Tektronix®

WFM5200 Series Waveform Monitors
WVR5200 Series Waveform Rasterizers

Release Notes

This document supports software Version 2.9.x.

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Release notes

This document describes the key features and known limitations for the following products with software Version 2.9.x. Some of these notes apply only to instruments with specific options installed. A list of available instrument options is available at www.tek.com and in the product User Manual, which is available for download at www.tek.com/downloads.

- WFM5250 SDI/HDMI Waveform Monitor

- WVR5250 SDI/HDMI Waveform Rasterizer

- WFM5200 Waveform Monitor

- WVR5200 Waveform Rasterizer

New key features and benefits

Firmware Version 2.9.x introduces a new HDR (High Dynamic Range) tool set for assisting camera operators and editors to adjust their content to the correct levels. The new HDR features and functions are described on the following pages.

NOTE. Option PROD is required to access HDR features.

Waveform display   **Dynamic Range setting.**   The pop-up menu for the Waveform display now
contains a selection for setting the Dynamic Range as shown below (Option
PROD required).

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*NOTE. When HDR, HDR Full, SDR Narrow, or SDR Full is selected, you can use
the Left / Right arrow keys to toggle the vertical scale of the graticule between
NITS, STOPS, REFLECTANCE, CODE VALUE, and PERCENT. The selected
scale is shown at the bottom of the display. (See Figure 3.)*
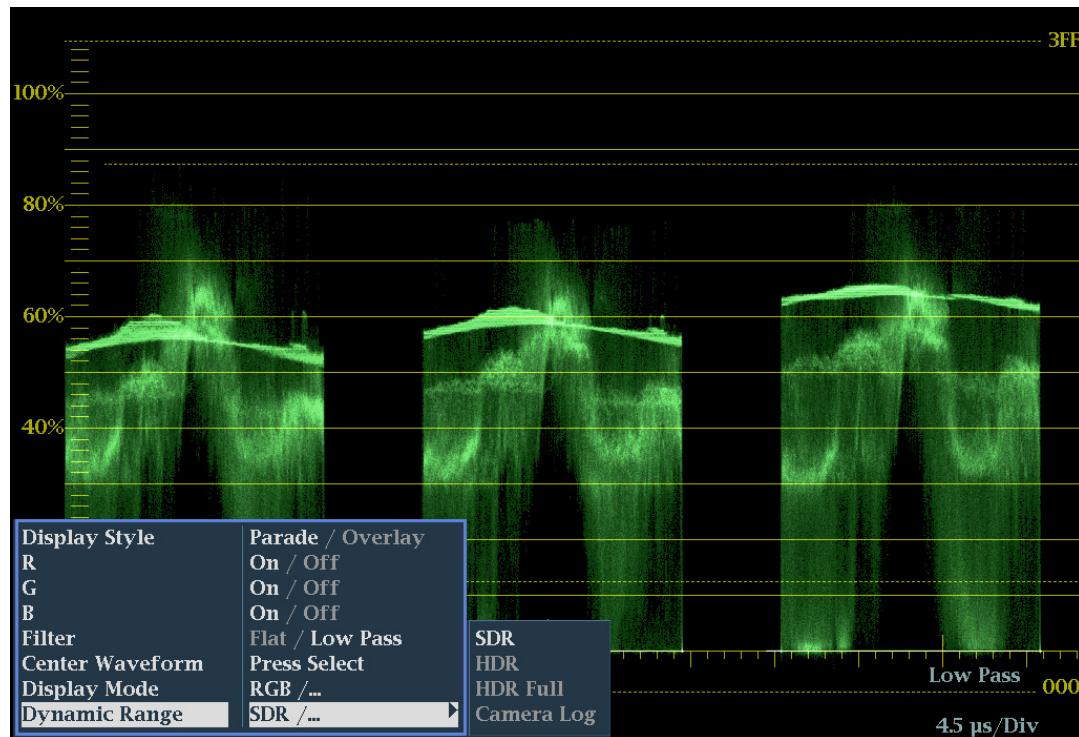
Figure 1: Waveform display pop-up menu showing the Dynamic Range selection

The following settings are available:

- **SDR (Standard Dynamic Range)**. Use this setting for conventional SD, HD and 3G signals using ITU-R BT.709/2020 with OETF (Optical to Electrical Transfer Function) gamma of 0.45 and with a display gamma EOTF (Electrical to Optical Transfer Function) of 2.4 as defined in ITU-R BT.1886.

  When SDR is selected as the dynamic range, the CONFIG > Graticules and Readouts menu contains the following graticule settings:

  - **STD**. The Standard graticule is available in either millivolts (Normal) or Percent and can be configured within CONFIG > Graticules and Readouts > SDI Waveform Graticules.

  - **NARROW**. The Narrow graticule uses a Nits graticule scale and code values, which is the traditional signal representation. This setting provides a signal representation using a code value of 64 decimal (10-bit) equal to 0 mV or 0%, and a code value of 940 decimal (10-bit) equal to 700 mV or 100%.

  - **FULL**. The Full graticule uses a NITs graticule scale and code values that provides signal representation with a code value of 4d decimal (10-bit) equal to 0%, and a code value of 1019 decimal (10-bit) equal to 100%.

  NOTE. In SDI signals, the code words 0-3d and 1020-1023 are excluded and clipped from a file that uses 0-1023 as the full range as defined in ITU-R BT.2100.

- **HDR (High Dynamic Range)**. Use this setting to change the graticule scale of one of the selected curves. When HDR is selected as the dynamic range, the CONFIG > Graticules and Readouts menu contains the following graticule settings:

  - **HLG(1000)**. The Hybrid Log Gamma (HLG) graticule is configured for a maximum value of 1000 Nits as defined by standard ITU-R BT.2100-0.

  - **HLG(1200)**. The Hybrid Log Gamma graticule is defined in standard ARIB STD B-67 and was developed by the BBC and NHK.

  - **ST2084(1K)**. This graticule uses the ST 2084 curve with a maximum value of 1000 Nits using the narrow range.

  - **ST2084(2K)**. This graticule uses the ST 2084 curve with a maximum value of 2000 Nits using narrow range.

  - **ST2084(4K)**. This graticule uses the ST 2084 curve with a maximum value of 4000 Nits using narrow range.

- **ST2084(5K)**. This graticule uses the ST 2084 curve with a maximum value of 5000 Nits using narrow range.

- **ST2084(10K)**. This graticule uses the ST 2084 curve with a maximum value of 10000 Nits using narrow range. SMPTE standard ST 2084 defines High Dynamic Range Electro-Optical Transfer Function of Mastering Reference Displays also know as Perceptual Quantization (PQ).

NOTE. Narrow range is defined by ITU-R BT.2100 as signal representation with code value 64 decimal (10-bit) equal to 0 mV or 0%, and code value 940 decimal (10-bit) equal to 700 mV or 100%.

NOTE. HLG(1000), HLG(1200) and ST2084(10K) are the preferred configurations for HDR. ST2084(1K), ST2084(2K), ST2084(4K), and ST2084(5K) settings are intended for future use or legacy modes.

NOTE. For compatibility between HDR configurations, a reference point of 203 Nits is displayed in HLG1000 and ST2084(10K) modes.

■ **HDR Full (High Dynamic Range Full)**. Use this setting if you need the High Dynamic Full Range defined by ITU-R BT.2100, which provides signal representation with code value 4d decimal (10-bit) equal to 0%, and code value 1019 decimal (10-bit) equal to 100%.

NOTE. In SDI signals, the code words 0-3d and 1020-1023 are excluded and clipped from a file that uses 0-1023 as the full range as defined in ITU-R BT.2100.

When HDR Full is selected as the dynamic range, the CONFIG > Graticules and Readouts menu contains the following graticule settings:

- **ST2084(1K) Full**. This graticule uses the ST 2084 curve with a maximum value of 1000 Nits using full range.

- **ST2084(10K) Full**. This graticule uses the ST 2084 curve with a maximum value of 10000 Nits using full range.

■ **Camera Log**. Use this setting to use a graticule with a curve based on the camera manufacturers specification. When Camera Log is selected as the dynamic range, the CONFIG > Graticules and Readouts menu contains the following graticule settings:

  ▬ **S Log**. This graticule uses the Sony S Log curve.

  ▬ **S Log2**. This graticule uses the Sony S Log2 curve.

  ▬ **S Log3**. This graticule uses the Sony S Log3 curve.

  ▬ **C Log**. This graticule uses the Canon C Log curve.

  ▬ **Log C**. This graticule uses the ARRI Log C curve at (ISO) El 800.

  ▬ **BT.709**. This graticule uses the traditional ITU-R BT.709 representation.

HDR graticule selection. The CONFIG > Graticules and Readouts menu now contains a setting for selecting the HDR graticule to be used by the Waveform display: HLG(1000), HLG(1200), ST2084(1K), ST2084(2K), ST2084(5K), or ST2084(10K).
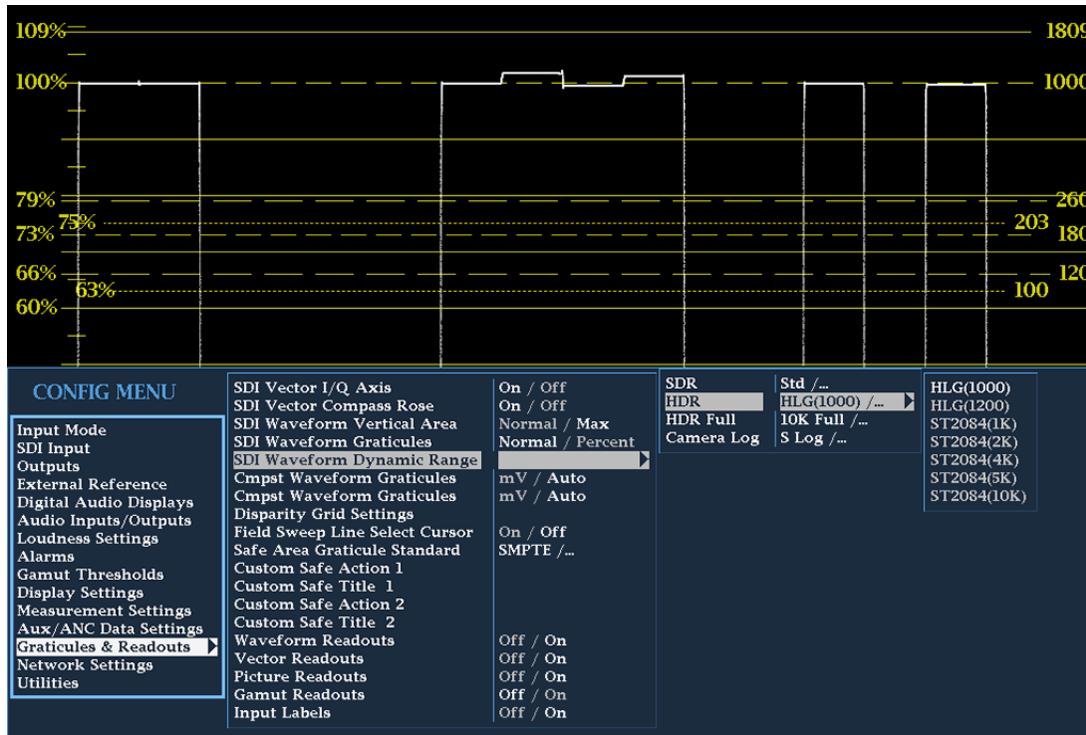
Figure 2: CONFIG menu showing the SDI HDR Waveform Graticule selection

HDR graticule vertical scale setting. When an HDR graticule is selected for the Waveform display, you can use the Left / Right arrow keys to toggle the vertical scale units between NITS, STOPS, or REFLECTANCE. Camera operators can use the graticule lines at 2%, 18% or 90% Reflectance to properly setup camera exposure with a camera test chart of 2% black, 18% gray and 90% white.
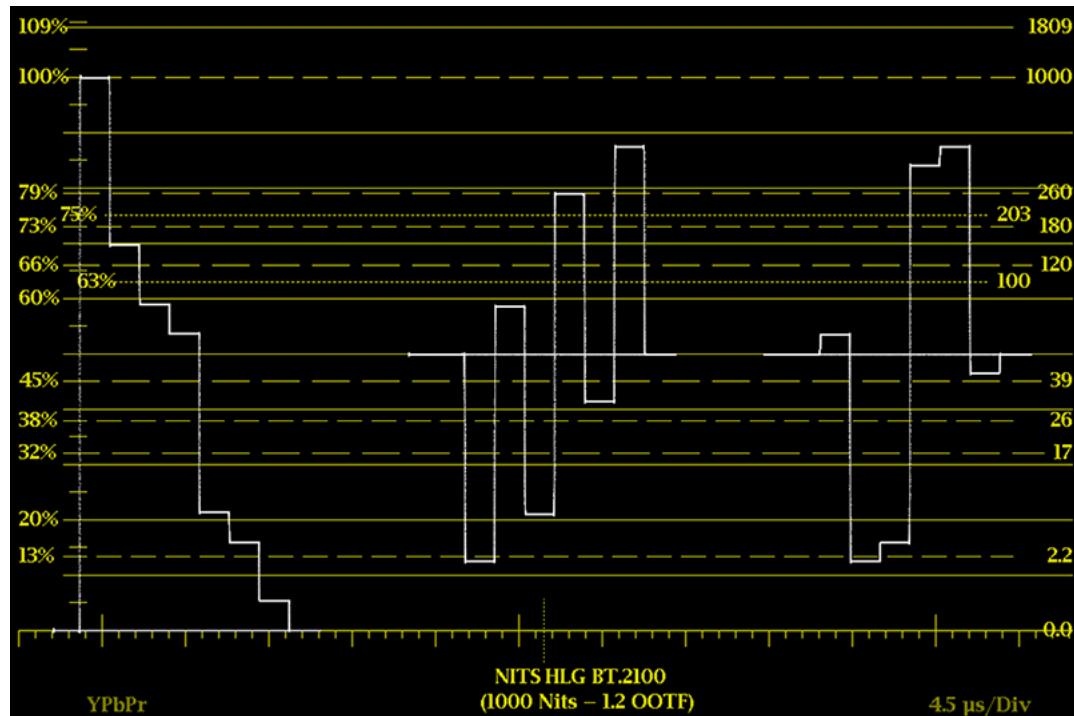
Figure 3: Waveform display showing the HDR graticule with NITS selected as the vertical scale

Gain adjustment. When the ST2084(1K) or ST2084(10K) HDR graticules are selected, a fixed zoom mode from 100 Nits to maximum scale is available by using the Up arrow key to enable Zoom Mode and the Down arrow key to disable Zoom Mode. When Zoom Mode is enabled, the Gain function and the Vertical Position controls are locked in a fixed configuration. When in HDR modes, Variable Gain will be enabled by default to facilitate the Zoom mode function.

Voltage cursors. When HDR or HDR Full mode is selected as the Dynamic Range setting, the mV voltage measurement cursors are replaced by a set of Nits measurement cursors.

Picture display brightup settings

The CONFIG > Display Settings > Picture Brightup on Luma/Specular Gamut Error menu has new selections for HDR monitoring:

- **Off**. For this setting, the highlight overlay is turned off in the picture display.

- **Luma**. For this setting, the highlight overlay is turned on for Luma values that exceed signal levels based on gamut thresholds for Luma settings.

- **HDR Specular On**. For this setting, the highlight overlay is turned on for selected HDR settings and produces HDR zebra highlights in the picture for large areas of the trace that exceed 100 nits. HDR zebra highlighting allows users to verify the location and the size of the specular highlights.

NOTE. The Specular Gamut Error selection is only displayed on the Picture Brightup menu when option PROD is installed.

- **HDR Specular Full On**. For this setting, the highlight overlay is turned on for HDR Full settings and produces HDR zebra highlights in the picture for large areas of the trace that exceeding 100 Nits.
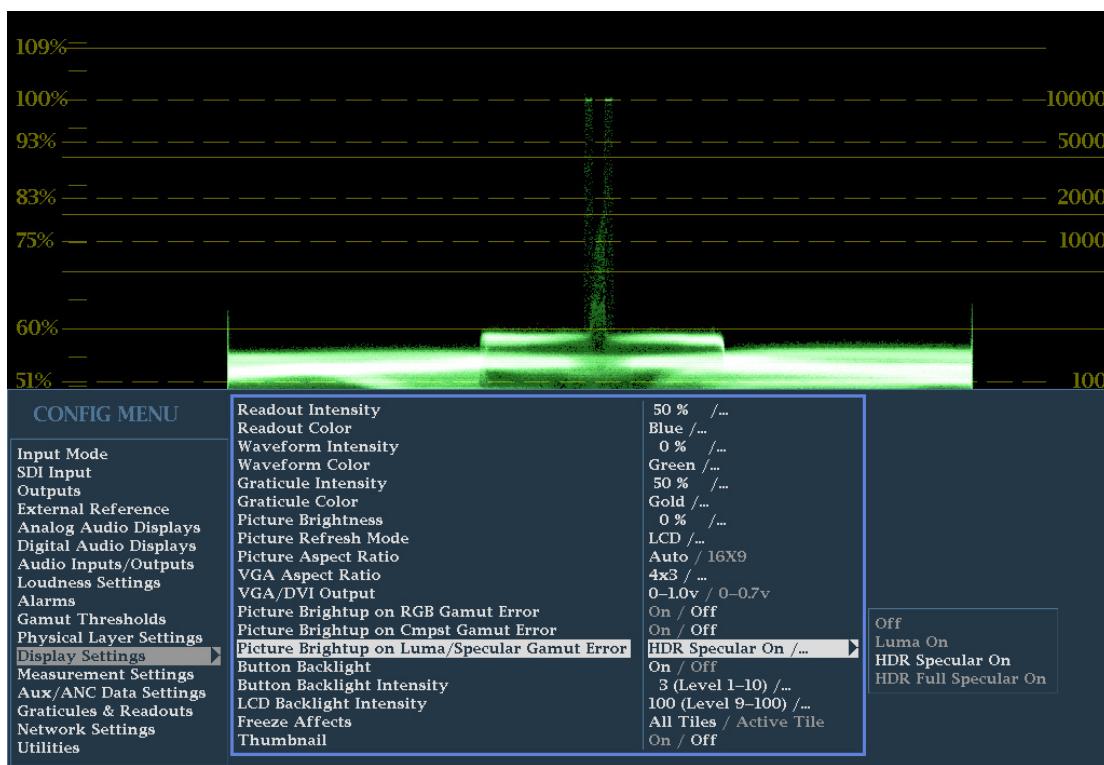
Figure 4: CONFIG menu showing the Picture Brightup on Luma/Specular Gamut Error selection

Typical HDR monitoring setup for ST2084(10K)

The following figure shows a typical HDR monitoring setup for ST2084(10K):

- Tile 1: Waveform display with HDR graticule.

- Tile 2: Waveform display with the HDR zoom mode enabled.

- Tile 3: Picture display with specular highlighting enabled.

- Tile 4: Video Session display.
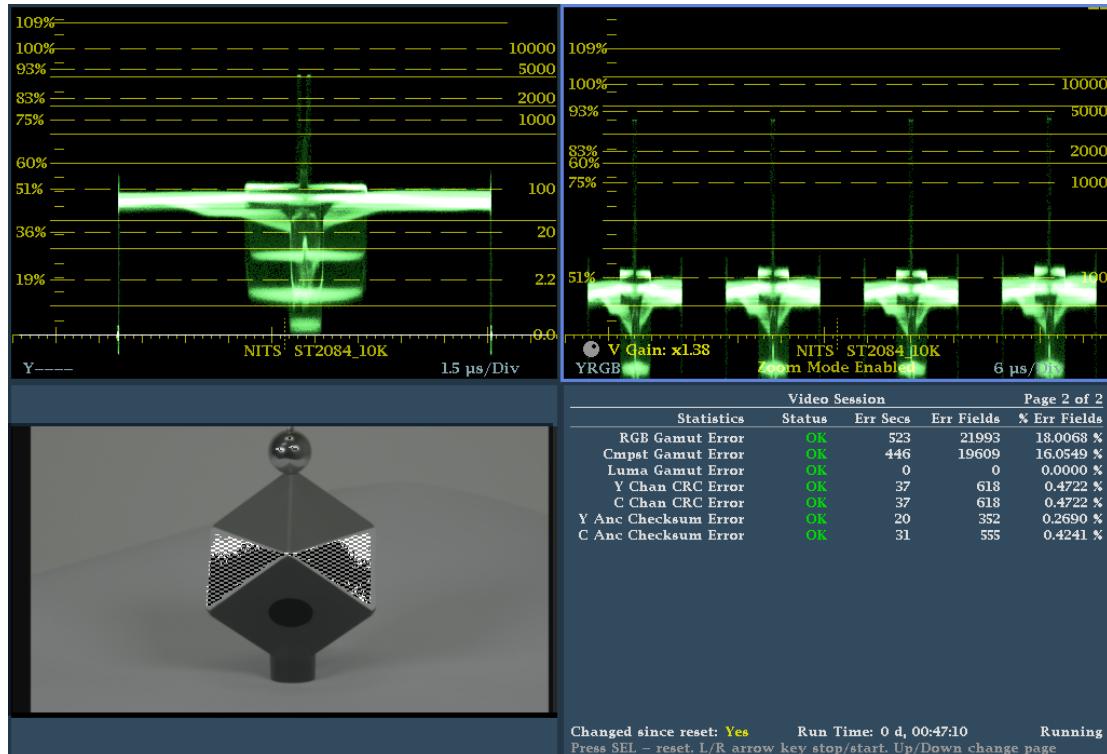
Figure 5: Typical HDR monitoring setup for ST2084(10K)

For more information visit: www.tek.com/waveform-monitor/wfm-wvr5000–series

General limitations

This release has the following general limitations for all instrument models, unless otherwise noted. Topics are listed in alphabetical order.

External reference

The waveform display may take up to 10 seconds to stabilize with external Tri-level sync.

Frozen frame detection (WFM5250 and WVR5250 models only)

Frozen Frames for HDMI 1080p 50/59.94 are calculated using odd lines on frame n and even lines on frame n+1.

HDMI format (WFM5250 and WVR5250 models only)

480i and 576i formats are not officially supported for HDMI inputs.

Incompatible operation

When applying 3 Gb/s signals to any instrument that does not support the signal formats, the unit indicates that the signal input is not standard. Applying unsupported video signals may result in a frozen PICT display.

Line select

Internal reference should be used with line select operation for 3G-SDI Level A signals.

Remote web user interface

When the external reference has Tri-level sync, the format readout from the remote web user interface may not be reliable.

SDI output (WFM5250 and WVR5250 models only)

SDI output in Pix monitor mode has no signal output when the input signal has a 480i/576i/480p/576p and 640 x 480 format through an HDMI input.

Sweep

The waveform style must be set to Overlay to get 2 line or 2 field sweep.

USB

- Always press the MAIN button and select USB Status to safely "Unmount" and remove the USB memory device from the USB port. You risk permanent loss of any files saved on the USB device if you do not use the "Unmount" feature.

- If there are more than 32 files saved in a Presets directory on the USB device, you can only view the first 32 files.

Waveform mode cursor for XYZ color space

The voltage cursors are given in millivolt scale, but the XYZ color space is referenced in hex scale. To see the values for 000 to FFF, change the graticule settings to max and percent.

Web browser

- The Web browser applet will not resize when running in some versions of the Netscape browser and in some non-Windows Operating Systems (for example, Solaris).

- We recommend using Java Runtime Engine (JRE) Version 1.6 or above.