Tektronix®

Comprehensive Production Tool Solution for 4K/UHD, WCG and HDR Content Creation

PRISM Datasheet

PRISM provides flexible options and field-installable upgrades to provide a monitoring solution that best fits each user application. With options supporting 4K video formats and a production tool set, PRISM becomes a comprehensive production tool solution for 4K, Wide Color Gamut (WCG) and High Dynamic Range (HDR) content creation. PRISM allows camera shading engineers / operators, who are shooting live sports broadcasting or episodic dramas, to quickly calibrate and balance multiple cameras with a variety of output signal characteristics. PRISM is the ideal HDR and WCG solution for camera acquisition in OB Vans and production studios.

Features and benefits

- A comprehensive production tool set supporting 4K / WCG / HDR content creation

- SDI / IP hybrid interface supporting up to 4K resolution, up to 2160p60 format support with 12G-SDI / Quad 3G-SDI interface, and up to 1080p60 format with SMPTE 2022-6/7 and ST2110-20

- Integrated 9-inch 1920×1080 display (MPI)

- Waveform conversion to light in camera stops relative to 18% mid-tones to provide a common, high dynamic range waveform over a wide range of HDR / SDR and camera log transfer functions

- HDR graticules (Nits, Stop, Reflectance %) in waveform display

- Integrated transfer function / color space converter available in the Waveform, Vector, Diamond, and Picture display, allowing users to use their familiar displays in ITU BT.709 for HDR / WCG content creation

- Flexible display configuration with Full / Quad / Vertical extended tile modes

- 12G-SDI physical layer measurements to check SDI signal quality and integrity

- All-in-one instrument using a 3RU half-rack platform (MPI) or a 1RU full-rack platform (MPX) that can be used for either portable or rack mount applications

Simplify camera shading/matching operation among cameras with different Optical to Electrical Transfer Functions (OETF)

One of the challenges in creating HDR content is the need to understand the new reference white/grey levels required for each transfer function used in HDR content acquisition, which requires the camera operator to adjust the cameras exposure accordingly for the specific OETF.

However, operators may need to use a variety different cameras and need to match the exposure of each or work on multiple projects with different transfer functions. Also, a project using different types of cameras may require operators to match exposures among cameras with different transfer functions. In either case, the operators have to pay special attention to the various reference levels for each camera OETF used in the project.

The Tektronix patented Stop Display application allows operators to adjust camera exposure in a consistent manner without worrying about the transfer function (OETF) of a camera. The Stop Display reverses the OETF to convert the video signal from the camera to linear scene light with internal integrated look up table, and then represents the light level as log2 (stops) waveform with over 16 stops of range in one display.

The vertical axis on the Stop Display is either "Stops" referring to scene light or "Nits" referring to display light. The reference levels in the graticule are consistent regardless of which transfer function is selected. The selection of scene reference or display reference is available in the application menu.
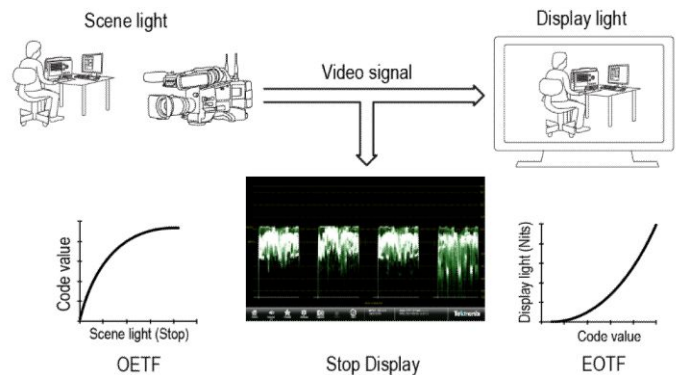

Provides consistent reference levels regardless of the transfer function being selected.

Benefits of using the Stop Display:

- The operator can adjust the camera exposure in a consistent manner regardless of camera's transfer function.

- The Stop Display makes balancing/matching cameras easier when using multiple cameras in a project. The operator can simply set the average exposure to the same relative light level by matching the traces on the stop scale while monitoring the full dynamic range of each camera's OETF.

- The logarithmic processing of the Stop Display means that when the camera's exposure is changed, the trace height (dynamic range) is not affected. Only a vertical shift is observed, which corresponds to the number of stops the camera's exposure is changed. This makes the camera balancing operation more predictable since the vertical trace shift amount is consistent regardless of the transfer function selected.

- The Stop Display increases the effective gain in dark regions of the image, allowing precise black balance without vertical magnification.

- For live field sports you can easily optimize camera gain/exposure by monitoring at any point in production chain. Simply set the ball field grass to 0-stop (18% gray) on the Stop Display regardless of shadows, cloudy or direct sunlight for all camera types, HDR or SDR signal formats.

- When on location shooting episodic dramas, scene and subject lighting is very important since it is typically done with multiple light sources. Cinematographer can use the Stop Waveform display as a "real-time multipoint relative reflectance light meter" to quickly create the scene or subject lighting that a director of photographer (DP) wants in familiar units of stops.

Reference object with specular highlight, 90% white, 18% gray, black, and light trap.
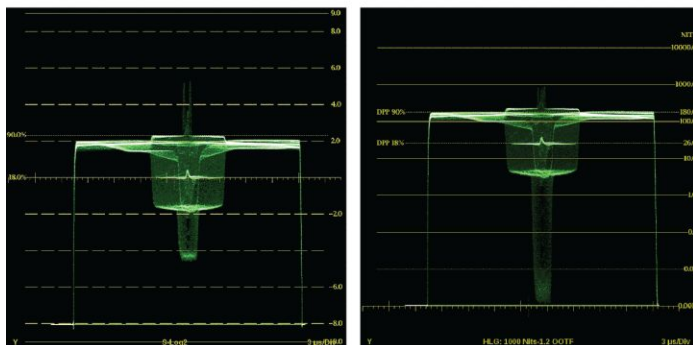
Slog2 OETF, Stop graticule.

ITU. BT2100 HLG Reference EOTF, Decade nits graticule.

Familiar operation in skin tone matching among signals with different color primaries

ITU-R BT.2020 color and many custom camera color primaries have a wider color coverage than the traditional ITU-R BT.709 color gamut. Because of differences in both color primaries and gamma, the trace presentation in a typical color difference vector display is different from the familiar BT.709 vector display, which forces the camera operators to interpret the colors differently depending on the color format used.

The integrated transfer function / color space converter converts a HDR / WCG signal to SDR / 709 gamut signal. This feature is available in the Waveform, Vector, Diamond, and Picture applications for camera operators to confidently monitor the color of the scene they are shooting and for colorists to use their familiar displays in ITU BT.709 to check mid tones in HDR / WCG content creation. It also ensures a consistent look between content in simultaneous SDR / HDR content creation.
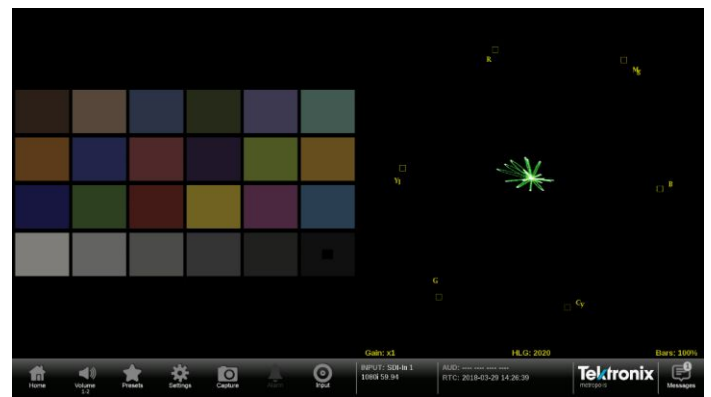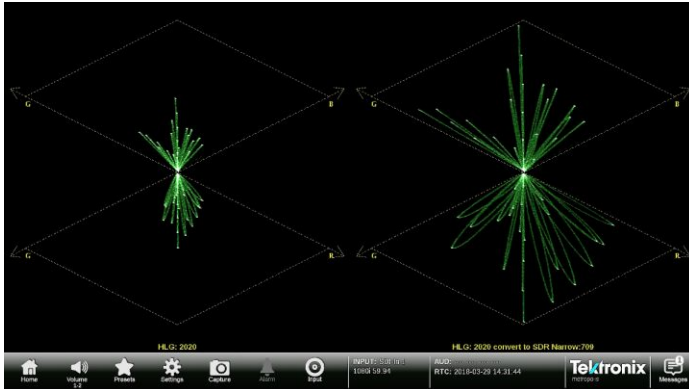

Macbeth chart in HLG / RP2020, Picture display and Vector display
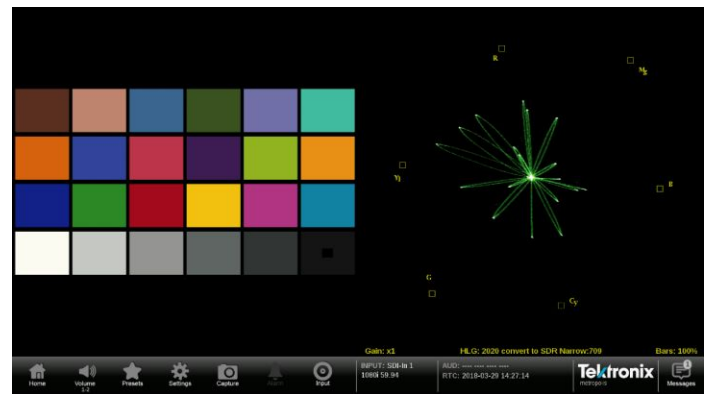
Macbeth chart in HLG / RP2020, Picture display and Vector display enabling integrated converter.

Simplify gamut monitoring and camera setup with Tektronix patented displays

The Tektronix-patented Diamond and Split Diamond displays simplify the process of identifying and correcting RGB gamut errors in digital video signals. Since the Diamond display has the traces on G/R and G/B planes, the trace position moves linearly as a response to R,G,B adjustment by the color editor. This allows editors to quickly identify and correct gamut issues. With the integrated transfer function / color space converter, the operator can check 709 color gamut error of WCG signals. During camera setup, the operator can quickly adjust BW balance by monitoring linearity in the center of the display.

Left : Macbeth chart in HLG / RP2020, Diamond display. Right : Macbeth chart in HLG / RP2020, Diamond display enabling integrated converter

Flexible display layout to quickly see what you want to see

A combination of Full / Quad / Vertical extended tile configuration provides more flexibility in how an operator views the application displays. As a vertical extended tile, the 9 inch, 16:9 display panel can show the Vector display in an equivalent size to a 6.5 inch, 4:3 display panel. This provides a practical single-box solution with the Waveform and Vector displays shown side-by-side for camera shading applications.
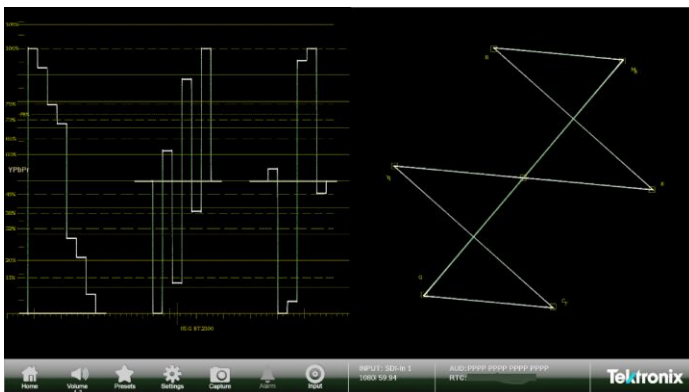
Waveform and Vector displays in vertical extended tiles.

Most advanced SDI physical layer measurement solutions

In an SDI video system, checking SDI signal quality and integrity is one of the most important tasks before starting to shoot a show. PRISM provides unique capabilities such as providing various jitter filters from 10 Hz to 100 kHz for SD/HD/3G/12G-SDI signals.

In addition, PRISM can also perform automated eye amplitude, automated rise/fall time, and automated overshoot/undershoot measurements. All of these capabilities, along with the integrated SDI signal generation feature, help broadcasters and network operators detect and diagnose signal quality problems quickly and efficiently.
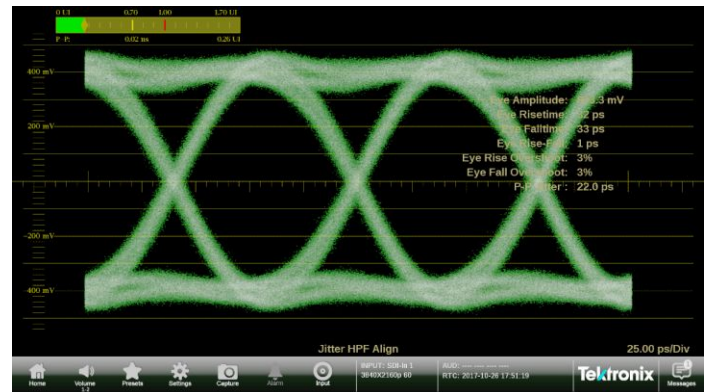
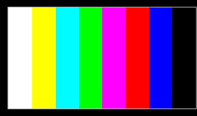12G-SDI Eye pattern display with Automatic measurements.
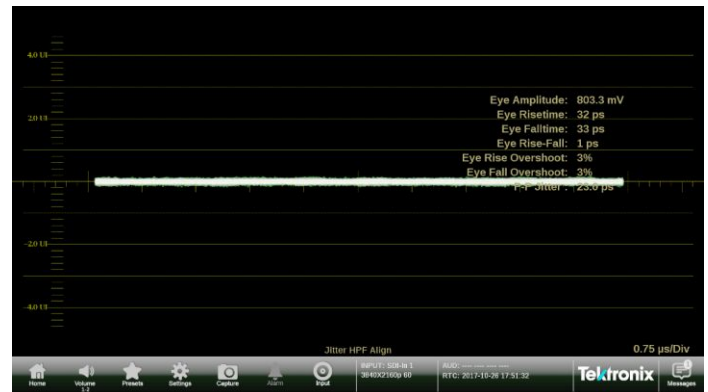

12G-SDI Jitter display.

Integrated SDI signal generator.

Flexible installation options

PRISM offers two platform options: 3RU half-rack width (MPI) and 1RU full-rack width (MPX). The MPI platform with the optional portable cabinet allows users to move the unit between different locations. The MPI platform with the optional rack mount kits allows users to install the unit in an equipment rack.

The MPX platform is intended for applications where space in an equipment rack needs to be minimized, for applications where an external touch panel display is going to be used, for KVM operation or for applications where remote monitoring is preferred.

Applications
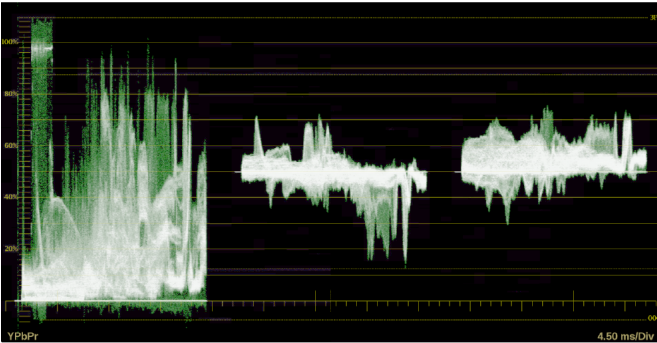
Waveform

- YCbCr, YRGB, RGB, Y Only mode
- mv, %, reflectance %, Code Value, Nits, Stop graticules
- Transfer function / color space conversion for HDR/WCG monitoring (option MP-PROD)
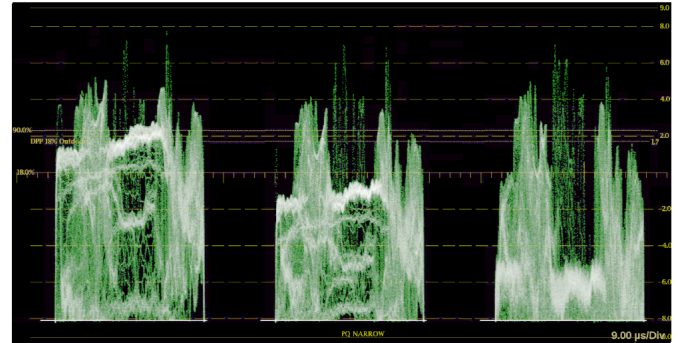
Stop Display (requires option MP-PROD)

- Stop graticule for Scene light, Nits graticule for Display light
- Balance cameras with different gamma
- Real time reflectance light meter to aid scene lighting
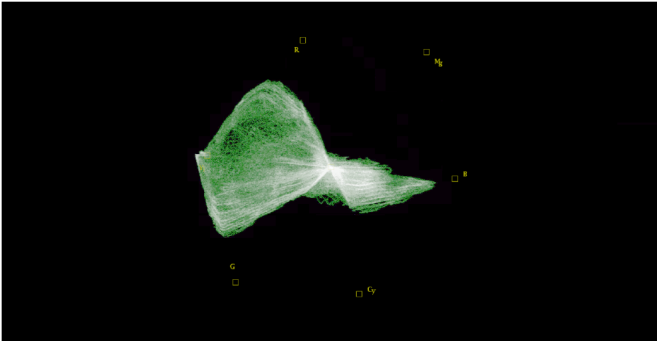
Vector

- XY trace with Cb / Cr component
- I axis for skin tone adjustment, white / black\balancing
- Transfer function / color space conversion for HDR/WCG monitoring (option MP-PROD)
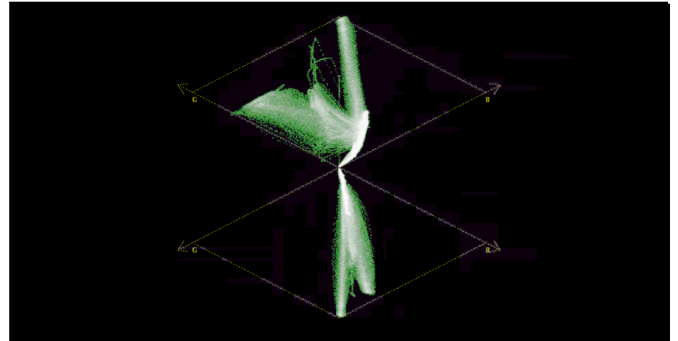
Diamond (requires option MP-PROD)

- G / R XY trace and G / B XY trace
- Gamut error monitoring, white balance and gray-scale tracking (gamma-curve matching)
- Transfer function / color space conversion for HDR/WCG monitoring
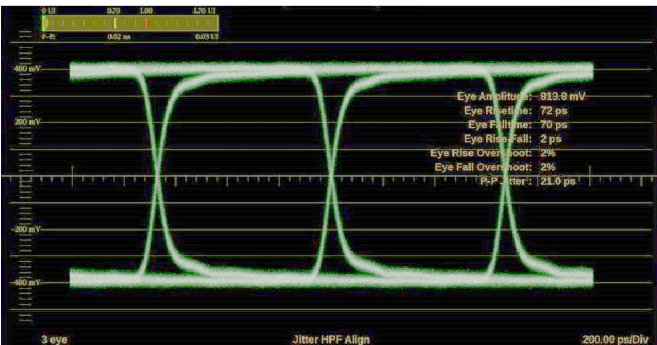
Eye Display (requires option MPI PHY-12G / MPX PHY-12G)

- SD / HD / 3G / 12G-SDI
- Automatic parameter measurements
- Characterize the SDI output of source instrument
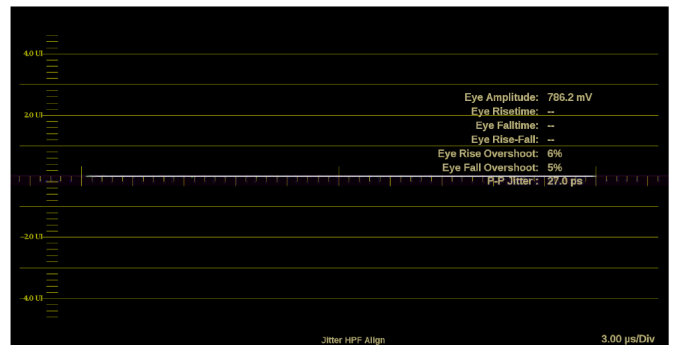
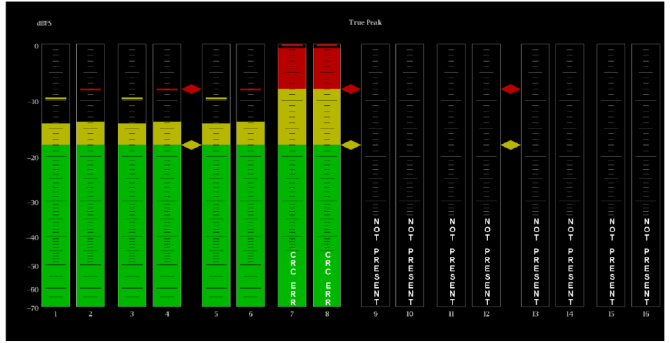## Jitter Display (requires option MPI PHY-12G / MPX PHY-12G)

- SD / HD / 3G / 12G-SDI
- Measures more than 1UI jitter
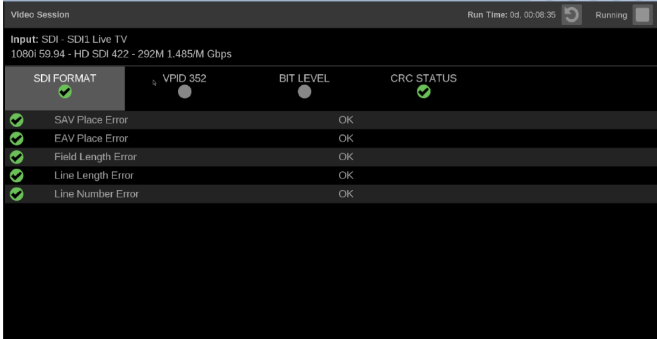- Characterize the SDI output of source instrument

Applications

Picture

- Checking composition, level and color at production
- Conformance monitoring
- Transfer function / color space conversion for HDR/WCG monitoring (MP-PROD)
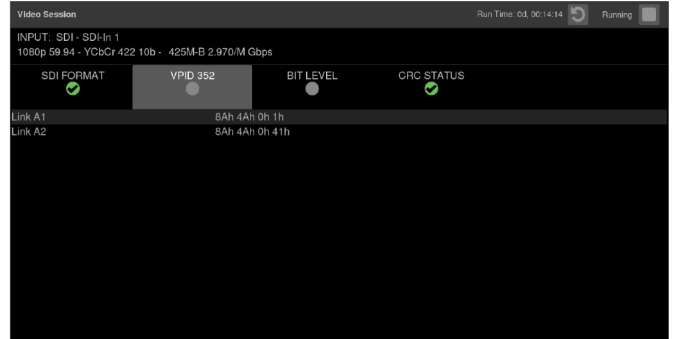

Video Session

- SAV/EAV placement, Field / Line length Error detection

Audio

- SDI Embedded, ST2022-6 and ST2110-30 (AES67)
- Up to 16ch audio level monitoring, peak level meter

Video Session: VPID 352

- VPID information

Video Session: Bit Level

- Bit Activity
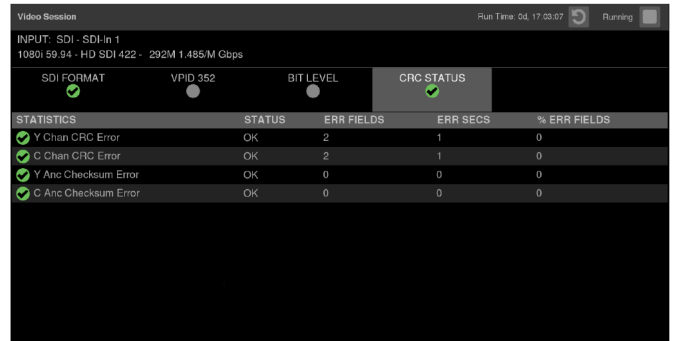
Video Session: CRC Status

- CRC Error detection

Applications

Event Log

- Event / Error log with the source and time information

IP Status (requires option MP-IP-STD)

- List the streams and communications in 10GE cables
- Simultaneously monitoring two ports for ST2022-7
- Error detection, Protocol, Bit rate, IP Address / Port and more

IP Session: Layer 1/2 (requires option MP-IP-MEAS)

- Layer 1, Layer 2 session display
- Simultaneously monitoring two ports for ST2022-7
- Link / SFP information, Rx Bytes, CRC Errors, Frame count

IP Session: Video (requires option MP-IP-MEAS)

- IP / UDP / RTP layer session display
- Simultaneously monitoring two ports for ST2022-7
- Error detection, HBRMT (ST2022-6) decoding

IP Session: PTP (requires option MP-IP-MEAS)

- PTP lock status and session display
- PTP time, Master / Slave phase lag, Grandmaster ID
- Interpretation of Announce Message
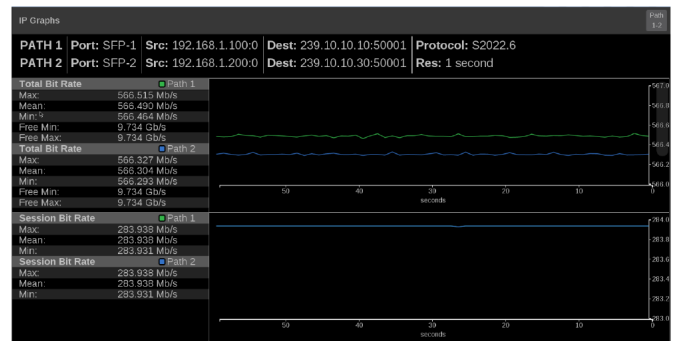
IP Graphs : Bit rate (requires option MP-IP-MEAS)

- Total bit rate, Session bit rate
- Max/Mean/Min value in the selected time window
- Simultaneously monitoring two ports for ST2022-7

Applications
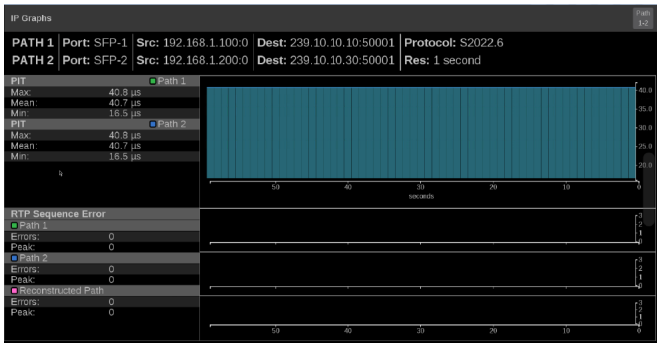
IP Graphs: PIT and RTP Sequence Error
(requires option MP-IP-MEAS)

- Detect intermittent packet loss in the trend graph
- Time correlated trend graphs for root cause isolation
- 2 paths and reconstructed path monitoring for ST2022-7

IP Graphs: Video CRC Error and TS-DF
(requires option MP-IP-MEAS)

- Time correlated trend graphs for root cause isolation
- TS-DF standardized in EBU-TECH 3337 (ST2022-6)
- Video CRC detection in ST2022-6

IP Graphs: Path1-Path2 Differential
(requires option MP-IP-MEAS)

- Packet arrival time difference in ST2022-7
- Ensure the proper packet reconstruction
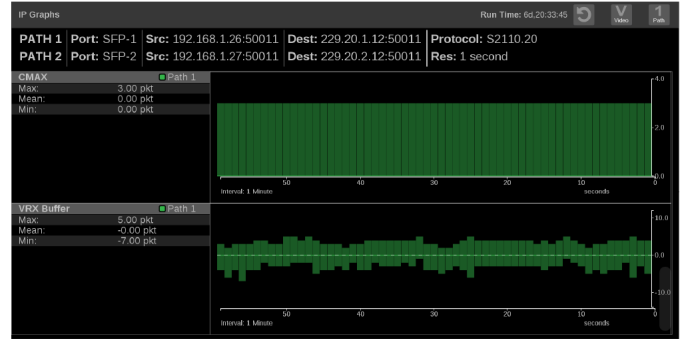
IP Graphs: CMAX, VRX Buffer
(requires option MP-IP-MEAS)

- ST2110-21 simulation
- CMAX: Network compatibility model
- VRX: Virtual Receiver buffer model

PIT Histogram (requires option MP-IP-MEAS)

- ST2022-6, ST2110
- Simultaneously monitoring two ports for ST2022-7
- Balance the packet loss probability and the system latency

PTP Graph (requires option MP-IP-MEAS)

- Master / Slave Delay, Delay variance and Phase lag
- Ensure proper PTP system setting
- Detect intermittent PTP locking issue

Applications

Timing (requires option MP-IP-MEAS)

- ST2022-6, ST2110 stream against PTP
- Simultaneous 2 streams monitoring for ST2022-7
- Adjust the timing to minimize the system latency

Generators (requires option MP-GEN)

- ST2110-20, -30 and 12G-SDI
- Basic test pattern to check signal path
- PTP locked ST2110 streams, good for timing / latency measurements

Stream Timing (requires option MP-IP-MEAS)

- Video stream timing against PTP
- Video / Audio / Data packet latency
- Video / Audio, Video / Data timing difference

Features
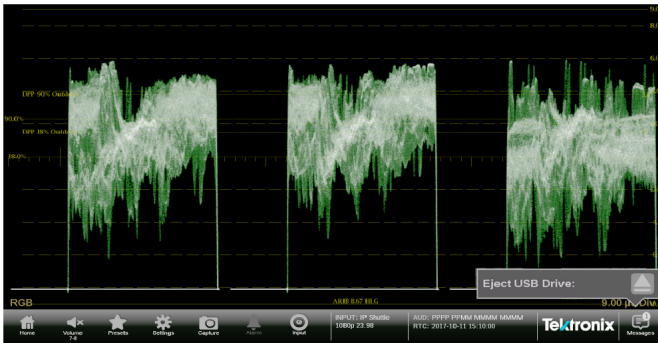
Message Center

- Intuitive navigation

Remote VNC

- Support VNC Client software
- Manage multiple PRISM units from remote location

Fullscreen, 2, 3 and 4 Tile Display

- Flexible tile configuration
- Configure the display to best fit to your application
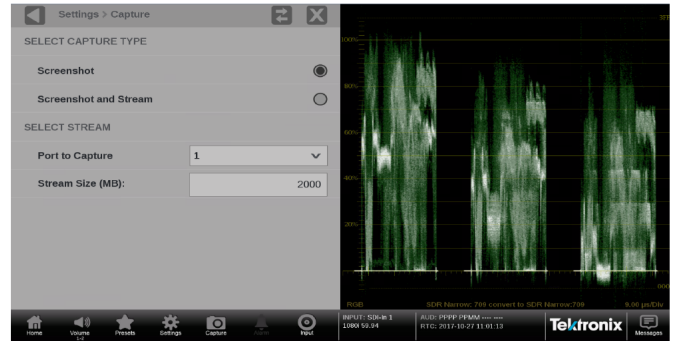
Screen and Stream Capture

- Screen capture to create the QC report
- Stream capture for further analysis with an offline tool (requires option MP-IP-CAP)

Touchscreen / Mouse

- Intuitive / quick operation with pinch and swipe action
- Easy navigation
- Higher flexibility in user interaction
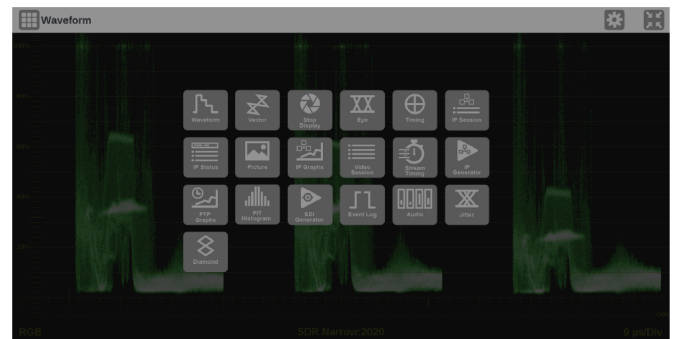
Application selection menu

- Faster access to the most used applications with a customizable application selection menu

Supported formats

Supported IP formats

Format	Description	Option
SMPTE 2022-6, SMPTE 2022-7		MP-IP-STD
SMPTE 2110-20, SMPTE 2110-30, SMPTE 2110-40 [1]		MP-IP-STD
ASPEN (video content only) [1]	SMPTE RDD-37	MP-IP-STD
PTP	IEEE1588, SMPTE2059-2 (Multicast, Mixed SMPTE w/o negotiation)	MP-IP-STD

Supported SDI formats

Link	Format	Sample Structure		Bits	Frame/field rate	Option
SD-SDI	525i	4:2:2	YCbCr	10b	59.94	Base instrument
	625i	4:2:2	YCbCr	10b	50	Base instrument
HD-SDI	1920x1080	4:2:2	YCbCr	10b	50/59.94/60i	Base instrument
	1280x720	4:2:2	YCbCr	10b	50/59.94/60p	Base instrument
3G-SDI Level A	1920x1080	4:2:2	YCbCr	10b	50/59.94/60p	Base instrument
3G-SDI Level B	1920x1080	4:2:2	YCbCr	10b	50/59.94/60p	Base instrument
Quad Link 3G-SDI Level A, Square Division [1]	3840x2160	4:2:2	YCbCr	10b	50/59.94/60p	MP-FMT-4K
Quad Link 3G-SDI Level B, Square Division [1]	3840x2160	4:2:2	YCbCr	10b	50/59.94/60p	MP-FMT-4K
Quad Link 3G-SDI Level A, Two Sample Interleave [1]	3840x2160	4:2:2	YCbCr	10b	50/59.94/60p	MP-FMT-4K
Quad Link 3G-SDI Level B, Two Sample Interleave [1]	3840x2160	4:2:2	YCbCr	10b	50/59.94/60p	MP-FMT-4K
12G-SDI [2]	3840x2160	4:2:2	YCbCr	10b	50/59.94/60p	MP-FMT-4K

Supported video formats in SMPTE 2022-6 streams

Link	Format	Sample Structure		Bits	Frame/field rate	Option
SD-SDI	525i	4:2:2	YCbCr	10b	59.94	MP-IP-STD
	625i	4:2:2	YCbCr	10b	50	MP-IP-STD
HD-SDI	1920x1080	4:2:2	YCbCr	10b	50/59.94/60i	MP-IP-STD
	1280x720	4:2:2	YCbCr	10b	50/59.94/60p	MP-IP-STD
3G-SDI Level A	1920x1080	4:2:2	YCbCr	10b	50/59.94/60p	MP-IP-STD
3G-SDI Level B	1920x1080	4:2:2	YCbCr	10b	50/59.94/60p	MP-IP-STD

[1]   No AUX SDI output is available for this format.

[2]   12G-SDI support is available in SDI 1 and SDI 3 inputs. 12G-SDI loop through outputs are available through the 12G-SDI SFP modules installed in the SDI SFP slots.

Supported video formats in SMPTE 2110-20 streams

Link	Format	Sample Structure		Bits	Frame/field rate	Option
ST2110-20 [1]	1920x1080	4:2:2	YCbCr	10b	50/59.94/60i	MP-IP-STD
	1280x720	4:2:2	YCbCr	10b	50/59.94/60p	MP-IP-STD
	1920x1080	4:2:2	YCbCr	10b	50/59.94/60p	MP-IP-STD
	525i	4:2:2	YCbCr	10b	59.94i	MP-IP-STD
	625i	4:2:2	YCbCr	10b	50i	MP-IP-STD

Receiver conformance level in SMPTE 2110-30 streams

Conformance level	Description
Conformance level B	Reception of 48 KHz streams with 1 to 8 channels at packet times of 1 ms or 1 to 8 channels at packet times of 125 µs

Supported video formats in ASPEN video

Link	Format	Sample Structure		Bits	Frame/field rate	Option
ASPEN [1]	1920x1080	4:2:2	YCbCr	10b	50/59.94/60i	MP-IP-STD
	1280x720	4:2:2	YCbCr	10b	50/59.94/60i	MP-IP-STD
	1920x1080	4:2:2	YCbCr	10b	50/59.94/60p	MP-IP-STD

Specifications

All specifications apply to all models unless noted otherwise.

MPI power characteristics

Power consumption

Typical	100 W
Maximum	200 W

Voltage range	100 to 240 VAC ±10%, 50/60 Hz

MPI physical characteristics

Dimensions

Height (at bezel)	13.34 cm (5.25 in.)
Width (at bezel)	21.91 cm (8.625 in.)
Depth	30.48 cm (12.00 in.)

Weight (net)	3.4 kg (7.45 lbs.)

MPX power characteristics

Power consumption

Typical	100 W
Maximum	200 W

Voltage range	100 to 240 VAC ±10%, 50/60 Hz

MPX physical characteristics

Dimensions

Height	4.45 cm (1.75 in.)
Width	48.26 cm (19.00 in.)
Depth	45.72 cm (18.00 in.)

Weight (net)	3.9 kg (8.7 lbs.)

Ordering information

Models

MPI	PRISM Media platform; 3RU half rack with integrated 9 inch HD display and touch panel; 4 SDI Inputs (SD, HD and 3G-SDI)
MPX	PRISM Media platform; 1RU Full rack; 4 SDI Inputs (SD, HD and 3G-SDI)

Options

Hardware options

PHY-12G	Add SDI Physical Layer Measurement Package; includes automated measurement of 12G/3G/HD/SD-SDI Eye pattern parameters; (Option MP-FMT-4K required for 12G support)
MPX RACK	Add rack mount slides and rails kit for MPX

Software options

MP-IP-STD	Add node locked license for SMPTE 2022-6/7, ST2110, NMOS/SDP, and PTP (IEEE1588, SMPTE 2059-2) support; includes IP Status application
MP-IP-MEAS	Add node locked license for IP Measurement feature sets: includes IP/PTP Graph, IP Session, PIT Histogram, Timing, and Stream Timing applications (Option MP-IP-STD required)
MP-IP-CAP	Add node locked license for IP stream capture (Option MP-IP-MEAS required)
MP-FMT-4K	Add node locked license for 4K formats, enable 12G-SDI
MP-PROD	Add node locked license for Production Tools: Stop Display and Diamond applications, Transfer function / Color space conversion
MP-GEN	Add node locked license for SDI/IP signal generator; includes IP/SDI Generator application (Option MP-IP-STD required for IP signal generation, Option MP-FMT-4K required for 4K signal generation)

International power plugs

Opt. A0	North America power plug (115 V, 60 Hz)
Opt. A1	Universal Euro power plug (220 V, 50 Hz)
Opt. A2	United Kingdom power plug (240 V, 50 Hz)
Opt. A3	Australia power plug (240 V, 50 Hz)
Opt. A5	Switzerland power plug (220 V, 50 Hz)
Opt. A6	Japan power plug (100 V, 50/60 Hz)
Opt. A10	China power plug (50 Hz)
Opt. A11	India power plug (50 Hz)
Opt. A12	Brazil power plug (60 Hz)
Opt. A99	No power cord

Service options

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. R3DW	Repair Service Coverage 3 Years (includes product warranty period). 3-year period starts at time of instrument purchase
Opt. R5	Repair Service 5 Years (including warranty)
Opt. R5DW	Repair Service Coverage 5 Years (includes product warranty period). 5-year period starts at time of instrument purchase

Post purchase upgrades

MPI-UP PHY-12G	Add SDI Physical Layer Measurement Package to the MPI product; includes automated measurement of 12G/3G/HD/SD-SDI Eye pattern parameters; (Option MP-FMT-4K required for 12G support)
MPX-UP PHY-12G	Add SDI Physical Layer Measurement Package to the MPX product; includes automated measurement of 12G/3G/HD/SD-SDI Eye pattern parameters; (Option MP-FMT-4K required for 12G support)
MPX-UP RACK	Add rack mount slides and rails kit for MPX unit
MP-IP-STD-UP	Add node locked license for SMPTE 2022-6/7, ST2110, NMOS/SDP, and PTP (IEEE1588, SMPTE 2059-2) support; includes IP Status application
MP-IP-MEAS-UP	Add node locked license for IP Measurement feature sets: includes IP/PTP Graph, IP Session, PIT Histogram, Timing, and Stream Timing applications (Option MP-IP-STD required)
MP-IP-CAP-UP	Add node locked license for IP stream capture (Option MP-IP-MEAS required)
MP-FMT-4K-UP	Add node locked license for 4K formats, enable 12G-SDI
MP-PROD-UP	Add node locked license for Production Tools: Stop Display and Diamond applications, Transfer function / Color space conversion
MP-GEN-UP	Add node locked license for SDI/IP signal generator; includes IP/SDI Generator application (Option MP-IP-STD required for IP signal generation, Option MP-FMT-4K required for 4K signal generation)

Warranty

Standard product warranty: 1 year; Long-term product support: 5 years

Recommended accessories

MPI-PTBL   Portable cabinet for MPI unit includes handle, feet, tilt bail, and protective front cover

MPI-RACK-MM   19 inch, 3RU dual rack cabinet for one MPI unit or two MPI units in a side-by-side installation, includes front panel USB/headphone connectors for each MPI unit

MPI-RACK-MW   19 inch, 3RU dual rack cabinet for one MPI unit or one MPI unit in a side-by-side installation with a WFM52x0, WFM7200, WFM8x00 instrument, includes front panel USB/headphone connectors for one MPI unit

MP-SFP

   Opt. 3GTO   SD/HD/3G Optical (1310 nm) SDI SFP transmitter module (to be installed into SDI SFP+ cage for optical SDI loop through output)

   Opt. 3GTD   SD/HD/3G DIN SDI SFP transmitter module (to be installed into SDI SFP+ cage for SDI loop through output with DIN coaxial connector)

   Opt. 3GTH   SD/HD/3G HDBNC SDI SFP transmitter module (to be installed into SDI SFP+ cage for SDI loop through output with HDBNC coaxial connector)
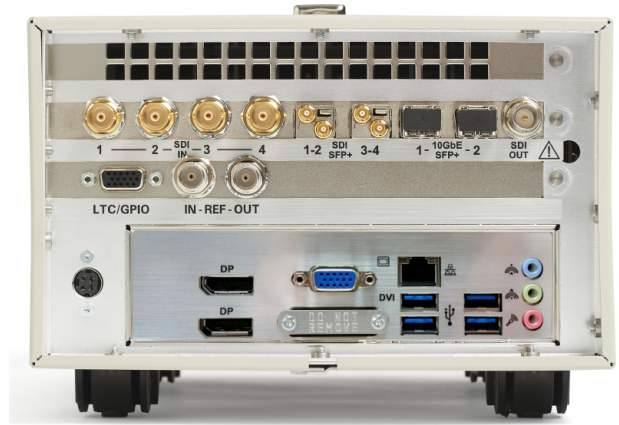
   Opt. 10GESR   10G Ethernet short range (850 nm) transceiver module (to be installed into 10GbE SFP+ cage); requires Option MPI-IP-STD

   Opt. 10GELR   10G Ethernet long range (1310 nm) transceiver module (to be installed into 10GbE SFP+ cage); requires Option MPI-IP-STD

MPI front and rear panels

MPX front and rear panels

CE

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

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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.tek.com.

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