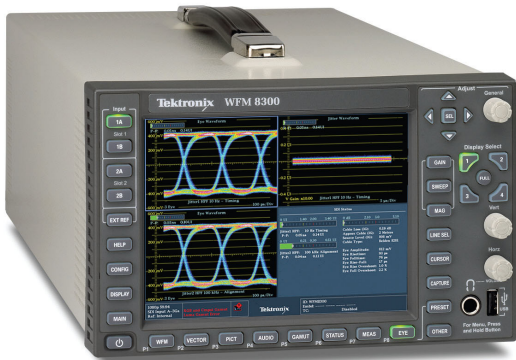


Advanced Analog/SD/HD/3G-SDI Waveform Monitors

WFM8300 • WFM8200 Data Sheet



Features & Benefits

- Video/Audio/Data Monitor and Analyzer – All in One Platform
 - WFM8300 and WFM8200 come standard with auto-detection of HD/SD-SDI and multiple Dual Link video formats (including RGB and XYZ color space support)
 - Optional capabilities include 3G-SDI (Level A and Level B) formats support (Opt. 3G), composite analog video support (Opt. CPS), as well as analog and digital audio (Opt. AD) and Dolby E, Dolby Digital Plus, and Dolby Digital audio (Opt. DPE) decoding and monitoring
 - WFM8300 also comes standard with Simultaneous Input Monitoring capability, ANC Data Inspector, and numerical/graphical display of A/V delay for analog, digital (with Opt. AD), and Dolby audio formats (with Opt. DPE)
- Superior Physical Layer Signal Integrity Analyzer
 - High-performance real-time eye pattern display, jitter measurements, and patented cable length measurement (WFM8300 Opt. PHY or WFM8200 Opt. EYE)
 - Most comprehensive eye pattern measurements including eye amplitude, rise/fall time, and overshoot/undershoot measurements as well as Tektronix jitter waveform display (WFM8300 Opt. PHY only)
 - Field-upgradeable HD/SD-SDI eye pattern input module to full 3G-SDI and HD/SD-SDI support with the purchase of an upgrade key (WFM8300UP Opt. 3G or WFM8200UP Opt. 3G)
- Black Picture and Tektronix-patented Frozen Picture Detection
- Tektronix-patented Timing and Lightning Displays Facilitate Accurate Adjustment of Critical Plant Timing
- New Tektronix-patented Spearhead Display and Luma Qualified Vector (LQV™) Display Facilitate Precise Color Adjustment for Post Production Applications (Opt. PROD)
- Most Comprehensive Audio Monitoring
 - Multichannel Surround Sound*1 display and flexible Lissajous display (Opt. AD or Opt. DPE)
 - Audio Loudness monitoring (Opt. AD or Opt. DPE)
 - Comprehensive Dolby metadata decode and display including VANC metadata (Opt. DPE)
 - User-selectable Dolby E Guard Band limits with intuitive Dolby E Guard Band meter (Opt. DPE)
- Most Comprehensive ANC Data Monitoring
 - 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
- Most In-depth Digital Data Analysis Helps Quickly Resolve Difficult Content Quality and Reliability Issues (WFM8300 only)
- Unmatched Display Versatility
 - FlexVu™, the most flexible four-tile display, tailors to various application needs to increase productivity
 - Standard and user-definable Safe Area Graticules facilitate editing and format conversions tasks, reducing the need for reworks
 - Active Format Description (AFD) detect, decode, and automatically adjusted graticule on picture display enable easy identification of aspect-ratio related issues
- Unmatched Usability
 - CaptureVu® advanced video frame data capture simplifies troubleshooting and equipment setup
 - 32 instrument presets for quick recall of commonly used configurations tailored to engineers or operators
 - Front-panel USB port enables easy transfer of presets, captured video frame data, and screenshots
 - Front-panel headphone port enables quick verification of selected audio pair
 - Intuitive menu structure and context-sensitive help
 - Extensive alarms, status reporting, and error logging
 - Bright, crisp, high-resolution LED backlight display
 - SNMP and Ethernet remote interface capabilities and GPI control facilitate centralized monitoring and control



Multiformat support grows with your needs

Applications

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

*1 Audio Surround Sound Display licensed from Radio Technische Werksüßen GmbH and Co. KG (RTW).

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 video formats, and 3G-SDI video signals. The WFM8300 offers support for a variety of audio formats for analog, digital AES/EBU, digital embedded, Dolby Digital, Dolby Digital Plus, and Dolby E.

- 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
- 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
 - 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



3G-SDI monitoring, jitter measurement, and test generator

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 3G-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, Dolby Digital Plus, and Dolby E formats.

- 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
- 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
 - 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

Both WFM8300 and WFM8200 support flexible combinations of options and field upgrades, providing an excellent solution for multiformat environments while protecting your investment. For complete details regarding option and feature availability by model please refer to the section of this document on ordering information.

From Composite Analog to 3G-SDI Advanced Digital Video – All in One Platform

Ideal for multiformat environments, the WFM8300 and WFM8200 advanced waveform monitors provide flexible options and field-installable upgrade kits to monitor diverse video types including 3G-SDI, Dual Link, HD/SD-SDI, and composite analog video.

Both WFM8300 and WFM8200 come standard with Dual Link 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 Link A, Link B, or the combined Dual Link input with a comprehensive set of displays and status reporting tools. The Tektronix-patented Timing display, which measures timing between Link A and Link B of the Dual Link signal, proves a valuable ally to maintain correct timing between the two links.

To support the latest production trends for high-definition 1080p 50/59.94/60 content, the WFM8300 and WFM8200 provide optional capabilities to monitor this 3G-SDI format. Option 3G for the WFM8300 and WFM8200 enables monitoring of SMPTE 425M Level A (directly mapped) and Level B (mapped from Dual Link) signals.

Monitoring display modes such as Waveform, Vector, Gamut, Timing, Status, Picture, and Audio, as well as automated physical layer measurements and in-depth data analysis are available for 3G-SDI and other input formats.

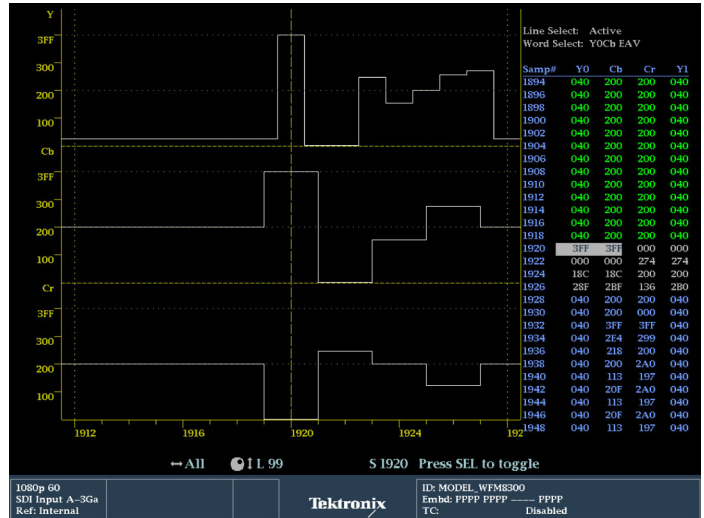
Both WFM8300 and WFM8200 support any combination of video and audio format options, so these instruments excel in multiformat environments and evolve with your needs to protect your investment.

ANC Data Inspector				
Name	DID/SDID	Presence	Status	Location
S299M Ctrl Grp 2	E2/-	Present	OK	Field 1 / Line 9
S299M Ctrl Grp 1	E3/-	Present	OK	Field 1 / Line 9
S299M Aud Grp 2	E6/-	Present	OK	Field 1 / Line 12
S299M Aud Grp 1	E7/-	Present	OK	Field 1 / Line 12
S334-1 CDP(708)	61/01	Present	OK	Field 1 / Line 9

Detail		View Mode: Watch List	Time Elapsed Since Last Reset: 0 d, 00:01:25
Format: SMPTE 334M CDP (708B)			
DID: 61 (161)	Type: 2	Field: 1	Line: 9
SDID: 1 (101)	DC: 82 (152)	Link: --	Stream: Y
Exp/Act Chksum: 2b4 / 2b4	Error: OK		

000	016	032	296	269	152	14f	167	1a7	224	272	1f4	2fc	1e5	164	1fd	1c8	1ec	2ff	
016	203	222	1fe	265	164	1fe	200	200	2fa	200	200	2fa	200	200	2fa	200	200	2fa	200
032	200	2fa	200	200	2fa	200	200	2fa	200	200	2fa	200	200	2fa	200	200	2fa	200	200

ANC Data Inspector and CaptureVu provide detailed content analysis



Datalist display provides detailed pixel-by-pixel information

Auxiliary Data Status	
Anc Data:	Y and C Present
CEA608:	534 CDP (ANC)
CEA708:	534 CDP (ANC)
Teletext:	Not detected
CDP:	Present
V-Chip Rating:	(U.S. TV) TV-PG
TSID:	Not detected
CGMS-A:	Not detected
TC Flags:	DB: 1 CF: 0 DBB: 0000 BG Flags: 0 Unspecified 4 Unspecified BG Data: 00000000
SMPTE 2016 AFD:	109 B - Code is 111 - AR is 169
Desc:	Full Frame 109 (at 4:3 center) in 109 Frame
Bar 1:	No Valid Bar data found
Bar 2:	No Valid Bar data found

Monitoring of Ancillary data (Closed Caption, Time Code, and AFD) using Aux Data Status

Superior Data Analysis Capabilities for Engineers and Operators

The new ANC Data Inspector (standard on WFM8300) provides an industry-leading solution to help broadcasters easily and accurately ensure that all required VANC data is present and correctly configured through an intuitive ANC data display.

In contrast to other solutions, the ANC Data Inspector enables operators to easily and quickly ensure that the VANC data is present and free of errors. When errors are detected, engineers are quickly guided to a more detailed view of the data packet content for further analysis.

With FlexVu™, each picture display tile can display different CEA708/608 Closed Caption and individual Teletext subtitles. Teletext subtitle pages can be decoded in either WST or OP47 format.

The Auxiliary Data Status display (standard on both the WFM8300 and WFM8200) provides summary information on Active Format Description

(AFD) per SMPTE 2016, Video Index Aspect Ratio, Wide Screen Signaling (WSS), V-Chip, TSID, CGMS-A, Broadcast Flag, CEA708/608 Closed Caption, Teletext, and Time Code information.

Today there is a wide array of metadata that provides information to a variety of equipment through the processing chain. Monitoring of this metadata is critical to ensure that the processing equipment correctly handles the signal. For instance, correct format of the AFD ensures that the aspect ratio on the display is correctly formatted and the automated AFD graphic is available for the picture display of the WFM8300 and WFM8200 along with the binary data and text description for easy monitoring.

With Option DPE, the WFM8300 and WFM8200 can also monitor Dolby metadata embedded in the Vertical Ancillary (VANC) data space per SMPTE 2020.

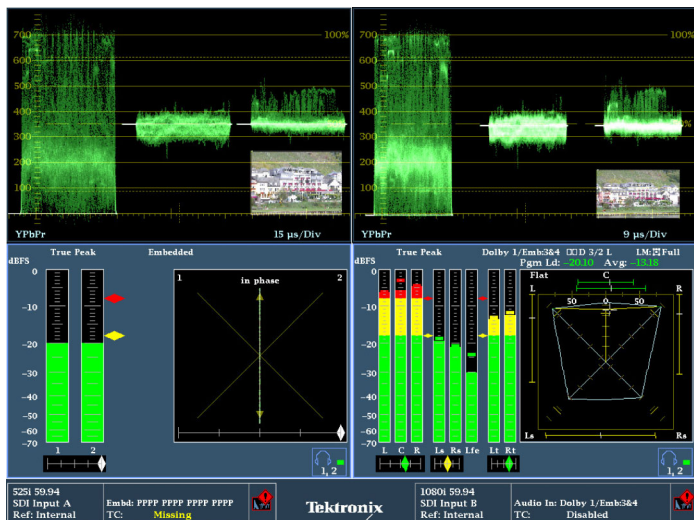
The Datalist display, available as standard on the WFM8300, provides detailed information on the actual data values in HD/SD-SDI and 3G-SDI (with Option 3G) input signals. Users can easily use this display to locate protocol errors in the input signals.

The right side of the display shows the data values in hexadecimal, decimal, or binary format and uses the following color coding for easy identification of data types and errors:

- Green – Active video data
- Blue – Data in horizontal or vertical blanking intervals
- White – EAV, SAV, and other reserved words
- Yellow – Data outside nominally allowed values
- Red – Data with illegal values

The left side of display shows un-interpolated digital values plotted against sample numbers as a digital waveform. You can configure this unique display in either video mode or data mode.

In video mode, the display shows the Y, Cb, Cr values aligned temporally, but offset vertically. Like the waveform display, you can configure the display to show 1, 2, or all 3 components.



Simultaneous display, virtually two instruments in one

Full-featured Simultaneous Input Monitoring Boost Versatility

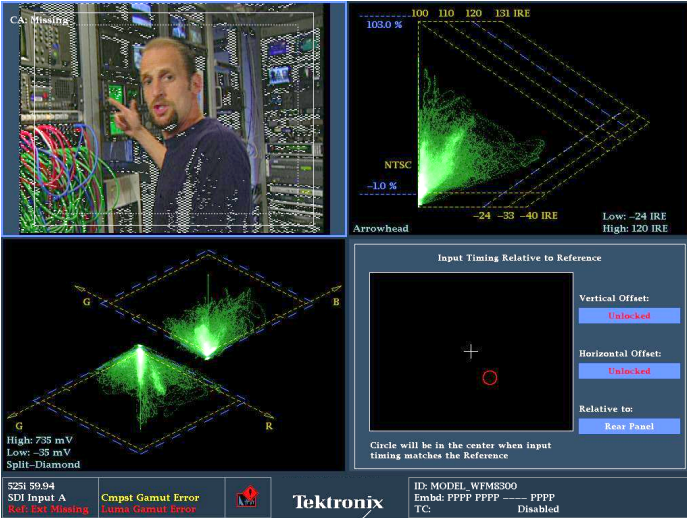
The Simultaneous Input Monitoring (SIM) capability of the WFM8300 takes multiformat monitoring to a new level. This capability helps operational

staff quickly determine if a video quality problem existed in the input signal or arose in their facility. It enables engineering staffs to quickly detect, diagnose, and resolve technical problems introduced in a piece of video equipment by comparing the input and output signals at each point in the chain. This feature is also especially helpful when checking for transparency during format conversion.

FlexVu™ enables flexible and intuitive configuration of displays from two monitored inputs. User can display simultaneous fault detection, status reporting, alarm generation, and error logging. SIM is ideal for transmission monitoring of simultaneous HD and SD programs. It is also ideal for monitoring stereoscopic 3D content in production and post production applications by simultaneously monitoring the left eye signal and the right eye signal.

The patented Tektronix Timing display can be used for each source to time each input relative to the reference or measure the timing between each input.

Audio and video signals can be displayed independently for each input.



See and Solve™ displays detect and address problems quickly and efficiently

See and Solve™ with Tektronix Displays

Tektronix See and Solve™ displays simplify video monitoring tasks such as calibration, error detection, and content correction allowing users to detect errors at a glance and troubleshoot them efficiently.

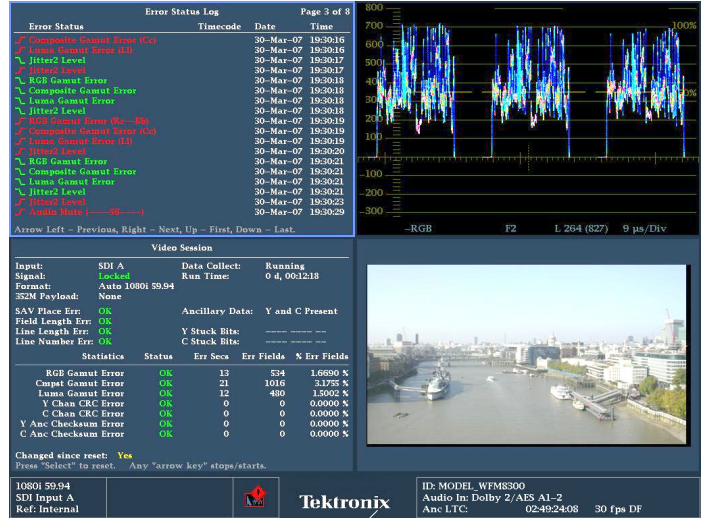
Specialized session and status displays provide summarized yet comprehensive reports of conditions and measurements of content parameters.

The Black and Frozen frame detection can be used to alert the operator to a problem in the transmission chain. These and other errors can automatically be logged in the Error Log and provided as a report.

The powerful Error Log is configurable and provides detailed reports for up to 10,000 events that can be downloaded using a web browser. Alarms can also activate ground closures and SNMP traps simplifying centralized monitoring of multiple programs.

The FlexVu™ four-tile display provides maximum flexibility to increase your productivity. Unlike instruments with predetermined view combinations or limited choices, FlexVu™ lets you create a multiview display tailored to your specific needs and work practices. Each tile can be configured to enable easy signal analysis such as multiple alarm and status screens, different Safe Area Graticules and cursors on each tile, and more.

Tektronix displays offer the sharpest CRT-like trace quality for clear waveform and vector monitoring without pixelation distortions. The familiar video waveform display can show SD/HD/3G-SDI signals in RGB, YPbPr, YRGB, or composite formats. Signal components can be displayed in either parade or overlay mode. For composite analog video, NTSC and PAL signals can be displayed with luma, chroma, and luma+chroma filtering. The vector display offers user-selectable graticules, color targets (75% or 100%), and color axis.



FlexVu – The display that adapts to your work practices

The Tektronix-patented Diamond, Split Diamond, and Arrowhead gamut displays simplify the process of verifying gamut compliance.

The Diamond and Split Diamond displays help easily identify and correct RGB gamut errors in digital video signals. The Arrowhead display saves time in verifying composite gamut compliance for digital video signals.

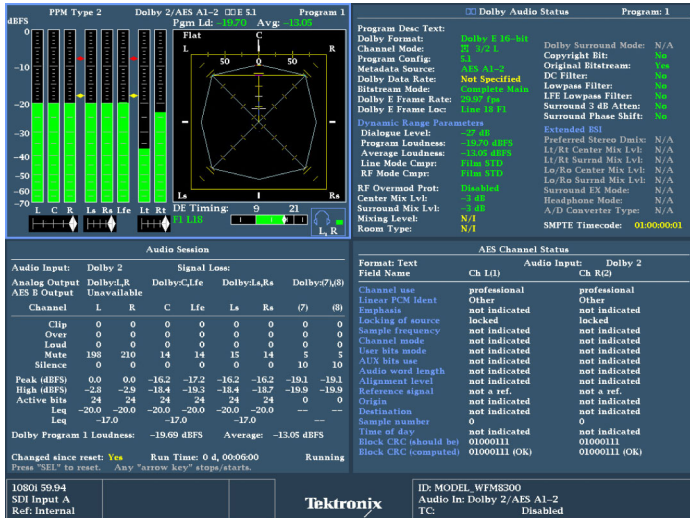
User-selectable gamut thresholds let you tailor these displays and the associated gamut alarms to your particular compliance standards.

You can also select bright-up conditions to see the location of gamut errors on the picture display.

The WFM8300 and WFM8200 also feature new optional advanced color gamut monitoring capabilities including the Tektronix-patented Luma Qualified Vector (LQV™) display and Spearhead display which, when used in conjunction with Tektronix proprietary Diamond and Split Diamond gamut displays, provide the most comprehensive color gamut monitoring tools available for precise color gamut adjustments (Option PROD).

The picture display can simultaneously detect and decode CEA708/608 Closed Caption. Teletext subtitle pages can also be decoded in either 625 formats or using OP47 Ancillary data. Flexible Safe Area Graticules allow for quick placement of graphics, titles, or logos. Using FlexVu™, users can see two or more pictures with different graticules.

The CaptureVu® feature on the WFM8300 and WFM8200 allows users to capture, store, and download the data of a video frame to recreate displays and compare the live signal to captured data for easy troubleshooting of intermittent errors or for analyzing fault conditions at remote sites.



Surround Sound, Dolby Metadata, Audio Session, and Channel Status

Complete Monitoring Tool Set for Optimum Sound Quality

The WFM8300 and WFM8200 provide high-quality digital filtering and oversampling to insure precise, reliable, and repeatable audio measurements. For easy monitoring, the WFM audio options provide format auto-detection and flexible mapping of audio inputs to analog or digital audio outputs for connection to external devices.

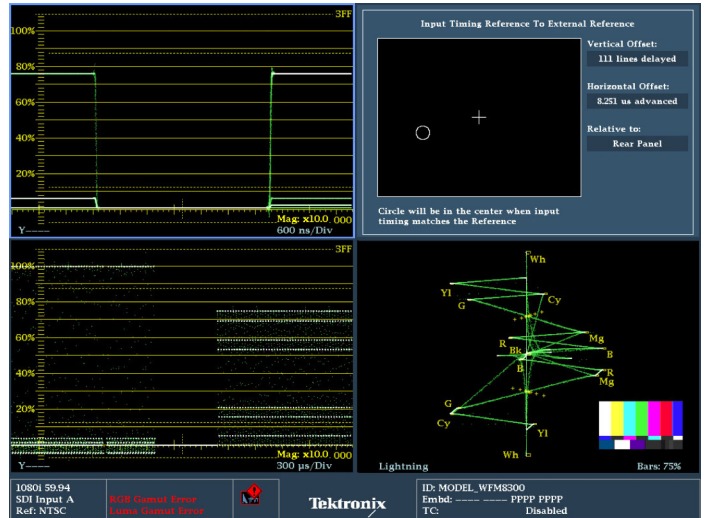
The Surround Sound*1 display, the most comprehensive waveform monitor audio analyzer available, provides intuitive graphical representation of channel interaction in a system. The Bars display provides indicators for faults, audio levels, and Dolby format information. The flexible Lissajous display allows the selection of any two audio channels.

Specialized audio displays provide deeper inspection of the signal. The audio session displays summarize levels, faults, and number of active bits for each channel. The user can select from three loudness filters; Flat, A-weighted, and RLB-weighted (BS.1770). These instruments also feature Audio Control Packet Data and Channel Status displays.

The Dolby Status display (in Option DPE) gives an in-depth view of integrated or VANC metadata and Dolby E Guard Band timing and synchronization.

User-configurable thresholds for the Dolby E Guard Band timing measurement (in Option DPE) are available as well as Dolby E Guard Band timing and trigger alarms based on their specific guard band parameters.

*1 Audio Surround Sound Display licensed from Radio Technische Werksütten GmbH and Co. KG (RTW).



Timing and Lightning displays simplify timing tasks

Facility Timing Made Easy

Audio/Video synchronization is an important challenge in the processing of video materials. The WFM8300 displays the A/V delay on a graphical bar indicator. The measurement readout gives facility engineers the necessary tools to ensure system integrity and facilitate A/V delay compliance. This feature provides out-of-service measurement of A/V delay for analog or digital audio and video formats. A TG700 is required to generate the SDI signal which contains the audio and video sequence that can be distributed through the system and measured by the WFM8300.

The Tektronix-patented Timing display makes facility timing easy through a simple graphical representation which shows the relative timing of the input signal and the reference signal (or a saved offset reference) on an X-Y axis. The Lightning display shows luma and chroma amplitudes and helps users verify component timing using a color bar header signal. The Tektronix-patented Bowtie display (standard on both the WFM8300 and WFM8200) complements the timing measurement capability of the Lightning display. Using a special Bowtie test signal in component format, this display helps make precise and accurate measurements of interchannel amplitude and timing. The SCH Phase display helps quickly verify this critical timing parameter of composite analog video signals.

Characteristics

Composite Video Interface (Option CPS)

Formats Supported – NTSC, NTSC no setup, PAL.

Inputs – Two, only one active at a time.

Input Type – Passive loopthrough BNC, 75 Ω compensated.

Input Dynamic Range – ± 6 dB (typical).

Maximum Operating Amplitude – -1.8 V to $+2.2$ V, DC + peak AC (typical).

Absolute Maximum Input Voltage – -6.0 V to $+6.0$ V, DC + peak AC.

DC Input Impedance – 20 k Ω , nominal.

Return Loss –

>40 dB to 6 MHz, power on (typical).

>40 dB to 10 MHz (typical).

>46 dB to 6 MHz (typical).

35 dB, power off (standard amplitude video).

Crosstalk between Channels – >60 dB to 6 MHz (typical).

Loopthrough Isolation – >70 dB to 6 MHz (typical).

DC Offset with Restore Off – <20 mV (typical).

DC Restore: 50 Hz and 60 Hz.

Attenuation: Fast mode >95% attenuation, Slow mode <10% attenuation, <10% peaking.

Slow Mode: Typical peaking 8% at 50 Hz and 60 Hz.

Lock Range: ± 50 ppm remains locked.

External Reference

Input Type – Passive loopthrough BNC, 75 Ω compensated.

DC Input Impedance – 15 k Ω , typical.

Return Loss – >40 dB to 6 MHz, >35 dB to 30 MHz (typical).

User Interface

1024 (H) \times 768 (V) pixels LCD.

Serial Digital Waveform Vertical Characteristics

Vertical Measurement Accuracy – At 1X, $\pm 0.5\%$; at 5X, $\pm 0.2\%$ of 700 mV full-scale mode.

Gain – X1, X2, X5, and X10.

Frequency Response

HD –

Luminance Channel (Y): 50 kHz to 30 MHz $\pm 0.5\%$.

Chrominance Channels (Pb, Pr): 50 kHz to 15 MHz $\pm 0.5\%$.

SD –

Luminance Channel (Y): 50 kHz to 5.75 MHz $\pm 0.5\%$.

Chrominance Channels: 50 kHz to 2.75 MHz $\pm 0.5\%$.

Analog Composite Waveform Vertical Characteristics (Option CPS)

Vertical Measurement Accuracy – $\pm 1\%$ all gain settings.

Gain – X1, X2, X5, and X10.

Frequency Response – Flat to 5.75 MHz, $\pm 1\%$.

Waveform Horizontal Sweep Characteristics

Sweep Timing Accuracy – $\pm 0.5\%$, all rates, fully digital system.

Sweep Linearity – 0.2% of time displayed on screen, fully digital system.

Vector Characteristics

Vector Amplitude Accuracy – $\pm 2\%$.

Vector Phase Accuracy – $\pm 2^\circ$.

Audio Characteristics (Optional Capability)

Level Meter Resolution – 0.056 dB steps at 30 dB scale, from full scale to -20 dBFS.

User-selectable Scales –

Analog: dBu, Din, Nordic, VU, IEEE PPM, BBC Scale, and user definable.

Digital: dBFS, Din, Nordic, VU, IEEE PPM, BBC Scale, and user definable.

Meter Ballistics – Selectable from true peak, PPM type 1, PPM Type 2, and Extended VU.

Defined/Programmable Level Detection – Mute, clip, user-programmable silence, over.

Digital Audio (Option DPE and AD)

Inputs – Two sets with 8 channels each, 32-192 kHz, 24 bit. Meets requirements of AES 3-ID and SMPTE 276M-1995.

Input Characteristics – BNC, 75 Ω terminated, unbalanced, 0.2 V_{p-p} to 2 V_{p-p} .

Input Return Loss – >25 dB relative to 75 Ω from 0.1 to 6 MHz (typical).

Outputs – Up to 8 channels, AES 3-ID output, 48 kHz 20 bit for SD embedded, 48 kHz 24 bit for HD embedded, 48 kHz 24 bit for analog to AES. For AES to AES loopthrough, output format equals input format. Meets requirements of SMPTE 276M-1995 (AES 3-ID). For decoded Dolby Digital, output is 24 bits at a rate of 32, 44.1, or 48 kHz for any one decoded pair. For decoded Dolby E, the output is 24 bits at 48 kHz or 47.952 kHz for up to four pairs.

Output Characteristics – BNC, 75 Ω terminated, unbalanced, 0.9 V_{p-p} to 1.1 V_{p-p} into 75 Ω .

Output Return Loss – >25 dB relative to 75 Ω from 0.1 to 6 MHz (typical).

Output Jitter – 3.5 ns, peak, typical, with 700 Hz high-pass filter per AES specification (typical).

Level Meter Accuracy over Frequency – $+0.1$ dB from 20 Hz to 20 kHz, 0 to -40 dBFS, sine wave, Peak Ballistic mode (except for within 5 Hz of some submultiples of the sampling frequency).

Analog Audio (Option DPE and AD)

Analog Inputs – Two sets of 6 channels each.

Analog Input Characteristics – Balanced, unterminated through the rear-panel connector.

Crosstalk – <90 dB.

Input Impedance – 24 k, typical.

Analog Outputs – 8 channels.

Analog Output Characteristics – Balanced: unterminated through the rear-panel connector.

Maximum Output Level – Balanced: +24 dBu ±0.5 dB.

Digital Input to Analog Output Gain Accuracy over Frequency – ±0.5 dB, 20 Hz to 20 kHz, –40 dBFS, 20 or 24 bit inputs.

Analog Input to Analog Output Gain Accuracy over Frequency – +0.8 dB, 20 Hz to 20 kHz, 24 dBu to –16 dBu.

Output Impedance – 50 Ω nominal.

Physical Characteristics

Dimension	mm	in.
Height	133	5 1/4
Width	213	8 3/8
Depth	464	18 1/4
Weight	kg	lb.
Net	3.9	8.5

Power 100 to 240 V AC; 50/60 Hz

Capabilities by Model

Capability	WFM8300	WFM8200
Video Formats and Inputs		
HD-SDI / Dual Link / SD-SDI	Standard	Standard
3G-SDI (Level A and Level B)	Option 3G	Option 3G
Composite PAL/NTSC	Option CPS	Option CPS
Audio Formats and Inputs		
Embedded and AES Digital Audio	Option AD or DPE	Option AD or DPE
Analog Audio	Option AD or DPE	Option AD or DPE
Dolby E / Dolby Digital Plus / Dolby Digital	Option DPE	Option DPE
Physical Layer Measurement		
Jitter Measurements	Option PHY	Option EYE
Eye Pattern Display	Option PHY	Option EYE
Eye Pattern Auto Measurements	Option PHY	
Pathological Signal Generation	Option PHY	
Other Advanced Capabilities		
Advanced Color Gamut (Spearhead/LQV)	Option PROD	Option PROD
Simultaneous Input Monitoring (SIM)	Standard	
ANC Data Inspector	Standard	
Digital Data Analysis	Standard	
Out-of-Service AV Delay Measurement	Standard	

Ordering Information

Product Nomenclature and Descriptions

Model	Option	Description
WFM8300		Advanced 3G/HD/SD Waveform Monitor, 2 SDI inputs (3G-SDI, HD-SDI, and SD-SDI support on the same inputs – auto detect) Base unit includes HD-SDI, SD-SDI, Dual Link signal formats, Simultaneous Input Monitoring for HD and SD formats (SIM), advanced data analysis, and audio/video delay measurement (requires an audio option) Option 3G required for 3G-SDI support
	3G	Add support for 3G-SDI signal formats
	CPS	Add support for composite analog video monitoring; 2 composite analog inputs; passive loopthrough
	AD	Add analog audio monitoring (2 sets of 6-channel analog audio inputs and 8-channel analog audio outputs) plus 16 channels embedded or AES/EBU digital audio support (8 channels at a time)
	DPE	Add Option AD capabilities (analog and digital audio – embedded or external AES) plus support for decoding and monitoring Dolby E, Dolby D, and Dolby Digital Plus
	PHY	Physical Layer Measurement Package (includes 3G-SDI, HD-SDI, and SD-SDI eye pattern and jitter waveform displays; automated measurements of eye pattern parameters, jitter, and cable parameters; color bar and pathological signal generation) Option 3G required for 3G-SDI support
	PROD	Advanced Gamut Monitoring Package (Spearhead Gamut display and Luma Qualified Vector display)
	62	Analog Audio Breakout Cable, 6 feet, male 62-pin connectors to 8 XLR male output connectors and 12 XLR female input connectors
	NRC	No portable or rack cabinet
WFM8200		3G/HD/SD Waveform Monitor, 2 SDI inputs (3G-SDI, HD-SDI, and SD-SDI support on the same inputs – auto detect) Base unit includes HD-SDI, SD-SDI, and Dual Link signal formats support Option 3G required for 3G-SDI support
	3G	Add support for 3G-SDI signal formats
	CPS	Add support for composite analog video monitoring; 2 composite analog inputs; passive loopthrough
	AD	Add analog audio monitoring (2 sets of 6-channel analog audio inputs and 8-channel analog audio outputs) plus 16 channels embedded or AES/EBU digital audio support (8 channels at a time)
	DPE	Add Option AD capabilities (analog and digital audio – embedded or external AES) plus support for decoding and monitoring Dolby E, Dolby D, and Dolby Digital Plus
	EYE	Eye pattern display and Jitter Measurement Package (includes 3G-SDI, HD-SDI, and SD-SDI eye pattern display; automated measurements of jitter and cable parameters) Option 3G required for 3G-SDI support
	PROD	Advanced Gamut Monitoring Package (Spearhead Gamut display and Luma Qualified Vector display)
	62	Analog Audio Breakout Cable, 6 feet, male 62-pin connectors to 8 XLR male output connectors and 12 XLR female input connectors
	NRC	No portable or rack cabinet

Post Sale Upgrade Options

Model	Option	Description
WFM830UP		Post sale upgrade for WFM8300 Advanced 3G-SDI / Dual Link / HD-SDI / SD-SDI Waveform Monitor Option 3G required to be installed in the WFM8300 for 3G-SDI support
	3G	Add support for 3G-SDI signal formats (software option key)
	CPS	Add support for composite analog video monitoring; 2 composite analog inputs; passive loopthrough
	AD	Add analog audio monitoring (2 sets of 6-channel analog audio inputs and 8-channel analog audio outputs) plus 16 channels embedded or AES/EBU digital audio support (8 channels at a time)
	DPE	Add Option AD capabilities (analog and digital audio – embedded or external AES) plus support for decoding and monitoring Dolby E, Dolby D, and Dolby Digital Plus
	PHY	Add Physical Layer Measurement Package (includes 3G-SDI, HD-SDI, and SD-SDI eye pattern and jitter waveform displays; automated measurements of eye pattern parameters, jitter, and cable parameters; color bar and pathological signal generation) Option 3G required to be installed in the WFM8300 for 3G-SDI support
	PROD	Add Advanced Gamut Monitoring Package (Spearhead Gamut display and Luma Qualified Vector display)
WFM820UP		Post sale upgrade for WFM8200 3G-SDI / Dual Link / HD-SDI / SD-SDI Waveform Monitor Option 3G required to be installed in the WFM8200 for 3G-SDI support
	3G	Add support for 3G-SDI signal formats (software option key)
	CPS	Add support for composite analog video monitoring; 2 composite analog inputs; passive loopthrough
	AD	Add analog audio monitoring (2 sets of 6-channel analog audio inputs and 8-channel analog audio outputs) plus 16 channels embedded or AES/EBU digital audio support (8 channels at a time)
	DPE	Add Option AD capabilities (analog and digital audio – embedded or external AES) plus support for decoding and monitoring Dolby E, Dolby D, and Dolby Digital Plus
	EYE	Add eye pattern display and Jitter Measurement Package (includes 3G-SDI, HD-SDI, and SD-SDI eye pattern display; automated measurements of jitter and cable parameters) Option 3G required to be installed in the WFM8200 for 3G-SDI support
	PROD	Add Advanced Gamut Monitoring Package (Spearhead Gamut display and Luma Qualified Vector display)

Video Input and External Reference Formats Supported

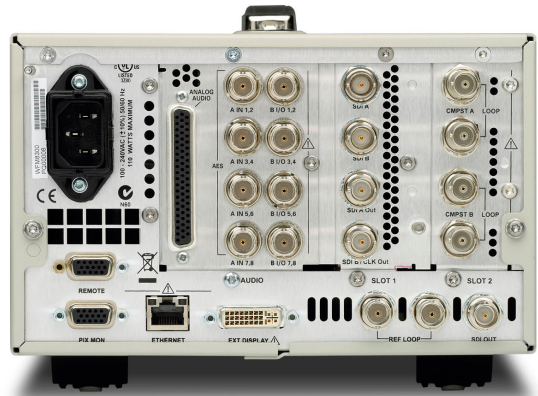
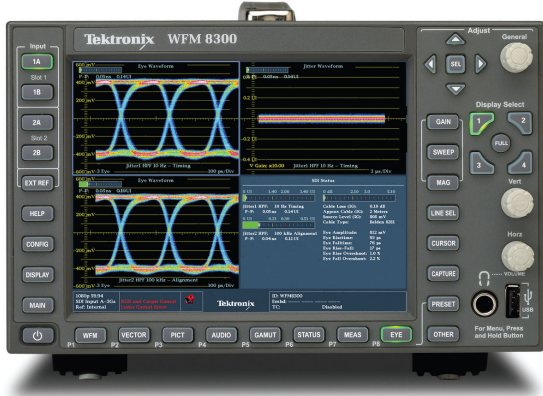
Automatic Detection of a Wide Range of Signal Formats

The WFM8300 and WFM8200 waveform monitors accept a wide variety of input signal formats and external references. The monitor will automatically detect the signal format and establish the appropriate settings for the various displays.

Setting	Opt. CPS	STD SD	STD HD	External Reference Inputs													
				Bi-level Sync		Tri-level 720p			Tri-level 1080p		Tri-level 1080i			1080 SF			
				NTSC	PAL	50 Hz	59.94 Hz	60 Hz	23.98 Hz	24 Hz	50 Hz	59.94 Hz	60 Hz	23.98 Hz	24 Hz		
NTSC 59.94 Hz	X			X													
PAL 50 Hz	X				X												
BT601 483i, 59.94 Hz (525)		X		X			X					X					
BT601 576i, 50 Hz (625)		X			X	X					X						
296M 720p, 23.98 Hz			X	X			X		X			X			X		
296M 720p, 24 Hz			X					X		X			X				X
296M 720p, 25 Hz			X		X	X					X						
296M 720p, 29.97 Hz			X	X			X					X					
296M 720p, 30 Hz			X					X					X				
296M 720p, 50.00 Hz			X		X	X						X					
296M 720p, 59.94 Hz			X	X			X					X			X		
296M 720p, 60.00 Hz			X					X		X				X			X
240M 1035i, 59.94 Hz			X	X			X					X					
240M 1035i, 60 Hz			X					X		X			X				X

Data Sheet

Setting	Opt. CPS	STD SD	STD HD	External Reference Inputs											
				Bi-level Sync		Tri-level 720p			Tri-level 1080p		Tri-level 1080i			1080 SF	
				NTSC	PAL	50 Hz	59.94 Hz	60 Hz	23.98 Hz	24 Hz	50 Hz	59.94 Hz	60 Hz	23.98 Hz	24 Hz
274M 1080i, 50 Hz			X		X	X					X				
274M 1080i, 59.94 Hz			X	X			X					X			
274M 1080i, 60 Hz			X					X		X			X		X
274M 1080p, 23.98 Hz			X	X			X		X			X		X	
274M 1080p, 24 Hz			X					X		X			X		X
274M 1080p, 25 Hz			X		X	X					X				
274M 1080p, 29.9 Hz			X	X			X					X			
274M 1080p, 30 Hz			X					X					X		
274M 1080sf, 23.9 Hz			X	X			X		X			X		X	
274M 1080sf, 24 Hz			X					X		X			X		X
274M 1080sf, 25 Hz			X		X	X					X				
274M 1080sf, 29.9 Hz			X	X			X					X			
274M 1080sf, 30 Hz			X					X					X		



Supported Dual Link Formats

Format	Sample Structure	Frame/Field Rates
Dual Link		
1920 × 1080	4:2:2 YCbCr 10 bit	60, 60/1.001, and 50 progressive
	4:4:4 RGB	30, 30/1.001, 25, 24 and 24/1.001 progressive, PsF 60, 60/1.001, and 50 fields interlaced
	4:4:4:4 RGB +A 10 bit	
	4:4:4 RGB 12 bit	
	4:4:4 YCbCr 10 bit	
	4:4:4:4 YCbCr +A 10 bit	
	4:4:4 YCbCr 12 bit	
2048 × 1080	4:2:2 YCbCr 12 bit	30, 30/1.001, 25, 24, and 24/1.001 progressive, PsF
	4:2:2:4 YCbCr +A 12 bit	
	4:4:4 RGB	
	4:4:4:4 RGB +A 10 bit	
	4:4:4 RGB 12 bit	
	4:4:4 YCbCr 10 bit	
	4:4:4 YCbCr +A 10 bit	
4:4:4 YCbCr 12 bit		
1920 × 1080	4:2:2 YCbCr 12 bit	30, 30/1.001, 25, 24, and 24/1.001 progressive, PsF
	4:2:2:4 YCbCr +A 12 bit	
	4:4:4 XYZ 12 bit	
	4:4:4 RGB 12 bit	

3G-SDI Formats

Single Link		
1920 × 1080	4:2:2 YCbCr 10 bit Level A and Level B	50, 59.94, 60 progressive

Optional Accessories

Accessory	Description
WFM7F02	Portable cabinet includes handle, feet, tilt bail, and front-panel cover
WFM7F05 (Option ON or NN)	Dual Rack Cabinet
	Service manual for the WFM8000 Series

Service Offerings

Service	Description
WFM8300, WFM8200	
Opt. CA1	Provides single calibration event or coverage for the designated calibration interval whichever comes first
Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
Opt. D1	Calibration Data Report
Opt. D3	Calibration Data Report 3 Years (with Opt. C3)
Opt. D5	Calibration Data Report 5 Years (with Opt. C5)
Opt. G3	Complete Care 3 Years (includes loaner, scheduled calibration and more)
Opt. G5	Complete Care 5 Years (includes loaner, scheduled calibration and more)
Opt. R3	Repair Service 3 Years (including warranty)
Opt. R5	Repair Service 5Years (including warranty)
Opt. R5DW	Repair Service Coverage 5 Years (includes product warranty period). 5-year period starts at time of customer instrument purchase. This option is available if the instrument is within product warranty. It is not available once instrument exits warranty period
Opt. R3DW	Repair Service Coverage 3 Years (includes product warranty period). 3-year period starts at time of customer instrument purchase. This option is available if the instrument is within product warranty. It is not available once instrument exits warranty period
Opt. R2PW	Repair Service Coverage 2 Years Post Warranty. This option is available if the 2-year time period does not extend beyond Long Term Product Support
Opt. R1PW	Repair Service Coverage 1 Year Post Warranty. This option is available if the 1-year time period does not extend beyond Long Term Product Support



Product(s) are manufactured in ISO registered facilities.

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Updated 25 May 2010

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28 Sep 2010

2PW-24416-3

