitoring Solutions

Tektronix®

Solving today's digital video delivery and quality challenges

Digital technology is quickly replacing analog technology at every level in the video industry, enabling entirely new classes of products and services. This transformation is fundamentally changing how video content is created, stored, managed, distributed and enjoyed. The digital video ecosystem is comprised of companies in the business of creating and distributing content as well as the designers and manufacturers of professional and consumer electronics. The new competitive landscape reflects the pace and scope of technology-driven change and Tektronix continues to provide the most comprehensive range of solutions across the entire ecosystem.

Video Test and Monitoring Product Selection Guide								
Application	**Waveform Monitors & Rasterizers**	**Sync Pulse Generators**	**Signal Generators**	**Picture Quality Analyzers**	**MPEG Generators & Analyzers**	**File-Based Content Analysis**	**RF Video Monitors**	**Video Quality Monitors**
Camera setup and alignment including OB Vans	■	■						
Color grading and color space compliance	■							
3D Video Content Monitoring	■							
Quality Assurance	■					■		■
Quality control of file-based Archiving workflows						■		
Quality control of file-based Ingest workflows						■		
Quality control of file-based Playout workflows						■		
Facility Distribution & Routing	■	■				■		
Monitoring Playout	■					■		
Closed Caption Monitoring & Analysis	■				■	■		■
Audio Loudness Monitoring	■				■	■	■	■
RF Transmission Monitoring - Satellite					■		■	
RF Transmission Monitoring - Transmitter							■	■
Headend Ingest Monitoring					■		■	■
Multi-stream IP Video Monitoring								■
Video & Audio Quality of Experience (QoE)					■	■	■	■
Adaptive Bit Rate Video Content						■		■
tru2way / OCAP Monitoring								■
EBIF Monitoring								■
Ad Insertion Monitoring					■			■
DVB Carousel Monitoring					■			■
Ad Content Encode/Transcode Verifications						■		■
VoD Asset Verification						■		
Headend Troubleshooting & Diagnostics					■		■	■
Video Semiconductor Design & Evaluation	■		■		■			
Encoder/Transcoder Evaluation & Field Test			■	■	■			
Consumer Electronics Design & Evaluation			■	■	■			
Professional Broadcast Equipment Design & Evaluation	■		■	■	■			
See Page	6	15	14	16	17	20	29	23

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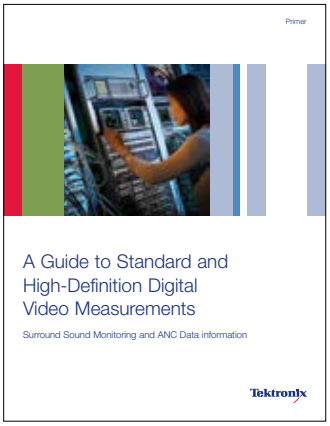


A Guide to Standard and High-Definition Digital Video Measurements

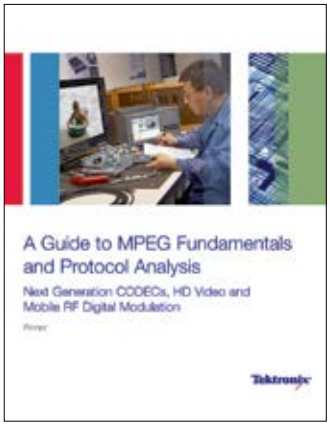
This guide discusses the basics of the digital signal and illustrates the measurements available to ensure your signals are valid and legal.

To order your free copy of this primer visit: www.tektronix.com/sd_hd_measurements

A Guide to Automating Quality Control in File-based Workflows

The file-based nature of the content, together with the new workflows, has created new requirements for automating the Quality Control of the content. Learn about the file-based technology, the workflows, and how Tektronix approaches automating the Quality Control of the content quality with its Cerify product.

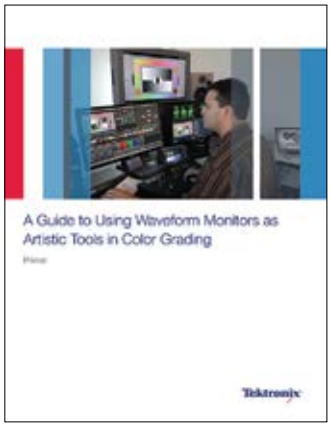
To order your free copy of this primer visit: www.tek.com/FBworkflows



A Guide to MPEG Fundamentals and Protocol Analysis

MPEG is one of the most popular audio/video compression techniques because it is not just a single standard. Instead, it is a range of standards suitable for different applications but based on similar principles.

To order your free copy of this primer visit: www.tektronix.com/mpeg_fundamentals



A Guide to Using Waveform Monitors as Artistic Tools in Color Grading

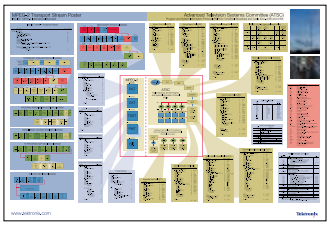
This primer is filled with essential information on developing colorgrading techniques as a creative skill set. Set your professional skills apart from other colleagues and competitors!

To order your free copy of this primer visit: www.tek.com/document/primer/guide-using-waveform-monitors-artistic-tools-color-grading-high-resolution

Guide to Understanding QoE Improve Viewer Experience

This poster describes some of the most frequent types of Quality of Experience errors and how to fix/prevent them so that you deliver the best possible viewing experience for your subscribe.

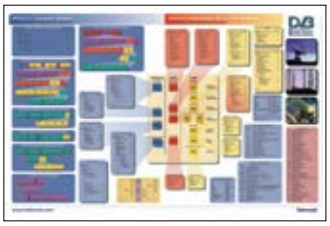
To order your free copy of this poster visit: www.tek.com/qoe-poster



ATSC Standard Poster

This poster provides a reference to the Advanced Television System Committee (ATSC) A/65 standard and MPEG-2 transport stream - ISO/IEC 13818-1 International Standard.

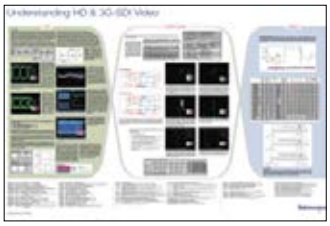
To order your free copy of this poster visit: www.tektronix.com/mpegposter



DVB (Digital Video Broadcasting) Standard Poster

This poster provides a reference to the DVB standard. Service Information (SI) in DVB systems and MPEG 2 Transport stream - ISO/IEC 13818 International Standard.

To order your free copy of this poster visit: info.tek.com/www-mpeg-poster-dvb.html



Understanding HD and 3G-SDI Video Poster

This poster provides a graphical reference to understanding HD and 3G-SDI video.

To order your free copy of this poster visit: www.tektronix.com/video/hdposter

Waveform Monitor Selection Guide					
	1741C	WFM6120	WFM7200	WFM8200	WFM8300
SD Digital		■	■	■	■
HD Digital			■	■	■
NTSC/PAL	■	Opt CPS	Opt CPS*2	Opt CPS*2	Opt CPS*2
Dual Link			■	■	■
3G-SDI Single Link (Level A & Level B)			Opt 3G	Opt 3G	Opt 3G
4K/UHDTV1 Quad Link				Opt 2SDI, 3G, 4K	Opt 2SDI, 3G, 4K
2 Simultaneous inputs: HD/SD SDI or 1 HD/SD SDI and 1 CPS			Opt SIM	Opt SIM or 3D	■
4 x SDI Input Monitoring (incl. 3G with Opt. 3G) Camera Balance Mode			Opt 2SDI*2	Opt 2SDI*2	Opt 2SDI*2
In-depth Data and ANC Data Analysis		Opt DAT	Opt DAT	Opt DAT	■
Closed Captions / Subtitles Decoding		■	■	■	■
Advanced Gamut Monitoring (Spearhead, LQV)			Opt PROD	Opt PROD	Opt PROD
3D Video Content Monitoring			Opt S3D	Opt 3D	■
Embedded Audio		Opt AD	Opt AD or DPE	Opt AD or DPE	Opt AD or DPE
Discrete AES/EBU Digital Audio		Opt AD	Opt AD or DPE	Opt AD or DPE	Opt AD or DPE
Analog Audio		Opt AD	Opt AD or DPE	Opt AD or DPE	Opt AD or DPE
Dolby Digital (AC-3) / E / DD+			Opt DPE	Opt DPE	Opt DPE
Audio Loudness Monitoring		■	■	■	■
Out-of-Service Audio-Video Delay		Opt AVD	Opt AVD	Opt AVD	■
Eye Diagrams, Jitter & Cable Parameter Measurements		Opt EYE / PHY	Opt PHY3	Opt EYE / PHY3	Opt PHY
Jitter Waveform and Automated Eye measurements		Opt PHY	Opt PHY3	Opt PHY3	Opt PHY
3G Jitter Waveform and Jitter measurement			Opt PHY3 & 3G	Opt PHY3 & 3G	Opt PHY & 3G
Basic Test Signal Generation			Opt GEN	Opt GEN	Opt PHY
See Page	14	9	9	10	10

Rasterizer Selection Guide			
	WVR7200	WVR8200	WVR8300
SD Digital	■	■	■
HD Digital	■	■	■
NTSC/PAL	Opt CPS*2	Opt CPS*2	Opt CPS*2
Dual Link	■	■	■
3G-SDI Single Link (Level A & Level B)	Opt 3G	Opt 3G	Opt 3G
4K/UHDTV1 Quad Link		Opt 2SDI, 3G, 4K	Opt 2SDI, 3G, 4K
2 Simultaneous inputs: HD/SD SDI or 1 HD/SD SDI and 1 CPS	Opt SIM or S3D	Opt SIM or 3D	■
4 x SDI Input Monitoring (incl. 3G with Opt. 3G) Camera Balance Mode	Opt 2SDI*2	Opt 2SDI*2	Opt 2SDI*2
In-depth Data and ANC Data Analysis	Opt DAT	Opt DAT	■
Closed Captions / Subtitles Decoding	■	■	■
Advanced Gamut Monitoring (Spearhead, LQV)	Opt PROD	Opt PROD	Opt PROD
3D Video Content Monitoring	Opt S3D	Opt 3D	■
Embedded Audio	Opt AD or DPE	Opt AD or DPE	Opt AD or DPE
Discrete AES/EBU Digital Audio	Opt AD or DPE	Opt AD or DPE	Opt AD or DPE
Analog Audio	Opt AD or DPE	Opt AD or DPE	Opt AD or DPE
Dolby Digital (AC-3) / E / DD+	Opt DPE	Opt DPE	Opt DPE
Audio Loudness Monitoring	Opt AD or DPE	Opt AD or DPE	Opt AD or DPE
Out-of-Service Audio-Video Delay	Opt AVD	Opt AVD	■
Eye Diagrams, Jitter & Cable Parameter Measurements	Opt PHY3	Opt EYE / PHY3	Opt PHY
Jitter Waveform and Automated Eye measurements	Opt PHY3	Opt PHY3	Opt PHY
3G Jitter Waveform and Jitter measurement	Opt PHY3 & 3G	Opt PHY3 & 3G	Opt PHY & 3G
Basic Test Signal Generation	Opt GEN	Opt GEN	Opt PHY
See Page	12	13	13

*2 Only one CPS or 2SDI option can be installed in the instrument.

Portable Waveform Monitors & Rasterizers								
	WFM2200A	**WFM2300**	**WFM5000**	**WVR5000**	**WFM5200**	**WVR5200**	**WFM5250**	**WVR5250**
SD Digital	■	■	■	■	■	■	■	■
HD Digital	■	■	■	■	■	■	■	■
HDMI	Opt SFP-HDMI	Opt SFP-HDMI					■	■
NTSC/PAL								
Dual Link	■	■			■	■	■	■
3G-SDI Single Link (Level A & Level B)	Opt 3G	Opt 3G			Opt 3G	Opt 3G	Opt 3G	Opt 3G
SDI Fiber Input (SMPTE 297)	Opt SFP	Opt SFP						
ASI Monitoring		Opt ASI						
Simultaneous input monitoring					Opt CAM	Opt CAM	Opt SIM	Opt SIM
4 x SDI Input Monitoring (incl. 3G with Opt. 3G) Camera Balance Mode					Opt CAM	Opt CAM		
In-depth Data and ANC Data Analysis	Opt DATA	Opt DATA			Opt DATA	Opt DATA	Opt DATA	Opt DATA
Closed Captions / Subtitles Decoding	Opt DATA	Opt DATA			Opt DATA	Opt DATA	Opt DATA	Opt DATA
Advanced Gamut Monitoring (Spearhead, LQV)					Opt PROD	Opt PROD	Opt PROD	Opt PROD
3D Video Content Monitoring					Opt S3D	Opt S3D	Opt S3D	OptS3D
Embedded Audio	■	■	■	■	Opt AUD	Opt AUD	Opt AUD	Opt AUD
Discrete AES/EBU Digital Audio	Multi IN	Multi IN	■	■				
Analog Audio								
Dolby E Generation & Monitoring	Opt DBE	Opt DBE						
Audio Loudness Monitoring	Opt LOUD	Opt LOUD			Opt LOUD	Opt LOUD	Opt LOUD	Opt LOUD
Out-of-Service A/V Delay & Propagation	Opt AVDP	Opt AVDP						
Eye Diagrams, Jitter & Cable Parameter Measurements		■						
Jitter Waveform & Automated Eye Measurements		■						
3G Jitter Waveform and Jitter Measurement		Opt 3G						
Basic Test Signal Generation	■	■			Opt GEN	Opt GEN	Opt GEN	Opt GEN
See Page	6	6	7	11	7	11	11	11

■ Function is standard.

Opt Option is required to provide this capability.

Multiformat, Multistandard Portable Waveform Monitor WFM2200A

The WFM2200A waveform monitor is an ideal tool for field applications offering an array of basic video / audio monitoring tools with test signal generation features supporting a wide range of interfaces (SDI - SD / HD / Dual Link / optional 3G, optional SFP optical interface, discrete AES/EBU, LTC, Composite Sync) to quickly isolate, diagnose and resolve system issues and enable effective setup with sharp CRT-like traces on a large 6.5 inch LED back-lit display.

Weighing in at less than 4 lbs/1.8 kg and having a replaceable/rechargeable battery system makes the WFM2200A an easily portable testing tool for field operations.

Features and Benefits

- Optical SDI Input and Output compliant to SMPTE297 (Option SFP)
- Coaxial Cable simulation / margin test loop for secure system installation
- One SDI Input and one MULTI Input with Multiformat, Multistandard Support
- The MULTI input can be configured as SDI, AES or LTC input
- Upgradeable to include 3G-SDI (Level A and Level B) format support (Option 3G)
- HDMI Monitoring (option SFP-HDMI)
- 3G/HD/SD Signal Generator with Genlock and Moving Picture / Circle for Troubleshooting Signal Paths and Equipment (Option 3G to support 3G formats)
- Comprehensive Audio Monitoring tool Up to 16 channel Embedded AES/EBU Audio
- Multichannel Surround Sound[1] Display and Flexible Lissajous Display
- Audio Loudness meter (Option LOUD)
- Dolby metadata decode, peak level metering and Dolby E signal generation (Option DBE)
- Dolby E Guard Band meter with user-defined limits (Option DBE)
- Ability to Display Waveform of External Reference Signal and LTC Signal for Quick Diagnosis of the Potential Issues in Sync and Time Distribution System
- Audio/Video Delay and Propagation Delay measurement with the test signal generation (Option ADVP)
- Tektronix-patented Diamond and Arrowhead Displays for Color Gamut Compliance Monitoring
- Comprehensive Data Monitoring helps to Quickly Resolve Difficult Content Quality and Reliability Issues (Option DATA)
- Simultaneous CEA708/608 Closed Caption monitoring; Teletext and OP47 subtitle monitoring (Option DATA)
- Detect and decode ANC data including AFD, WSS, Video Index, TSID, V-Chip, Broadcast Flag/CGMS-A, VITC, LTC, and ANC TC ARIB STD-B35/B37/B39, TR-B22, and TR-B23 support
- ANC Data Inspector and SDI Data Analysis display helps troubleshoot ANC data and SDI data problems.

For further details visit:
www.tek.com/wfm2200

Multiformat, Multistandard Portable Waveform Monitor WFM2300

The WFM2300 Portable Video Waveform Monitor offers all the same functionality of the WFM2200A with the addition of measurement for the physical layer of the SDI signal and optional ASI monitoring tool. The WFM2300 is an ideal instrument for video installation and maintenance applications. The instrument has an integrated high brightness, low-power consumption LED backlit display in a convenient portable form factor. This versatile instrument can operate with an internal battery and DC input through an AC-DC converter unit.

Features and Benefits

- Portable Instrument that is Ideal for Field Production Setup and Troubleshooting
- Coax SDI Eye pattern measurement including eye amplitude, rise/fall time and overshoot measurements as well as Tektronix jitter waveform display
- Operates with Internal, Rechargeable, and Replaceable Battery Unit; External Recharger Kit and a Battery Unit for Replacement is available as an option
- Optical SDI Input and Output compliant to SMPTE297 (Option SFP)
- Coaxial Cable simulation / margin test loop for secure system Installation
- One SDI Input and one MULTI Input with Multiformat, Multistandard Support
- The MULTI input can be configured as SDI, AES or LTC input
- Dual Link SDI is supported by using Input A and Multi In selected as SDI
- Upgradeable to include 3G-SDI (Level A and Level B) format support (Option 3G)

- 3G/HD/SD Signal Generator with Genlock and Moving Picture / Circle for Troubleshooting Signal Paths and Equipment (Note: Option 3G is required for 3G-SDI signal generation) through Coax cable and Optical interface (Option SFP)
- HDMI Monitoring (option SFP-HDMI)
- ASI Monitoring tools (Option ASI)
- Comprehensive Audio Monitoring tool Up to 16 channel Embedded AES/EBU Audio
- Multichannel Surround Sound[1] Display and Flexible Lissajous Display
- Audio Loudness meter (Option LOUD)
- Dolby metadata decode, peak level metering and Dolby E signal generation
- Dolby E Guard Band meter with user-defined limits (Option DBE)
- AES Audio Test Tone Generator for Embedded and AES Output
- Audio/Video Delay and Propagation Delay measurement with the test signal generation (Option ADVP)
- Ability to Display Waveform of External Reference Signal and LTC Signal for Quick Diagnosis of the Potential Issues in Sync and Time Distribution System
- Tektronix-patented Diamond and Arrowhead Displays for Color Gamut Compliance Monitoring
- Comprehensive Data Monitoring helps to Quickly Resolve Difficult Content Quality and Reliability Issues (Option DATA)
- Simultaneous CEA708/608 Closed Caption monitoring; Teletext and OP47 subtitle monitoring (Option DATA)
- Detect and decode ANC data including AFD, WSS, Video Index, TSID, V-Chip, Broadcast Flag/CGMS-A, VITC, LTC, and ANC TC ARIB STD-B35/B37/B39, TR-B22, and TR-B23 support
- ANC Data Inspector and SDI Data Analysis display helps troubleshoot ANC data and SDI data problems

For further details visit:
www.tek.com/wfm2300

[1] Audio Surround Sound Display licensed from Radio Technische Werksätten GmbH and Co. KG (RTW).

WFM4000/WFM5000 Series Multistandard, Multiformat, Portable Waveform Monitors

The WFM5000 is for HD and SD Serial Digital Video Monitoring and HD/SD format auto-detection. The WFM4000 is for SD Serial Digital Video Monitoring. Both units provide Digital audio monitoring for 16 embedded channels and 2 AES/EBU channels.

Applications

- Camera level setup including camera shading
- Quality control and fault detection of outgoing video and audio content (control rooms and mobile trucks)
- Basic content verification during field production
- Content processing (including content edit, color adjustment, format conversion, and addition of promos and /or station IDs)
- Quality control and fault detection of incoming or outgoing video and audio content
- Tape or File QC

Features and Benefits

- Quad Tile display allows more display combinations to suit specific applications
- TandemVu™ enables Wavform/Vector (or Waveform Lightning) Display with Picture Thumbnail in a full-size single tile display
- Tektronix patented Timing Display simplifies facilities timing
- Short-depth integrated waveform monitor (WFM5000 / WFM4000) form factor for space-critical environments
- High-resolution, LED backlit display provides bright, readable instrument display - even under sunlight
- Easy to learn with intuitive user interface and online help
- Exclusive Tektronix Gamut displays (Diamond, Split Diamond, and Arrowhead) ensure compliant content
- Captured screen display downloadable to USB storage device in bitmap file format for easy documentation
- Picture Thumbnail in all modes for quick identification of source content
- Audio Bars and Lissajous displays let Audio Editors and Operators verify compliance of digital audio signals, without the need for an additional piece of equipment
- Front panel headphone port for easy identification and monitoring of audio channels
- Passive loop-throughs for HD-SDI (WFM5000 and WVR5000 only) and SD-SDI inputs allow for monitoring the true signal in the path and ensuring signal integrity, even if instrument power is off
- 32 instrument Presets for quick recall of commonly used configurations
- Front panel USB device for easy transfer of instrument Presets
- SNMP Support

For further details visit:
www.tektronix.com/wfm4000_5000

WFM5200 Multiformat, Multistandard Compact Waveform Monitor

The WFM5200 waveform monitor offers uncompromised monitoring quality with sharp CRT-like traces, SD/HD monitoring, a range of software options, and an upgrade path to 3G-SDI.

Applications

- Camera Monitoring (Camera Shading) in Mobile Trucks (OB Vans) and Production Studio Control Rooms
- Color Correction and Manipulation
- Content Editing and Special Effects
- Content Quality Control (QC) in Production and Post Production
- Field Production Setup and Troubleshooting
- Compliance Checking in Distribution and Broadcast

Features and Benefits

- Four SDI Inputs with Multiformat, Multistandard Support
  - Auto-detection of HD/SD-SDI and multiple Dual Link video formats
  - Monitor up to four SDI inputs simultaneously for multiple camera monitoring applications (Option CAM)
  - Upgradeable to include 3G-SDI with the purchase of an upgrade key (Option 3G)
  - 16-channel embedded AES/EBU audio simultaneous monitoring support with Multichannel Surround Sound[*1] display and flexible Lissajous display (Option AUD)
  - Audio Loudness monitoring (Option LOUD, requires Option AUD to be installed)
- Diamond and Arrowhead Displays for Color Gamut Compliance Monitoring
- Spearhead and Luma Qualified Vector (LQV™) Displays Facilitate Precise Color Adjustment for Post Production Applications (Option PROD)
- Stereoscopic 3D Video Monitoring (Option S3D)

- Comprehensive Data Monitoring (Option DATA) helps to Quickly Resolve Difficult Content Quality and Reliability Issues
  - Simultaneous CEA708/608 Closed Caption monitoring; Teletext and OP47 subtitle monitoring
  - Detect and decode ANC data including AFD, WSS, Video Index, TSID, V-Chip, Broadcast Flag/CGMS-A, VITC, LTC, and ANC TC
  - ARIB STD-B35/B37/B39, TR-B22, and TR-B23 support
  - ANC Data Inspector and SDI Data Analysis display helps troubleshoot ANC data and SDI data problems
- Simple 3G/HD/SD Color Bar and Pathological Signal Generator (Option GEN) for Troubleshooting Signal Paths and Equipment (3G capability requires option 3G)
- Range of Monitoring Displays
  - Timing and Lightning displays simplify facility and inter-channel timing
  - Waveform display of external reference (Black Burst or Tri-Level Sync)
  - Black Picture and Tektronix-patented Frozen Picture Detection
  - Extensive alarms, status reporting, and error logging for 10,000 events simplifies error correction tasks
  - Voltage and Timing Cursor for precise measurement
  - User-definable Safe Area Graticules and AFD Graticule facilitate editing and format conversion tasks
- Unmatched Usability & Display Versatility
  - 32 instrument presets for quick recall of commonly used configurations tailored to colorists, editors, or operators
  - Super lightweight and low power consumption design for portable, battery-powered applications
  - Flexible Quad Tile Display increases productivity
  - TandemVu® Display for efficient camera adjustments of luma and chroma
  - Full Screen mode that maximizes display size for precise adjustments

For further details visit:
www.tektronix.com/wfm5200

WFM5250 SDI/HDMI Multiformat Compact Waveform Monitor

The WFM5250 is a compact waveform monitor with an internal display supporting both SDI and HDMI with HDCP compliance support. That combines support for professional SDI equipment and HDMI consumer or professional devices.

Applications

- Content Acquisition with DSLR camera
- Quality Control (QC) of DVD / Blu-ray master disk authoring in Post Production
- CALM and Picture quality monitoring in distribution with Set Top Box (STB) output
- Color Correction and Manipulation
- Content Editing and Special Effects
- Content Quality Control (QC) in Production and Post Production
- Field Production Setup and Troubleshooting

Features and Benefits

- Two SDI Inputs and two HDMI inputs with High-bandwidth Digital Content Protection (HDCP)
- HDCP support on HDMI input and HDMI output for connectivity with consumer electronics products such as Set Top Box, DVD/Blu-ray disk player
- Auto-detection of HD/SD-SDI and multiple Dual Link video formats
- Upgradeable to include 3G-SDI (Level A and Level B) format support with the purchase of an upgrade key (Option 3G)
- Two-channel Simultaneous Monitoring (Option SIM)
- HDMI status display with EDID information
- 16-channel embedded AES/EBU audio (8-channel for HDMI) with Multichannel Surround Sound[*1] display and flexible Lissajous display (Option AUD)
- Audio Loudness monitoring to ITU-R BS.1770-3/1771, EBU R 128, and ATSC A/85 recommendations (Option LOUD, requires Option AUD to be installed)
- Diamond and Arrowhead displays for Color Gamut Compliance Monitoring
- Spearhead and Luma Qualified Vector (LQV™) Displays Facilitate Precise Color Adjustment for Post Production Applications (Option PROD)
- Stereoscopic 3D Video Monitoring (Option S3D)
- SDI Comprehensive Data Monitoring (Option DATA) helps to Quickly Resolve Difficult Content Quality and Reliability Issues
- Simultaneous CEA708/608 Closed Caption monitoring; Teletext and OP47 subtitle monitoring (Option DATA)
- Detect and decode ANC data including AFD, WSS, Video Index, TSID, V-Chip, Broadcast Flag/CGMS-A, VITC, LTC, and ANC TC- ARIB STD-B35/B37/B39, TR-B22, and TRB23 support
- ANC Data Inspector and SDI Data Analysis display helps troubleshoot ANC data and SDI data problems
- Simple 3G/HD/SD Color Bar and Pathological Signal Generator (Option GEN) for Troubleshooting Signal Paths and Equipment (3G capability requires option 3G)
- Range of Monitoring Displays
- Timing and Lightning displays simplify facility and inter-channel timing
- Waveform display of external reference (Black Burst or Tri-Level Sync)
- Black Picture and Tektronix-patented Frozen Picture Detection
- Extensive alarms, status reporting, and error logging for 10,000 events simplifies error correction tasks
- Voltage and Timing Cursor for precise measurement
- User-definable Safe Area Graticules and AFD Graticule facilitate editing and format conversion tasks
- Unmatched Usability & Display Versatility
- 32 instrument presets for quick recall of commonly used configurations tailored to colorists, editors, or operators
- Flexible Quad Tile Display increases productivity
- TandemVu® Display for efficient camera adjustments of luma and chroma
- Full Screen mode that maximizes display size for precise adjustments
- DVI-I external display output for easy connection to digital or analog XGA display
- Super lightweight and low power consumption design for portable, battery-powered applications

For further details visit:
www.tek.com/waveform-monitor/wfm5250

WFM6120 SD-SDI Waveform Monitor

The WFM6120 waveform monitor boosts your productivity, allowing you to accurately monitor and analyze content at a glance with Tektronix See and Solve displays. Provides SD-SDI and Analog composite monitoring (Option CPS) and measurement with analog, digital and embedded audio monitoring (Option AD).

Applications

- Monitoring and Compliance Checking in Video Distribution and Broadcasting
- Quality Control in Video Production and Post-production
- Equipment Qualification and Troubleshooting in the Installation and Maintenance of Video Facilities and Systems
- Combine with the TG8000 for A/V Delay measurements (AVD Option)

Features and Benefits

- Analog and SD-SDI formats
- Numerical and Graphical Display of A/V Delay (AVD Option)
- Extensive Fault Monitoring, Status Reporting, and Error Logging Simplify Content Quality Control
- Exclusive Tektronix Gamut Displays Help Ensure Compliant Content
- Exceptional Audio Monitoring Available, (Option AD) with support for analog, digital AES/EBU and embedded with a Front-panel Headphone Connector, Reduces Time and Effort in Verifying Multi-channel Audio Content
- Measure audio loudness and true peak of combination of discrete audio channels as per ITU-R BS.1770-3 / 1771, EBU R128 and ATSC A/85 recommendations
- Audio Control Packet provides a decoded display of the embedded audio information
- CEA608 Closed Caption decoding
- Selectable Time Code- for ANC VITC or LTC; selectable VITC selectable line number
- ANC Data Inspector simplifies ANC Data Monitoring and Helps Quickly Resolve Difficult Quality and Reliability Issues (DAT Option)
- Available High-Performance SDI Physical Layer Measurements (PHY Option) is Available for Eye and Jitter Displays
- FlexVu™ XGA Display Increases Productivity with the Ability to Create Hundreds of Custom Multiple-view Displays Tailored to Specific Work Practices
- CaptureVu™ Video Frame Capture Improves Efficiency in Troubleshooting and Equipment Setup
- The Patented Tektronix Lightning Display is Ideal for Maintaining Correct Inter-channel Timing
- Black Picture and Frozen Frame Detection for monitoring signal path continuity
- Standard and User-definable Safe Area Graticules Help Avoid Errors and Rework in Editing and Format Conversion
- Active Format Description (AFD), Video Index and Wide Screen Signaling (WSS) decoding
- Teletext Subtitle decoding
- Infinite Persistance Mode for trace displays
- Front-panel USB Port For Easy Storage and Transfer of Instrument Settings and Video Data

For further details visit:
www.tek.com/waveform-monitor/wfm6000-7000

WFM7200 Multiformat, Multistandard Waveform Monitor

The monitoring and measurement capabilities of the WFM7200 provide a comprehensive suite of options and configurations to suit a variety of applications. For monitoring applications Tektronix-patented gamut displays simplify color adjustments for camera balancing and color correction applications. Get information about the signal at a glance from the audio session and video session displays that assist in ensuring quality control of the image.

Applications

- Post-production Edit Suite and Color Correction Monitoring
- Quality Control in Content Production and Post-production
- Monitoring and Compliance Checking in Content Distribution and Broadcast transmission
- Equipment/System Qualification and Troubleshooting for Installation and Maintenance of Content Creation and Distribution Facilities

Features and Benefits

- Simultaneous monitoring of 2 HD/SD-SDI inputs or 1 HD/SD-SDI input and 1 CPS input. Option 3G is required for 3G-SDI format support (Opt. SIM)
- Auto-detection of HD/SD-SDI and multiple Dual Link video formats
- Composite analog (PAL/NTSC) video support (Opt. CPS[*2])
- Multiple Input Mode allows monitoring of 2 to 4 SDI inputs simultaneously (4-input mode requires Opt. 2SDI[*2])
- Upgradeable to 3G-SDI (Level A and Level B) format support (Opt. 3G)
- Audio Monitoring Standards and Formats

  - Measure audio loudness and true peak of combination of discrete audio channels as well as Dolby Digital, Dolby Digital Plus, and Dolby E audio program as per ITU-R BS.1770-3 / 1771, EBU R 128 and ATSC A/85 recommendations

  - Analog, Digital AES/EBU, Digital Embedded – Option AD

  - Analog & Digital plus Dolby Digital and Dolby E – Option DDE
- Stereoscopic 3D Video Displays for Camera Alignment and Production/Post-production Applications (Opt. S3D)
- Black Picture and Tektronix-patented Frozen Picture Detection
- Advanced ANC Data Monitoring including In-depth Digital Data Analysis (Opt. DAT)
- Standard and User-definable Safe Area Graticules Facilitate Editing and Format Conversion Tasks, Reducing the Need for Reworks
- Active Format Description (AFD) Detection, Decode, and Automatically Adjusted Graticule in Picture Display enable Easy Identification of Aspect-ratio Related Issues
- Superior Physical Layer Signal Measurement including high-performance real-time eye pattern display, jitter measurements, and patented cable length measurement (Opt. PHY3)
- Most comprehensive eye pattern measurements including eye amplitude, rise/fall time, and overshoot/undershoot measurements as well as Tektronix jitter waveform display (Opt. PHY3)

For further details visit:
www.tek.com/waveform-monitor/wfm7200

[*2] Only one CPS or 2SDI option can be installed in the instrument.

WFM8300/WFM8200 Advanced Multistandard, Multiformat Waveform Monitors

Ideal for multiformat environments, the WFM8200 and WFM8300 advanced waveform monitors provide flexible options and field-installable upgrade kits to monitor diverse video types including 4K/UHDTV1 quad link, 3G-SDI, Dual Link, HD/SD SDI, and Composite Analog Video. Both WFM8200 and WFM8300 come standard with SMPTE 372M compliant monitoring, SMPTE 352M automatic format detection, and selectable display of Alpha Channel as well as 2K Dual Link monitoring with XYZ Color Space.

These instruments allow for monitoring of Quad Link 4K/UHDTV1 (Option 4K, 3G, 2SDI) with a comprehensive set of displays and status reporting tools. The Tektronix patented Timing Display has been extended to measure timing between Link A,B,C,D and proves invaluable to maintaining correct timing between links. Both instruments can be configured to decode and monitor Dolby formats (Dolby Digital, Dolby E and Dolby Digital Plus), display Dolby Metadata, and monitor 16-channel embedded audio simultaneously.

Applications

- Monitoring and compliance checking in video distribution and broadcasting
- Quality control in the video production and post-production
- Equipment qualification and troubleshooting in the installation and maintenance of video facilities and systems
- 4K/UHDTV1 Quad Link Monitoring Video Monitoring

WFM8300

The measurement and monitoring capabilities of the WFM8300 provide precision capabilities such as Physical Layer Measurements, Digital Data Analysis (including ANC Data Inspector), A/V Delay Measurement, and in-depth Simultaneous Input Monitoring which makes Tektronix the brand of choice for applications that require deep signal and content analysis with unquestionable accuracy.

The WFM8300 features the complete range of options of the product family and comes standard with HD/SD-SDI and Dual Link video formats support. It provides high-performance monitoring and measurement for applications for a wide range of formats from Composite Analog to SD-SDI, HD-SDI, Dual Link, 3G-SDI and Quad Link 4K/UHDTV1 video signals. The WFM8300 offers support for a variety of audio formats for analog, digital AES/EBU, digital embedded, Dolby Digital, and Dolby E.

Features and Benefits

- Video Monitoring Standards and Formats
  - 3G-SDI (Level A and Level B) – Option 3G
  - High Definition SDI – Standard
  - Standard Definition SDI – Standard
  - Dual Link (4:2:2, 4:4:4, alpha channel, 10 bit, 12 bit) – Standard
  - Composite Analog Video – Option CPS[*2]
  - 4 SDI Input Monitoring – Option 2SDI[*2]
- 4K/UHDTV1 Quad Link Monitoring (Options 4K, 3G, 2SDI)
- Support for extend color space ITU-R BT.2020
- Color Gamut Monitoring
  - Arrowhead Display – Standard
  - Diamond and Split Diamond Displays – Standard
  - Spearhead Display – Option PROD
  - Luma Qualified Vector (LQV™) – Option PROD
- Audio Monitoring Standards and Formats
  - Measure audio loudness and true peak of combination of discrete audio channels as well as Dolby Digital, Dolby Digital Plus, and Dolby E audio program as per ITU-R BS.1770-3 / 1771, EBU R 128 and ATSC A/85 recommendations
  - Analog, Digital AES/EBU, Digital Embedded – Option AD
  - Analog & Digital plus Dolby Digital and Dolby E – Option DDE
- Stereoscopic 3D Video Monitoring
- Tektronix Patented Timing Displays with support for Quad Link timing measurement in 4K modes
- Measurement and Analysis
  - Eye Pattern & Jitter Waveform Measurements Option PHY
  - Color Bar & Pathological Signal Generation – Option PHY
  - Digital Data Analysis – Standard
  - ANC Data Inspector – Standard
  - Simultaneous Input Monitoring – Standard
  - Audio / Video Delay Measurement – Standard

WFM8200

The WFM8200 provides an ideal solution for advanced monitoring of Analog, Digital, High Frame-rate Digital Video, and multiple Audio formats. This flexible solution comes standard with HD/SD-SDI and Dual Link video monitoring and can be equipped with options and upgrades to monitor 4K/UHDTV1 Quad Link, 3Gb/s SDI and or Composite Analog video. The WFM8200 is an intelligent choice that prepares you for format transitions and growing monitoring needs. Available audio options include support for analog, digital AES/EBU, digital embedded, Dolby Digital, and Dolby E formats.

Features and Benefits

- Video Monitoring Standards and Formats
  - 3G-SDI (Level A and Level B) – Option 3G
  - High Definition SDI – Standard
  - Standard Definition SDI – Standard
  - Dual Link (4:2:2, 4:4:4, alpha channel, 10 bit, 12 bit) – Standard
  - Composite Analog Video – Option CPS[*2]
  - 4 SDI Input Monitoring – Option 2SDI[*2]
- 4K/UHDTV1 Quad Link Monitoring (Options 4K, 3G, 2SDI)
- Support for extend color space ITU-R BT.2020
- Color Gamut Monitoring
  - Arrowhead Display – Standard
  - Diamond and Split Diamond Displays – Standard
  - Spearhead Display – Option PROD
  - Luma Qualified Vector (LQV™) – Option PROD
- Audio Monitoring Standards and Formats
  - Measure audio loudness and true peak of combination of discrete audio channels as well as Dolby Digital, Dolby Digital Plus, and Dolby E audio program as per ITU-R BS.1770-3 / 1771, EBU R 128 and ATSC A/85 recommendations
  - Analog, Digital AES/EBU, Digital Embedded – Option AD
  - Analog & Digital plus Dolby Digital and Dolby E – Option DDE
- Measurement and Analysis
  - Eye Pattern Display & Jitter Readouts – Option EYE
  - Digital Data Analysis – Option DAT
  - ANC Data Inspector - Option DAT
- Stereoscopic 3D Video Monitoring
- Tektronix Patented Timing Displays with support for Quad Link timing measurement in 4K modes

Both WFM8300 and WFM8200 support flexible combinations of options and field upgrades, providing an excellent solution for multiformat environments while protecting your investment.

For further details visit:
www.tektronix.com/wfm8000

[*2] Only one CPS or 2SDI option can be installed in the instrument.

WVR4000/5000 Series Waveform Rasterizers

The WVR5000 is a compact Waveform Rasterizer for HD and SD Serial Digital Video Monitoring with HD/SD format auto-detection. The WVR4000 is a compact Waveform Rasterizer for SD Serial Digital Video Monitoring. Both units provide Digital audio monitoring for 16 embedded channels and 2 AES/EBU channels.

Applications

- Camera level setup including camera shading
- Quality control and fault detection of outgoing video and audio content (control rooms and mobile trucks)
- Basic content verification during field production
- Content processing (including content edit, color adjustment, format conversion, and addition of promos and /or station IDs)
- Quality control and fault detection of incoming or outgoing video and audio content
- Tape or File QC

Features and Benefits

- Quad Tile display allows more display combinations to suit specific applications
- Half-rack 1RU Rasterizer (WVR5000/WVR4000) form factor for space-critical environments
- TandemVu enables Waveform/Vector (or Waveform Lightning) Display with Picture
- Patented Tektronix Timing Displays simplifies facilities timing
- Exclusive Tektronix Gamut displays (Diamond, Split Diamond, and Arrowhead) ensure compliant content
- Picture Thumbnail in all modes for quick identification of source content
- Audio Bars and Lissajous displays let Audio Editors and Operators verify compliance of digital audio signals, without the need for an additional piece of equipment
- Passive loop-throughs for HD-SDI (WFM5000 and WVR5000 only) and SD-SDI inputs allow for monitoring the true signal in the path and ensuring signal integrity, even if instrument power is off

For further details visit:
www.tektronix.com/wvr4000_5000

WVR5200 Multiformat, Multistandard Compact Rasterizer

The WVR5200 waveform rasterizer offers uncompromised monitoring quality with sharp CRT-like traces, SD/HD monitoring, a range of software options, and an upgrade path to 3G-SDI.

Applications

- Camera Monitoring (Camera Shading) in Mobile Trucks (OB Vans) and Production Studio Control Rooms
- Color Correction and Manipulation
- Content Editing and Special Effects
- Content Quality Control (QC) in Production and Post Production
- Field Production Setup and Troubleshooting
- Compliance Checking in Distribution and Broadcast

Features and Benefits

- Four SDI Inputs with Multiformat, Multistandard Support
  - Auto-detection of HD/SD-SDI and multiple Dual Link video formats
  - Monitor up to four SDI inputs simultaneously for multiple camera monitoring applications (Option CAM)
  - Upgradeable to include 3G-SDI with the purchase of an upgrade key (Option 3G)
  - 16-channel embedded AES/EBU audio simultaneous monitoring support with Multichannel Surround Sound[1] display and flexible Lissajous display (Option AUD)
  - Audio Loudness monitoring (Option LOUD, requires Option AUD to be installed)
- Diamond and Arrowhead Displays for Color Gamut Compliance Monitoring
- Spearhead and Luma Qualified Vector (LQV™) Displays Facilitate Precise Color Adjustment for Post Production Applications (Option PROD)
- Stereoscopic 3D Video Monitoring (Option S3D)
- Comprehensive Data Monitoring (Option DATA) helps to Quickly Resolve Difficult Content Quality and Reliability Issues
  - Simultaneous CEA708/608 Closed Caption monitoring; Teletext and OP47 subtitle monitoring
  - Detect and decode ANC data including AFD, WSS, Video Index, TSID, V-Chip, Broadcast Flag/CGMS-A, VITC, LTC, and ANC TC
  - ARIB STD-B35/B37/B39, TR-B22, and TR-B23 support
  - ANC Data Inspector and SDI Data Analysis display helps troubleshoot ANC data and SDI data problems
- Simple 3G/HD/SD Color Bar and Pathological Signal Generator (Option GEN) for Troubleshooting Signal Paths and Equipment (3G capability requires option 3G)
- Range of Monitoring Displays
  - Timing and Lightning displays simplify facility and inter-channel timing
  - Waveform display of external reference (Black Burst or Tri-Level Sync)
  - Black Picture and Tektronix-patented Frozen Picture Detection
  - Extensive alarms, status reporting, and error logging for 10,000 events simplifies error correction tasks
  - Voltage and Timing Cursor for precise measurement
  - User-definable Safe Area Graticules and AFD Graticule facilitate editing and format conversion tasks
- Unmatched Usability & Display Versatility
  - 1RU height, Half-rack Width, Short-depth (5.5 in. or 14 cm) Instrument, Ideal for Space-constrained Environments
  - 4-pin XLR DC Power Input with AC Power Adapter for both AC/DC Operation
  - DVI-I external display output for easy connection to digital or analog XGA display
  - SNMP and Ethernet remote interface capabilities and GPI control facilitate centralized monitoring and control
  - 32 instrument presets for quick recall of commonly used configurations tailored to colorists, editors, or operators
  - Flexible Quad Tile Display increases productivity
  - TandemVu® Display for efficient camera adjustments of luma and chroma
  - Full Screen mode that maximizes display size for precise adjustments

For further details visit:
www.tektronix.com/wvr5200

WVR5250 SDI/HDMI Multiformat Compact Waveform Rasterizer

The WVR5250 is a compact waveform monitor that requires an external display. The instrument supports both SDI and HDMI with HDCP compliance support. That combines support for professional SDI equipment and HDMI consumer or professional devices.

Applications

- Content Acquisition with DSLR camera
- Quality Control (QC) at DVD / Blu-ray master disk authoring in Post Production
- CALM and Picture quality monitoring in distribution with Set Top Box (STB) output
- Color Correction and Manipulation
- Content Editing and Special Effects
- Content Quality Control (QC) in Production and Post Production
- Field Production Setup and Troubleshooting

Features and Benefits

- Two SDI Inputs and two HDMI inputs with High-bandwidth Digital Content Protection (HDCP)
- HDCP support on HDMI input and HDMI output for connectivity with consumer electronics products such as Set Top Box, DVD/Blu-ray disk player
- Auto-detection of HD/SD-SDI and multiple Dual Link video formats
- Upgradeable to include 3G-SDI (Level A and Level B) format support with the purchase of an upgrade key (Option 3G)
- Two-channel Simultaneous Monitoring (Option SIM)
- 16-channel embedded AES/EBU audio (8-channel for HDMI) with Multichannel Surround Sound[*1] display and flexible Lissajous display (Option AUD)
- Audio Loudness monitoring to ITU-R BS.1770-3/1771, EBU R 128, and ATSC A/85 recommendations (Option LOUD, requires Option AUD to be installed)
- Diamond and Arrowhead displays for Color Gamut Compliance Monitoring
- Spearhead and Luma Qualified Vector (LQV™) Displays Facilitate Precise Color Adjustment for Post Production Applications (Option PROD)
- Stereoscopic 3D Video Monitoring (Option S3D)
- SDI Comprehensive Data Monitoring (Option DATA) helps to Quickly Resolve Difficult Content Quality and Reliability Issues
- Simultaneous CEA708/608 Closed Caption monitoring; Teletext and OP47 subtitle monitoring (Option DATA)
- Detect and decode ANC data including AFD, WSS, Video Index, TSID, V-Chip, Broadcast
- Flag/CGMS-A, VITC, LTC, and ANC TC- ARIB STD-B35/B37/B39, TR-B22, and TRB23 support
- ANC Data Inspector and SDI Data Analysis display helps troubleshoot ANC data and SDI data problems (Option DATA)
- HDMI status display with EDID information
- Simple 3G/HD/SD Color Bar and Pathological Signal Generator (Option GEN) for Troubleshooting Signal Paths and Equipment (3G capability requires option 3G)
- Range of Monitoring Displays
- Timing and Lightning displays simplify facility and inter-channel timing
- Waveform display of external reference (Black Burst or Tri-Level Sync)
- Black Picture and Tektronix-patented Frozen Picture Detection
- Extensive alarms, status reporting, and error logging for 10,000 events simplifies error correction tasks
- Voltage and Timing Cursor for precise measurement
- User-definable Safe Area Graticules and AFD Graticule facilitate editing and format conversion tasks
- Unmatched Usability & Display Versatility
- 32 instrument presets for quick recall of commonly used configurations tailored to colorists, editors, or operators
- Super lightweight and low power consumption design for portable, battery-powered applications
- Flexible Quad Tile Display increases productivity
- TandemVu® Display for efficient camera adjustments of luma and chroma
- Full Screen mode that maximizes display size for precise adjustments

For further details visit:
www.tek.com/waveform-rasterizers/wvr5250

WVR7200 Multiformat, Multistandard Compact Rasterizer

The monitoring and measurement capabilities of the WVR7200 provide a comprehensive suite of options and configurations to suit a variety of applications. For monitoring applications Tektronix-patented gamut displays simplify color adjustments for camera balancing and color correction applications. Get information about the signal at a glance from the audio session and video session displays that assist in ensuring quality control of the image.

Applications

- Post-production Edit Suite and Color Correction Monitoring
- Quality Control in Content Production and Post-production
- Monitoring and Compliance Checking in Content Distribution and Broadcast transmission

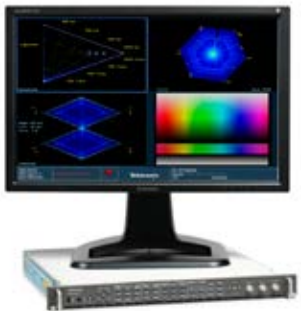
- Equipment/System Qualification and Troubleshooting for Installation and Maintenance of Content Creation and Distribution Facilities

Features and Benefits

- Simultaneous monitoring of 2 HD/SD-SDI inputs or 1 HD/SD-SDI input and 1 CPS input. Option 3G is required for 3G-SDI format support (Opt. SIM)
- Auto-detection of HD/SD-SDI and multiple Dual Link video formats
- Composite analog (PAL/NTSC) video support (Opt. CPS[*2])
- Multiple Input Mode allows monitoring of 2 to 4 SDI inputs simultaneously (4-input mode requires Opt. 2SDI[*2])
- Upgradeable to 3G-SDI (Level A and Level B) format support (Opt. 3G)
- Comprehensive Audio Monitoring
- Stereoscopic 3D Video Displays for Camera Alignment and Production/Post-production Applications (Opt. S3D)
- Black Picture and Tektronix-patented Frozen Picture Detection
- Advanced ANC Data Monitoring including In-depth Digital Data Analysis (Opt. DAT)
- Standard and User-definable Safe Area Graticules Facilitate Editing and Format Conversion Tasks, Reducing the Need for Reworks
- Audio Monitoring Standards and Formats
  - Measure audio loudness and true peak of combination of discrete audio channels as well as Dolby Digital, Dolby Digital Plus, and Dolby E audio program as per ITU-R BS. 1770-3 / 1771, EBU R 128 and ATSC A/85 recommendations
  - Analog, Digital AES/EBU, Digital Embedded – Option AD
  - Analog & Digital plus Dolby Digital and Dolby E – Option DDE
- Active Format Description (AFD) Detection, Decode, and Automatically Adjusted Graticule in Picture Display enable Easy Identification of Aspect-ratio Related Issues
- Superior Physical Layer Signal Measurement including high-performance real-time eye pattern display, jitter measurements, and patented cable length measurement (Opt. PHY3)
- Most comprehensive eye pattern measurements including eye amplitude, rise/fall time, and overshoot/undershoot measurements as well as Tektronix jitter waveform display (Opt. PHY3)

For further details visit:
www.tek.com/waveform-rasterizers/wvr7200

[*2] Only one CPS or 2SDI option can be installed in the instrument.



WVR8300/WVR8200 Advanced Analog/SD/HD/3G-SDI/4K/UHDTV1 Waveform Rasterizer

The WVR8300 features the complete range of options of the product family and comes standard with HD/SD-SDI and Dual Link video formats support. It provides high-performance monitoring and measurement for applications for a wide range of formats from Composite Analog to SD-SDI, HD-SDI, Dual Link, 3G-SDI video formats and 4K/UHDTV1 Quad Link signals. The WVR8300 offers support for a variety of audio formats for analog, digital AES/EBU, digital embedded, Dolby Digital, Dolby Digital Plus, and Dolby E.

The measurement and monitoring capabilities of the WVR8300 provide precision capabilities such as Physical Layer Measurements, Digital Data Analysis (including ANC Data Inspector), A/V Delay Measurement, and in-depth Simultaneous Input Monitoring which makes Tektronix the brand of choice for applications that require deep signal and content analysis with unquestionable accuracy.

The WVR8200 provides an ideal solution for advanced monitoring of analog, digital, high frame-rate digital video, and multiple audio formats. This flexible solution comes standard with HD/SD-SDI and Dual Link video monitoring and can be equipped with options and upgrades to monitor 4K/UHDTV Quad Link, 3G-SDI and/or composite analog video. The WVR8200 is an intelligent choice that prepares you for format transitions and growing monitoring needs. Available audio options include support for analog, digital AES/EBU, digital embedded, Dolby Digital, Dolby Digital Plus, and Dolby E formats.

Applications

- Monitoring and Compliance Checking in Content Distribution and Broadcast
- Quality Control in Content Production and Post Production
- Equipment/System Qualification and Trouble-shooting for Installation and Maintenance of Content Creation and Distribution Facilities
- Research and Development of Professional Video Equipment
- Stereoscopic 3D Video Monitoring

Features & Benefits - WVR8300

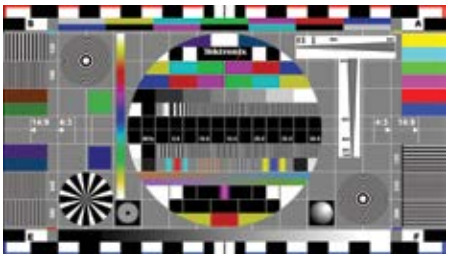
- 3G-SDI (Level A and Level B) - Option 3G
- High Definition SDI - Standard
- Standard Definition SDI - Standard
- Dual Link (4:2:2, 4:4:4, alpha channel, 10 bit, 12 bit) - Standard
- Composite Analog Video - Option CPS[*2]
- 4K/UHDTV1 Quad Link Monitoring (Options 4K, 3G, 2SDI)
- Support for extend color space ITU-R BT.2020
- 4 SDI Input Monitoring – Option 2SDI[*2]
- Color Gamut Monitoring
  - Arrowhead Display - Standard
  - Diamond and Split Diamond Displays - Standard
  - Spearhead Display - Option PROD
  - Luma Qualified Vector (LQV™) - Option PROD
- Audio Monitoring Standards and Formats
  - Measure audio loudness and true peak of combination of discrete audio channels as well as Dolby Digital, Dolby Digital Plus, and Dolby E audio program as per ITU-R BS.1770-3 / 1771, EBU R 128 and ATSC A/85 recommendations
  - Analog, Digital AES/EBU, Digital Embedded - Option AD
  - Analog and Digital including Dolby Digital, Dolby Digital Plus, and Dolby E - Option DPE
- Measurement and Analysis
  - Automated Eye Pattern and Jitter Measurements - Option PHY
  - Color Bar and Pathological Signal Generation - Option PHY
  - Digital Data Analysis - Standard
  - ANC Data Inspector - Standard
  - Simultaneous Input Monitoring - Standard
  - Audio/Video Delay Measurement - Standard
- Stereoscopic 3D Video Monitoring
- Tektronix Patented Timing Displays with support for Quad Link timing measurement in 4K modes

[*2] Only one CPS or 2SDI option can be installed in the instrument.

Features & Benefits - WVR8200

- 3G-SDI (Level A and Level B) - Option 3G
- High Definition SDI - Standard
- Standard Definition SDI - Standard
- Dual Link (4:2:2, 4:4:4, alpha channel, 10 bit, 12 bit) - Standard
- Composite Analog Video - Option CPS[*2]
- 4K/UHDTV1 Quad Link Monitoring (Options 4K, 3G, 2SDI)
- Support for extend color space ITU-R BT.2020
- 4 SDI Input Monitoring – Option 2SDI[*2]
- Color Gamut Monitoring
  - Arrowhead Display - Standard
  - Diamond and Split Diamond Displays - Standard
  - Spearhead Display - Option PROD
  - Luma Qualified Vector (LQV™) - Option PROD
- Audio Monitoring Standards and Formats
  - Measure audio loudness and true peak of combination of discrete audio channels as well as Dolby Digital, Dolby Digital Plus, and Dolby E audio program as per ITU-R BS.1770-3 / 1771, EBU R 128 and ATSC A/85 recommendations
  - Analog, Digital AES/EBU, Digital Embedded - Option AD
  - Analog and Digital including Dolby Digital, Dolby Digital Plus, and Dolby E - Option DPE
- Measurement and Analysis
  - Eye Pattern Display and Jitter Readouts - Option EYE
  - Digital Data Analysis – Option DAT
  - ANC Data Inspector – Option DAT
- Stereoscopic 3D Video Monitoring
- Tektronix Patented Timing Displays with support for Quad Link timing measurement in 4K modes

For further details visit:
www.tektronix.com/wvr8000



1741C Analog Dual-Standard Waveform Monitor

The 1741C analog waveform monitor features user interface tools to simplify operations. Its precise displays provide high-quality monitoring for traditional analog composite (PAL and NTSC) or component systems. This instrument supports four analog composite signal inputs with waveform, vector, SCH, and picture functions. The input ports can also be used for RGB signals. For camera alignment, the user can display one, two, three, or four waveforms simultaneously and overlay just as many vector displays, thus facilitating monitoring of multiple cameras during content acquisition. Powerful tools such as timing display, VITC, or LTC decode, freeze capture, video session, alarm status, and error log allow for deeper signal inspection to enable superior video production and delivery quality.

Applications

- Camera Alignment and Analog Video Equipment Setup
- Compliance Checking in Distribution and Broadcast
- Content QA of Composite and Component Video in Production and Postproduction

Features & Benefits

- Four Passive Loop through Analog Composite Signal Inputs
- Waveform Display Supports Composite or Component Video for White and Black Balance and Level Checking
- Vector Display for Analog Composite Signal Allows System Setup to Specific Chroma Values
- SCH Display for Color Subcarrier-to-Horizontal Sync Timing and Color Framing Matching among Edit Sources
- Timing Display for Measuring Signal Timing between Each Input and the Reference
- Screen Capture for Pictures and Traces Facilitate Reference Setting, Troubleshooting, and Documentation Tasks
- Video Session, Alarm Status, and Error Logging for Quick Identification and Easier Correction of Problems
- XGA Display with Full-screen Picture Display and Picture Thumbnail for Easy Signal Source Verification

For further details visit:
www.tektronix.com/1741C

TG8000 Multiformat Test Signal Generator

The TG8000 is a precision multiformat analog and digital signal generation platform, designed for sync pulse and timecode generation in broadcasting applications and reference test signal generation in video equipment testing applications.

Applications

- Sync Pulse Generator and Test Signal Generator for Post Production and Broadcast Facilities
- Test Signal Generator for Research and Development
- Equipment Design and Maintenance
- The TG8000 is a modular system, with up to four user-changeable generator modules and one power supply module in a full-width 1RU form factor.

Features and Benefits

- Multiformat Analog and Digital Test Signal Generation
- Ideal Channel Configuration and Performance to Support Reference Generator Needs
- Modular Configurable Platform
- Stay GenLock™ – Unique, Robust Genlock Mode provides Stable Synchronization Signals for Digital and Traditional Broadcast Facilities

Selection of Modules

- The AGL7 Analog Genlock Module adds the capacity to lock to a variety of signals, which makes the TG8000 an ideal solution as the master house reference or slave reference for broadcast and production/post-production applications.
- The GPS7 GPS Synchronization and Time Code Module includes an integrated GPS receiver which can serve as the system timing reference.
- The ATG7 Composite Analog Test Generator supports PAL, NTSC, and NTSC No Setup. It provides one test signal output, one color bar test signal output, and two black outputs.
- The AVG7 is an Analog Video Generator for 525/625 interlace formats supporting component (Y'P'bP'r, G,B,R, Y/C), 525 Beta, and composite (PAL, NTSC, NTSC No Setup).
- The AG7 provides eight channels (4 AES/EBU pairs) of audio signal generation. It also provides two channels (1 AES/EBU pair) of DARS (Digital Audio Reference Signal), as well as a 48 kHz word clock output.
- The BG7 is an analog black generator with four independently selectable outputs. The BG7 Black Generator supports NTSC and PAL black burst as well as HDTV tri-level sync.
- The DVG7 is a multiformat SD-SDI test signal generator. The DVG7 Digital Video Generator supports 525 line and 625 line serial digital video at 270 Mb/s.
- The HDVG7 is a high-accuracy, multiformat, high-definition test signal module that provides up to two identical 1.485 Gb/s serial digital video test signal outputs in a broad variety of formats.
- The HDLG7 is a test signal generator that provides two identical dual-link high-definition serial digital interface (HD SDI) outputs.
- The HD3G7 is a test signal generator that provides two outputs of a HD/3G-SDI video test signal. For Level A and Level B 3Gb/s formats.
- The SDI7 is a test signal generator that provides two independent channels of SD/HD/3G-SDI video test signal generation in a variety of formats with separate test and test/black signal generation per channel (3G-SDI signal generation is optionally available).
- Embedded Dolby E audio test signal generation capability. (Option DBT)
- The ECO8000 Series Automatic Changeover Unit can be used to configure a redundant SPG system using primary and backup TG8000 units, for high-reliability applications.
- SD, HD, and 3G-SDI modules can be used to generate standard test signals such as color bars, SDI stress patterns, and digital black. Embedded audio tones can be added, including an AV Delay test sequence. ID text, burnt-in timecode and logo image overlays can be added to the active picture.
- Ethernet and USB interfaces allow you to download test signals, full-frame pictures, station or network logos, and firmware updates.

For further details visit:
www.tek.com/sync-pulse-generator-spg



SPG8000 Master Sync / Master Clock Reference Generator

The SPG8000 is a precision multiformat video signal generator, suitable for master synchronization and reference applications. It provides multiple video reference signals, such as black burst, HD tri-level sync, and serial digital and composite analog test patterns, and it provides time reference signals such as time code and NTP (Network Time Protocol).

Applications

- Sync pulse generator and time reference generator for broadcast, studio, mobile, and post-production facilities
- Master or slave (genlock) operation for distributed system architectures
- Video equipment verification, facility link testing, and display calibration

Features and Benefits

- Optional GPS Receiver (Opt GPS) that adds an internal GPS receiver to the instrument
- Option BG provides two black burst or HD tri-level sync outputs plus two composite analog outputs (NTSC or PAL) that can be used to generate test patterns such as color bars, or serve as additional black burst outputs.
- Option SDI adds two fully independent serial digital video generator channels of two outputs each. With embedded Dolby E audio test signal generation capability. (Option DBT)
- Option 3G extends the functionality of the SDI test signal outputs by adding 3 Gb/s SDI formats.
- The base configuration includes a 48 kHz word clock output
- Option AG adds four AES/EBU output pairs and a Digital Audio Reference Signal (DARS).
- Optional Backup Power Supply for mission critical applications (Option DPW)
- The SPG8000 includes a 10/100/1000BASE-T Ethernet interface for remote access to the instrument. A web-based user interface can be used for all configuration settings and for monitoring system status.
- The ECO8000 series automatic changeover unit can be used to configure a redundant SPG system using primary and backup SPG8000 units, for high-reliability applications.
- Multiple independent black burst and HD tri-level sync outputs provide all the video reference signals required in a video broadcast or production facility
- Four LTC outputs, VITC on black burst outputs, and NTP server provide time reference signals in a variety of formats GPS-based synchronization gives an accurate time-of-day reference and deterministic video phase reference, and locks remote SPG8000 systems to each other
- Stay GenLock® and GPS Holdover Recovery prevent synchronization shock when the external reference input or GPS signal is temporarily lost
- Wide selection of video test patterns in serial digital formats (SD, HD and 3G-SDI) and composite analog formats (NTSC and PAL)
- Dual hot-swappable power supplies ensure continuous availability of reference signals
- Easy to manage with Web-based interface for remote configuration and SNMP for status and alert information

For further details visit:
www.tektronix.com/spg8000

SPG300/600 SD Sync Pulse Generators

Cost effective Sync Pulse Generators for analog, digital and analog digital mixed facilities with "Stay GenLock™", a unique, robust genlock architecture that provides stable synchronization signals for digital and traditional broadcast facilities.

Applications

- Master sync/signal generators for standard definition post production and broadcast facilities
- SD-SDI reference test signals for facility verification and equipment calibration

Features and Benefits

- Choice of form factors; full rack width - SPG600, or half rack width - SPG300
- Stay GenLock™ – Unique, robust Genlock mode for analog or digital production facilities
- All signal output channels are configurable with black burst or test signal outputs
- SNMP and Web-based remote control for easy integration into any operational environment
- ECO8000 Series Automatic Changeover unit for fully redundant sync system design

For further details visit:
www.tektronix.com/spg300_600

Automatic Changeover Unit ECO8000/ECO8020 Series

The ECO8000 series are highly versatile automatic sync and signal changeover units with configurations and capabilities required to address modern master sync application and other advanced sync timing application. The ECO8000 series offers exceptional reliability, stability and high availability and is designed with optional high bandwidth input changeover capabilities for HD/SD and/or 3G-SDI signal environments.

The ECO8000/8020 can be used with a pair of SPG8000 or TG8000 sync generators that offer redundancy for critical timing and synchronization with a facility.

ECO8000 - The ECO8000 provides up to nine user-configurable BNC channels and four LTC channels. Each channel consists of primary and backup inputs, and an output.

ECO8020 - The ECO8020 provides up to 20 user-configurable channels with high density BNC connectors and four LTC channels through the breakout cable. Each channel consists of primary and backup inputs, and an output.

Applications

- Sync generator and time reference generator system for broadcast, studio, mobile, and post-production facilities

Features and Benefits

- Switches analog black burst, HD tri-level sync, AES/DARS, word clock, LTC, as well as SD/HD/3G-SDI signals
- Scalable product architecture to fit various application needs
- 50MHz Electronic Fast Switch function for near glitch-less sync source switching, minimizing disruption in operations
- 3 GHz Relay Switch channels support SD/HD/3G-SDI
- Front panel LED fault indicators for each individual channel
- Dual hot-swappable power supplies
- Easy to manage with Web-based interface for configuration and SNMP for status and alert information

For further details visit:
www.tek.com/sync-pulse-generator

Picture Quality Analyzers

Based on the concepts of the human vision system, the PQA600B and PQASW Picture Quality Analysis PC software provide a suite of repeatable, objective quality measurements that closely correspond with subjective human visual assessment.

These measurements provide valuable information to engineers working to optimize video compression and recovery, and maintaining a level of common carrier and distribution transmission service to clients and viewers. The PQA600B and PQASW share some common functions - please refer to the Selection Guide.

Applications

- Codec and Transcoder Design, Optimization and Verification
- Conformance Testing, Transmission Equipment and System Evaluation
- Digital Video Mastering
- Video Compression Services
- Digital Consumer Product Development and Manufacturing

Features and Benefits

- Fast, Accurate, Repeatable, and Objective Picture Quality Measurement (Option BAS)
- Predicts DMOS (Differential Mean Opinion Score) Measurement Based on Human Vision System Model (Option BAS)
- Embedded Reference Decoder (Option BAS)
- SD/HD/3G SDI, HDMI compliant with HDCP interface and IP interface supporting IGMP for Simultaneous Generation and Capture, 2-channel Capture and 2-channel Generation with Swap-channel / Side by Side / Wipe display
- Real time Up / Down conversion at generation / capture with SDI/HDMI interface for testing the instrument with Up / Down conversion process
- IP Interface with simultaneous 2–channel generation / capture with IGMP support for multicast streams (Option IP)
- Picture Quality Measurements Can be Made on a Variety of HD Video Formats (1080i, 720p) and SD Video Formats (525 or 625)
- 3G-SDI support to evaluate 1080p60/59/50 video contents. (PQA600B)
- HDMI compliant with HDCP interface to directly evaluate the consumer devices such as Blu-ray disk player or Set Top Box. (PQA600B)
- IP interface with IGMP simplifying the IP video evaluation process (Option IP)
- Attention/Artifact Weighted Measurement (Option ADV)
- Automatic Temporal and Spatial Alignment (Option BAS)
- Region Of Interest (ROI) on Measurement Execution and Review (Option BAS)
- Easy Regression Testing and Automation using XML Scripting with "Export/Import" File from GUI (Option ADV)
- Multiple Results View Options (Option BAS)
- Pre-Installed Sample Reference and Test Sequences
- User-configurable Viewing Condition and Display Models for Reference and Comparison (Option ADV)
- Attention/Artifact Weighted Measurement (Option ADV) Region Of Interest (ROI) on Measurement Execution and Review
- Easy Regression Testing and Automation using XML Scripting (Option ADV) with "Export/Import" File from GUI
- IP Interface with Simultaneous Generation/ Capture and 2-Ch Capture (Option IP)
- Embedded Sample Reference and Test Sequences
- 2-channel Generation with Swap-channel / Side by Side / Wipe display to simplify subjective evaluation (PQA600B)

For further details visit:
www.tek.com/picture-quality-analyzer

PQA Analysis Selection Guide

	PQASW	PQA600B
PSNR, PQR, DMOS Preconfigured Measure-ments	Yes	Opt. BAS
Multi-resolution/ Frame-rate Support	Yes	Opt. BAS
Multi-results View Options	Yes	Opt. BAS
Embedded Reference Decoder	Yes	Opt. BAS
Automatic Temporal and Spatial Alignment	Yes	Opt. BAS
IP Generation/Capture	Opt. IP	Opt. IP
User-configurable Measurements	Opt. ADV	Opt. ADV
Attention/Artifact Weighted Measurements	Opt. ADV	Opt. ADV
Script Execution (Batch processing)	Opt. ADV	Opt. ADV
Multiple Simultaneous Application Executions	Yes	Yes
SD/HD SDI Generation and Capture	No	Yes
HDMI without HDCP Generation & Capture	No	Yes
HDMI with HDCP Capture	No	Opt. BAS

MPEG Analyzer Selection Guide			
Capability	**MTS4000**	**IPM400A**	**MTS4SAV3**
TS Player	Standard		
Real Time TS Analyzer with Triggering Recording	Standard	Standard	Option
Real Time Video over IP	Standard	Standard	Option
Real Time Video over NIC: Generation	Standard		Option
Deferred Time Analyzer	Standard		Option
Transport Stream Editing including Multiplexer, TS Editor, DVB Carousel Generator, and Tclips Test Streams	Option		Option
Electrical Interface Output: ASI	Option (up to 4)		
Electrical Interface Input: ASI Monitor	Option (up to 4)	1	
Electrical Interface Input/Output: 1000BaseT NIC RJ-45	Standard		Option
IP Interfaces Input: IPTV GigE interface	Option	Standard	
IP Interfaces Input/Output: IPTV 10GigE	Option		
RF Interfaces Input: 8VSB or QAM-B	Option		
RF Interface Input: DVB-S/S2 Interface supporting QPSK, 8PSK, 16APSK and 32APSK Demodulation	Option		
PES & T-STD Buffer Analyzer	Option		Option
DVB Carousel Analyzer	Standard		Option
DVB Carousel Generator	Option		Option
MTS4EAV7 ES Analyzer	Option		Option
MTS4CC ES Analyzer	Option		Option
MPEG-2 ES Analyzer (includes AC-3 and 608/708 Closed Captioning and DVB Subtitles)	Option		Option
Picture Quality Analysis Software, Single and Double Ended. Includes PQASW with IP option	Option		
Video and Audio QoE software, Single Ended. Includes VQS1000 with all options	Option	Option	
See Page	17	18	19

MTS4000 MPEG Test System

Targeting a range of design, validation and test, field diagnostics and troubleshooting applications, the MTS4000 MPEG Test System offers unparalleled analysis to examine the video and audio quality of IP and RF Video services. Cross layer and cross domain analysis of the video and audio quality is possible through an extensive software suite that includes real-time video and audio QoE analysis, human vision model based picture quality analysis, and advanced Elementary Stream Analysis. Network interface options include 1G IP, 10G IP, ATSC 8-VSB, QAM-B, DVB-S2, and a Quad port ASI interface.

Applications

- Complex Timing Problems in Video over IP and IPTV Network equipment
- Flexible Test Stream Creation and Modification
- Confirm Functionality and Compliance to Standards
- Set-top Box Buffer Testing and Verification
- Codec Design and Optimization
- Device Design Optimization and Fault Diagnosis
- Broadcast System Troubleshooting at any Point in the Network
- Isolation of Intermittent Network Problems that other Analyzers would not be Capable of Isolating
- Distinguish between Impairments Resulting from Network Distribution versus Artifacts Resulting from Compression
- Evaluating Different Vendors' Compression Equipment and Diagnosing Faults

Features and Benefits

- Industry's Fastest Analysis Engine enables Reduced Time to Insight, Rapid Development, Evaluation, Deployment, and Diagnostics of Next-generation DTV and IPTV Systems and Services
- A Wide Range of DTV Standards are Supported, including MPEG, DVB, ATSC, ISDB, and ISDB-TB (Brazil). Specific SI for Terrestrial, Cable, and Satellite, plus Regional Variations of these Standards are also Supported
- Range of Interfaces and Analysis Capabilities provide the Necessary Connectivity to Diagnose Problems Anywhere in the Network
- Environment, whether that be Transmission Links (RF or IP Layer) or Content Processing (TS Layer)
- Connect to both IP Version 4 and 6 Networks, including those using IGMP and MLD Multicast Protocols Respectively
- Analyze both Constant and Variable Bit Rate Streams (CBR and VBR)
- Integrated Cross-layer Fault Analysis and Logging provides One-box Solution for Fault Diagnosis, Reducing Time to Insight when Troubleshooting
- Playout Functionality provides Stimulus with Parametric Capabilities and IP Multisession Replication to Characterize Behavior of Network or Device Under Test
- CaptureVu™ Technology Captures and Analyzes System Events in Real Time and Deferred Time to Debug the Intermittent and Complex Problems that Traditional Analyzers Miss
- H.264 Buffer Analysis, Multiplexing, and ES Compliance Checking provide the Most Powerful Suite of Tools for Creation and Analysis of Transport Streams containing H.264 Content
- Video and Audio Quality Analysis that Helps Distinguish between Impairments Resulting from Network Distribution versus Artifacts Resulting from Compression
- T Clips a range of MPEG 2 Transport Streams designed to test receivers across a broad range of video and audio formats is included

For further details visit:
www.tek.com/datasheet/mpeg-test-systems-0

IPM400A IP Video Remote Analyzer

The IPM400A helps video network operators efficiently deliver superior quality of service (QoS) levels by providing an intuitive and simplified representation of video quality and diagnostic information. Simultaneously verify IP and TS integrity on all IP Video sessions on a GbE link, for monitoring networks which carry either single program, or multi-program transport streams.

Applications

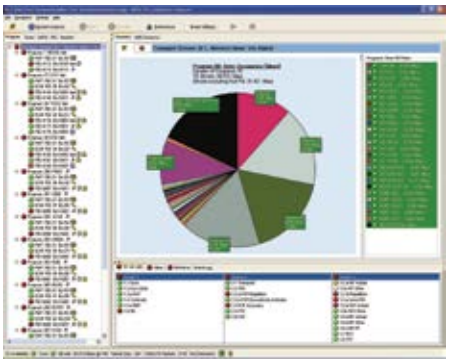
- Diagnostic monitoring of IP Video contribution and primary distribution (Cable head-end monitoring, Terrestrial distribution and DTH or network operator satellite uplink monitoring)
- IPTV ingest and head-end monitoring

Features and Benefits

- Ensure IP and TS integrity for all services on a GbE link by monitoring up to 500 IP sessions including all essential parameters, such as continuity count, sync byte, and packet inter-arrival time (PIT).
- Analyze program utilization over time to determine if overwhelmed routers are dropping packets
- In-depth analysis of transport stream, syntax, timing and content to support root-cause analysis of system errors with comprehensive TR 101 290 Priority 1, 2 & 3 MPEG measurements
- Filter and display only errors that require immediate attention from the SCTE-142 five distinct levels of importance
- Analyze and diagnose "splice" advertising and other local content from SCTE 35 DPI monitoring
- Feed back actual content to a central monitoring point to see and hear the actual content being broadcast with the Video/Audio backhaul
- Use the QoE Dashboard to detect Video impairments and artifacts like Stuck Frame, Black Frame, Blockiness, as well as Visible Compression Artifacts.
- Provide early visibility of problems to predetermined, key individuals, supporting quicker corrective action with the simultaneous connection of multiple remote users and network management systems (NMS)

For further details visit:
www.tek.com/ipm400a

MPEG Software Selection Guide				
Capability	**MTS4SAV3**	**MTS4EAV7**	**VQS1000**	**PQASW**
TS Analysis	Option			
Formats: MPEG-2 & H.264	Option	Standard	Standard	Standard
Format: H.265 - HEVC	Option	Option		
Quality assessment method		Single or Double stimulus	Single stimulus	Double stimulus
Video syntax testing		Standard		
Audio syntax testing		Standard		
Audio level/loudness testing			Option	
Real Time Video Analysis (IP input)	Option		Standard	
Deferred Time Analysis	Option	Standard	Standard	Standard
Video artifact testing			Standard	Standard
Triggered stream capture	Option		Standard	
Video Bandwidth testing	Option		Standard	
IP Generation/Capture	Option			Option
PSNR measurements		Standard		Standard
PQR and DMOS measurements				Standard
See Page	19	20	21	16



MTS4SAV3 PC based MPEG Analysis

The MTS4SAV3 can be purchased as a bundle or as individual software tools to run on stand alone PCs running Microsoft Windows. This provides a flexible and cost-effective way to purchase only those tools required for the job. These tools operate on file-based streams. A real-time version of the Transport Stream analyzer (TSCA) is also available for analyzing streams received through the PC's Ethernet (IP) interface.

Applications

Equipment Manufacturers - Research & Development

- Multiplexer/Re-Multiplexer allows test stream creation and modification for transmissions not yet on-air. Create custom streams for Set Top Box and Multiplexer testing offline.
- In-depth analysis of selected elements of transport streams to confirm functionality and compliance to standards
- Set Top Box buffer testing and verification
- Codec design and optimization

Broadcasters and Network Operators

- Encoder and other equipment fault diagnosis and evaluation
- Analysis of transport streams to confirm correct system operation and isolate faults during installation and commissioning

Summary of MTS4SAV3 Options

Transport Stream Compliance Analyzer (TSCA)
The TSCA enables monitoring and interpretation of the contents of real-time or previously recorded or synthesized transport streams using the latest ATSC, DVB, ISDB-S, ISDB-T, ISDB-Tb and MPEG standards. The analyzer is optimized to quickly locate and identify problems within a transport stream with minimum intervention. The TSCR is a real-time version of the TSCA analyzer operating on Transport Streams received through the PC's Ethernet port. The real-time analysis also includes Cross Layer time-correlated IP and TS measurements, alarms and error logging together with stream recording. A batch mode operation allows for inclusion in an automated test system.

Multiplexer
Use the Multiplexer/Re-multiplexer/De-multiplexer application to create and modify multi-program Transport Streams with custom SI/PSI/PSIP information for DVB, ATSC, ISDB, and MPEG compliant Transport Streams. Video and audio Elementary Streams may also be multiplexed into a Transport Stream.

T-STD Buffer Analyzer
Determines adherence to the buffer model used by the receiver which is signaled within the Elementary Stream itself. The T-STD method is based upon the DTS values within the PES header and can be used for any contained CODEC type. Additionally, certain video CODECs such as MPEG-2 and H.264/AVC may signal buffer parameters within the ES. The Buffer Analyzer verifies conformance of a stream to the T-STD model. (Refer to the MTS4EA for verification of the H.264/AVC HRD method).

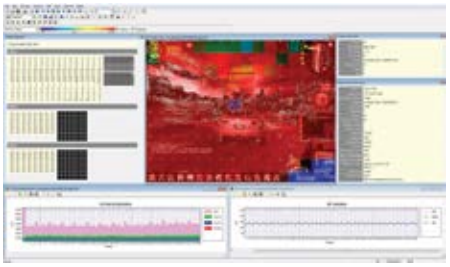
Packetized Elementary Stream (PES) Analyzer
The PES Analyzer analyzes the header associated with each PES packet, as it contains the decode and presentation timestamps (DTS and PTS) for the contained Elementary Stream. Additionally it can verify conformance of the PES header contents to the MPEG, DVB and ATSC standards.

MPEG-2 Elementary Stream (ES) Analyzer
Analyzes and views the moving picture from within a PES stream and carry out a whole range of sophisticated tests on the lower layers of an elementary stream within a Transport Stream. In addition, it both analyses and displays a range of extended media formats, including ATSC Closed Captions, DVB Subtitles and Teletext associated with video Elementary Streams.

Carousel Analyzer
Analyses carousels compliant with MPEG-2 DSM-CC, DVB (including MHP), DTT (MHEG-5) or ARIB standards.

Carousel Generator
Creates object carousel contents within an output Transport Stream conforming to the MPEG-2, DVB, DTT (MHEG-5) or MHP standards.

For further details visit:
www.tek.com/datasheet/mts4sav3-datasheet



HEVC / AVC Video and Compressed Audio Analyzer MTS4EAV7

The MTS4EAV7 HEVC / AVC Video and Compressed Audio Analyzer is a powerful PC-based software package for deferred time analysis of encoded video and audio elementary streams. Supported video standards include HEVC (H.265), AVC / H.264, VC-1, MPEG-2, MPEG-4 part 2, and H.263. Supported audio standards include MPEG-2 audio, AAC, and AC-3. The MTS4EAV7 analyzer is available for standalone or networked PCs, and for Tektronix MTS4000 MPEG Test Systems.

Intended Users and Applications

- Equipment manufacturers
- Video codec software and hardware developers
- Semiconductor device designers and manufacturers
- Mobile video infrastructure and mobile device developers
- Video content transmission and distribution
- CODEC and equipment evaluation and comparison in cable, satellite, terrestrial, and IP applications
- Network operators and network equipment providers
- Application and service providers and streaming media applications
- Broadcasters for checking AV delay

Features and Benefits

- Video and audio decode and analysis
- Verification of the stream's compliance with the encoding standard
- Extraction of elementary streams from containers
- Comprehensive stream navigation and tracking to follow all aspects of the decoding process
- Multiple displays and overlays of Coding Unit (CU), Prediction Unit (PU), Transform Unit (TU), Macroblocks (MB)
- Easy selection of specified CU/MB and navigation using Zoom in and out for analysis
- Synchronized video, audio, and data views for instant cross reference
- Wide range of frame and Coding Tree Unit (CTU), Coding Unit (CU), Prediction Unit (PU), Transform Unit (TU), macroblock statistics, syntax traces – bitstream, interpret, alerts, frame, macroblock, transform, pixel level, fidelity traces
- Buffer analysis with graphical plots – spatial bits/MB, MV histogram, quantization, DCT frequency, MB coded frequency, intra-coding frequency
- Video differencing and fidelity analysis
- Bitstream editor for making changes, reanalyzing the stream, then saving
- Exports data for detailed graphical analysis (requires Microsoft Excel®) Comprehensive batch mode for automated regression testing with log reports
- YUV decoded video output for baseband video analysis
- Audio compression analysis
- AV delay measurement
- Built-in help and tutorials

For further details visit:
www.tek.com/datasheet/mpeg-software/mts4eav7-datasheet

VQS1000 Video Quality Software

The Video Quality Software is for single ended QoE analysis of video and audio content. It is used with Tektronix IP & RF Video monitoring probes to stream back live video, or with MPEG Analyzers for time deferred analysis of captured video files.

Applications

- Affordable QoE Monitoring - live monitoring.
- Network performance optimization - in service tuning of network.
- Network diagnostics - in service troubleshooting.

Features and Benefits

- Reliable and sophisticated analysis algorithms applied to decoded MPEG 2 or H.264 video to identify stuck, black, macro-blocking and blocky compression artifacts. This enables operators to distinguish between impairments resulting from network distribution versus artifacts resulting from over-compression.
- Industry First unique visualization tool with innovative impairment displays highlights the location and severity of video defects enabling engineers to clearly see and validate the presence of impairments on the image.

- User defined graticule area of visual interest to exclude unwanted areas of the screen, such as news tickers, so as to focus QoE analysis on area of the frame that will be of highest interest to the human eye.
- Measurements on the fully decoded live or file-based video gives reliable, objective impairment and artifact detection while eliminating false alarms.
- Triggered capture with pre-trigger buffer enables archive of impairments or offline video quality analysis to be performed.
- QoE measurements can be correlated to problems at the Transport Stream and IP or RF Transmission Layers at each location, and across the network,
- Can be used as stand alone PC analysis software for offline file analysis on Multi or Single Program Transport Streams.
- Analysis of decoded MPEG-2, AC-3, MPEG-2 AAC and MPEG-4 AAC audio in accordance with ITU-R BS.1770/1771 and ATSC A/85 allows operators to analyze audio loudness related problems
- Connect directly to an Ethernet switch using IGMP v3 support for analysis of multicast streams beyond the local router

For further details visit:
www.tek.com/datasheet/mpeg-test-video/mpeg-software-video-quality-analysis-software

Sentry QoS/QoE Monitoring Selection Guide					
	Sentry (ASI, GigE, 10G)	**Sentry Verify, Verify 10G**	**Sentry Assure**	**Sentry ABR**	**Sentry Edge/ Sentry Edge II**
Comprehensive MPEG Quality of Service (QoS) Monitoring					
Transport Stream QoS Monitoring	■	■	■		■
IP statistics	■	■	■		
HTTP Statistics				■	
IDR/EBP Alignment	■				
Closed captioning (708, 608, SCTE-20), DVB Subtitle, Teletext reporting	■	■	■		■
Error Seconds and Program Availability Reporting	■	■	■		■
GOP length reporting	■	■	■		■
Video and Audio PID metadata	■	■	■		■
Program/PID discontinuity	■	■	■		■
Program/PID/Transport Stream/Program Group bandwidth graphing	■	■	■		■
PCR interval & jitter	ASI Only				
MPEG-PSI, DVB-SI, ATSC-PSIP table detect, bit rate, cycle time	■	■	■		■
TR 101 290 (priority 1, 2, 3) reporting	■	■	■		■
Scalable RF Monitoring (64/256 QAM A, B, or C)					■
Comprehensive MPEG Quality of Experience (QoE) Monitoring[1]					
Video QoE real time monitoring	■				Option
Video eMOS/PVQ real time monitoring	Option				Option
Audio QoE real-time monitoring	■				Option
Audio loudness & AC-3 Dialnorm (ITU-R BS.1770) monitoring	■		■		Option
Video freeze detection	■				Option
Audio silence detection	■				Option
Purchasable Software Options					
QoE Monitoring	■				Option
Carousel monitoring (tru2way / OCAP/MHP / DSM-CC), SA-BFS	Option	Option	Option		Option
Ad Insertion/Digital Program Insertion	Option	Option	■		Option
EBIF Monitoring	Option	Option	Option		Option
Perceptual Video Quality (eMOS) on MPEG-2 & H.264	Option				Option
Audio Loudness Monitoring (includes CALM Compliance)	■		■		Option
Video & Audio					
Video: HD, SD, MPEG-2, MPEG-4 AVC (H.264), VC1, HEVC H.265	■	■	■		■
Audio: Dolby AC-3, MPEG-1 Layer II, AAC, HE-AAC, and HE-AAC v2	■	■	■		■
Interfaces					
ASI	ASI Only				
Dual Input Capability	■	■			
GigE	GigE Only	GigE Only	■	■	
Single-Mode or Multi-Mode LC SFP+	10G Only	10G Only		10G Only	
8VSB & 64/256 QAM B					■ Edge Only
16/64/256 QAM A, B, C					■ Edge II Only
RF Measurements: Level, EVM, MER, CNR, Pre-RS BER, Post-FEC Erred Packets, Carrier Offset					■ Edge II Only
See Page	23	23	24	24	25

[1] Sentry Edge only supports QAM B.

Sentry

Sentry is a comprehensive and scalable monitoring solution that enables enables video service providers to deliver services with optimum quality and to reduce operational expenditures.

Sentry automatically & continuously evaluates all video programs in real time, and provides alerts on hundreds of SD/HD programs simultaneously. Monitoring up to 500 Transport Streams at full line rate provides more monitoring bandwidth in the same chassis, especially for SPTS monitoring. Sentry identifies anomalies in the network at the IP and MPEG layers, as well as in quality of experience (QoE), identifying issues including frozen video, tiling/ macro-blocking, and audio disruptions or audio level issues, which represent the bulk of trouble calls from subscribers. In addition, Sentry includes a video artifact detection capability. This makes Sentry the only solution that detects video and audio errors in MPEG-2 and H.264 digital programs while generating metrics that correlate to Mean Opinion Scores (MOS). Sentry's multi-threshold-based alerting capability enables a flexible alert configuration from subscribers. Sentry uses this approach for alerting, because it is effective in detecting problems in their developing stages before a subscribers experience is impacted. This capability, combined with detailed root-cause troubleshooting information appended in the actual alert, allows engineers to resolve problems quickly and often before subscribers experience any quality deterioration or outage.

Applications

- Audio and Video Quality of Experience Scoring System
- IP Network Impairment Analysis
- Alert Filtering and Resolution Tracking
- Carousel Monitoring (SA-BFS, DSM-CC, tru2way)
- Closed Caption Monitoring
- Digital Program Insertion Monitoring
- 10 GbE Network Monitoring
- EBIF Monitoring
- Program Statistics and Availability Reporting

Features and Benefits

- Audio and Video Quality of Experience Scoring (1 to 100) with reason codes for quality degradations. Scores QoE independently from transmission errors to avoid missing events or false alarming
- Audio Silence and Audio Level Issue Detection (supports ITU-R BS.1770)
- Frozen Video, Tiling / Macro-blocking
- Detect artefacts due to over compression with Perceptual Video Quality (eMOS) monitoring on MPEG-2 / H.264 Elementary Streams
- HD/SD programs, SPTS or MPTS, multicast (IGMP v3) & unicast
- Live Thumbnails and Thumbnail Wall for content verification
- MPEG-PSI, DVB-SI, ATSC-PSIP table support
- GOP length reporting (avg, min, max)
- Error Second and Program Availability Reporting
- Triggered Alert Stream Capture
- 60-day historical graphing with real time alerting capability
- IDR/EBP Alignment
- Transport Stream Bandwidth Graphing
- Program Group Bandwidth Graphing
- IP Network Impairment Analysis
- Alert Filtering and Resolution Tracking
- Carousel Monitoring (SABFS, DSM-CC, tru2way™)
- Digital Program Insertion SCTE-35 (local ads)
- Software Add-Ons for Ad Insertion (DPI), tru2way™, EBIF Monitoring, SA-BFS Monitoring, Carousels (MHP / DSM-CC)
- TR 101 290 (priority 1,2,3) reporting
- Compliant with RTP network protocols

Specifications

- Video: MPEG-2, MPEG-4 AVC (H.264), VC-1, HEVC H.265
- Audio: Dolby AC-3 (5.1 Surround), MPEG audio, AAC, HE-AAC, HE-AAC v2
- Carousels: tru2way™ (OCAP), SA-BFS, MHP / DSM-CC
- Interfaces: GigE (1000BASE-T Ethernet), 10G and ASI
- Browser support: Firefox, Safari, and IE

For further details visit:
www.tek.com/video-quality-monitors

Sentry Verify

Sentry Verify™ enables video service providers to accurately determine the health of the MPEG/IP transport network. Sentry Verify provides alerts and generates useful reports in the same fashion as our flagship product, Sentry Verify detects subscriber impacting events during MPEG-over-IP transport and offers a historical database to assist with troubleshooting and trending analyses. Sentry Verify also offers a multiple alert trigger capture capability to quickly identify and visualize issues as they arise.

Sentry Verify is specially designed for operational staff and is a cost-effective solution for large-scale deployments to hub sites and other remote locations. It provides necessary, accurate and timely information to assist in the identification of faults within the IP network and has been integrated with industry leading management solutions to accelerate troubleshooting and root cause analysis.

Sentry Verify is part of the S2E (Source-to-Edge) monitoring solution, which provides the most comprehensive, 24/7 real-time monitoring system with a 60-day historical database, executive reports and trending analysis capabilities. It can be easily integrated with Medius to provide a seamless monitoring package.

Applications

- Monitor and validate MPEG transport stream quality at hub sites
- 10 GbE Network Monitoring

Features and Benefits

- QoS Monitoring
- HD/SD programs, SPTS or MPTS, multicast (IGMP v3) & unicast
- MPEG-PSI, DVB-SI, ATSC-PSIP table support
- Historical Reporting and Graphing
- Triggered Alert Stream Capture
- Real-time Detection and Alerting
- Transport Stream Bandwidth Graphing
- Program Group Bandwidth Graphing
- IP Video Network Impairment Analysis
- Alert Filtering and Resolution Tracking
- Software Add-Ons for Ad Insertion (DPI)

Specifications

- Video: MPEG-2, MPEG-4 AVC (H.264), VC-1
- Audio: Dolby AC-3 (5.1 Surround), MPEG audio, AAC, HE-AAC, HE-AAC v2
- Interfaces: GigE (1000BASE-T Ethernet), 10G
- Browser support: Firefox, Safari, and IE

For further details visit:
www.tek.com/sentryverify

Sentry Assure

Sentry Assure offers Sentry Verify functionality with Digital Program Insertion (DPI) monitoring and Audio Loudness Monitoring (ALM) options included in the base product and serves as a last line of defense before modulation and encryption.

Sentry Assure is cost effective and future proofed for large-scale post-splice monitoring deployments. It has been optimized to help cable television operators and other providers of multichannel video services comply with the Commercial Advertising Loudness Mitigation (CALM) Act, which requires that ads be no louder than the programs they accompany.

Applications

- Post-splice Monitoring
- QoS Monitoring
- Audio Loudness Monitoring
- Digital Program Insertion Monitoring
- EBIF Monitoring
- CALM Compliance Monitoring
- Regulatory Compliance Monitoring

Features and Benefits

- Digital Program Insertion Validation
- CALM Compliance Monitoring
- Regulatory Compliance Monitoring
- Detect MPEG and IP Issues
- Historical Reporting and Graphing
- Error Seconds and Program Availability Reporting
- Program Group Bandwidth Graphing
- Live Thumbnails for content verification
- Triggered Alert Stream Capture
- Real-time Detection and Alerting

For further details visit:
www.tek.com/datasheet/video-quality-monitors-video-quality-monitors-0

Sentry ABR

Proactively Monitor ABR Content Throughout Your Network

Sentry ABR is a post-origin measurement device that focuses on QoS. Sentry ABR is an "active" monitoring product that proactively monitors ABR content on origin servers or CDN caching servers. It does this by actively requesting and validating program playlists / manifests that it has been configured to monitor. It then requests from the server, in turn, all of the fragments of each profile / representation for each program – calculating availability and performance metrics and generating alerts in real time.

Sentry ABR can operate as a stand alone monitor, or as an extension to an existing Sentry / Medius deployment providing a unified platform for both linear broadcast and ABR video service monitoring.

Applications

- Adaptive Bitrate video testing and monitoring at origin servers, CDN (caching servers), and last mile (streaming servers)
- Quality assurance monitoring for multiscreen video delivery from Pay TV providers
- Full 60-day historical reporting and real time alerting ideal for testing, proactive monitoring, and troubleshooting
- Flexible configuration and throttling capability provides flexibility from initial network testing to live 24x7 monitoring of large scale multiscreen service roll outs

Features and Benefits

- Supports up to 250 Top Manifests
- Supports Apple's HTTP Live Streaming and MPEG DASH Protocols with HTTP statistics
- Proactively monitors all available ABR "media" and "network" from content acquisition (source) to the edge of the network
- Fetches manifest files and fragments from any place on the network to simulate a subscriber's request for content
- Validates all assets, bitrate profiles and manifest files based on a highly parallel HTTP fragment fetching engine
- Top level manifest file validation is used to automatically discover the sub-stream manifest URLs
- Performs sub-stream manifest validation and fragment fetching in real time at the manifest-indicated rate
- Alerts on any mismatch in the bitrate of the sub streams; missing segments (HTTP errors); and excessive segment-fetching latency
- Reports on the availability of all input manifests (programs) over the network, and their sub streams in the familiar Sentry-product style
- Supports both 1 GbE and 10 GbE interfaces allowing Sentry ABR to be placed throughout the network for maximum ABR monitoring coverage

For further details visit:
www.tek.com/video-quality-monitors/sentry-abr

Sentry Edge

Sentry Edge provides critical monitoring at the edge of your network, providing specific reporting and alerting capabilities for services in the RF domain. Sentry Edge detects transport stream and RF modulation errors. Transport stream errors are typically related to the bandwidth/bit rate, embedded data, applications or video and audio. The RF modulation errors include those related to the Signal-to-Noise Ratio (SNR) and signal strength.

Applications

- Scalable RF Monitoring (64/256QAM / 8VSB)
- Historical Reporting and Graphing
- Designed for Large Deployments
- Intelligent Tuning including RF parking
- Alert Filtering and Resolution Tracking
- Integration with Sentry, Sentry Verify, and Medius Units provides Comprehensive View of Network Health
- Dual Tuner Configuration to Monitor All RF Channels Efficiently

Features and Benefits

- Monitor Linear Broadcast Programs
- Be Alerted to RF and TS Errors
- Generate Historical and Trending Reports

For further details visit:
www.tek.com/sentryedge2

Sentry Edge II

Applications

- RF measurements post-QAM at the hub and at headends where QAM is used
- Two RF inputs enable simultaneous monitoring from different sources on 8-tuner unit
- High quality MER measurements for quick detection when signal quality is inadequate to be tuned by set-top box
- Comprehensive RF reporting for targeted, rapid problem isolation
- Cost-effective, high-density solution enables more effective monitoring of the network edge
- Remote management of RF measurement collection

Features and Benefits

- High-density solution: 2 RF inputs with 8 parallel QAM tuners or 1 RF input with 4 tuners
- Analyzer-quality QAM RF Measuring Capability. RF Measurements include:
- RF Lock Indication (including LED on rear panel)
- Input Signal Level (Channel Power)
- EVM
- MER
- CNR
- Pre-RS BER
- Post-FEC Uncorrectable TS Packet Count
- Carrier Offset
- Constellation diagram provided for diagnostics
- Monitors RF signals up to 1 GHz
- QAM A/B/C support
- Remote management of RF measurement collection
- Proactively detect RF issues before they impact subscribers
- Full range of Transport Stream monitoring capabilities
- 1RU footprint minimizes rack space and power costs
- Highly scalable solution where multiple units can be managed by the Medius Application Manager
- Additional service monitoring capabilities available for QAM channels in the clear: audio/video QoE, Ad Verification, EBIF, tru2way™, MHP, and DSM-CC carousel analysis

For further details visit:
www.tek.com/sentryedge2

Medius

Medius is ideal for Network Operation Centers (NOCs) and provides a single interface for consolidated status, alerts and reports from multiple Sentry and/or Sentry Verify, and Sentry Edge units across the network. Medius is designed to be flexible, so operators won't experience any limitations as their network evolves and grows. For example, Medius program grouping allows operators to group programs (e.g., logically by content provider or physically by location) from any or all connected Sentry, Sentry Verify and Sentry Edge units for alerting, problem isolation and trending analysis. The alert configuration on Medius allows you to apply alerts to multiple programs and get an aggregated status from Sentry, Sentry Verify and Sentry Edge units to rapidly drill down to specific problem areas.

Medius offers an advanced reporting package that is particularly helpful in capturing detailed QoE information that quickly highlights the top offending programs and/or locations. The reporting capabilities allow each user to generate customized reports that provide as much or as little detail as required, from monthly high level reports for executive staff to immediate notices for technicians as incidents occur.

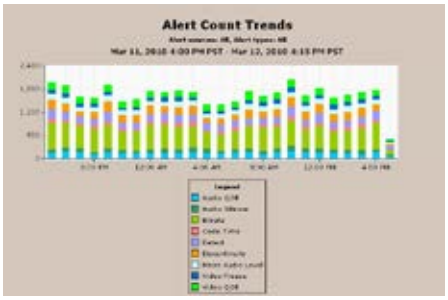
Applications

- Multiple-view Alert Dashboard Reporting
- QoE Reporting
- Automated Report Generation and E-mail
- Single Point for NMS Integration

Features and Benefits

- Customizable Dashboard Display
- Centralized Alarm Reporting
- Historical Reporting and Graphing
- Alert Filtering and Resolution Tracking
- User-defined Reporting Template
- Ability to Upgrade Multiple Sentry Units
- Automated Report Generation and Email
- GigE (1000BASE-T Ethernet) interface

For further details visit:
www.tek.com/medius



Consul

Consul™ aggregates reports and trending data from multiple Medius units and offers video service providers an effective way of utilizing monitoring data in large-scale monitoring deployments. Consul can be used by service providers to gain a quick understanding of the quality of experience they are providing on a local, regional or national level. Key features of Consul includes a program alert dashboard that gives a single consolidated view of all programs monitored across all Medius units. In addition, Consul provides an understanding of the video quality degradation from location to location and identifying the top offending programs at each location.

Capturing detailed QoE (Quality of Experience) information is a function of Consul's advanced reporting package. The reporting capabilities allow each user (i.e., a national NOC/operation center) to generate customized reports that provide as much or as focused detail as required, from monthly high level reports for executive staff to immediate notices for technicians as incidents occur.

Users can create a schedule template so that reports can be generated automatically and emailed to designated recipients. Examples of the reports include alert counts by location, trending reports and distributions by alert type.

Applications

- Network Operation Center (NOC) based correlation and data management from Medius units located throughout the network.

Features and Benefits

- Program alert dashboard provides single consolidated view of all programs across all Medius units
- Supports multiple Medius Units
- Generates Alert analysis reports with roll-up data collected from multiple Medius
- Automatic report generation and email in PDF file format per user defined schedule

  GigE (1000BASE-T Ethernet) interface

For further details visit:
www.tek.com/consul

Sentry Support Services

World-Class Support When You Need It

Tektronix best practices, specialized competencies and industry-leading expertise ensure your success. Tektronix system architecture and integration teams help design and deploy your monitoring solution, train your staff, and reduce your exposure to failure risks. We are experts at integrating systems that incorporate multiple technologies and our goal is simple: deliver world-class monitoring without extending your resources.

Support Contract

A support contract from Tektronix provides you with all of the tools you need to make sure your monitoring deployment becomes more of a success for your organization over time. Support is provided to upgrade the core software with new features in intermediate releases. Tektronix field technicians are experts in all of the disciplines required to configure, test and operate our monitoring solutions in real-world settings. Our support team is thoroughly trained in the real-world performance characteristics of Tektronix equipment, as well as those of many other vendors, and offers extensive experience in digital networks.

Simply put, the level of support provided in a Tektronix support contract is unmatched by any other company.

Our standard agreement includes the following:

- Hardware warranty
- Software warranty
- Intermediate releases and enhancements
- Pre-deployment engineering support
- Installation
- Configuration of system
- On-site training
- Phone support
- Email support
- On-site support

Professional Services

Tektronix field technicians and engineering teams are experts in MPEG infrastructure, monitoring, NOC procedures and troubleshooting. Take advantage of our expertise when you are planning your next short-term or long-term project. Tektronix offers professional services for items such as, but not limited to, monitoring assessments, issue/problem resolution, tru2way™ or EBIF deployment and bandwidth management.

For further details visit:
www.tek.com/digital-content-monitors

RF Video Selection Guide				
	MTM400A	**RFM300**	**RFM220**	**QAM400A**
Measurements				
Advanced RF measurements	■	■	■	■
MPEG Transport Stream Analysis	■	■		■
Video/Audio content checking for MPEG-2 and H.264/AVC	■	■		■
PSIP and EPG Analysis	■	■		■
Dual-level alarming and seven day trending	■	■	■	■
TR-101-290 tests and results	■	■		■
ATSC A/78 Monitoring modes	■	■		■
ISDB-Tb 204 Byte TS analysis	■			■
Interfaces				
DVB-S/S2	Option S2			
Turbo 8PSK/QPSK Interface	Option EP			
8VSB		■		
QAM A	Option QA			Option QA
QAM B	Option QB2			Option QB2
QAM C	Option QC			Option QC
ISDB-Tb			■	
DVB-T	Option CF			
ASI Input	■	■	■	■
ASI Output	■	■	■	■
Options				
Diagnostics*1	Option DIAG	Option DIAG		Option DIAG
Complementary Products				
DVB/ATSC/ARIB TS Compliance Analyzer Software (TS file size limited to 192 MB)	MTS4SA Opt. TSCL	MTS4SA Opt. TSCL		MTS4SA Opt. TSCL
QoE Analysis (using optional VQS1000)	■	■	■	■
See page	27	28	28	29

Legend:

■ Included as standard
Works with complementary product

*1 Deep-dive MPEG diagnostic analysis. Includes: Triggered recording capability up to 160 MB, Template testing (for user-defined service plan testing), In-depth PCR analysis with graphical result views, Bit rate testing functionality, Service logging, RF polling functionality

MTM400A Transport Stream Monitor

The MTM400A Transport Stream Monitor is a scalable solution that detects Digital TV system degradation, and enables operators to easily perform diagnostics and rapidly pinpoint problems, ensuring an error-free network and minimal downtime.

FlexVuPlus™ is a browser enabled, user definable interface that is powerful, personal and enables improved productivity. Up to four panels can be displayed in the UI window and can be sized and repositioned based on operational needs. FlexVuPlus provides a user definable "button strip," "historical views," and "short-cuts" that intuitively guide a user to key areas of interest to accelerate video delivery fault root cause analysis. Thumbnail displays with performance indicators show overall program status in addition to video PID status.

Applications

- Terrestrial distribution
- Contribution and primary distribution
- Cable headend monitoring
- DTH or network operator satellite uplink monitoring
- Combine with the Opt. TSCL (DVB/ATSC/ARIB TS Compliance Analyzer Software) for off-line analysis of recorded TS files to 192 MB

RF Monitoring Features and Benefits

- Monitor key measurements according to DVB standard with real-time monitoring of key TR 101 290 parameters
- Embedded real time operating system provides a high-reliability system for unattended 24x7 operation
- User-defined template monitoring option to ensure right content at the right place at the right time
- Confidence monitoring at the RF layer with optional QPSK, COFDM, Turbo 8PSK, and DVB-S2 interfaces
- RF diagnostic mode enables measurements on signals where lock cannot be achieved
- Critical RF Measurements, MER, and EVM provide early indication of signal degradation before any picture impairment is visible to the end customer, without additional costly RF test equipment
- Video and Audio backhaul for content checking and verification allows viewing transmitted content in the native, uncompressed format
- Use the QoE Dashboard to detect Video impairments and artifacts like Stuck Frame, Black Frame, Blockiness, as well as Visible Compression Artifacts.

By monitoring the quality of the broadcast video at any network access point, broadcasters and network operators can improve network performance and deliver superior quality of service to customers.

For further details visit:
www.tek.com/datasheet/digital-tv-monitor-0

RFM220 ISDB-T/Tb Measurement Demodulator

The RFM220 RF Channel Analyzer is ideally suited for ISBD-Tb broadcasters who manage Digital TV services and need tools to remotely monitor broadcast network QoS with capabilities to remotely diagnose network issues. With both RF and ASI inputs, the RFM220 can monitor a transmitter before and after modulation.

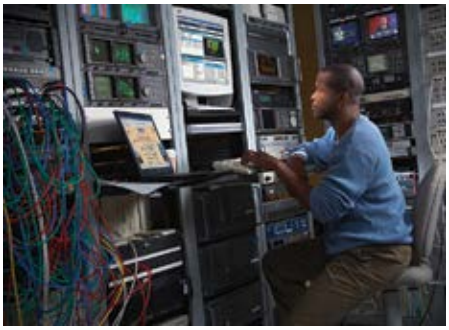
Applications

- RF performance monitoring of local and remote ISDB-Tb transmitter sites
- Off-air monitoring at local and national operation centers and headends

Features and Benefits

- Comprehensive ISDB-Tb RF measurement and monitoring capabilities including overall and separate MER per layer (one for HDTV, one for the 1-seg),
- TMCC information monitoring, and Channel Impulse Response display with SFN window measurements
- Constellation and Spectrum displays with shoulder measurements help to identify degradations in transmitter performance and efficiency before viewers are impacted
- High-performance tuner/demodulator with MER measurement performance to 36 dB typ. offers the flexibility needed for use in both transmitter monitoring and off-air ISDB-Tb broadcast applications
- Remote access to monitoring functionality with user-configurable alarm reporting, event logs, and 7-day trending enables remote notification and reporting to engineers and operators of transmission system problems
- Transport Stream output enables connection to MPEG TS monitoring products, offering a flexible and affordable monitoring solution to quickly identify and isolate problems in either the Transport Stream or the RF signal
- Transport Stream output enables connection to the VQS1000 Video Quality software, enabling real time analysis of the program QoE

For further details visit:
www.tek.com/rf-video/rf-and-mpeg



RFM300 ATSC DTV Monitor

The RFM300 provides a complete solution for real-time DTV monitoring. The comprehensive RF and PSIP confidence-monitoring capability provides a powerful and cost-effective solution for monitoring DTV transmitter sites along with contribution and distribution feeds at local and national operation centers for FCC compliance.

Applications

- Monitoring DTV transmitter sites along with off-air monitoring, as well as contribution and distribution monitoring at local and national operation centers and head-ends

Features and Benefits

- Comprehensive confidence monitoring at the 8VSB modulated layer. This includes monitoring of the symbol distribution waterfall chart and MER, BER and SNR measurements for continuous monitoring of signal quality.
- PSIP analysis and repetition-rate graphing allows broadcasters to determine whether the system information is present and correct in the transport stream, ensuring FCC compliance
- Detect errors that impact viewer's video quality according to ATSC A/78, including Closed Captioning (CC) and Regional Ratings Table (RRT)
- Multilayer, multi-channel, remote monitoring and measurements at the RF, and MPEG transport stream layers, to ATSC A/65 standards
- Service logging supports verification of service-level agreements to ensure that all contractual obligations are met
- Unique dual-level alarming and seven-day trend information proactively identifies impending problems before they become visible to the viewer without additional costly RF test equipment
- Video and Audio backhaul for content checking and verification allows a broadcaster to view transmitted content in the native, uncompressed format
- Use the QoE Dashboard to detect Video impairments and artifacts like Stuck Frame, Black Frame, Blockiness, as well as Visible Compression Artifacts.
- Unique learning capability creates a true “monitor by exception” mode of operation. This reduces operational expenditure by eliminating non-customer-impacting alarms to focus resources only on critical activities.
- FlexVuPlus™ uniquely empowers operations staff with the simplest information necessary to prove their service is delivering above their defined thresholds for FCC compliance

For further details visit:
www.tek.com/rfm300

QAM400A QAM Video Monitor

The QAM400A QAM Digital TV Monitor is a scalable solution that detects system degradation, and enables operators to easily perform diagnostics and rapidly pinpoint problems, ensuring an error-free network and minimal downtime. FlexVuPlus™ is a browser enabled, user definable interface that is powerful, personal and enables improved productivity. Up to four panels can be displayed in the UI window and can be sized and repositioned based on operational needs. FlexVuPlus provides a user definable button strip, historical views, and short-cuts that intuitively guide a user to key areas of interest to accelerate video delivery fault root cause analysis.

Applications

- Monitoring digital video services at the output of the QAM A, B, or C modulator

Features and Benefits

- Verify RF and TS integrity on a QAM channel with the ability to tune to any QAM channel for verification and diagnostics
- Ideal for monitoring the output of headend SEM or EdgeQAM devices at the RF combiner, with support for both MPEG-2 and H.264 at either constant bit rate (CBR) or variable bit rate (VBR)
- In-depth, real-time MPEG analysis option allows diagnostics to be performed on live payload without always having to use labor-intensive deferred-time analysis of captured streams
- Filter and display only errors that require immediate attention from the SCTE-142 five distinct levels of importance.
- No additional analysis software is required - all confidence and diagnostic analysis can be carried out with the QAM400A

For further details visit:
www.tek.com/qam400a

Aurora, Hydra and Autofix

With the addition of Aurora, Hydra and AutoFix to the content analysis solution portfolio,Tektronix is focused on the development and delivery of the best validation solutions on the market.

Our software operates on industry standard IT platform including virtual environments.The Validation Suite products can operate independently or work together to provide a powerful QC solution. In addition, the suite provides an open API, enabling integration with leading 3rd party solutions for archive, asset management and workflow automation.

Aurora FILE-BASED QC

Aurora is the new generation of file-based QC solution from Tektronix fully implemented in a 64-bit architecture, enabling broad use of available CPU processing power and GPU acceleration to deliver unrivaled QC analysis speed and accuracy, perform up to 8 times faster manual review, and automate corrective actions. Aurora can analyze more file types (from 4K to ABR) faster than any other product in its class, with QC artifact detection accuracy that is a close correlation to human perception.

- Unparalleled, Scalable Speed
- 4K Production Capable
- Enhanced Adaptive Bit Rate Support
- 8x Faster Manual Review
- Configurable Automated Workflows
- QC Report Analytics

Aurora Standard

Our entry level Aurora Standard file-based QC platform enables up to 2x CPU cores to be allocated to each Aurora Verification Unit (VU). The resulting performance enables throughput of SD files up to 5x real time and HD files up to real time.

Aurora Professional

Our flagship Aurora Professional QC platform can utilize up to 8x CPU cores per Verification Unit and provides support from up to 2 GPUs. A full hardware configured Aurora can analyze SD files up to13x real time, HD files up to 4x real time, and 4K files up to real time.

Aurora Professional Plus

The VU Plus Plug-in for Aurora Professional enables up to 16 CPU cores to be dedicated to each Verification Unit and will access high numbers of GPU cores for accelerated testing. The analysis speed is up to about 50% faster than Aurora Profession

Features and Benefits

- Scalable File Analysis Speed: Aurora dynamically allocates threads across a user-specified number of CPU cores, enabling performance and scalability in high density virtual and blade environments. Using high CPU allocation or a lower CPU allocation combined with Aurora's unique GPU accelerated processing capability, QC throughput approaching wireline limits can be achieved, rather than being constrained by a legacy decoding and testing architecture
  - Achieve file-based QC speeds that no other solution on the market can achieve, and scale the speed to analyze files by allocating more hardware processing power to a VU.
- Guaranteed QC Capacity and Throughput: Aurora reserves CPU and CUDA GPU capacity for each Aurora VU so that the system does not overload itself. The same resources are allocated to each VU no matter how many QC tasks are being concurrently executed. As a result, Aurora doesn't slow down as the system loads up.
  - Reliably forecast and manage your QC testing throughput as each individual file will always take the same time to test, whether it is the only file being tested on the system, or one of many concurrent files being tested.
- Scalable Concurrent File Analysis: The Aurora Controller software manages a group of Aurora VUs, managing the QC task queue and allocating QC tasks to each VU. Almost unlimited VUs can be controlled by a Controller and additional VUs can be added at any time, increasing the number of concurrent QC tasks that can be executed.
  - Easily implement a QC solution with the number of Aurora VUs that you need to meet your current file-testing throughput needs, and have the flexibility to easily expand the system in the future for increased file-testing throughput as your operation expands.
- Different Priority QC Task Queues: Multiple Aurora Controllers can be deployed to manage groups of differently configured VUs, allowing for multiple QC analysis speed queues.
  - Implement a file-based QC solution with different speed queues. One queue may be for high priority or large files, while another is for standard priority files.
- Faster QC Manual Review: QC review functionality in our tightly integrated Hydra frame accurate player. Click on any issue in the Aurora QC Report and Hydra will be launched at the exact frame of the issue. Open the Hydra Review Bar to see the full list of QC issues, jump between them, and jog/shuttle to review the issue. Add annotations and make QC decisions for each issues, with all information added to the QC test report.
  - Speed up human review of QC results by 8 times compared to linear processes, adding your comments and QC decisions to the QC Report.
- Modern, Responsive User Interface: Aurora has a totally overhauled user interface with a consistent information layout, with the ability to modify the theme/colors and display different language scripts in both the user interface and in QC reports. Current support for English, Japanese and Chinese Simplified
  - Configure the Aurora user interface to suit your specific operational environment.
- Easy To Use QC Reports: Aurora job reports are a single easy-to-read page showing all of the metadata in one location followed by a error summary from which you can jump to more detail. The report provides the same view on line using a web browser and off line in a PDF.
  - Identify any QC issues quickly, and collaborate with others no matter what format of the report they are using.
- Fast Access Help Files: Aurora provides help files for every test accessed with a click from test templates or reports, providing an explanation of what the test is, how we are testing it, advice and guidance on how it may be possible to fix the issue, and where to in the workflow would be best to fix it.
  - Quickly understand the tests that are performed and receive useful advise on how to correct issues if they occur in your files.
- Email Notification: Aurora email notifications ensure that regardless of the device you use for email, you have enough information to determine if a particular job needs further action. Emails contain summary info and a HTML link to the full QC Report, and optionally the PDF version of the report.
  - Be informed of any file that fails your QC test plans wherever you are with your on-line mobile device, enabling you to then communicate decisions or actions required back to your organization.

Container Wrappers:
MXF (All OP, including AMWA defined AS, RDD-9, P2, SxS), Transport Stream, Elementary Stream, Program Stream/VOB, AVI, WMV/ASF, QuickTime/ MOV, GXF, MP4, 3GPP, LXF, R3D, DPX, DXW, HLS, DASH, Smooth Streaming, IMF, DCP (unencrypted).

Video Codecs:
H.264 (AVC/AVC-Intra/MVC 3D), MPEG-2 (including XDCAM, IMX and D-10), ProRes, JPEG 2000, DNxHD (VC-3), Cineform (VC-5), VC-1 (and WMV), DV/DVCPro, Flash VP-6/7, RAW (Huffman, YUV, RGB, Blackmagic), EXR, DPX, Canopus, H.265 (HEVC)

Audio Codecs:
PCM Audio (WAV/AES/BWF), Dolby Digital (AC-3), DD+ (EAC-3), Dolby TrueHD (MLP), Dolby E, AAC, HE-AAC, WMA Standard/Pro, MPEG-2 (L1,2,3), MPEG-1.

Captions/Subtitles/Text:
Line 21, CEA-608, CEA-708, Timed Text / DFXP, STL, SRT, SCC.

Supported Formats:
As of April 2015 Aurora 5 supports the following file formats. Please contact Tektronix for latest listing.

For further details visit:
www.tek.com/aurora

Hydra Player & Manual Review

Hydra Player is the frame accurate player than can smoothly and reliably playout more file types than any other product in its class, including visualizing not only the video, but also the audio, captions/ subtiles/text and metadata.

- Video, audio, captions/subtitles/text and metadata visualization
- Tight integration with Aurora for manual QC review
- Frame accurate video
- Audio waveforms and peak meters
- Captions, subtitles and text display
- Metadata visualization
- Widest format support
- HDMI or SDI (SD, HD, 4K) output
- GPU acceleration for 4K playback
- Adaptive bit rate file playback

Hydra Standalone Player

Hydra is a standalone frame accurate player with reliable and smooth playback of more broadcast and media industry file formats than any other player in its class. Install this software application on industry standard IT hardware, with an optional video card for SDI output. Hydra utilizes GPU acceleration for high resolution files (like 4K) and complex codecs, plus supports frame-accurate shuttle control.

Hydra Integrated QC Review

Hydra integrates with the Aurora file-based QC platform to become a fully event driven player, speeding up manual review by up to 8 times compared to traditional linear processes. Click on a test report issue and instantly view the exact frame in Hydra. Use the Hydra Review Bar to list all QC issues and jump to each with a single click. Manually review with shuttle control, enter QC decisions and add annotations. Even add non-technical issues. All this information is automatically added to the Aurora QC Report.

Features and Benefits

- Audio Playout and Visualization: Hydra Player includes an Audio Service Mapping function that enables you to playback the audio you want the way you want. Specify how your mono or AES wrapped audio tracks are allocated into programs and which of those services should be available for playback. Hydra Player enables you to select specific audio channels from multiple programs (or within a single program) for playback and visually monitor them in a frame-accurate waveform view and/or use built-in audio loudness meter to monitor audio peaks and average levels.
  - Review just the audio you want in your media files in the way you want to monitor them.
- Caption / Subtitle / Text Playback: Hydra Player supports the display of captions, subtitles and/or text overlaid on the video frame, timed precisely with the video timestamps. Any available text data will play. Text can be in side-car files (linked through a reference file) or embedded.
  - Easily check that your captions / subtitles / text is correct without having to use specialist tools.
- Metadata Visualization: Hydra Player enables toggling between the video and the declared header metadata associated with the file. Since Digimetrics is the sponsor of the MediaInfo open source project, we know how to parse files and display the most relevant technical and tag data for a file.
  - Quickly review your media file's metadata without having to use specialist tools.
- HDMI or SDI Output: Hydra Player supports full resolution playout to the PC monitor/HDMI output or alternatively you can install an AJA Corvid or Kona card (3G models preferred) for high quality SD or HD SDI output, or even 4K playout to external broadcast quality monitors.
  - View your media on your desktop display or in full SD/HD/4K SDI on a broadcast monitor.
- Video Scaling Options: Hydra Player will by default show the video essence in the presentation window at 100% of the pixel density, but you can manually select other sizes or if your monitor is too small, then Hydra will automatically scale to show the entire picture.
  - Scale your video to your monitor.
- Audio Service Mapping: Hydra Player includes an Audio Service Mapping function that enables you to playback the audio you want the way you want. Specify how your mono or AES wrapped audio tracks are allocated into programs and which of those services should be available for playback.
  - Playback and visualize just the audio you wish.
- GPU Acceleration for 4K Playout: Hydra Player can playout higher resolution files and process more complex wrappers than most other players as it uses GPU acceleration (any NVIDIA Kepler GPU with at least 1.5GB of memory), including handling IMF CPLs for 4K playback in real time.
  - Smoothly playout 4K media files with no chunking.
- Adaptive Bit Rate (ABR): Hydra Player supports playout from Adaptive Bit Rate filesets (HLS, HSS, HDS and DASH), including any of the codecs or text referenced in the playlist. Bitrate variations show up as Programs in Hydra, so playback or review with manual bitrate switching, if needed. When integrated with Aurora 5 file-based QC, tests specifically designed to catch the most common causes of adaptive bit rate streaming problems are available and by clicking on any reported instance Hydra Player will jump to the exact frame of its occurrence.
  - Playout ABR files at the bit rates you want to review.
- Reference File Handling: Hydra Player supports playout using reference files like MXF OP-1b, MOV and IMF, allowing selection of any program, video essence track, audio essence track or ancillary/text available in the container. Where reference files are not present Hydra has a generic XML container that can be customized to enable synchronous playout.
  - Playout reference files, selecting the program, video essence, audio essence and data you wish to review.

- Interoperable Master Format (IMF): IMF is the new Hollywood standard that allows a single set of master essence to be mapped to composition playlists (CPL) to define and manage multiple distribution points needed by a studio. The CPL may be a simple reference to an essence, or it can be a complex series of in/out points from multiple essence. Hydra Player can handling IMF CPLs for playback with 4K content in real time. Operators can select between the CPLs and playback of any specific profile. When integrated with Aurora 5 QC an operator can click on a reported QC issue on the Aurora Test Report and view in 4K the exact frame of the reported issue, scrubbing back and forth as required.
  - Rely on Hydra to support the latest codecs and wrappers, including the new IMF standard.
- Hydra Integration with Aurora QC: Hydra closely integrates with our Aurora 5 file-based QC software. Click on any issue in the Aurora QC Report and Hydra will be launched at the exact frame of the issue. Open the Hydra Review Bar to see the full list of QC issues detected by Aurora for that file – then jump between them, and jog/shuttle to review the issue. Add annotations and make QC decisions for each issue, with all information added to the QC test report.
  - Speed up manual review and decision-making on Aurora 5 reported QC issues by up to 8 times
- Hydra Integration with Technology Partner Solutions: Hydra has a SOAP API that enables third party solutions to natively integrate file-based playout functionality into their solution workflows. Third party solution providers can control the playback ad display the video within their own user interfaces.
  - Enhance third party solutions with the Hydra player integration.

Container Wrappers:
MXF (All OP, including AMWA defined AS, RDD-9, P2, SxS), Transport Stream, Elementary Stream, Program Stream/VOB, AVI, WMV/ASF, QuickTime/ MOV, GXF, MP4, 3GPP, LXF, R3D, DPX, DXW, HLS, DASH, Smooth Streaming, IMF, DCP (unencrypted).

Video Codecs:
H.264 (AVC/AVC-Intra/MVC 3D), MPEG-2 (including XDCAM, IMX and D-10), ProRes, JPEG 2000, DNxHD (VC-3), Cineform (VC-5), VC-1 (and WMV), DV/DVCPro, Flash VP-6/7, RAW (Huffman, YUV, RGB, Blackmagic), EXR, DPX, Canopus, H.265 (HEVC)

Audio Codecs:
PCM Audio (WAV/AES/BWF), Dolby Digital (AC-3), DD+ (EAC-3), Dolby TrueHD (MLP), Dolby E, AAC, HE-AAC, WMA Standard/Pro, MPEG-2 (L1,2,3), MPEG-1.

Captions/Subtitles/Text:
Line 21, CEA-608, CEA-708, Timed Text / DFXP, STL, SRT, SCC.

Supported Formats:
As of April 2015 Aurora 5 supports the following file formats. Please contact Tektronix for latest listing.

For further details visit:
www.tek.com/hydra-frame-accurate-file-based-player-software

Autofix Correction

AutoFix Audio Normalization

AutoFix Audio Normalization is the audio loudness correction tool that top content providers rely on to ensure their files meet all international broadcast standards that provides high quality audio normalization with exceptional dynamic retention - available as a standalone product or as a plug-in to leading NLEs.

- Advanced Measurement Algorithms
- High Quality Correction
- Exceptional Dynamic Retention
- Choice of Audio Correction Methods
- Audio Mapping
- Desirable Broadcast Levels
- Guaranteed Playout Capability

Standalone Application

AutoFix Audio Normalization is available as

a standalone application, with versions for Windows and Mac OS available. AutoFix can be deployed anywhere within a file-based media workflow.

Integrated in Workflow Solutions

AutoFix Audio Normalization is available as an optional plug-in with leading third party workflow solutions, automatically corrected audio loudness within wider automated operations.

NLE Plugin

AutoFix Audio Normalization is available as a plug-in to some non-linear editing applications, supporting the same containers and codecs as their host applications.

Integrated with Aurora 5

AutoFix Audio Normalization can be integrated with Aurora 5 file-based QC software to add automated audio loudness correction as an action defined in the Aurora 5 decision engine.

Features and Benefits

- Audio Loudness Measurement: AutoFix uses the same audio measurement algorithms as the market-leading Aurora QC platform, including maximum level tests, average loudness tests and range tests. These algorithms focus on replicating the true experience of the human ear, so only the parts of the audio waveform that need correction are identified.
  - You receive reports that only list the issues that your audience will detect, not a long list of technical issues.
- Choice of Audio Correction: AutoFix provides user selectable correction methodologies, including a true peak limit and a post-correction gain adjustment. Correction is available for R128, ATSC A/85, ARIB TR-B32 and OP59. AutoFix can also be kept in automatic mode, guaranteeing the audio will meet the desired specification.
  - You can correct the audio using your preferred methods, ensuring it meets your requirements.
- Exceptional Dynamic Retention: AutoFix has exceptional dynamic retention capabilities with its default settings using a multi-band compressor for both first pass compression/reduction and make-up gain correction
  - You can be assured that the audio will continue to sound as good as the original, just with the audio loudness corrected.
- Desirable Broadcast Levels: AutoFix ensures that your audio levels are playout and distribution ready using AGC (automatic gain correction). This includes True Peak Limit adjustment, Final LU Target adjustment and Dynamic audio adjustment tuning (attack, release, spread, silence threshold, attenuation).
  - You can be assured that your audio files will meet broadcast standards.
- Guaranteed Playout Capability: AutoFix corrects the audio and re-inserts it into a copy of the original container without a re-multiplexing operation, ensuring that the output has all of the original mux parameters, metadata and stream layout. AutoFix supports Transport Stream, MXF, GXF and LXF, and MP4/MOV.
  - You can be assured that your playout or distribution system will be able to play the corrected files.
- Channel Mapping: AutoFix Audio automatically handles any multi-channel audio codecs, and also includes the ability to create an Audio Service Map as a template for incoming files with AES wrapped or mono channel audio tracks.
  - You can test just the audio tracks that you want.
- Correction Reports: AutoFix assigns job IDs to all jobs it processes with .xml file reports easily accessed in the AutoFix web browser for viewing or printing. The actual measured values are shown in the report while corrected values are shown in Test Parameters.
  - You can easily review the test results in an easy to read report.
- Application for Mac or Windows: AutoFix Audio Normalizer is available as a desktop application for Windows or Mac OS X. Correction jobs can be manually launched or automated workflows implemented using input and output hot folders, along with audio specification and values.
  - You have flexibility to deploy the solution on the OS of your choice.
- Plugin for NLE Systems: AutoFix Audio Normalizer is available as a plug-in to non-linear editing applications, including Final Cut Pro 6/7, FCP X and Adobe Premiere Pro CS6/CC. AutoFix plug-ins support the same containers & codecs as their host applications.
  - You can integrate audio normalization into your NLE.
- Plugin for Workflow Solutions: AutoFix Audio Normalizer is available as a plug-in to a wide variety of workflow systems, including Digital Rapids Kayak- based applications and Telestream Vantage, utilizing encoder and mux processes to take incoming files and create a new output files after audio correction.
  - You can integrate audio normalization into your workflow orchestration solution.
- Integration with Aurora File-Based QC: AutoFix Audio Normalizer can be implemented downstream from the Aurora QC software. The Decision Engine in Aurora QC can be configured to place files that fail the audio loudness test into a watch folder for AutoFix to automatically correct.
  - You can integrate audio normalization into your file-based QC workflow

Audio Codecs:
AutoFix applications support PCM Audio (WAV/AES/BWF), MPEG Audio (CBR-only). Dolby AC-3 (Dolby D), Dolby AC-3+ (Dolby D+) and Dolby E (additional option) codecs. AutoFix Plug-in codec support is governed by the workflow or editing system.

Audio Wrappers:
AutoFix applications support the following audio wrappers: MXF (OP-Atom, OP1-a, OP1-b), Transport Stream, Program Stream, MP4/MOV, LXF and GXF wrappers. AutoFix Plug-in container support is governed by the workflow or editing system.

For further details visit:
www.tek.com/autofix-audio-normalization-software

AutoFix Gamut Legalizer (a separate product to AutoFix Audio Normalization) is available as a plug-in for Apple Final Cut Pro 6/7/X, with the ability to set limits for measurement and correction of gamut. Set the color space and AutoFix will automatically legalize the file gamut as it is rendered.

AutoFix Correction is a series of tools for the automated correction of broadcast files on which you can rely in your production workflow to deliver the trust that your files are compliant and ready for distribution and playout.

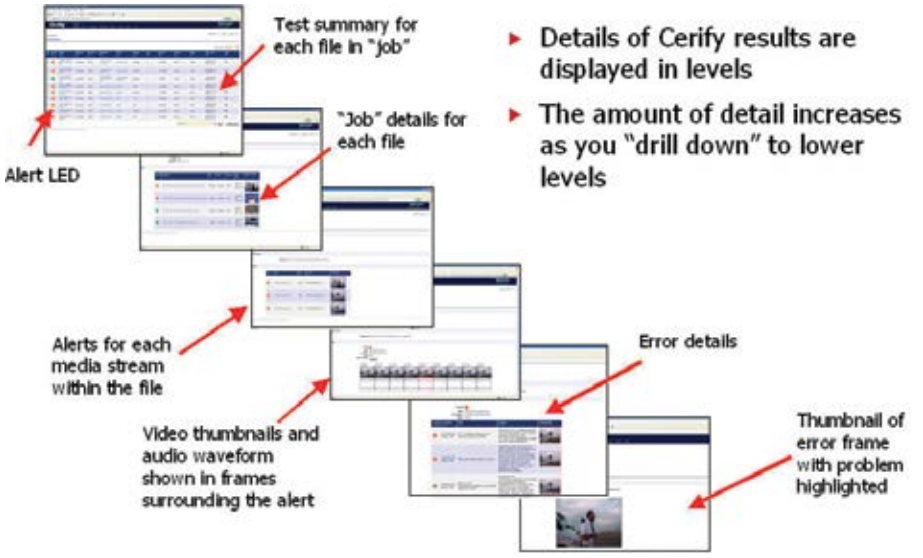
Color Gamut to EBU R103: AutoFix Gamut Legalizer offers the ability to set limits for measurement and correction (and, by default, correct gamut using AutoFix) relative to EBU R103 in several methods: Percentage of legal limits, Millivolts (mV) and IRE (absolute value adjusted to 0-255).

Gamut Measurement: AutoFix Gamut Legalizer allows you to measure gamut against ITU color standards BT.601 or BT.709, or define your own custom color space using the Y', Cb' and Cr' coefficients for the RGB components.

Safe Title/Area Overlays: Safe Title/Action Area overlays are provided in the preview window for: NTSC 4:3 and 16:9 (525 line raster), PAL 4:3 and 16:9 (625 line raster) where applicable, overlays for 14:9 also provided, 720p, 1080p, 2k/Digital Cinema using the following SMPTE, ARIB, ITU and EBU standards.

Reporting: Measurement and correction results are provided in an XML-based report, showing which frames are out of gamut, and if AutoFix is enabled, which color components were adjusted.

For further details visit:
www.tek.com/autofix-gamut-legalizer



Cerify Content Validation System

Cerify automatically verifies Content Interchange - the quality of file-based, compressed digital audio & video content, metadata, & ancillary data. Cerify can help you deal with your content explosion by checking content at the input of your workflow, and ensure that the quality and integrity of the content being sent to your transmission system meets your quality standards. Cerify fully tests all aspects of the video and audio elements to make certain it meets quality and compliance for video and audio standards, and can automatically verify and validate that the file content is ready and adheres to user-defined format templates. Cerify's industry proclaimed video quality measurement fidelity means that you can maintain the QoE for your viewers that you have set as your organization's standard. Automated, repeatable, objective testing of your content library ensures that you can efficiently process all your content in a 24X7 operation with minimal human intervention and without any of the subjectivity of human QC.

Backed by the Cerify Developer Community (CDC), Cerify supports the widest range of Video Server and Broadcast Management System vendors, reducing your system integration complexity. Cerify is a software solution that is based on Tektronix industry leading video compression testing technologies. Interfacing to 3rd party automation or asset management systems, Cerify provides automated, 24x7, unattended content verification that is seamlessly integrated into your workflow.

Applications

- Broadcasters and Video Service Providers – Ensuring quality, compliance, and playability of audio and video after encoding, at ingest, after editing, after transcoding, and before playout for terrestrial, satellite, cable, internet, and video-on-demand content
- Archiving – Ensuring quality, compliance, and playability of archive content before archiving, while in archival or prior to retrieval from the archive.
- Content Providers – Ensuring post production and aggregated content has been correctly encoded and conforms to the required quality and format

Features and Benefits

- Provides exception-based technical compliance to enable QC teams to focus on problem content and subjective requirements
- Runs automatically 24/7 to perform consistent and thorough checks of incoming video files against user defined content templates
- All aspects are checked, including encoding, compliance/correctness to video and audio standards, video formats, resolutions, bitrates, adherence to transmission system limits, and also video and audio quality (including the presence of faults such as black frames, blockiness, AFD, tape artifacts, audio silence/ incorrect levels, audio loudness, Dolby-E Guard Band Interval and true peak levels)
- Simultaneous testing of multiple files ensures the workflow does not get backed up because of QC operations
- Logs errors, informs automation systems, plus programmable actions such as email user alert, and file quarantine
- Web-browser multi-user interface plus Web-services API and control provides the flexibility of command and control from anywhere and the ability to allow required personnel/partner access to check compliance from anywhere
- SOAP based Web-services, CeriTalk API for integration with broadcast management systems allows workflow integration
- Multi-track audio testing reduces the amount of time it would take to process assets with multiple audio tracks by efficiently processing all audio tracks with a single pass QC
- Flexible audio loudness test duration allows different groups of channels to be tested against different loudness thresholds
- Available automated audio loudness correction across all tracks using Dolby Dialog Intelligence
- Ensures presence and compliance of Ancillary Data: Closed captions, Teletext, DVB Subtitles, & Timecode Continuity, Integrity, Synchronization and comparison
- Ensures regulatory and legal compliance to Photosensitive Epilepsy (PSE) standards by detecting flash/pop sequence in video that might trigger epileptic seizures
- Workflow efficiency technologies built in ensure that time-sensitive materials are QC'ed in parallel to other operations such as ingest thus removing serialized operations and reducing overall workflow time
- Unlimited Scalability from Stand-alone (single server) to Enterprise (clustered for higher parallel processing and high availability requirements)

Video Formats:
All frame format sizes, bit rates and resolutions for SD/HD and mixed workflows (including QCIF, CIF, D1, 720p, 1080i, 1080p)

Resolutions:
QCIF, CIF, SD, D1, 720p, 1080i/50, 1080i/60, 1080p (and non-standard sizes from 16X16 to HD+)

Container:
MPEG TS/PS, MXF, GXF, MP4, QuickTime, ASF (Windows Media), 3GPP, AVI, LXF, Apple HLS, Microsoft Smooth Streaming

Video:
MPEG-2 (IMX, XDCAM), H.264/AVC, MPEG-4, H.263, VC-1/WMV, DV/DVCPro25/50/100/HD, Apple ProRes 422/422(HQ)/422(Proxy)/422(LT)/444, AVC-Intra (High10 Intra, High422 Intra, High444 Intra, and CAVLC Intra), JPEG-2000, DNxHD, Raw YUV and RGB

Audio:
MPEG-1/2, AAC, HE AAC (LAOS/LATM), PCM (AES, BWF, AIFF, WAV), DV, WMA, Dolby D / AC-3, Dolby E, SMPTE 302M

With Tektronix' Cerify, you can be assured that your content conforms to your standards for quality, and know that your content is correct before it is distributed to your customers, broadcasted to your viewers, or streamed to your subscribers.

For further details visit:
www.tek.com/cerify

[*1] There are no syntax checks for these codecs

Automated QC of Media Content in Cloud Media Workflows

Increasingly, media workflows are being operated in the cloud to take advantage of the instant scalability and usage based pricing models of cloud platforms. Due to the significant size of the media files in these cloud resident workflows, it becomes cost and time prohibitive to move them back to onsite storage to perform QC. Tektronix has solved this problem by developing a file-based media QC solution that is optimized to run on cloud platforms which leverages 7 years of field-experience and usage with the Tektronix file-based QC engine.

Features	Benefits
No capital expense	Get stared quickly without needing capital upfront
Pay-as-you-go licensing	Usage based payment model ensures one only pays for QC services consumed
Instant & Infinite scalability	Ensures QC service available **always** scales to the need of the workflow — never too big, never too small
Amazon S3 content accessible	QC content from your Amazon S3 account without having to move content for QC
Automated objective testing	Improve consistency of results, levels of quality and find errors many visual inspections with miss
Processes one or multiple files simultaneously based upon EC2 instance type	Cost-effective, software-only solution that runs on customer's Amazon EC2 instances
User definable test templates	Enable Conformance Agreements for content exchange between content suppliers and broadcasters
Logs all testing and results	Detailed reports provide an audit trail of testing
Multi-user intuitive browser interface	Web-based user control for global reach simultaneously
Integrates with video servers and automation	Streamlined automated workflow via API that works with both on-premise and Cloud solutions
User definable quality levels	Allows QC managers to define required quality levels for different content types, uses and delivery channels

Tests Include

- Encoding Errors, Syntax Errors, Format, Bit Rate, Quantization, Frame Rate, GOP (Length, Bit Rate, and P-frame) Tests, Aspect Ratio, Color Format, Buffer Analysis, File Size, Correct PID, CableLabs VoD Compliance, Number of Video and Audio Streams, Number of Audio Channels/Tracks
- Video Playtime, Signal Levels, Gamut, Luminance, Chrominance, Black Frame Detection, Video Quality (Blockiness), Freeze Frame Detection, Field Order, Quantization, Cadence, Missing Frame, Tape Artifact Detection, Color Bar Detection, AFD Detection
- Audio Playtime, Peak and Minimum Levels, Audio Loss, Clipping, Silence, Mute, Test Tones, Dolby-E Guard Band Interval Testing, Multitrack Audio Testing, Peak Audio-level Reporting, Audio Loudness Testing per ATSC A/85 and EBU R128, PPM Audio Ballistics, Loudness Tests across Multiple Tracks, Automated Audio Loudness & Level Correction using Dolby DPLC engine
- Perform All Audio Tests on All Audio Tracks in a File with 1 Pass
- Closed Caption, Teletext, and DVB Subtitles: Presence and Standards Compliance
- Timecode Continuity, Integrity, Synchronization, and Comparison
- Photosensitive Epilepsy (PSE) Testing per U.K.'s OfCom & Japan NAB specifications

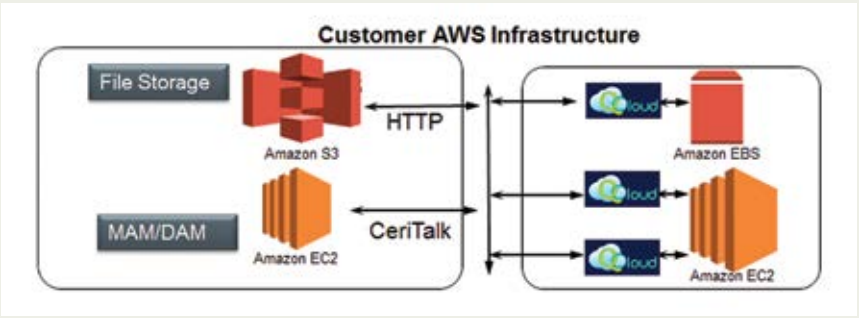
Formats

- **Format –** All Frame Sizes, Bit Rates, and Resolutions for SD/HD and Mixed Workflows
- **Container –** MPEG TS/PS, MXF, GXF, MP4, QuickTime, ASF (Windows Media), 3GPP, AVI, LXF, Apple HLS, Microsoft Smooth Streaming
- **Video –** MPEG-2 (IMX, XDCAM), H.264/AVC, MPEG-4, H.263, VC-1/WMV, DV/DVCPro25/50/100/HD, Apple ProRes 422/422(HQ)/422(Proxy)/422(LT)/444, AVC-Intra (High10 Intra, High422 Intra, High444 Intra, and CAVLC Intra), JPEG-2000, DNxHD, Raw YUV and RGB
- **Audio –** MPEG-1/2, AAC, HE AAC (LOAS/LATM), PCM (AES, BWF, AIFF, WAV), DV, WMA, Dolby D / AC-3, Dolby E, SMPTE 302M

Applications

- **Broadcasters / Video Service Providers –** Ensuring quality, compliance, and playability of audio and video after encoding, at ingest, after editing, after transcoding, and before playout for terrestrial, satellite, cable, internet, and video-on-demand content
- **Archiving –** Ensuring quality, compliance, and playability of archive content before archiving, while in archival or prior to retrieval from the archive.

  Content Providers – Ensuring post production and aggregated content has been correctly encoded and conforms to the required quality and format



Cerify Services: Assurance of Quality Output

Installation & System Support

Installation services are available with all Cerify products. Installation services are defined in a Statement of Work and include system design, configuration, implementation, test and trouble shooting, and documentation. The installation service deliverables are:

- Service Initiation
- System Design
- Design Implementation
- System Test
- Documentation
- Acceptance and Sign-off

Cerify System Support

Annual maintenance agreement options are available for your Cerify products. A system support maintenance agreement includes:

- Software maintenance that includes all software maintenance releases and bug fixes
- Telephone technical support during regular business hours

Professional Services

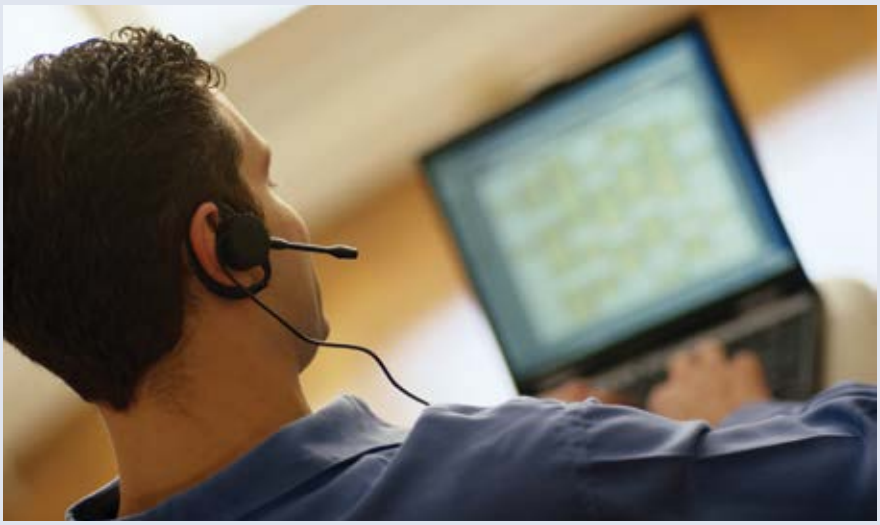
Knowing that file based video and the test systems approach required to efficiently operate the workflows and extract the most value out of your Cerify system might leave some overwhelmed, Tektronix has put together some professional services to help:

- Design templates relevant to your application
- Fine tune Audio/Video measurements to your QoS
- Customize Cerify notification to fit your escalation policies

Training

Recognizing that file-based QC systems are still new to most, Tektronix has constructed on-site training classes to:

- Train system administrators on set up and configuration
- Train Master Control personnel to use the QC results for actionable activities



Your Tektronix Service Advantage

You can trust Tektronix to offer unequalled engineering expertise and a customer-centric approach to ensure the optimal performance of your Tektronix products and maximize the lifetime value of your Tektronix investment.

Summary of Service Plans

Repair Service Extended Coverage	Calibration Service Coverage	Multi-Vendor Calibration Services
■ Save money with multi-year coverage ■ Priority service ■ Covers equipment, parts, labor and transportation ■ Applicable software, safety and reliability updates	■ Accredited calibration ■ Traceable calibration ■ Functional verification ■ Applicable software, safety and reliability updates ■ Calibration records retention	■ Single point of contact for all of your calibration needs ■ Simplify your operations and reduce administrative costs ■ On-site delivery for convenience and reduced downtime.

Tektronix Factory Experts

Access to the engineering expertise that designed and built your products to ensure they are in peak performance. Over 20 man years of training per support engineer.

Comprehensive and Thorough Treatment

Software updates, safety and reliability modifications, and cosmetic enhancements are included if applicable. Products are returned to you in a “like new” condition. Worldwide support is available through the Tektronix network.

Efficiency and Convenience

Team of professionals focused on getting your instruments back to you as soon as possible to keep your downtime to a minimum and your service management easy.

Flexible Repair and Calibration Service

Choice of cost effective, flexible options and service packages to meet your needs.

For further details visit:
www.tektronix.com/service

Glossary of Terms

Download our free Glossary of Video Terms & Acronyms. This comprehensive reference book has been compiled from material gathered over time and from numerous sources.

To download your free copy of this glossary, please visit: www.tektronix.com/video/glossary

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Become a member today at: www.tektronix.com/mytek

Find a Manual

Did you know that downloadable manuals for many products are available on our web site free of charge?

Find them at: www.tektronix.com/downloads

Have a Technical Question? Ask the Experts!

Our group of video experts has more than 140 combined years of experience in the industry. Send them your video questions and they will get back to you within one business day.

You can find them on our web site at: www.tektronix.com/videoexperts

TekTV

A variety of product video and technical video resources.

Get connected at: www.tek.com/tektv#application/video-test-net-work-monitoring

Tektronix Video on YouTube

Make sure to benefit from the Tektronix Video resources available on YouTube channel.

Subscribe to Tektronix Video Channel at: www.youtube.com/user/TektronixVideo

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United Kingdom & Ireland 00800 2255 4835
USA 1 800 833 9200

Rev. 0415

For Further Information
Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit www.tektronix.com and www.keithley.com.

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