PRISM MPI2-10 and MPX2-10

Media Analysis Platform

User Manual

D00010021A

PRISM MPI2-10 and MPX2-10
Media Analysis Platform
User Manual

This document supports software version 2.1.

www.telestream.net

D00010021A

Contact Telestream

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Table of Contents

Important compliance and safety information

United States of America Compliance Notices

Class A Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15, Subpart B of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Caution

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

Safety

UL 61010-1: 2012 R4.16: Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements.

Environmental

Perchlorate Materials: this product contains one or more type CR lithium batteries. According to the state of California, CR lithium batteries are classified as perchlorate materials and require special handling.

See www.dtsc.ca.gov/hazardouswaste/perchlorate for additional information.

Canada Compliance Notices

Department of Communications Radio Interference Regulations

This digital apparatus does not exceed the Class A limits for radio-noise emissions from a digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications. This Class A digital apparatus complies with Canadian ICES-003.

Reglement sur le brouillage radioelectrique du Quadstere des Communications

Cet appareil numerique respecte les limites de bruits radioelectriques visant les appareils numeriques de classe A prescrites dans le Reglement sur le brouillage radioelectrique du Quadstere des Communications du Canada. Cet appareil numerique de la Classe A est

conforme a la norme NMB-003 du Canada.

Safety

CAN/CSA-22.2 NO. 61010-1-12 + Gil + Gl2:: Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements.

Sécurité

CAN / CSA-22.2 NO. 61010-1-12 + Gil + Gl2 :: Exigences de sécurité pour l'électricité Matériel de mesure, de contrôle et d'utilisation en laboratoire - Partie 1: Généralités Exigences.

European Union and European Free Trade Association (EFTA) Compliance Notices

This equipment may be operated in the countries that comprise the member countries of the European Union and the European Free Trade Association. These countries, listed in the following paragraph, are referred to as The European Community throughout this document:
AUSTRIA, BELGIUM, BULGARIA, CYPRUS, CZECH REPUBLIC, DENMARK, ESTONIA, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, IRELAND, ITALY, LATVIA, LITHUANIA, LUXEMBOURG, MALTA, NETHERLANDS, POLAND, PORTUGAL, ROMANIA, SLOVAKIA, SLOVENIA, SPAIN, SWEDEN, UNITED KINGDOM, !CELANO, LICHTENSTEIN, NORWAY, SWITZERLAND

Declaration of Conformity

Marking by the “CE” symbol indicates compliance with the Essential Requirements of the EMC Directive of the European Union 2014/30/EU

This equipment meets the following conformance standards:

Safety

EN 61010-1: Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements
Low Voltage Directive 2014/35/EU

Emissions

EN 55032: 2012 + AC: 2013, CISPR 32: 2015, EN 61000-3-2: 2014,
EN 61000-3-3: 2013

Immunity

EN 55103-2: 2009, EN 61000-4-2: 2009,
EN 61000-4-3: 2006 + Al: 2008 + A2: 2010, EN 61000-4-4: 2004 + Al: 2010,
EN 61000-4-5: 2006, EN 61000-4-6: 2009, EN 61000-4-11: 2004
Environments: E2

Warnings

Warning! This is a Class A product. In a domestic environment, this product may cause

radio interference, in which case, the user may be required to take appropriate measures.

Achtung! Dieses ist ein Gerat der Funkstorgrenzwertklasse A. In Wohnbereichen konnen bei Betrieb dieses Gerates Rundfunkstorungen auftreten, in welchen Fallen der Benutzer fur entsprechende Gegenmal3nahmen verantwortlich ist.

Attention! Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de creer des interferences radioelectriques, ii appartiendra alors a l?utilisateur de prendre les mesures specifiques appropriees.

Notes:

1. For Compliance with the EMC standards listed here, high quality shielded interface cables should be used.
2. Emissions which exceed the levels required by this standard may occur when this equipment is connected to a test object.

Environmental Compliance

This section provides information about the environmental impact of the product.

Product end-of-life handling
Observe the following guidelines when recycling an instrument or component:

Equipment recycling
Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. To avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.

This symbol on the product or its packaging indicates that this product complies with the applicable European Union requirements according to Directives 2012/19/EU and 2006/66/EC on waste electrical and electronic - equipment (WEEE) and batteries.

It also indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste for recycling, please contact your local authority, or where you purchased your product.

Battery Recycling
This product may contain a rechargeable battery, which must be recycled or disposed of properly. Please properly dispose of or recycle the battery according to local government regulations.

Transporting Batteries or products with Batteries in them
The capacity of the lithium ion secondary battery shipped with this product is under 100 Wh. The lithium content of the installed primary battery is under 1 g. Each battery meets the applicable requirements of UN Manual of Tests and Criteria Part Ill Section 38.3.

Battery quantity is under the limit for shipment according to Section II of the relevant Packing Instructions from the IATA Dangerous Goods Regulations. Consult your air carrier for applicability and determination of any special lithium battery transportation requirements.

Restriction of Hazardous Substances
This product is classified as an industrial monitoring and control instrument, and is not required to comply with the substance restrictions of the RoHS 3 Directives 2011 /65/EU and EU 2015/863 until July 22, 2021. This product does, however, comply with the RoHS 2 Directive 2011/65/EU.

Korea Compliance Statement

A급 기기 (업무용 방송통신기자재)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
Class A (Broadcasting Communication Equipment for Office Use)	As an electromagnetic wave equipment for office use (Class A), this equipment is intended to use in other than home area. Sellers or users need to take note of this.

Taiwan Compliance Statement

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

This is a Class A product based on the standard of the Bureau of Standards, Metrology and Inspection (BSMI) CNS 13438, Class A. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Japan Compliance Statement

この装置は、クラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 ＶＣＣＩ－Ａ

This is a Class A product based on the standard of the VCCI Council (VCCI 32: 2016). If this equipment is used in a domestic environment, radio interference may occur, in which case, the user may be required to take corrective actions.

Important Safety Information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition.
To safely perform service on this product, see the Service safety summary that follows the General safety summary.

General Safety Summary

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

Comply with local and national safety codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of the system.

To Avoid Fire or Personal Injury

Use proper power cord: Use only the power cord specified for this product and certified for the country of use. Do not use the provided power cord for other products.

Ground the product: This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded. Do not disable the power cord grounding connection.

Power disconnect: The power cord disconnects the product from the power source. See instructions for the location. Do not position the equipment so it is difficult to operate the power cord; it must remain accessible to the user at all times to allow for quick disconnection if needed.

Observe all terminal ratings: To avoid fire or shock hazard, observe all rating and markings on the product. Consult the product manual for further ratings information before making connections to the product. Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do not operate without covers: Do not operate this product with covers or panels removed, or with the case open. Hazardous voltage exposure is possible.

Avoid exposed circuitry: Do not touch exposed connections and components when power is present.

Do not operate with suspected failures: If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Disable the product if it is damaged. Do not use the product if it is damaged or operates incorrectly. If in doubt about safety of the product, turn it off and disconnect the power cord. Clearly mark the product to prevent its further operation.

Before use, inspect voltage probes, test leads, and accessories for mechanical damage and replace when damaged. Do not use probes or test leads if they are damaged, if there is exposed metal, or if a wear indicator shows.

Examine the exterior of the product before you use it. Look for cracks or missing pieces.

Use only specified replacement parts.
Do not operate in wet/damp conditions: Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry: Remove the input signals before you clean the product.

Provide proper ventilation: Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Slots and openings are provided for ventilation and should never be covered or otherwise obstructed. Do not push objects into any of the openings.
Provide a safe working environment: Always place the product in a location convenient for viewing the display and indicators.

Be sure your work area meets applicable ergonomic standards. Consult with an ergonomics professional to avoid stress injuries.

Use only the Telestream rackmount hardware specified for this product.

Service Safety Summary

The Service safety summary section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this Service safety summary and the General safety summary before performing any service procedures.

To avoid electric shock: Do not touch exposed connections.

Do not service alone: Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect power: To avoid electric shock, switch off the product power and disconnect the power cord from the mains power before removing any covers or panels, or opening the case for servicing.

Use care when servicing with power on: Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before

removing protective panels, soldering, or replacing components.

Verify safety after repair: Always recheck ground continuity and mains dielectric strength after performing a repair.

Terms in the Manual

These terms may appear in this manual:

WARNING. Warning statements identify conditions or practices that could result in injury or loss of life.

CAUTION. Caution statements identify conditions or practices that could result in damage to this product or other property.

Terms on the Product

These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product

When this symbol is marked on the product, be sure to consult the manual to find out the nature of the potential hazards and any actions which have to be taken to avoid them. (This symbol may also be used to refer the user to ratings in the manual.)

The following symbol(s) may appear on the product:

General Safety Product Specific Statements

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

Comply with local and national safety codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual. The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

This product is not intended for detection of hazardous voltages.

Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of the system.

CAUTION. *When the instrument has started the upgrade process, DO NOT remove power from the instrument. If you do, the instrument flash will be corrupted, and the instrument will have to be sent to a* Telestream *factory service center to have the system firmware restored.*

CAUTION. *To minimize the risk of damage to the instrument, we strongly recommend the power cord be connected to the instrument before the power cord is connected to the AC power source.*

CAUTION. *To prevent damage to the power cord or to the instrument power connector, do not attempt to disconnect the power cord by pulling on the cable. You must pull on the connector housing to disengage the locking mechanism.*

CAUTION. *To prevent data loss, we strongly recommend you first shut down the instrument before disconnecting the power cord. Press the power button or go to Settings, then Utilities, and select the Power submenu.*

Preface

This manual contains information to help you use the Telestream PRISM Media Analysis Platform. This includes:

- How to operate the instrument using the front panel, external mouse/keyboard/display, or remote connection.
- How to use the various displays for monitoring SDI or IP video signals.
- How to capture display data.
- How to set up error logging and alarms.
- How to move through instrument menus.

Where to find more information

The full **User Manual**, **Release Notes**, and other information about your product are available for download at www.telestream.net/video/resources.htm#literature. Table 1 lists all the documentation for the PRISM Media Analysis Platform.

Table 1: Product documentation

Document	Manual type	Part number	Description
User Manual	User	D00010021x	Provides detailed operating information.
Release Notes	Release Notes	D00010030x	Describes the new features, improvements, and limitations of the instrument firmware.
Installation and Safety Instructions	User	071-3628-xx	Describes how to install a PRISM MPI2-10 instrument and provides basic safety and operating information (included with instrument).
	User	071-3629-xx	Describes how to install a PRISM MPX2-10 instrument and provides basic safety and operating information (included with instrument).
Specifications and Performance Verification	Performance Verification	077-1523-xx	Lists the product specifications and provides procedures for verifying product performance.
PRISM MPI2-10 Dual Rack Cabinet Version 2 Installation Instructions	Field Install Instructions	071-3725-xx	Describes how to install a MPI2-10 instrument in a 19" equipment rack using the optional MPI-RACK-MM or MPI-RACK-MW dual rack cabinet.
MPX Rackmount Slides and Rails Installation Instructions	Field Install Instructions	071-3706-xx	Describes how to install a MPX2-10 instrument in a 19" equipment rack
PRISM MPI2-RACK-MD Installation and Safety	Field Install Instructions	071-3728-xx	Provides installation and safety information for the PRISM MPI2-RACK-MD Rack Cabinet with touch display.
PRISM MPX2-DUALDSP Installation and Safety Instructions	Field Install Instructions	071-3729-00	Provides installation and safety information for the PRISM MPX2-DUALDSP Dual Display module.
Field Upgrade Kit Instructions	Field Install Instructions	075-1136-xx	Describes how to install post-purchase field upgrades in the instrument.

Conventions used in this manual

The PRISM Media Analysis Platform is also referred to as the “PRISM monitor” throughout this manual.

The terms "press and hold," “touch and hold,” or “select-and-hold” are used throughout this document and applies to touchscreen use with the Prism 3RU half rack with internal touchscreen (MPI2-10) and the Prism 1RU full rack with external display (MPX2-10). If you are using a mouse and keyboard with the instrument you must click and hold the mouse buttons.

Getting started

This section will help you set up and begin to use the PRISM Media Analysis Platform. It is divided into these subsections:

- **Product description** describes your instrument and provides a list of key features.
- **Controls and connectors** shows you how to verify that you have received all of the parts of your instrument and provides a list of standard and optional accessories and a list of options that are available for your instrument.
- **Network installation** shows you how to set up your instrument on an Ethernet network.

Product description

The PRISM Media Analysis Platform provides flexible options and field-installable upgrades to monitor a diverse variety of SDI and IP statistics as well as video and audio content. The comprehensive feature set, along with an intuitive and simplified graphical presentation of IP statistics, including video quality and diagnostic information, enables engineers to ensure the delivery of superior QoS levels in an increasingly complex broadcast environment involving compressed / uncompressed video transmission through SDI/IP signal paths. PRISM is an ideal solution for monitoring SDI/IP hybrid environments including master control rooms, production studios, OB vans, and signal contribution/distribution centers.

PRISM model form factors

The PRISM Media Analysis Platform is available in two form factors:

MPI2-10. The PRISM MPI2-10 is 3RU half rack with integrated 9-inch HD display and touch panel.

MPX2-10. The PRISM MPX2-10 is 1RU full rack width optional integrated speakers. The MPX2-10 requires an external monitor or a remote connection, such as VNC.

Features and benefits for analysis of hybrid IP/SDI infrastructures

- A comprehensive analysis and monitoring tool for hybrid IP/SDI broadcast systems that provide system evaluation for long term system quality monitoring and reporting
- All-in-one instrument using a 3RU half-rack platform (MPI2-10) or a 1RU full-rack platform (MPX2-10) with optional integrated speakers can be used for either portable or rackmount applications
- Extensive IP monitoring solution for SMPTE 2022-6, 2110, PTP, and RTP streams
- Graphical displays that show the traffic present in the 10G Ethernet link, allowing engineers to understand what is on their network and to easily select the stream of interest
- Select a stream to view and monitor the content using the Picture, Waveform, and Audio applications, and listen to audio with headphones for conformance monitoring
- Detect IP packet errors, monitor the packet inter arrival time (PIT) and time stamped delay factor (TS-DF for 2022-6) to allow engineers to observe issues that may cause intermittent loss of Video, Audio or Data
- Monitor PTP trend graphs to ensure proper IP system setup for robust sync system
- Telestream patented Timing display, the SDI versus Analog reference and ST2022-6 / ST2110-20 / SDI / Analog reference versus PTP reference makes facility timing easy
- 1 PPS output when the instrument is locked to a PTP reference
- Seamless switching to ensure proper SMPTE 2022-6 and 2110 redundancy for each SMPTE 2022-7
- API to control PRISM from system management software
- Multipoint or remote site monitoring allowing one engineer to quickly respond to issues from multiple points in the system
- Optional 10 GbE line rate packet capture for offline analysis
- Optional SDI and ST2110 IP signal generators for testing new or changing facility configurations
- The Picture application uses the 9-inch HD screen for confidence monitoring
- NMOS IS-04 / IS-05 support for network discovery and connection management (receiver only)
- Optional dual display products (MPI2-RACK-MD and MPX2-DUALDSP) can be used to extend the workspace to a second HD screen.

Features and benefits for production tools supporting 4K/UHD, WCG and HDR content creation

- 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 2110
- Stop display for monitoring video signals with a variety of transfer functions in a consistent manner
- Configurable False Color display for easy identification of HDR content.
- Waveform, Vector, Lightning, Picture, and Diamond displays are equipped with a transfer function/color space conversion, allowing operators to match skin tones of video signals to standard BT.709 vector locations and verify wide color gamut compatibility to BT.709 color gamut
- 12G-SDI physical layer measurements to check SDI signal quality and integrity (optional)
- On-screen tools for accessing frequently used settings without opening a separate menu
- Audio volume and balance controls

Rackmount installation

MPI2-10 monitor

There are two optional dual rack cabinets (19-inch, 3RU) available for the PRISM monitor. Each of the cabinet kits include the *PRISM MPI2-10 Dual Rack Cabinet and Extender Installation Instructions* document (Telestream part number 071-3725-xx).

- **MPI-RACK-MM.** Allows you to install one MPI2-10 unit or two MPI2-10 units side-by-side. Each side of the cabinet front panel has two USB ports and a headphone ports for each MPI2-10 unit.
- **MPI-RACK-MW.** Allows you to install one MPI2-10 unit or one MPI2-10 unit in a side-by-side installation with a WFM52x0, WFM7200, WFM8x00 waveform monitor. The left side of the cabinet front panel has two USB ports and a headphone port for one MPI2-10 unit.

Dual rack cabinet versions. There are two versions of the instructions for the MPI-RACK-MM and MPI-RACK-MW dual rack cabinets:

Table 2: PRISM dual rack cabinet documentation

Document	Telestream Part Number	Description
PRISM MPI Dual Rack Cabinet Version 1 Installation Instructions	071-3720-XX (English)	In version 1 of the instructions, the MPI-RACK-MM and the MPI-RACK-MW cabinets are the same size.
PRISM MPI2-10 Dual Rack Cabinet Version 2 Installation Instructions	071-3725-XX (English)	In the second version of the instructions, the MPI-RACK-MW cabinet comes with a removable extender installed that makes it longer than the MPI-RACK-MM cabinet.

MPX2-10 monitor

For the PRISM MPX2-10 monitor, there is an optional 1RU full-rack kit that can be used for either portable or rackmount applications.

- **MPX2-10 RACK.** Allows you to install one PRISM 1RU full width MPX2-10 RACK. The MPX2-10 RACK rackmount kit includes the *Rackmount Slides and Rails Kit Installation Instructions* document (Telestream part number 071-3706-xx).

Dual Display monitors

Rack-mounted dual-display monitors are available for MPI2 and MPX2 to extend the PRISM display to a second HD monitor.

- **MPI2-RACK-MD.** Allows you to install one PRISM MPI2 monitor (not included) next to an external HD display in a 3RU full width rack. A software license is required to enable the extended display feature. For information on how to install and use this extended display, see the *PRISM MPI2-RACK-MD Installation and Safety Instructions*.
- **MPX2-DUALDSP.** Allows you to connect an MPX2 to a 3RU full rack width dual display assembly to serve as a compact primary and extended desktop display system for the MPX2. A software license is required to enable the extended display feature. For information on how to install and use this extended display, see the *PRISM MPX2-DUALDSP Installation and Safety Instructions*.

MPI2-10 power-on and power-off procedures

This section describes how to apply power to the MPI2-10 monitor and how to power-on and power-off the instrument.

MPI2-10 power cord installation

This instrument is powered by an AC power source. Connect the power cord to the power connector on the rear panel of the instrument. (See Figure 1.) The power connector is keyed to be directional, with the flat portion of the power cord housing facing the left of the instrument (as viewed from the rear). When fully inserted, the power cord housing latches onto the instrument power connector.

CAUTION. *To minimize the risk of damage to the instrument, we strongly recommend the power cord be connected to the instrument before the power cord is connected to the AC power source.*

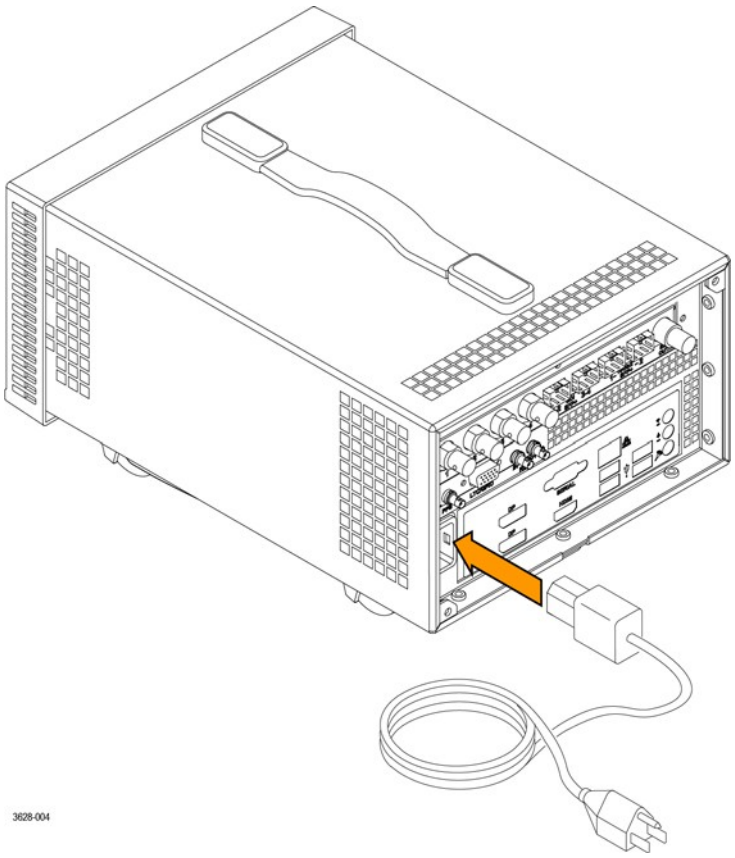


Figure 1: Connecting power to the MPI2-10 monitor

MPI2-10 power cord removal

The power cord housing latches on the instrument power connector when fully inserted. To remove the power cord, grasp the connector housing as shown in Figure 2 and firmly pull the cord away from the instrument.

CAUTION. *To prevent damage to the power cord or to the instrument power connector, do not attempt to disconnect the power cord by pulling on the cable. You must pull on the connector housing to disengage the locking mechanism.*

To minimize the risk of damage to the instrument, it is strongly recommended that the power cord be disconnected from the AC power source before the power cord is disconnected from the instrument.

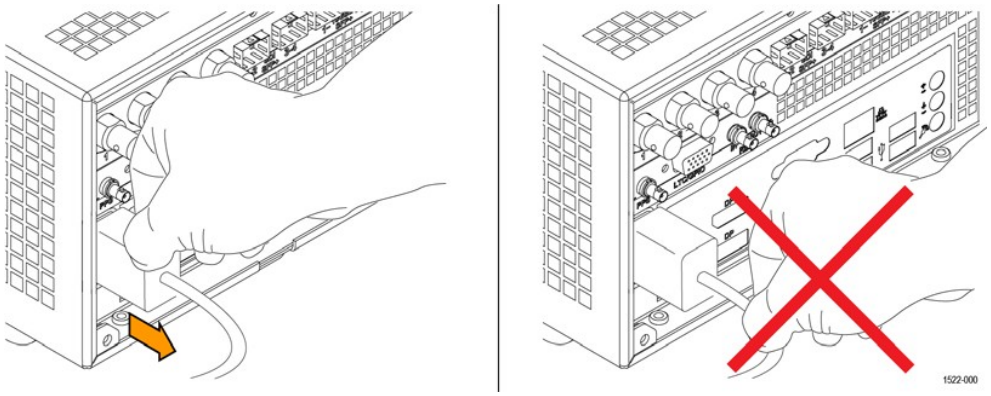


Figure 2: Disconnecting the power cord from the MPI2-10 monitor

MPI2-10 power-on procedure

1. Apply power to the instrument. (See MPI2-10 power cord installation.)

NOTE. *If the PRISM monitor was previously powered off by a power interruption or by removing the power cord from the rear of the instrument, the instrument will power on when power is reapplied.*

2. Press the **Power/Standby** button on the instrument front panel to turn the instrument on.

NOTE. *The Power/Standby button illuminates during the power-on sequence and then turns off during normal instrument operation.*

Figure 3: Front panel of the PRISM with the Power/Standby button marked

MPI2-10 power-off procedure

1. Press the **Power/Standby** button on the instrument front panel to turn the instrument off.

CAUTION. *To prevent data loss, we strongly recommend you first shut down the instrument. Press the power button or go into* ***Settings****, then* ***Utilities****, and use the* ***Power*** *submenu before disconnecting the power cord.*

2. To completely remove power from the instrument, disconnect the power cord from the instrument. The power cord has a locking mechanism to keep it attached to the instrument. Push the button on the cord housing to release the locking mechanism. (See MPI2-10 power cord removal.)

MPX2-10 power-on and power-off procedures

This section describes how to apply power to the MPX2-10 monitor and how to power-on and power-off the instrument.

MPX2-10 power cord installation

This instrument is powered by an AC power source. Connect the power cord to the power connector on the rear panel of the instrument as shown in Figure 4. The power connector is keyed to be directional, with the flat portion of the power cord housing facing the left of the instrument (as viewed from the rear). When fully inserted, the power cord housing latches onto the instrument power connector.

CAUTION. *To minimize the risk of damage to the instrument, we strongly recommend the power cord be connected to the instrument before the power cord is connected to the AC power source.*

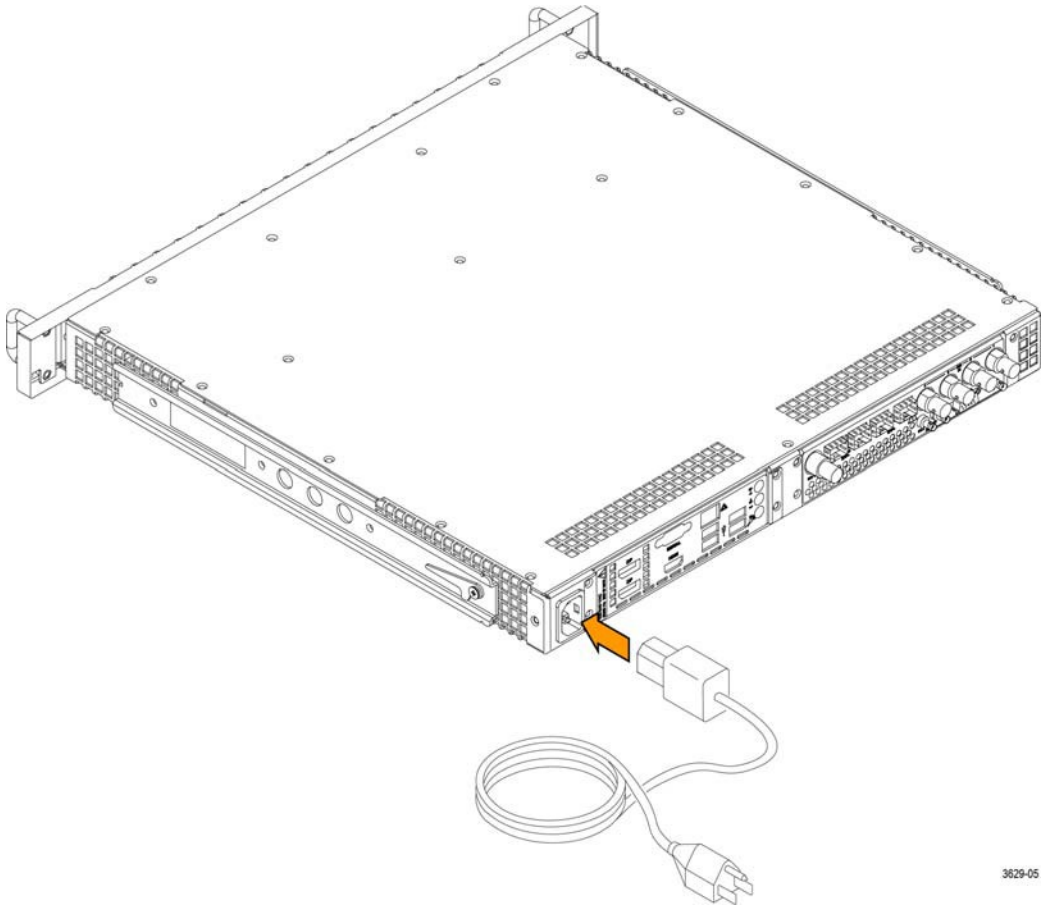


Figure 4: Connecting power to the MPX2-10 monitor

MPX2-10 power-on procedure

1. Apply power to the instrument. (See MPX2-10 power cord installation.)

NOTE. *If the PRISM monitor was previously powered off by a power interruption or by removing the power cord from the rear of the instrument, the instrument will power on when power is reapplied.*

2. Press the **Power/Standby** button on the instrument front panel to turn the instrument on. (See Figure 5.)

NOTE. *The Power/Standby button illuminates during the power-on sequence and then turns off during normal instrument operation.*

Figure 5: Front panel of MPX2-10 with Power/Standby button marked

MPX2-10 power-off procedure

1. Press the **Power/Standby** button on the instrument front panel to turn the instrument off.

CAUTION. *To prevent data loss, we strongly recommend you first shut down the instrument. Press the power button or go into* ***Settings****, then* ***Utilities****, and use the* ***Power*** *submenu before disconnecting the power cord.*

2. To completely remove power from the instrument, disconnect the power cord from the instrument. The power cord has a locking mechanism to keep it attached to the instrument. Push the button on the cord housing to release the locking mechanism.

SFP module installation

There are several types of optional SFP modules available:

- SD/HD/3G-SDI optical transmitter
- SD/HD/3G-SDI DIN transmitter
- SD/HD/3G-SDI HD-BNC transmitter
- 10G Ethernet short range transceiver (850 nm)
- 10G Ethernet long range transceiver (1310 nm)

NOTE. *ST2022-7 requires two 10 GbE SFP modules to be installed. The modules need to be installed in 10 GbE SFP ports 1 and 2.*

MPI2-10 SFP module installation

To install the SFP module on an MPI2-10 monitor, insert the module into the SFP connector as in Figure 6. The module will latch into place when fully inserted.

To remove the optical SFP module, lift *up* on the latch and then pull the module out of the SFP connector as in Figure 6.

NOTE. *An optical SFP module is shown in Figure 6. Other types of SFP modules may have different latching mechanisms.*

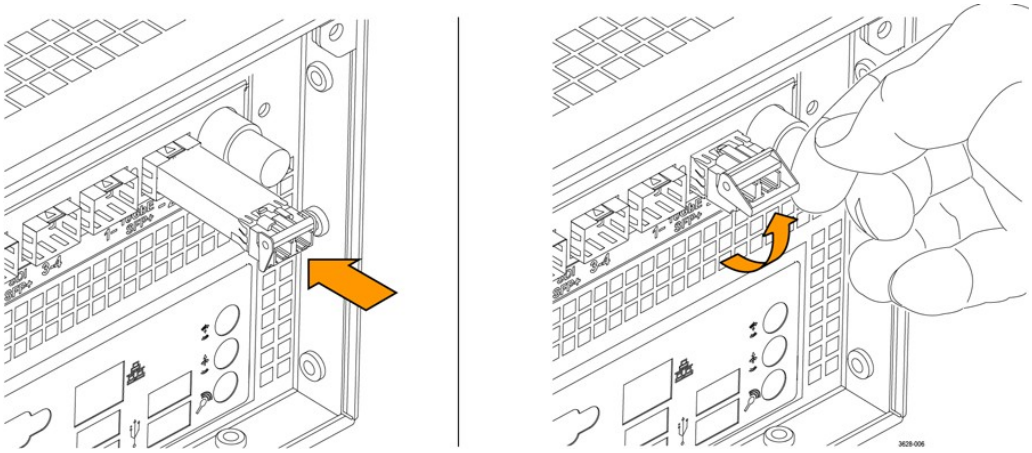


Figure 6: Installing and removing an optical SFP module on an MPI2-10 monitor

MPX2-10 SFP module installation

To install an SFP module on an MPX2-10 monitor, insert the SFP module into the SFP connector. The module will latch into place when fully inserted.

To remove the SFP module, pull *down* on the latch and then pull the module out of the SFP connector. (See Figure 7.)

NOTE. *To ensure you are using the correct SFP connectors, the 10 GE and SDI SFP connectors are marked on the back of the MPI2-10 (See MPI2-10 rear panel connectors.) and MPX2-10. (See MPX2-10 rear panel connectors.)*

An optical SFP module is shown in Figure 7. Other types of SFP modules may have different latching mechanisms.

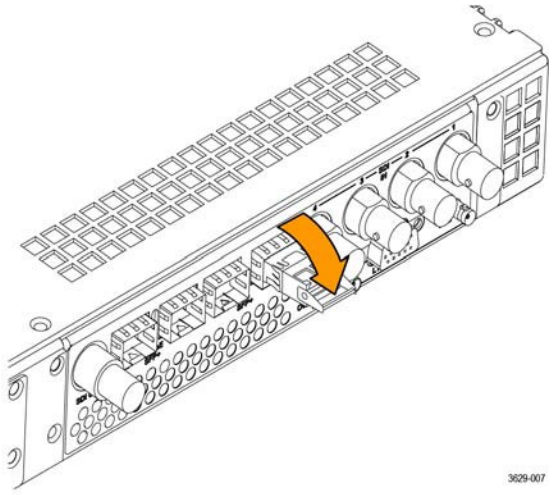


Figure 7: Removing an optical SFP module on an MPX2-10 monitor

SFP module transportation

CAUTION. *To prevent static damage to an SFP module, if you remove the SFP module from the instrument, always transport the SFP module in an anti-static bag or container.*

To prevent possible damage to the PRISM monitor and SFP modules, remove the SFP modules before transporting the PRISM monitor.

Network installation

See the installation and safety instructions manual that shipped with your instrument for basic installation instructions.

After your instrument is physically installed, if you want to connect it directly to a PC or to a network. This section explains how.

Connecting directly to a PC

To connect your instrument directly to a PC:

1. Connect the instrument directly to a PC with an Ethernet cable. You can also use an Ethernet Switch. (See Figure 8.)
2. Set up the instrument as described in this procedure. Choose **Manual** IP mode to set the IP address manually. Be sure to set an address that is compatible with the setting of your PC. The default IP address of the PRISM monitor is 192.168.1.2.

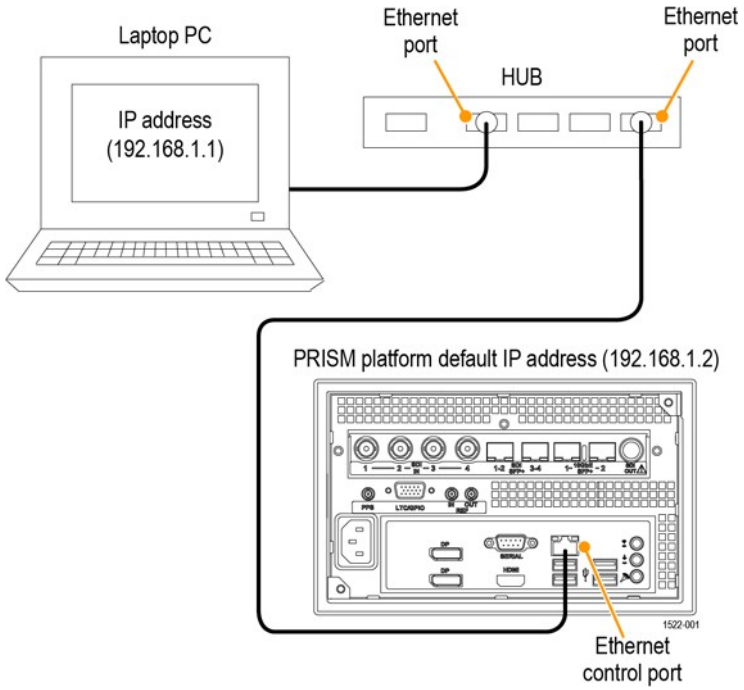


Figure 8: Connecting the instrument to a PC (MPI2-10 monitor shown)

Connecting to a network

To allow network access to the instrument, you must set the IP address. Network addresses can be assigned either automatically (DHCP) or manually. If your network does not use DHCP, you will have to manually enter the address for the instrument. To get a fixed address, talk to your LAN administrator. The default IP address of the PRISM monitor is 192.168.1.2.

To connect your instrument to a network and access it with a remote PC:

1. On the PRISM monitor, select the **Settings** icon ( ) to display the Settings menu.
2. Select **Network** to open the Network submenu.
3. Select **CONTROL IP PORT** to open the Control IP Port submenu. (See Figure 9.)
4. Depending on your local network requirements, select **DHCP** or **Manual** to select the method for selecting an IP address.

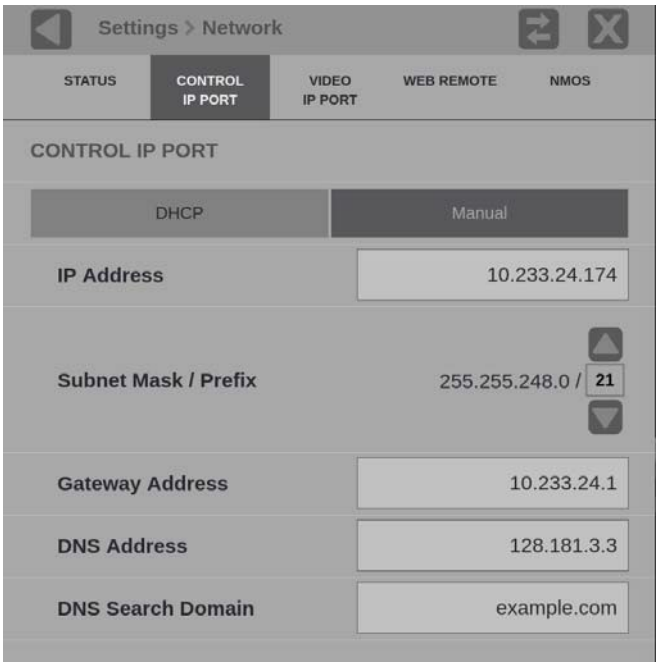


Figure 9: Setting network parameters

5. If you cannot use DHCP and you selected Manual, use the Manual submenu to set the IP address, subnet mask, gateway address, DNS address, and DNS Search Domain parameters you obtained from your LAN administrator. (Be sure to use compatible addresses between the PC and the instrument.) Select an address box to open the address editing tool. Use the editing box as described for editing an IP input address. (See Figure 36.)

CAUTION. *Do not configure your control and/or your Video IP ports to addresses on the same subnet. This may cause a non-deterministic operation, such as IGMP leaves failing or other network connectivity issues.*

6. Select the **Settings** icon ( ) or the icon to close the Settings menu.

MPI2-10 rear panel connectors

Figure 10 shows the external connections to the instrument. A description of each connector is provided in Table 3.

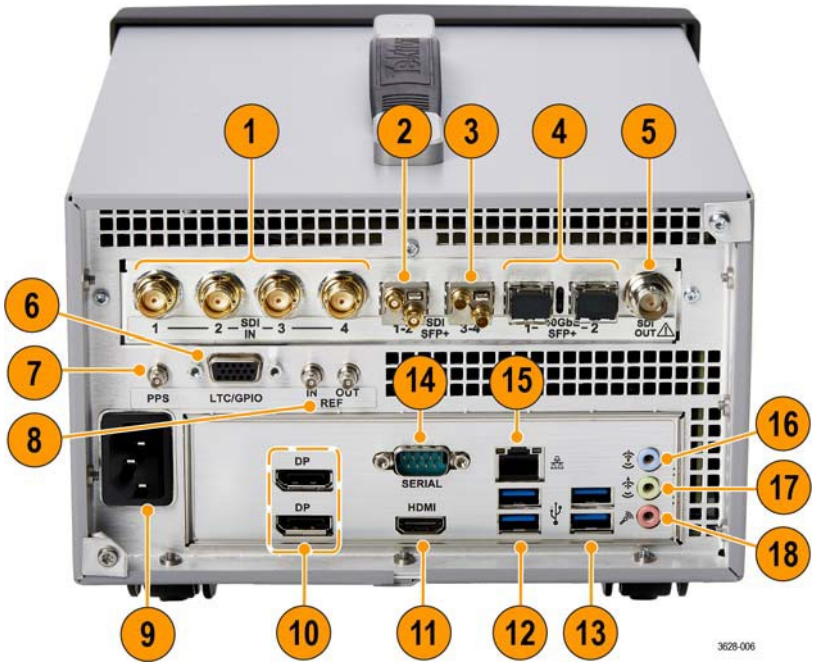
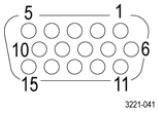
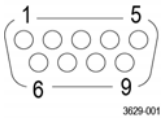


Figure 10: PRISM MPI2-10 rear panel

Table 3: Descriptions of PRISM MPI2-10 rear panel connectors

Item number (See Figure 10.)	Connector label, symbol, or end	Description
1	SDI IN	Four BNC inputs can operate in these modes: • SDI inputs 1 and 3 support SD/HD/3G/12G signals. SDI inputs 2 and 4 support SD/HD/3G signals. • Single SDI link (Option MP2-FMT-4K is required for 12G support). When used as a single link, only one of the SDI 1-4 inputs is active at a time. • Eye diagram up to 12G on SDI input 1 only for physical layer measurements, including automated measurement of 12G-SDI eye pattern parameters (requires Options MP2-FMT-4K and MPI2-10 PHY). • Quad 4K links when used in conjunction with the SDI 1-4 inputs (Option MP2-FMT-4K only). When used as Quad 4K links, all four SDI inputs are active.
2	SDI SFP+	Two optional SFP outputs are for SDI signals (HD-BNC transmitter SFP+ modules shown). SDI SFP outputs 1 and 2 supports HD/3G signals.
3	SDI SFP+	Two optional SFP outputs are for SDI signals (HD-BNC transmitter SFP modules shown). SDI SFP outputs 3 and 4 supports HD/3G signals.
4	10GbE SFP+	Two optional SFP ports are for 10GbE Ethernet applications.

Item number (See Figure 10.)	Connector label, symbol, or end	Description
5	**SDI OUT**	SDI output of the selected SDI or IP input.
6	**LTC/GPIO** 	15-pin, D-type connector is for future functionality.
7	**PPS**	PPS connector outputs a 1 PPS (pulse per second) signal when the instrument is locked to a PTP reference.
8	**REF IN – OUT**	REF IN is used for analog reference signals black burst and tri-level sync for locking. REF OUT is a pass through of the REF IN.
9		Connector is for an AC power source.
10	**DP**	Two DisplayPort outputs are for external monitors. The output video format is 1920×1080.[1] [2]
11	**HDMI**	HDMI port output is for an external monitor. The output video format is 1920×1080.[1] [2]
12		Two USB 3.0 ports are for connecting a mouse and keyboard, connecting importing or exporting instrument presets, upgrading the instrument firmware, or saving screen and stream captures.
13		Two USB 3.0 ports are for importing or exporting instrument presets, or for upgrading the instrument firmware.
14	**SERIAL** 	Serial Interface, 9-pin connector, is not used.
15		Ethernet port is a standard RJ-45 connector for 10/100/1000Base-T Ethernet cable.
16		Audio input connector is for future use.
17		Audio output (1/8-inch—3.5mm—line out) port is for headphones to listen to the selected audio channel pair.[3]
18		Microphone input connector is for future use.

[1] When connecting to an external monitor, a monitor with a 1920×1080 capable display works best with the instrument.

[2] MPX2-10 can drive a maximum of 1 external display.

[3] Audio output is an 1/8-inch (3.5mm) diameter port for a headset. It has connections for L and R audio channels. Headset plugs that are an 1/8-inch and have an additional contact for a microphone may not work because the headphone ports are not set for the spacing requirements of a third connection on the plug.

MPX2-10 rear panel connectors

Figure 11 shows the external connections to the rear panel of the instrument. A description of each connector is provided in Table 4. See *Front panel controls and connectors* for information about the front panel connectors.

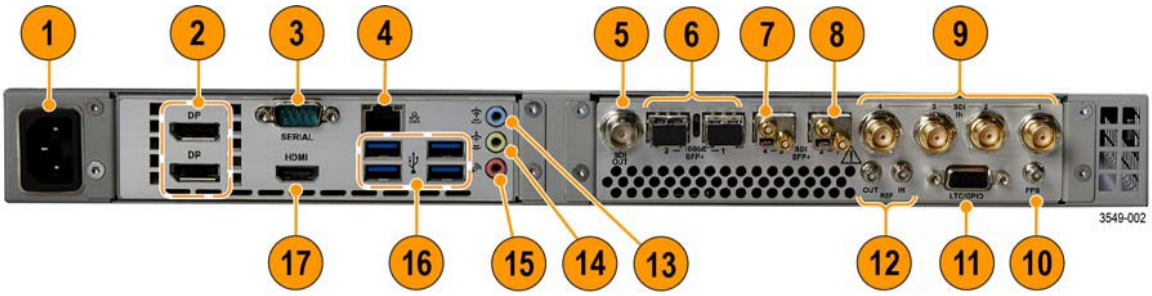
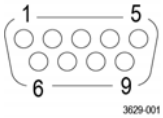
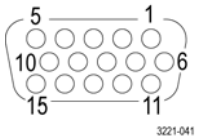


Figure 11: PRISM MPX2-10 rear panel

Table 4: Descriptions of PRISM MPI2-10 rear panel connectors

Item number (See Figure 11.)	Connector label, symbol, or end	Description
1		Connector is for an AC power source.
2	DP	Two DisplayPort outputs are for external monitors. The output video format is 1920×1080.[1 2]
3	SERIAL 	Serial interface, 9-pin connector, is not used.
4		Ethernet port is a standard RJ-45 connector for 10/100/1000Base-T Ethernet cable.
5	SDI OUT	SDI output is of the selected SDI or ST2022-6 IP input.
6	10GbE SFP+ 2-1	Two optional SFP ports for 10 GbE Ethernet applications.
7	SDI SFP+ 4-3	Two optional SFP outputs for SDI signals. SDI SFP inputs 3 and 4 support HD/3G signals.
8	SDI SFP+ 2-1	Two optional SFP outputs for SDI signals. SDI SFP inputs 1 and 2 support HD/3G signals.
9	SDI I/O	Four BNC inputs can operate in 4 modes: • SDI inputs 1 and 3 support SD/HD/3G/12G signals. SDI inputs 2 and 4 support SD/HD/3G signals. • Single SDI link (Option MP2-FMT-4K is required for 12G support). When used as a

Item number (See Figure 11.)	Connector label, symbol, or end	Description
		single link, only one of the SDI 1-4 inputs is active at a time. • Eye diagram up to 12G on SDI input 1 only for physical layer measurements, including automated measurement of 12G-SDI eye pattern parameters (requires Options MP2-FMT-4K and MPX2-10 PHY). • Quad 4K links when used in conjunction with the SDI 1-4 inputs (Option MP2-FMT-4K only). When used as Quad 4K links, all four SDI inputs are active.
10	**PPS**	PPS connector outputs a 1 PPS (pulse per second) signal when the instrument is locked to a PTP reference.
11	**LTC/GPIO**  	LTC/GPIO D-type, 15-pin connector is for future functionality.
12	**REF IN – OUT**	REF IN is used for analog reference signals black burst and tri-level sync for locking. REF OUT is a pass through of the REF IN.
13		Audio input connector is for future use.
14		Audio output (1/8-inch—3.5mm—line out) port is for headphones to listen to the selected audio channel pair.[3]
15		Microphone input connector is for future use.
16		Four USB 3.0 ports are for connecting a mouse and keyboard, importing or exporting instrument presets, upgrading the instrument firmware, or saving screen and stream captures.
17	**HDMI**	HDMI port output is for an external monitor. The output video format is 1920×1080.[1] [2]

[1] When connecting to an external monitor, a monitor with a 1920×1080 capable display works best with the instrument.

[2] MPX2-10 can drive a maximum of 2 external displays.

[3] Audio output is an 1/8-inch (3.5mm) diameter port for a headset. It has connections for L and R audio channels. Headset plugs that are an 1/8-inch and have an additional contact for a microphone may not work because the headphone ports are not set for the spacing requirements of a third connection on the plug.

Display elements

The Elements of the display figure shows the key elements of the internal monitor. (See Figure 12.) Descriptions of the elements are provided in Table 5.

Figure 12: Elements of the display (MPI2-10 monitor shown)

Table 5: Descriptions of PRISM display element

Item number (See Figure 12.)	Description
1	Application name. Lists the name of the displayed application.
2	Application tile 1. [1]
3	Application tile 3. [1]
4	Status bar. The right side of the status bar lists instrument status such as the selected input, type of input signal, selected signal reference, video/reference signal status, audio channel status, the real time clock setting, and the message center. The left side of the Status bar has icons with links to various instrument setting menus, presets, audio volume control, and status readouts. Use the Home icon to exit any displayed menus.
5	Power / Standby button. Press the button to turn the instrument on or off. To completely remove power from the instrument, remove the power cord. ***CAUTION.*** *To prevent data loss, we strongly recommend you first shut down the instrument before disconnecting the power cord. Press the power button or go to* ***Settings****, then* ***Utilities****, and select the* ***Power*** *submenu.*
6	Application tabs. Some applications have selectable tabs (highlighted readouts) you can use to display additional information.
7	Application tile 4.[1]
8	Application tile 2.[1]

[1] The application panels can be shown in four-tile mode, full screen mode, or in vertical extended tile mode.

Diagnostics report

You can download a .zip file containing a service report of instrument diagnostics using the Settings menu. If your instrument needs service, you may be asked to provide the diagnostics file to Telestream to aid in troubleshooting problems with the instrument.

1. Select the **Settings** icon () to open the Settings menu.
2. Select **Utilities** to open the Utilities submenu.
3. Select **Diagnostics** to open the Diagnostics submenu.
4. Insert a USB device into one of the USB ports on the PRISM monitor.
5. Select **Save Diagnostics** to save the diagnostics report to the USB device.

Message center

The Message center allows you to view messages. For example, you can view messages that allow you to eject devices mounted to the instrument.

To eject a USB stick from the instrument using the Message Center:

1. A number above the icon indicates the number of messages on the instrument. (See Figure 13.)

Figure 13: Messages icon with one message

2. Select the **Messages** icon to view the messages or devices mounted to the instrument. (See Figure 14.)

NOTE. *After using a USB stick, it must be unmounted using the Message Center before removing it from the instrument.*

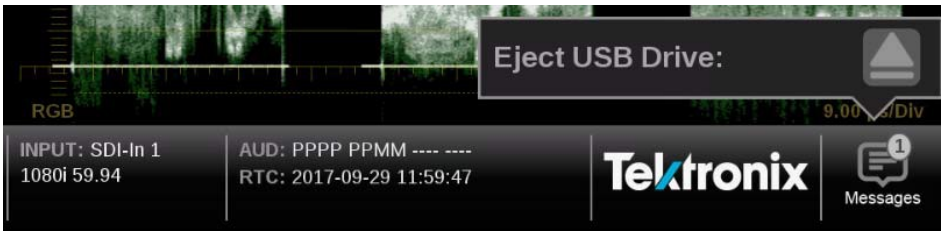


Figure 14: Message center pop-up window

3. Select the **Eject** icon ( ) to unmount the USB stick from the instrument.
4. Select the **Messages** icon again to hide the Message Center pop-up window.

Methods of operation

This section describes the primary methods of operating the instrument:

- MPI2-10 front panel touchscreen
- MPX2-10 front panel controls
- External touchscreen display
- Keyboard and mouse
- Remote control using VNC
- Remote control using API commands

MPI2-10 touchscreen operation

Figure 15 shows the instrument display with the application selection menu open in tile four.

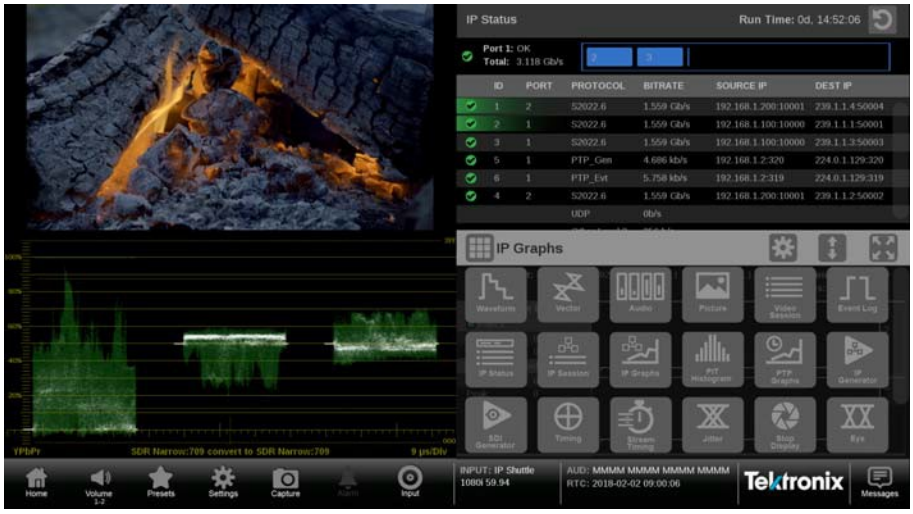


Figure 15: PRISM display in four-tile mode

Supported touchscreen gestures

Use these touchscreen gestures to control the instrument:

- Touch or tap the screen to select display elements.
- Press and hold on a tile to open the application banner to access the application controls or switch applications.
- Double tap an application banner to change the display between four-tile and a full-screen display of the selected application.

- Swipe up or down, or left or right as necessary to move between menus and preset listings, and to view additional application information.
- Some applications support pinch and zoom.

NOTE. *The terms "press and hold", "tap", "swipe", and "pinch" apply to the touchscreen on the instrument. If you are using a mouse and keyboard you must "click and hold", "click", "scroll" and use the scroll wheel on the mouse.*

How to select and control an application to display

1. Press and hold on an open application to open the application menu.
2. If necessary, touch the  icon to open the list of available applications. (See Figure 15.)
3. Press, hold, and drag an application icon to reorder the application list to best match your workflow.

NOTE. *This reorder operation requires a mouse.*

If a preset is saved your application icon list order is saved also. Each preset can have different configuration of the application list.

4. Select the application icon to display that application.
5. If available, touch or tap the Settings icon () in the menu bar to open the settings menu for the application.
6. Select or tap the  icon in the menu bar to change the selected application display to full screen.
7. Select or tap the  icon in the menu bar to change the selected application display to vertical extended mode. The vertical extended mode is useful for when you want to view two application displays side-by-side. When an application display is in vertical extended mode, touch or tap the  icon in the menu bar to return to quarter tile mode.
8. If available, select or tap the  icon to clear or reset the selected display.

How to use on-screen tools

Some settings for the Waveform, Vector, Lightning, and Stop Display applications are available outside the settings menu through on-screen tools. Applications with on-screen tools enabled have buttons on the top and bottom of the display that allow you to adjust the application settings. (See Figure 16.) When first selecting one of the displays, a highlighted ring appears around each available on-screen tool, such as Gain, Format, Sweep, Cursors and Position. For instructions on how to use each on-screen tool see these application sections.

- Waveform (See Waveform application on-screen tools.)
- Vector (See Vector application on-screen tools.)
- Lightning (See Lightning application on-screen tools.)
- Stop Display (See Stop Display application on-screen tools.)

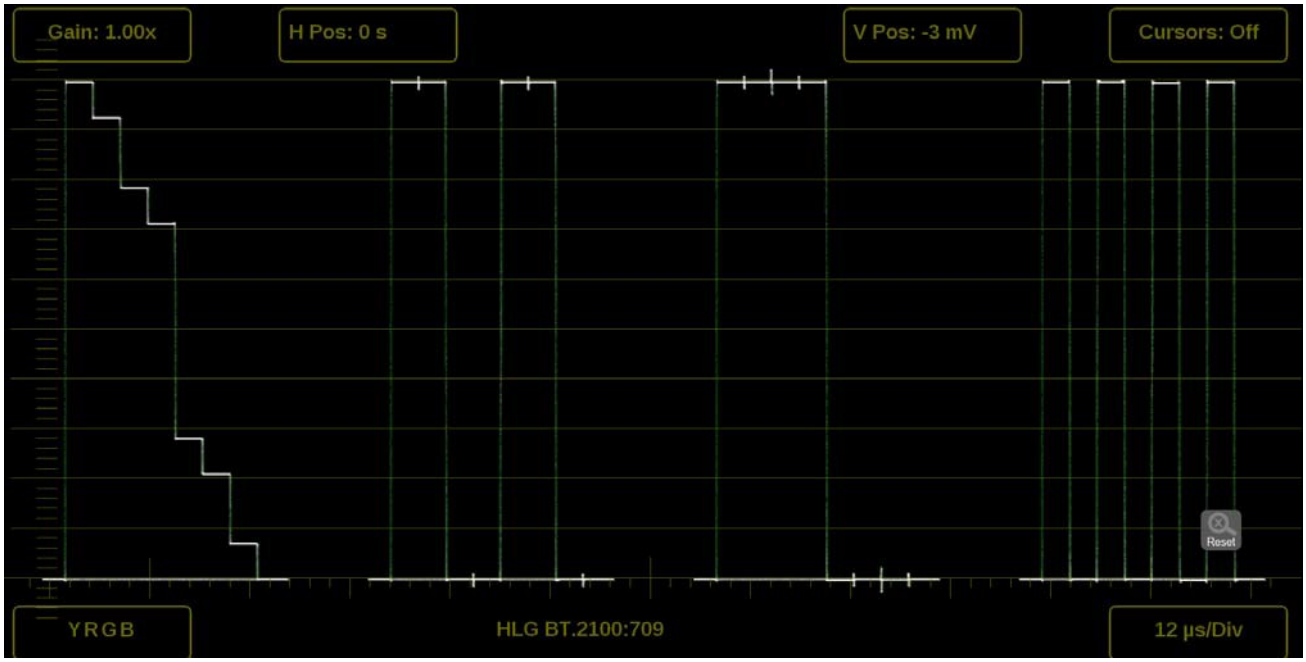


Figure 16: Waveform on-screen tools

MPX2-10 front panel controls

Figure 17: MPX2–10 front panel controls

Table 6: Descriptions of PRISM MPX2-25 front-panel controls

Item number (See Figure 17)	Description
1	**Power / Standby** button**.** Press the button to turn the instrument on or off. To completely remove power from the instrument, remove the power cord. ⚠ ***CAUTION.*** *To prevent data loss, we strongly recommend you first shut down the instrument before disconnecting the power cord. Press the power button or go to* ***Settings****, then* ***Utilities****, and select the* ***Power*** *submenu.*
2	**BALANCE** control**.** Turn the BALANCE control to adjust the balance on the front and rear panel headphone and optional speaker outputs. Push the BALANCE control to re-center the balance.[1]
3	**PRESET** button**.** Press the button one time to prepare the instrument for a preset selection from preset Group A using the SELECTIONS buttons (1-6). Press the button 2-6 times to select preset Group B-F.[1]
4	**SELECTIONS** buttons**.** After pressing the PRESET or INPUT button, press one of the SELECTIONS buttons (1-6) to recall an instrument preset or to select an input to monitor.
5	**VOLUME** control**.** Turn the VOLUME control to adjust the volume on the front and rear-panel headphone outputs. Push the VOLUME control to mute or unmute the audio.[1]
6	**Audio** output**.** (1/4-inch—6.35mm—line out) port is for using headphones to listen to the selected audio channel pair.
7	**USB** ports**.** Two USB 3.0 ports for connecting a mouse and keyboard, importing or exporting instrument presets, upgrading the instrument firmware, or saving screen and stream captures.
8	**INPUT** button**.** Press the button to prepare the instrument for an input selection using the SELECTIONS buttons (1-6).[1]
9	Speakers. Integrated 2.1 speakers for listening to the selected audio channel pair. Requires Option SPKR.

[1] When you use the PRESET and INPUT buttons, the associated menus appear on the display. The menus close after a short time-out period. Similarly, when you use the VOLUME or BALANCE control, the volume or balance slider and mute controls appear on the display and close after a short time-out period.

MPX2-10 front panel operation

Use the instrument front panel to perform these functions:

- Recall instrument presets
- Select an input to monitor
- Control or mute the volume on the headphone and optional speaker outputs
- Adjust the balance on the headphone and optional speaker outputs
- Connect a mouse and keyboard
- Connect a USB drive to upgrade the instrument firmware or save screen and stream captures

How to recall instrument presets. To recall instrument presets using the front panel:

1. Press the **PRESET** button one time to prepare the instrument for a preset selection from preset Group A using the SELECTIONS buttons (1-6).
2. Press the **PRESET** button 2-6 times to select preset Group B-F. The selected preset group is displayed.
3. After you select the preset group, press the SELECTIONS numbered button corresponding to the preset in that group to recall (1-6).

NOTE. *When you use the PRESET and INPUT buttons, the associated menus appear on the display. The menus close after a short time-out period. Similarly, when you use the VOLUME control, the volume slider and mute controls appear on the display and close after a short time-out period.*

Select an input to monitor. To recall instrument presets using the front panel:

1. Press the **INPUT** button to prepare the instrument for an input selection.
2. Press the **SELECTIONS numbered button** corresponding to the input you want to monitor.

Keyboard and mouse operation

You can use a USB keyboard and mouse to operate the instrument. The mouse must have a scrolling wheel to access all of the menu selections. Click or click-and-hold on applications to perform actions like you would on the touch panel.

Connect the keyboard and mouse:

- Use the USB ports on the rear panel of the instrument (MPI2-10) or front panel (MPX2-10)
- Use the USB port on the front of the optional dual rack cabinet (MPI-RACK-MM or MPI-RACK-MW)
- Connect the external monitor to any of the available display outputs, including Display Port or HDMI (MPX2-25).

Keyboard controls

Home icon. The ESC key on the keyboard is mapped to function as the Home icon, which closes any displayed menus.

Volume control. If your keyboard has volume control keys, you can use them to control the volume of the audio output on the instrument.

Input and preset selection. Table 7 lists the keyboard controls that allow you to quickly select between the SDI inputs and to select from instrument presets 1 through 6.

Table 7: Keyboard controls for selecting SDI inputs and instrument presets

Action	Keyboard control	Result
Input	ALT+i	Prepares the instrument for an input selection.
Preset	ALT+p	Prepares the instrument for a preset selection from preset Group A. Repeat 2-5 times to select preset Group B-F.
Select 1	1	Selects Input 1 or selects Preset 1 from the selected preset group.
Select 2	2	Selects Input 2 or selects Preset 2 from the selected preset group.
Select 3	3	Selects Input 3 or selects Preset 3 from the selected preset group.
Select 4	4	Selects Input 4 or selects Preset 4 from the selected preset group.
Select 5	5	Selects Input 5 or selects Preset 5 from the selected preset group.
Select 6	6	Selects Input 6 or selects Preset 6 from the selected preset group.

To select an SDI input or instrument preset.

1. On the keyboard, do one of two actions:
    - While pressing the **ALT** key, press **i** to enable an input selection change.
    - While pressing the **ALT** key, press **p** one time to recall a preset from Preset Group A. Press **p** 2-6 times to select a preset from another Preset Group (B-F). For example, press and hold ALT and press p 3 times to make a selection from Preset Group C.
2. Press a number from **1** to **6** to select the input or to select a preset from the selected Preset Group (A-F).

External touchscreen display operation

You can use an external touchscreen display to control the instrument. Two connections are required:

- Connect the Display Port output from the PRISM monitor to the input on the external device.
- Connect the output of the external device to one of the USB ports on the PRISM monitor.

NOTE. *A monitor with a 1920×1080 capable display works best with the instrument.*

We recommend you reboot the instrument after connecting an external touchscreen.

Manage the tile display

Each application can be independently changed to quarter, half, or full screen based on your requirements. The default for the PRISM instrument is to display four quarter screen tiles. These configurations show how to expand the applications to half or full screen tiles and collapse them back to a quarter of the screen.

Half screen tiles

Figure 18 and Figure 19 show different half screen configurations.

Select and hold on a tile to open the application banner and use the expand icon ( ) to expand the tiles vertically.

Figure 18: One half screen tile and two quarter screen tiles

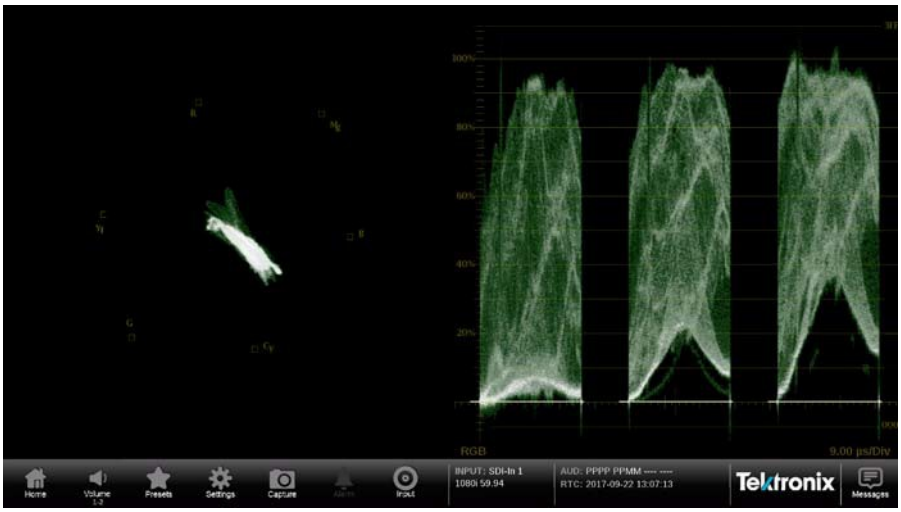


Figure 19: Two half screen tiles showing vector and waveform displays

Full screen tile

Figure 20 shows a full-screen display. One tile has expanded to use the entire PRISM monitor.

Double tap or click on the application to change it between full-screen and quarter- or half-screen mode. Alternately, select and hold one tile to open the application banner and use the maximize icon ( ) to expand the tile to full screen size.

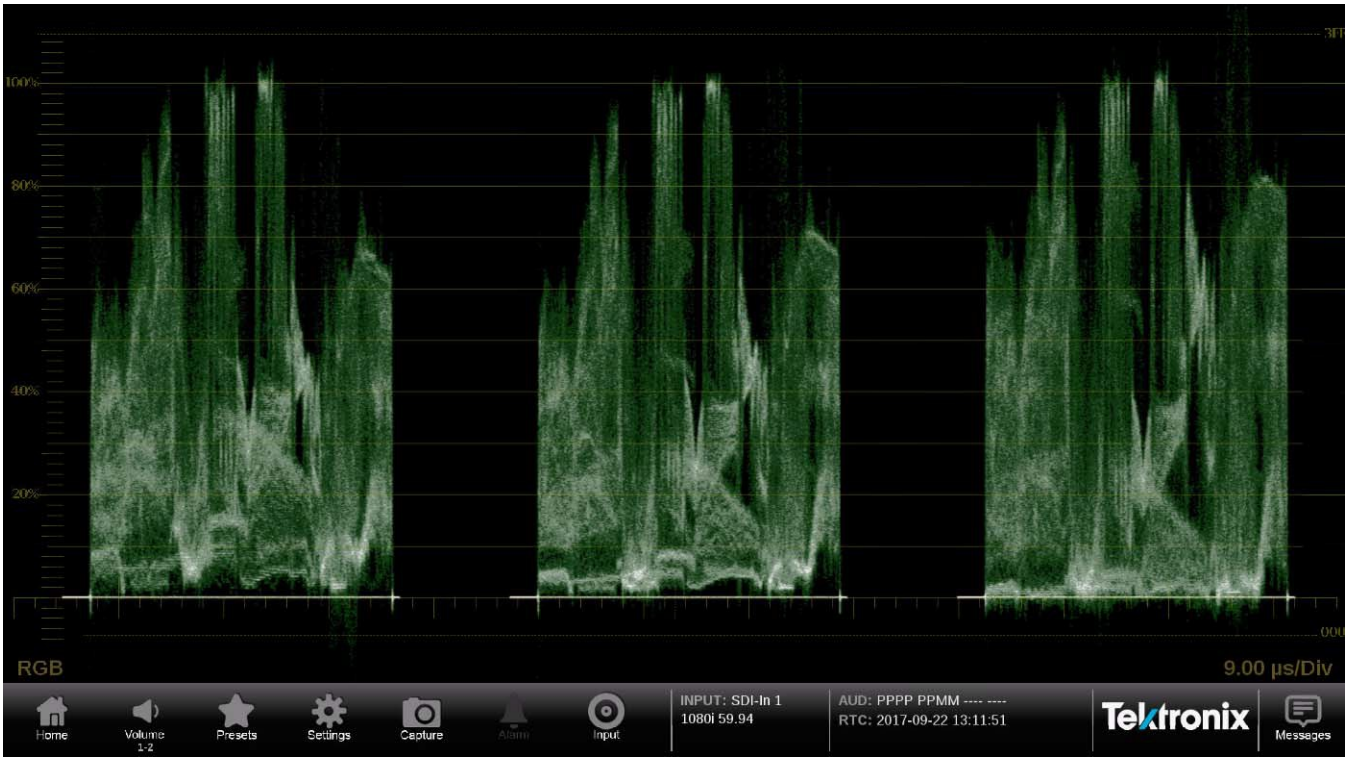


Figure 20: Full-screen tile

Quarter screen tiles

Setting tiles to a quarter screen allows you to view up to four tiles at the same time. (See Figure 21.)

Select and hold a tile to open the application banner and use these icons to re-size the application.

- Use the minimize icon ( ) to exit full screen mode.
- Use the collapse icon ( ) to collapse the tile vertically.

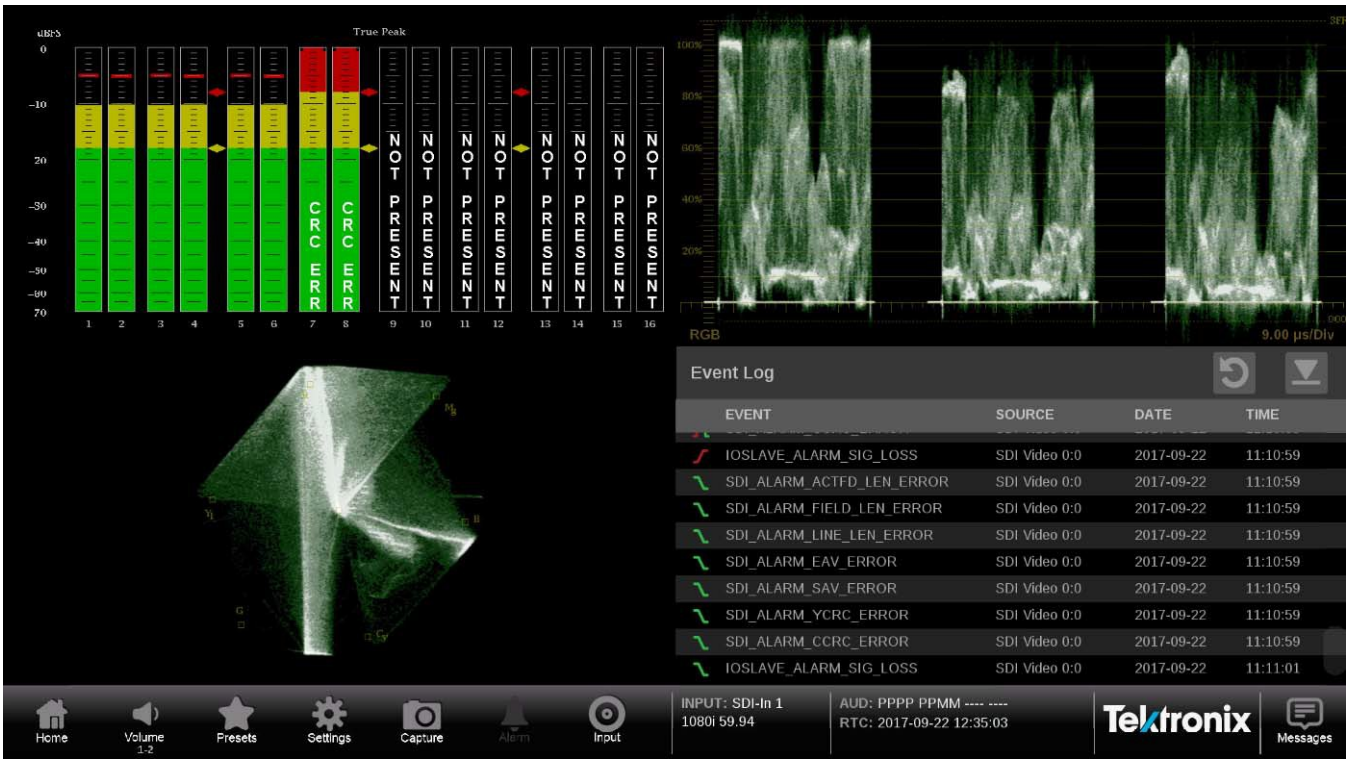


Figure 21: Four quarter screen tiles

Remote control through VNC operation

When the PRISM monitor is connected to an Ethernet network, you can use a computer connected to the same network to remotely control the instrument in a web browser or in a VNC client such as VNC Viewer.

To connect to the PRISM monitor through VNC:

VNC client. When using VNC for extended periods of time, we recommend using a VNC client.

1. On the PRISM monitor to connect to, select **Settings** and then select **Network**.
2. Find the Control IP Port IP address of the instrument to connect.
3. On your computer, open your VNC client and enter the IP address of the Control IP Port of the instrument in the VNC Server search bar.

NOTE. *A unique PRISM Hostname can be used instead of the IP address. To set a Hostname, select* ***Settings*** *and then select* ***Network,*** *and select the* ***Web Remote*** *tab.*

The VNC client connects to the instrument in a separate window that appears exactly like the instrument display.

Web browser. To connect to the instrument through a web browser.

1. On the PRISM monitor to connect to, select **Settings,** select **Network**, and find the Control IP Port IP address of the instrument.
2. In a web browser, enter the address

   http://xxx.xxx.xxx.xxx:6080/vnc.html

   where xxx.xxx.xxx.xxx is the IP address of the Control IP Port of the instrument.

NOTE. *If you have set a unique Hostname for the instrument, enter it in the browser address bar and select the* ***noVNC Access*** *link.*

This opens a login web page. (See Figure 22.)

Figure 22: noVNC web page

3. In the Control bar, select the **Settings** icon ( ) to open the Settings dialog box. (See Figure 23.)

4. In the Settings dialog, select the Scaling Mode drop-down list and select **Local Scaling**, and then click **Apply**.

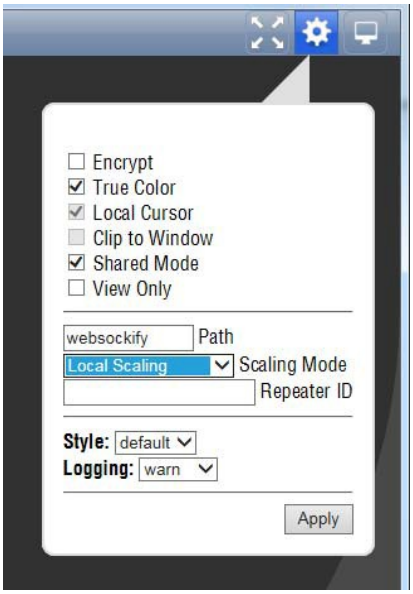


Figure 23: Settings dialog box with Local Scaling selected

5. In the Control bar, click the **Connect** icon ( ) to open the Connect dialog. (See Figure 24Figure 22.

6. In the Settings dialog, enter the default password **PRISM**, and then click **Connect**.

NOTE. *To change the default password for the remote web connection, in the PRISM Settings, in the Network menu, open the WEB REMOTE tab.*

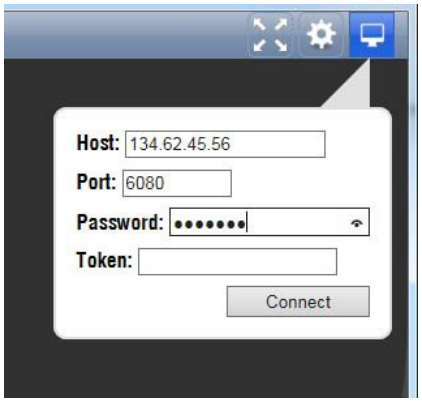


Figure 24: Settings dialog box with the password entered

The web browser connects to the instrument with the browser display appearing exactly like the display on the external monitor, but with a slower update rate.

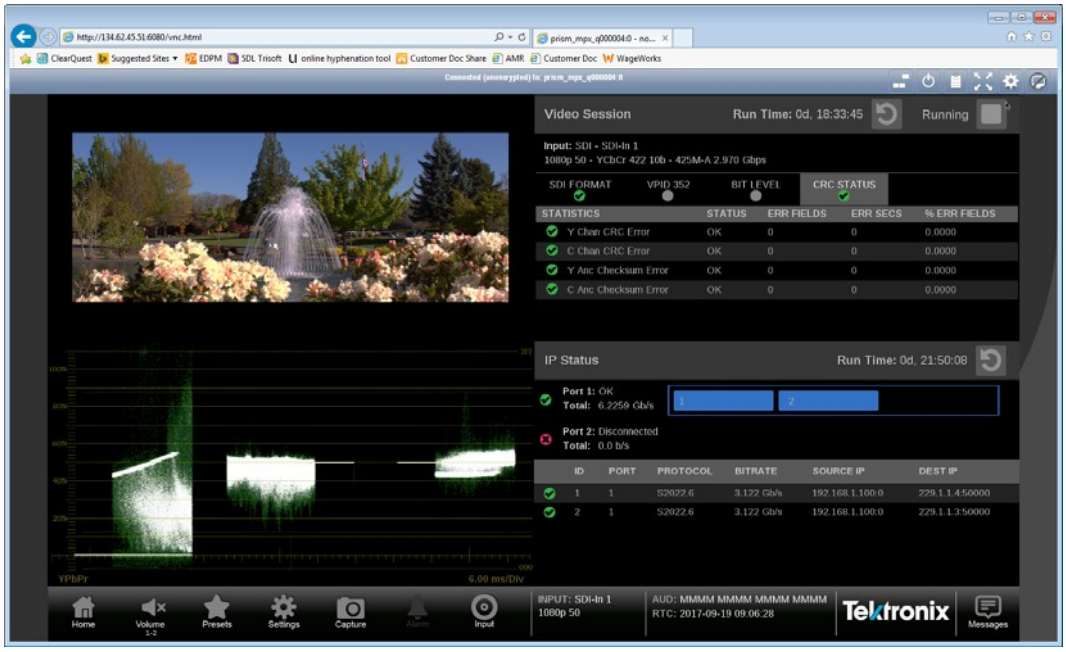


Figure 25: Sample web browser with an instrument displayed

NOTE. *If the correct Scaling Mode to Local Scaling is not selected, you will have to disconnect using the computer icon at the top of the viewer to gain access the Settings menu.*

Remote control through API commands

The PRISM monitor has a limited command set for controlling the instrument using REST-style API commands. You can use GET and POST commands to configure the signal inputs and to select the active input.

To access the API documentation:

1. On the PRISM monitor to connect to, open **Settings**, then **Network,** and find the Control IP Port IP address.
2. In a web browser, enter the address

   http://xxx.xxx.xxx.xxx:9000/api/help

   where xxx.xxx.xxx.xxx is the IP address of the Control IP Port of the instrument.

NOTE. *If you have set a unique Hostname for the instrument, enter it in the browser address bar and select the* ***API Help Page*** *link.*

This opens a PRISM API Documentation web page similar to Figure 26.

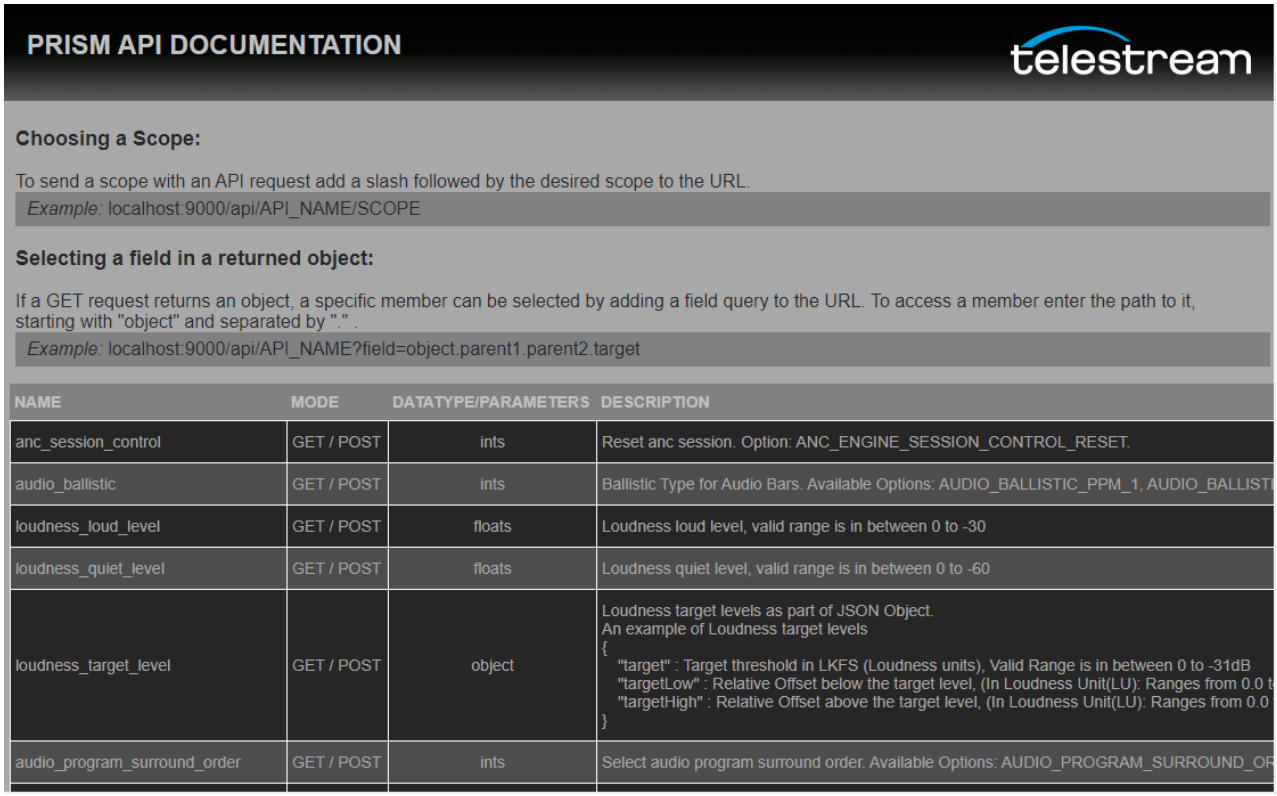


Figure 26: API documentation web page

Configure the instrument

Most of the instrument settings are controlled using the Settings menu. You can access the global settings menu by selecting the Settings icon ( ). This section describes how to configure these instrument settings:

- Signal inputs (See Configure and select the signal inputs.)
- HDR monitoring (See Configure the instrument for HDR / WCG monitoring.)
- PTP reference settings (See Configure the reference settings.)
- Presets (See Set and recall the instrument presets.)
- Internal time and date (See Set the time and date.)
- Firmware upgrade (See Upgrade the instrument firmware.)
- Installed software and hardware versions (See Verify the firmware upgrade.)

NOTE. *Some of the configuration settings require you to enter values. A USB keyboard can be used to enter these values instead of using the touchscreen keypad on the instrument.*

Configure and select the signal inputs

The PRISM monitor allows you to configure multiple signal inputs. Select the **Settings** and then **Inputs** to:

- Configure SDI inputs
- Configure IP stream inputs, including ST2022-6 and ST2110-20/30/40 IP streams
- Modify input names
- Enable ST2022-7 Seamless Switching

The input selection of the PRISM is displayed in the middle of the status bar. The first line is the user defined name and the second line is the format.

CAUTION. *IGMP communications can fail when the Video IP Ports are configured for the same IP Address. The control port and both video ports should always have different IP addresses and be on different subnets.*

Configure SDI inputs

Quad link SDI is only available when software option MP2-FMT-4K is present. If this option is not present, only a single link can be configured.

Single link input configuration:

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Select **Inputs** to open the Inputs submenu. (See Figure 27.)

Figure 27: Settings menu

NOTE. *shows six virtual inputs to choose from. Inputs can be given any meaningful name.*

Figure 28: Settings inputs submenu

3. Select an SDI input.

4. Select **Single** for the Input Configuration and select one of the four physical SDI inputs to monitor. shows the SDI 1 input selected.

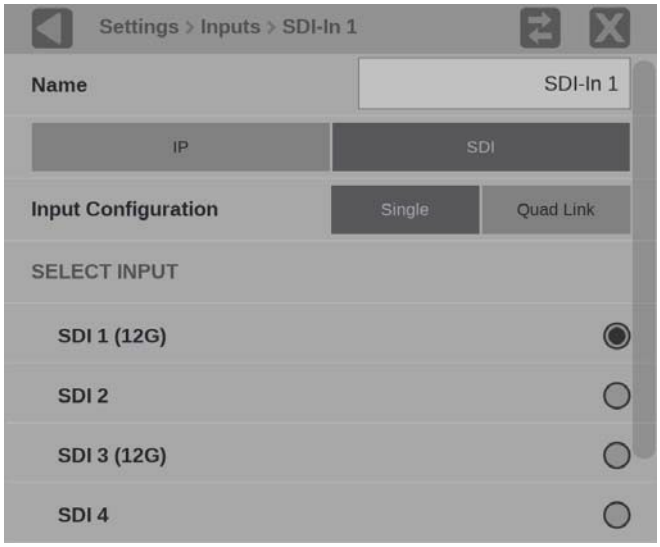


Figure 29: Single SDI signal configuration

5. Select **Save** and close the menu.

Quad Link input configuration.

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Select **Inputs** to open the Inputs submenu.
3. Select an SDI input.

NOTE. *All four SDI inputs must be connected to a cable on the back of the instrument to use the Quad Link Input Configuration.*

4. Confirm that Quad Link cables are connected to the back of the instrument.
   - Quad Link A is connected to SDI-IN 1
   - Quad Link B is connected to SDI-IN 2
   - Quad Link C is connected to SDI-IN 3
   - Quad Link D is connected to SDI-IN 4

5. Select **Quad Link** for the Input Configuration. SDI 1-4 (Link A-D) is selected by default. (See Figure 30.)

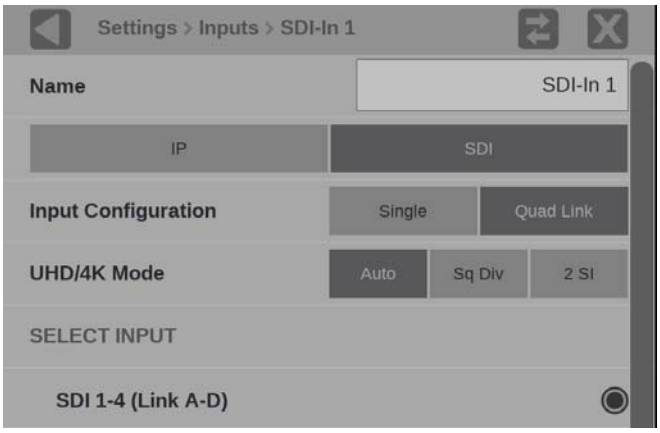


Figure 30: Quad Link SDI signal configuration

NOTE. *The Quad Link and UHD/4K Mode buttons are only available when software option MP2-FMT-4K is present.*

6. In the UHD/4K Mode line, select **Auto**, **Sq Div** (Square Division) or **2 SI** (Two Sample Interleave).

NOTE. *In AUTO mode, the instrument defaults to Two Sample Interleave mode if the Video Payload Identifier (VPID) complies with SMPTE 425.3 or SMPTE 425.5. The instrument defaults to Square Division mode if the VPID complies with SMPTE 292.1, SMPTE 372, SMPTE 425.1, or a quad-HD signal is present and VPID is missing. VPID in the signal is required for this option to operate properly.*

7. Select **Save** and close the menu.

Video settings. These settings are the same for Single- and Quad-Link input configurations. The Gamma and Color Gamut settings define the characteristics of the video signal.

1. Select **Video**. (See Figure 31.)

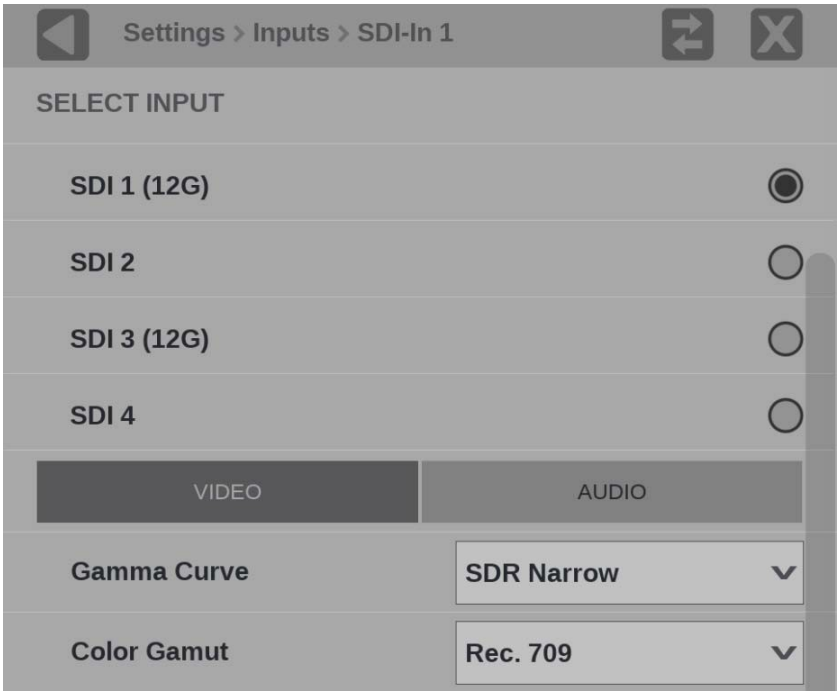


Figure 31: Video Signal Options

2. Choose the appropriate Gamma Curve selection from the drop-down menu. The selection characterizes the video signal on each virtual input.

    - **SDR Narrow**. The reference OETF (Optical to Electrical Transfer Function) is defined in ITU-R BT.709 with gamma of 0.45 and the reference EOTF (Electrical to Optical Transfer Function) is defined in ITU-R BT.1886 with gamma of 2.4.

      The Narrow Scaling places the extremes of the nonlinear color value from zero to unity at code words 40h(64) and 3ACh(940) in a 10-bit representation for 0% Black to 100% White.

    - **PQ Narrow**. The reference OETF with a high luminance range capability of 0 to 10,000 cd/m2 standardized in SMPTE2084. The EOTF is the inverse of OETF.

      The Narrow Scaling places the extremes of the nonlinear color value from zero to unity at code words 40h(64) and 3ACh(940) in a 10-bit representation for 0% Black to 100% White.

- **HLG**. The reference OETF is standardized in ARIB B67 and the reference EOTF is standardized in ITU BT.2100 at the nominal display peak luminance of 1000 nits.
- **S-Log2**. The reference OETF is defined as Sony S-Log2. The EOTF is the inverse of OETF.
- **S-Log3**. The reference OETF is defined as Sony S-Log3. The EOTF is the inverse of OETF.
- **S-Log3 (Live HDR)**. The reference OOTF (Optical to Optical Transfer Function) is defined as Sony S-Log3.
- **Log C**. The reference OETF is defined as ARRI Log C. The EOTF is the inverse of OETF.

3. Select the color space of the video signal using the **Color Gamut** selection from the drop-down menu.
   - **Rec. 709**. Standard for HD.
   - **Rec. 2020**. Standard for 4K.

NOTE. *Rec. 601 gamut is automatically selected when the SD format is detected / selected in the video signal.*

Audio settings. The Audio settings describe the how audio is embedded in the SDI input signal.

1. Select **AUDIO**. (See Figure 32.)

Figure 32: Audio signal settings

2. Choose the type of audio. Select **PCM** or **DOLBY**.

Select PCM.

a. Select **Program Configuration**.

b. Move the **Program Configuration** slider to **On**. (See Figure 33.)

c. Select **Edit**.

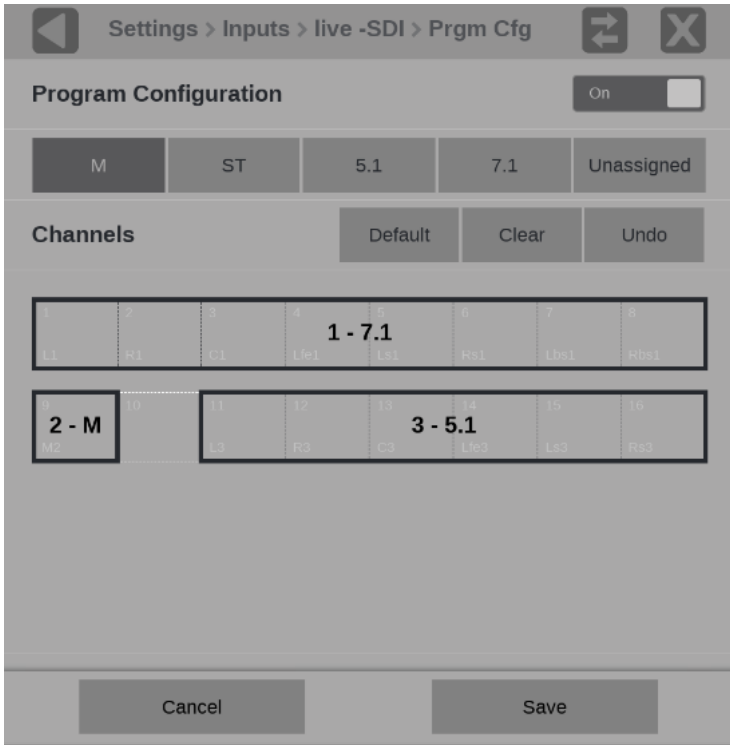


Figure 33: Program Configuration settings

d. Select the type of program (mono, stereo, etc.) and select the audio channel to assign it. Repeat until all the audio in the current input signal have programs assigned to channels. Select

- **M** is mono, 1 channel.
- **ST** is stereo, 2 channels.
- **5.1** is surround sound, 6 channels.
- **7.1** is surround sound, 8 channels.
- **Unassigned** removes an assignment from a channel. Click **Unassigned** and click any block in an assignment, for example the middle of a 7.1 assignment, the entire assignment is removed and is not displayed on the Audio application.
- **Default** resets the channels to 8 stereo pairs.
- **Clear** removes all assignments, including the default.

3. **Save** and close the menu.

NOTE. *You must save the program configuration to update the programs in the audio bars and loudness meter.*

Select DOLBY:

a. In the Dolby Audio Channel Pair menu, select the audio channel pair that contains Dolby audio.

Dolby audio in the selected channels are then decoded. Only Dolby E decode is supported.

b. Select **Save** and close the menu.

NOTE. *Audio programs configured in the Program Configuration menu are used to select a program for measurement by the Loudness application, to display audio bars in the Audio application, and to monitor with headphones. When all the channels are unassigned, all the channels are treated as stereo pairs. The audio programs in the Dolby E stream are automatically set up based on the Dolby E metadata.*

To rename a signal input.

1. To rename the input to a meaningful name, select the Name box to open the text editing display, shown in Figure 34.

Figure 34: Renaming a signal input

2. Use the editing controls to enter a new name for the input. Some notes on using the text editor:

- Enter a name with a maximum of 16 characters.
- Use the icon next to the input box to clear the existing name.

  Use the **shift** key to access capital letters.
- Use the **backspace** key to delete characters by backspacing over them.
- Use the **123-abc** keys to change between accessing letters and numbers/symbols.

3. When you are done editing the input name, select the **Enter** key.

4. When you are done editing the input, select **Save** to save your changes.

Configure IP stream inputs

To configure an IP stream:

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Select **Inputs** to open the Inputs submenu.
3. Select the input from the list.
4. Select **IP**. (See Figure 35.)

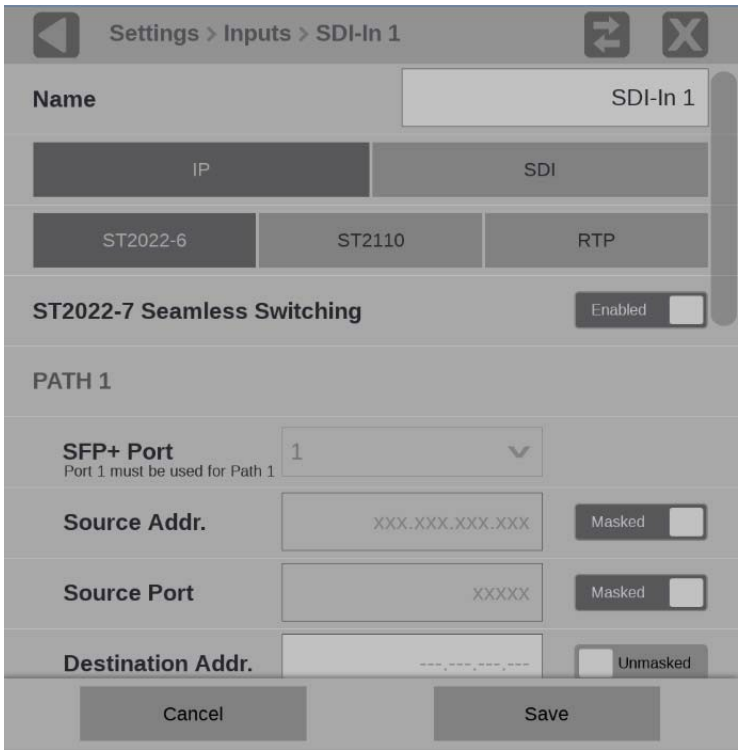


Figure 35: IP input protocols and ST2022-7 seamless switching

Configure ST2022. To monitor ST2022 streams:

1. Select **ST2022-6**.
2. Move the ST2022-7 Seamless Switching control to **Enabled** or **Disabled**.

NOTE. *There is a difference between "Port" and "Path". The Port is the physical SPF port that is used to input the 10GbE signal. Path 1 and Path 2 are the signal paths to be used for seamless switching. This differentiation is being made since it is possible for both Path 1 and Path 2 to use a single Port.*

NOTE: *With ST2022-7 seamless switching, a reconstructed output stream is created from the two input streams. The reconstructed stream is used downstream for various display tiles like Picture. The buffer size to absorb the packet reception time difference between Path1 and Path2 is 10ms. The output stream reconstruction will not work properly for streams on Path1 and Path2 with skew greater than 10ms. This error makes tiles show the wrong images and information.*

3. Enter the Source and Destination information for Path 1 and Path 2, if applicable.

NOTE. *Path 2 is only available if ST2022-7 Seamless Switching is enabled. You may have to scroll down to see Path 2.*

4. To have the instrument ignore a parameter, select the **Unmasked** control next to the parameter to change the state to Masked.
5. To edit one of the parameter values, select inside the parameter box to open the editing display as shown in Figure 36.

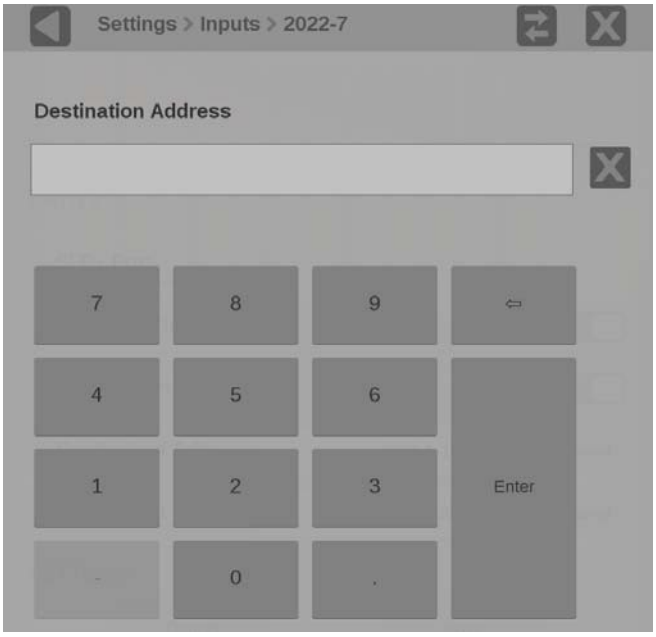


Figure 36: Editing parameter fields

6. When you are done editing, select **Enter**.
7. Scroll down to enter the Source and Destination information for Path 2.

NOTE. *If ST2022-7 Seamless Switching is set to Disabled only Path 1 is available.*

8. Select the Gamma and Color Gamut settings for the video stream. See Video IP input settings for available Gamma and Gamut selections.
9. Select **Save** and close the menu.
10. To begin monitoring this input, select the configured input. (See Input selection.)

Configure ST2110. To monitor ST2110 streams:

1. Select **ST2110**.
2. Move the NMOS control to **Enabled** or **Disabled**. Enabling NMOS allows

system management software to discover, register, configure the input, and select the active input for monitoring.

NOTE. *NMOS Discovery and Registration must be enabled in the networksettings for this control to be available.* (See Enable NMOS discovery and registration.)

3. Move the ST2022-7 Seamless Switching control to **Enabled** or **Disabled**.

NOTE. *For ST2022-7 Seamless Switching, the two Path 1 and Path 2 streams should be identical. If the streams are not identical then error messages will be shown in the Status Bar.*

There is a difference between "Port" and "Path". The Port is the physical SPF port that is used to input the 10 GbE signal. Path 1 and Path 2 are the signal paths to be used for seamless switching. This differentiation is being made since it is possible for both Path 1 and Path 2 to use a single Port (not currently supported).

NOTE: *With ST2022-7 seamless switching, a reconstructed output stream is created from the two input streams. The reconstructed stream is used downstream for various display tiles like Picture. The buffer size to absorb the packet reception time difference between Path1 and Path2 is 10ms. The output stream reconstruction will not work properly for streams on Path1 and Path2 with skew greater than 10ms. This error makes Picture tiles show the wrong image.*

4. Select the **Video (2110-20)**, **Audio (2110-30)**, or **Data (2110-40)** stream tab.

To configure the Video (2110-20) stream:

a. In the Video (2110-20) stream tab, move the Enable Video control to **Enabled** to begin configuration. (See Figure 37.)

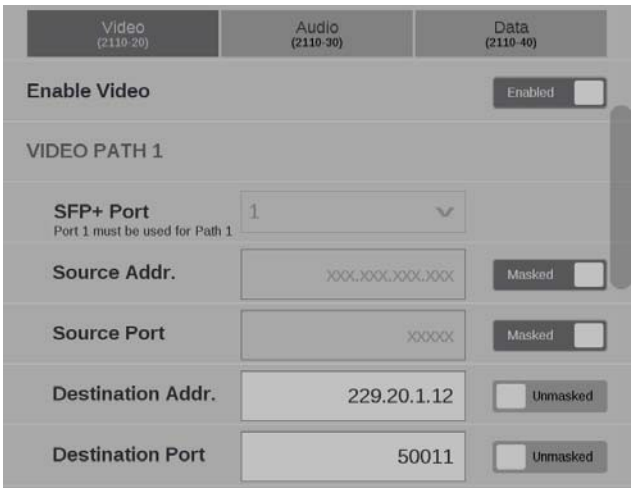


Figure 37: Enabling a ST2110-20 video stream

b. Enter the Source and Destination information for each video stream.

c. Set the RTP Payload Type between 96 to 127 for each of the enabled streams.

NOTE. *The RTP Payload Type number must be unique for each IP stream. The RTP Payload Type is displayed in the IP Status application.*

d. Set the Packet Read Schedule (PRS) to **Gapped**, **Narrow Linear**, or **Wide Linear** to correctly measure the CMAX and VRX buffer measurements in the IP graphs.

NOTE. *The PIT Histogram can be used to access the type of gapped, narrow linear, or wide linear stream.*

e. Select the Gamma and Color Gamut settings for the video stream.

To configure the Audio (2110-30) stream:

a. In the Audio (2110-30) stream tab, move the Enable Audio control to **Enabled** to begin configuration. (See Figure 38.)

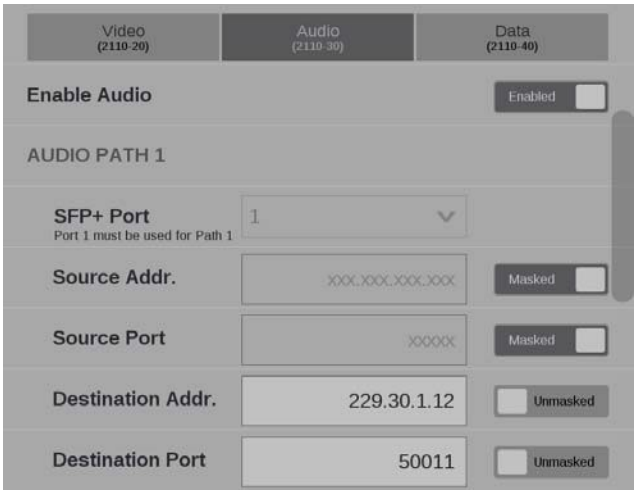


Figure 38: Enabling a ST2110-30 audio stream

b. Enter the Source and Destination information for each audio stream.

c. Set the **RTP Payload Type** for the between 96 and 127 for each of the enabled streams.

NOTE. *The RTP Payload Type number must be unique for each IP stream. The RTP Payload Type is displayed in the IP Status application.*

d. Set the number of channels. Bit Depth is always 24.

NOTE. *If the audio bars are flashing in the audio display, it is possible that the audio input configuration is not set up correctly. Check the IP address, port, and payload type from the IP session display and make sure to select the correct number of audio channels.*

To configure the Data (2110-40) stream:

a. In the Data (2110-40) stream tab, move the Enable Data control to **Enabled** to begin configuration. (See Figure 39.)

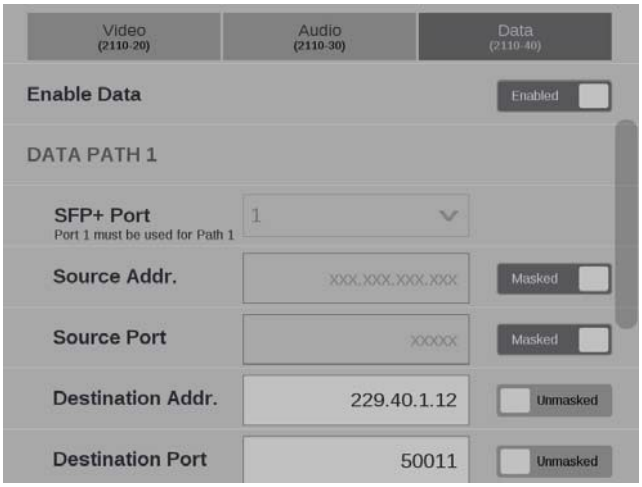


Figure 39: ST2110-40 data stream enabled

b. Enter the Source and Destination information for each data stream.

c. Set the RTP Payload Type between 96 and 127 for each of the enabled streams.

NOTE. *The RTP Payload Type number must be unique for each IP stream. The RTP Payload Type is displayed in the IP Status application.*

5. Select **Save** and close the menu.
6. To begin monitoring this input, select the configured input. (See Input selection.)

Configure RTP. Monitoring general purpose RTP streams allow you to see physical and IP layer measurements, but none of the video, audio, and data payload is decoded and displayed.

To monitor general purpose RTP streams:

1. Select **RTP**. (See Figure 40.)

Figure 40: Configure RTP

2. In **SFP Port** select the port being monitored.
3. Enter source and destination information.
4. Set the **RTP Payload Type** between 0 to 127.
5. Select the **Video Format** and **Frame Rate**.
6. Select **Save** and close the menu.
7. To begin monitoring this input, select the configured input. (See Input selection.)

Video IP input settings. These settings are the same for ST2022-6 and ST2110 video stream configurations. The Gamma and Color Gamut settings define the characteristics of the video signal.

1. Choose the appropriate **Gamma** selection from the drop-down menu. The selection characterizes the video signal on each virtual input. (See Figure 41.)

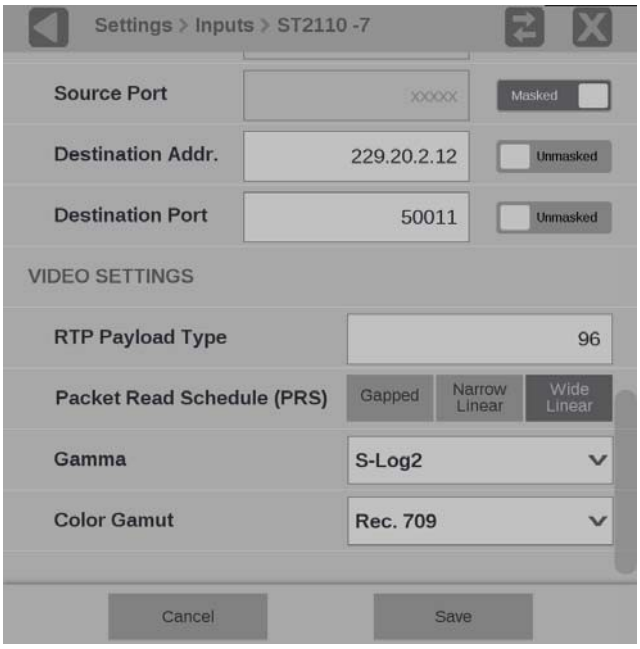


Figure 41: IP signal settings

- **SDR Narrow**. The reference OETF (Optical to Electrical Transfer Function) is defined in ITU-R BT.709 with gamma of 0.45 and the reference EOTF (Electrical to Optical Transfer Function) is defined in ITU-R BT.1886 with gamma of 2.4.

  The Narrow Scaling places the extremes of the nonlinear color value from zero to unity at code words 40h(64) and 3Ach(940) in a 10-bit representation for 0% Black to 100% White.

- **PQ Narrow**. The reference OETF with a high luminance range capability of 0 to 10,000 cd/m2 standardized in SMPTE2084. The EOTF is the inverse of OETF.

  The Narrow Scaling places the extremes of the nonlinear color value from zero to unity at code words 40h(64) and 3Ach(940) in a 10-bit representation for 0% Black to 100% White.

- **HLG**. The reference OETF is standardized in ARIB B67 and the reference EOTF is standardized in ITU BT.2100 at the nominal display peak luminance of 1000 nits.

- **S-Log2**. The reference OETF is defined as Sony S-Log2. The EOTF is the inverse of OETF.

- **S-Log3**. The reference OETF is defined as Sony S-Log3. The EOTF is the inverse of OETF.

- **S-Log3 (Live HDR)**. The reference OOTF (Optical to Optical Transfer Function) is defined as Sony S-Log3.

- **Log C**. The reference OETF is defined as ARRI Log C. The EOTF is the inverse of OETF.

2. Select the color space of the video signal using the **Color Gamut** drop-down menu.
   - **Rec. 709**. Standard for HD.
   - **Rec. 2020**. Standard for 4K.

NOTE. *Rec. 601 gamut is automatically selected when the SD format is detected / selected in the video signal.*

3. Select **Save** and close the menu.

Input selection

To select a configured input:

1. Select the **Input** icon ( ) from the Status bar at the bottom of the PRISM monitor.
2. Select a configured input from the list in the bottom bar. (See Figure 42.)

Figure 42: List of the configured inputs

3. Select the **Home** icon ( ) or select anywhere in an application tile to close the Input selection controls.

Configure the instrument for HDR / WCG monitoring

PRISM provides HDR / WCG monitoring features that set up and balance cameras in HDR / WCG during content creation. Before using these features, configure the signal input (See Configure and select the signal inputs.) Use the **Gamma** and **Color Gamut** drop-down menus to adjust the PRISM monitor settings to reflect the input signal properties.

These applications and features are used to configure the instrument for HDR / WCG monitoring.

Waveform display

In the Waveform display application, select the **Graticule** drop-down menu to select the graticule that fits your application. The trace represents the video data in the vertical axis. (See Waveform display application.)

- The %, mV, and Code Value are fixed graticules. They are compatible with the traditional waveform scales.
- The Reflectance and Stop graticules vary depending on the gamma selection in the Input Settings menu. These are the Scene light graticules that are used for scene setting and camera exposure adjustment.
- The Nits graticule varies depending on the gamma selection in Input Settings menu. This is the Display light graticule and is used for mastering the content for a targeted HDR system.

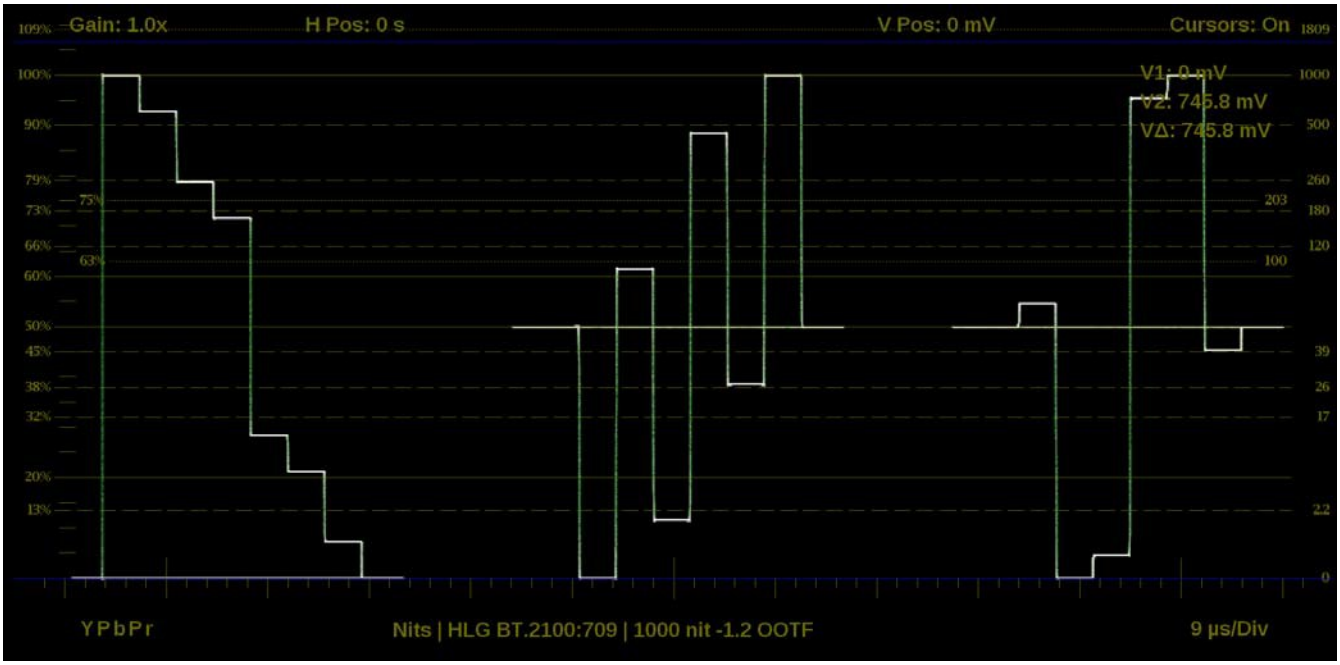


Figure 43: Waveform display with nits scale

Stop Display (Option MP2-PROD only)

In the Stop Display application settings menu (select and hold in the application tile and select the icon), select **Display light** or **Scene light** from the Reference setting depending on your application. The trace represents light level in the vertical axis. (See Stop Display application.)

- **Scene Light** shows a Stop graticule in the vertical axis and is fixed regardless of the selected Gamma. It is used for scene setting and camera exposure adjustment.
- **Display Light** show a Nits graticule in the vertical axis and is fixed regardless Gamma selected. It is used for mastering the content for a targeted HDR system.

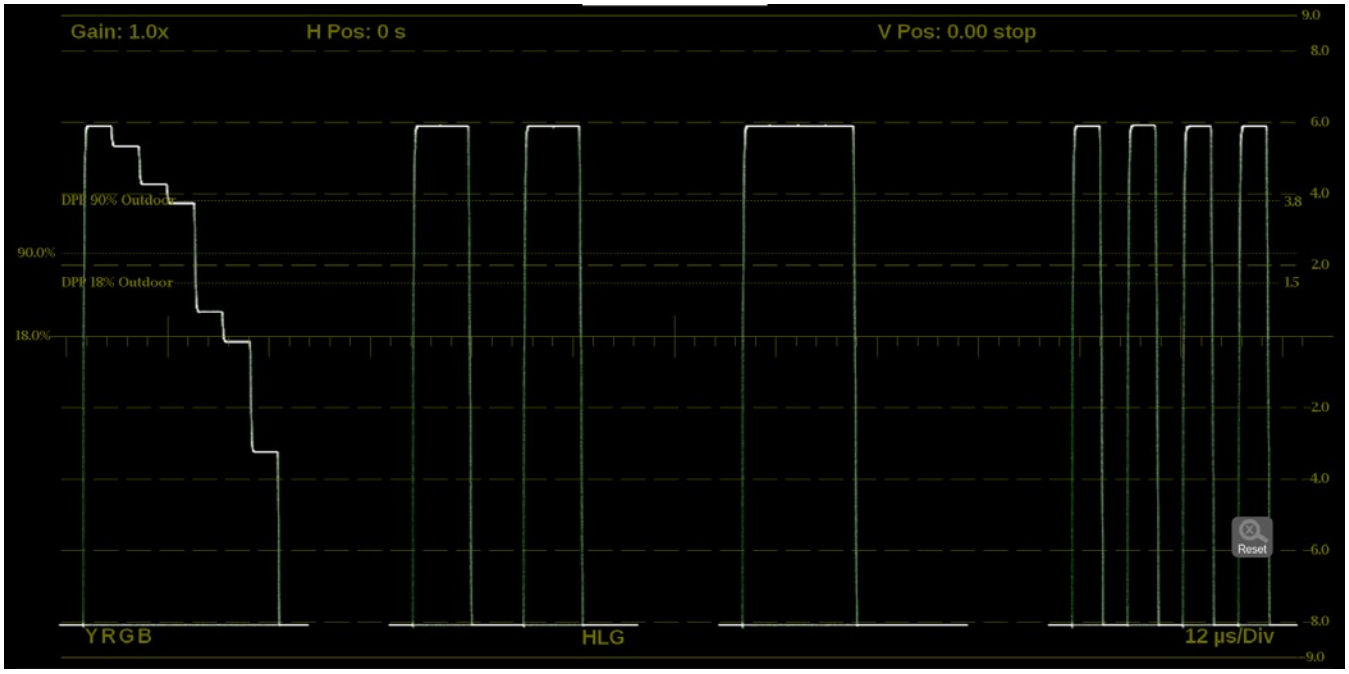


Figure 44: Stop Display with Stop scale

Transfer function/color space conversion (Option MP2-PROD only)

Transfer function/color space conversion is available in Waveform, Vector, Diamond, and Picture applications. Use the **Convert to Rec. 709** feature to convert the Gamma / Gamut settings for the signal to the BT. 709 Gamma / Gamut signal. This feature allows you to match the skin tone and the color in BT. 709 Gamma / Gamut displays. The conversion between input video and linear light is processed in Scene light.

NOTE. *Convert to Rec. 709 mode is not supported for SD signals.*

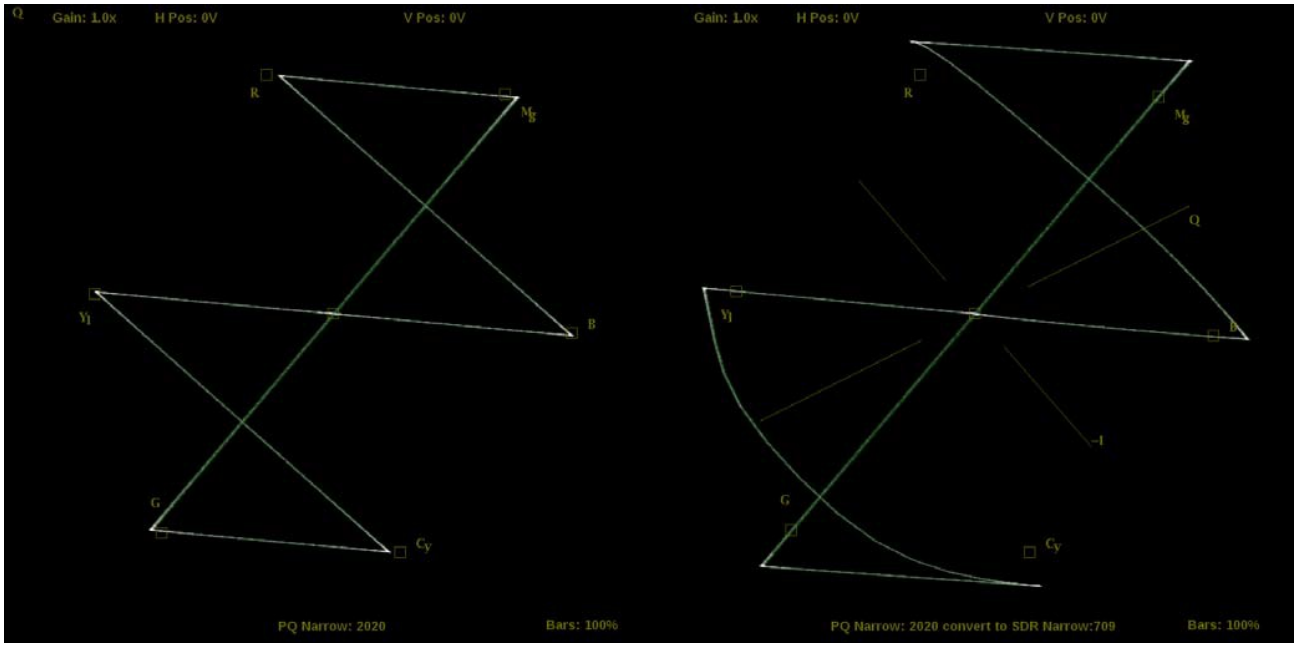


Figure 45: Vector display with (right) and without (left) Convert to Rec. 709 enabled, 100% color bar in PQ/BT.2020

Enable NMOS discovery and registration

The NMOS/SDP and API allows system integrators to build an IP system with PRISM being managed by system management software. The software discovers, registers, configures inputs, and selects the active input for monitoring.

To enable NMOS on your instrument:

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Select **Network** to open the Network submenu.
3. Move the **Enable NMOS Discovery & Registration** control to **Enabled** or **Disabled**. (See Figure 46.)
4. Close the Network menu.

Figure 46: NMOS discovery and registration enabled

NOTE. *The Advertised Port is the physical port on the back of the instrument. The Control selection is for the RJ-45 10/100/1000Mbps Ethernet port.*

Adjust Loudness Display

The Loudness meter is a part of the Audio App in PRISM and is configured in the Settings menu. The Audio Loudness Display allows you to view audio loudness values associated with audio loudness measurements. This instrument maintains a running audio loudness session.

Turn on the Loudness Display:

1. Open the Audio app.
2. Select and hold anywhere in the Audio app tile to bring up the Application Settings Overlay.
3. Select the **Settings** icon ( ) to open the Audio Application Settings.
4. Set Loudness Display to **On**. (See Figure 47.)

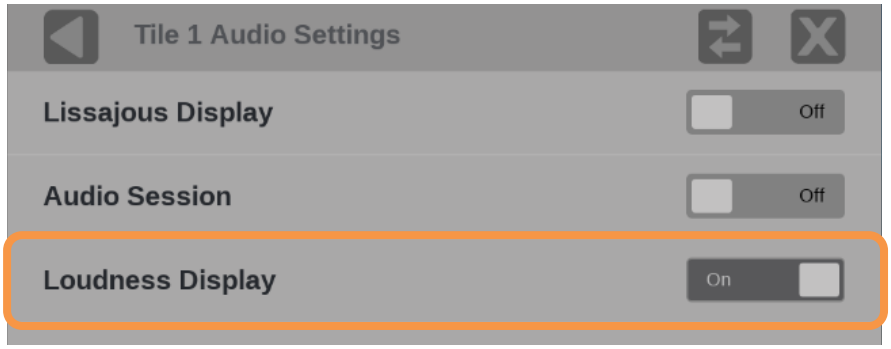


Figure 47: Audio Settings with the Loudness Display enabled

The Loudness Display appears in the right half of the tile. (See Figure 48.)

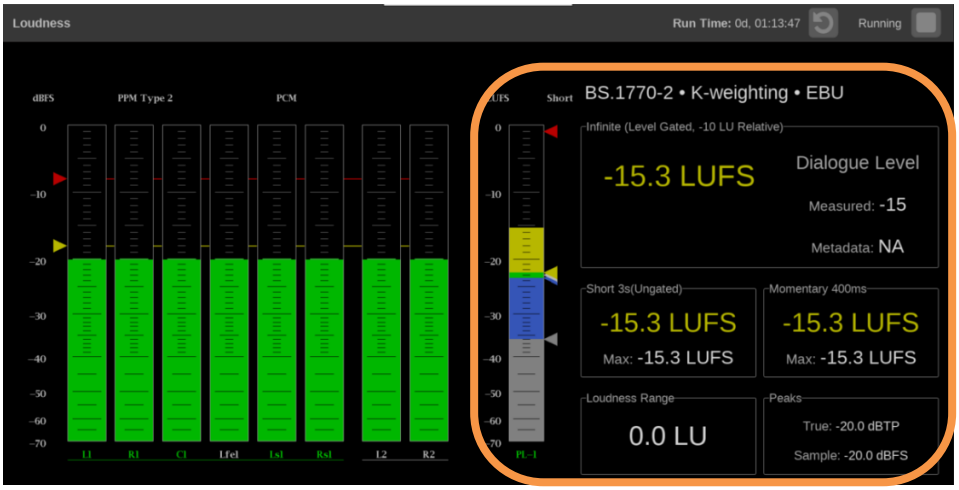


Figure 48: Loudness Display on the left of the Audio tile

NOTE. *The view varies based on the visibility selection of other auxiliary audio displays including Audio Session or Lissajous Display.*

Configure the Loudness meter:

1. Select the **Settings** icon ( ) from the status bar.
2. Select **Audio** to open the Audio submenu.
3. Select **Loudness Settings**. (See Figure 49.)

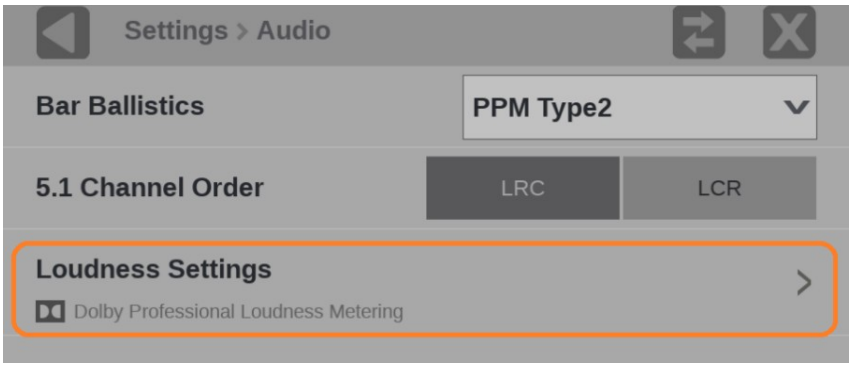


Figure 49: Audio submenu with the Loudness Settings marked

4. Load a standard preset: Select ***EBU R128:2014*** or ***ATSC A/85:2014*** for a pre-defined set of loudness metering configuration. (See Figure 50.)

   Or customize the Loudness meter configuration according to the metering measurement goal or audio content type (dialogue, music, or movie). Table 8 shows the available configuration parameters.

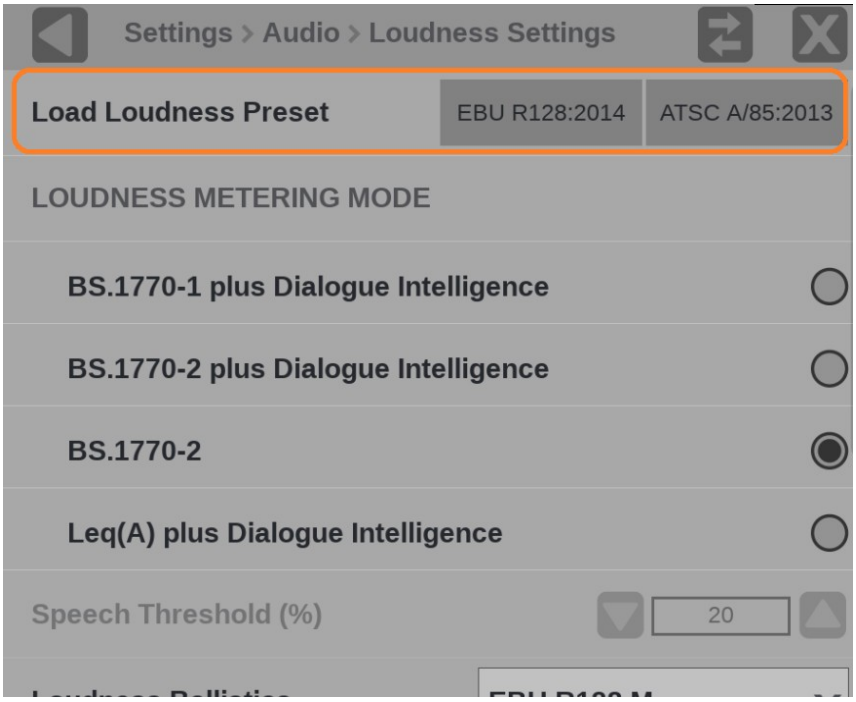


Figure 50: Loudness Settings with the Loudness preset options marked

Table 8: Configuration Parameters for Loudness Meter Configuration

Parameter	Available Configurations	Remarks
Metering Mode	BS.1770-1 with DI[1], BS-1770-2 with DI, Leq(A) with DI, BS.1770-2 w/o DI	Modes implies a weighting function (A-weighting or K-weighting) and gating technique(s) when performing loudness metering
Speech Threshold	0 to 100 %	Threshold above which the Speech Gating will be turned on in the DI enabled Metering modes.
Loudness Ballistics	Short Average, Long Average, EBU R128 M	Sets the response of the Loudness meter bar
Loudness Thresholds	Loud is 0 to -30 and Quiet 0 to -60 Full Scale Loudness	Sets the limits to trigger in-bar status for quiet and loud level.
Target Loudness	0 to -31LKFS with 0 to 10LU tolerance	Sets the intended target loudness (to be highlighted in the Loudness display with appropriate color code)
Short-Term Gating Window	EBU R128(3s), Legacy(10s)	Duration of the sliding windows for short-term loudness measurement
Full-Scale Units	LKFS or LUFS	Region specific selection; has no effect on measurement
True Peak DC Block and Emphasis Filter	Enable or Disable	DC block simulates the effect of downstream devices that remove DC. The emphasis filter compensates for dispersion effects from Nyquist filters in the broadcast chain that make it difficult to measure and control the peak levels of high-frequency signals.

[1] Dialogue Intelligence enabled

NOTE. *The dialogue intelligence algorithm in PRISM introduces a latency of 2.048s in the effective measurement of the short-term and infinite Loudness. Other Loudness measurement parameters are not affected by the latency.*

NOTE. *The Loudness measurements are updated every 500ms in the user interface.*

NOTE. *Maximum short-term Loudness level can be considered as an alternative to using Loudness range for short audio clips.*

Change the channels the Loudness meter measures. (See Figure 51.)

- Select the correct program labels at the bottom of the level bars (green letters are selected) and the Loudness meter measures the levels based on that audio program.

NOTE. *Changing the selected Audio Program that the Loudness meter measures changes the headphones or speaker pair output, and changing the headphones or speaker pair output changes the selected Audio Program the Loudness meter measures.*

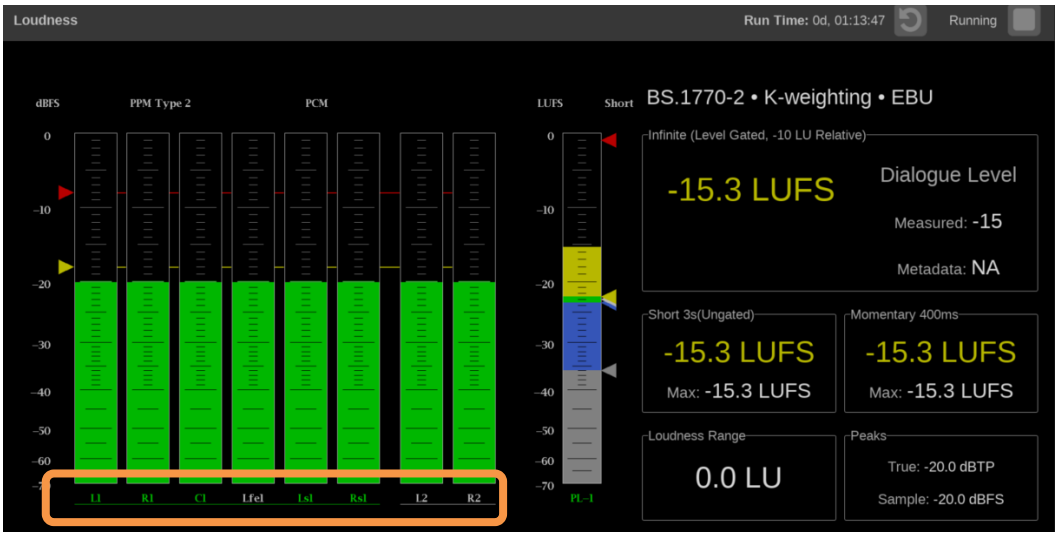


Figure 51: Audio tile with the program labels marked

Loudness meter labels: (See Figure 52.)

- The labels at the bottom of the audio bars (marked as 1) in this example means it is program 2 and there is a left and a right channel.
- The label at the bottom of the Loudness bar (marked as 2) means it is measuring program 2.
- The green letters in the status bar (marked as 3) mark the channels the Loudness display is measuring and where they are in the channel series.

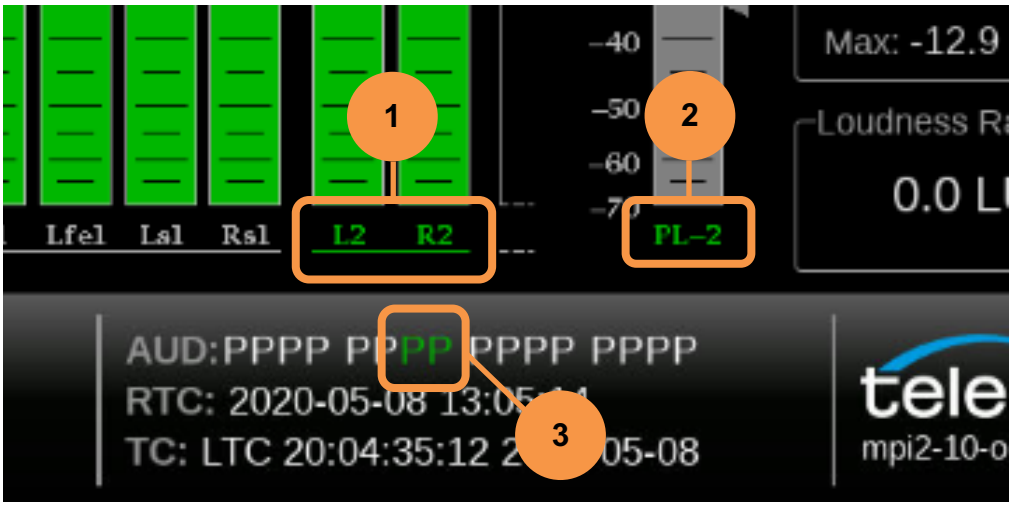


Figure 52: Program labels marked at the bottom of audio bars and in the status bar

Meter controls:

- To start and stop the loudness meter: select the  or  button. (See Figure 53.)
- To reset the measurement run time: select the  button.

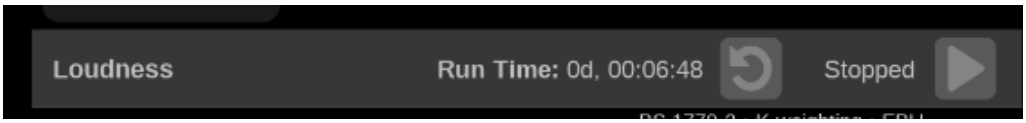


Figure 53: Loudness Display header

- The Audio Session and Loudness measurements can be independently stopped, started, and reset with the controls. (See Figure 54.)

Figure 54: Audio Session and Loudness Display headers

Configure instrument outputs

PRISM allows you to set the SDI OUT connector to Loop-through or Generator.

To change the SDI output:

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Select **Outputs** to open the Outputs submenu.
3. Set the SDI output to **Loop-through** or **Generator**. (See Figure 55.)

Figure 55: SDI output configuration

4. Close the Outputs menu.

SDI OUT loop-through of IP inputs is limited to ST2022-6 and ST2110-20 formats. See the SDI Generator applications for instructions on how to configure the SDI Generator signal.

SFP loop-through. Full-time loop-through outputs are available through the SDI SFP modules installed in the SDI SFP slots.

NOTE. *SDI SFP modules are available in two speed ranges: SD-3G and SD-12G.*

Configure to decode Timecode

Timecode. Decodes and displays ST 12-1:2014 Ancillary Timecode on the Status bar. ANC LTC (linear time code), ANC VITC (vertical interval time code), and Date Readout are supported.

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Select **Anc Data** to open the Anc Data submenu. (See Figure 56.)
3. In Timecode Format select **LTC** or **VITC** as needed and close the menu.

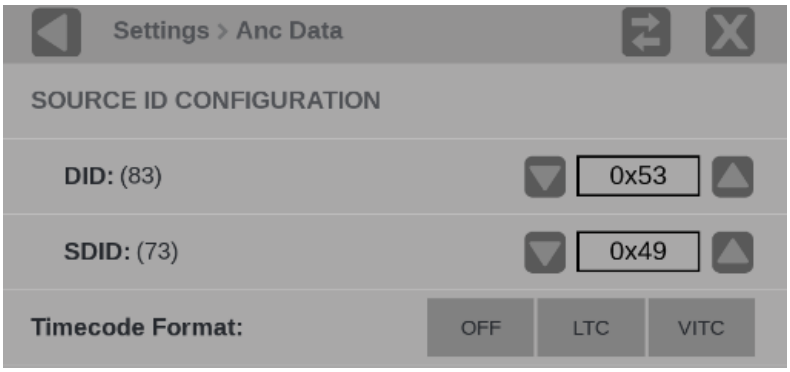


Figure 56: Reference configuration Anc Data

The selected timecode appears in the bottom border of the Status frame. (See Figure 57.)

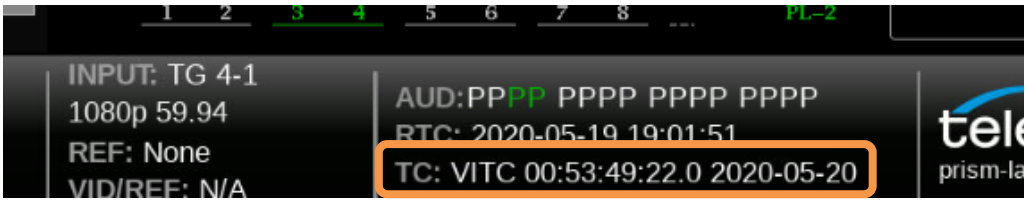


Figure 57: Status bar with VITC timecode marked

Configure the reference settings

The reference configuration of the PRISM is displayed in the middle of the status bar. The third line is the reference type and the fourth line is the Video versus Reference lock indication. This indication shows if the signal is N/A, Mismatched, Drifting, or Locked. (See Figure 58.)

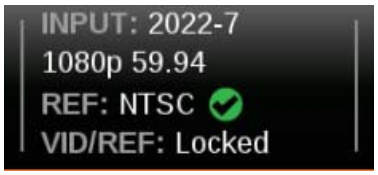


Figure 58: Reference configuration status

Choose the reference

The Timing application supports SDI timing against Analog external reference, Analog external reference timing against PTP, SDI timing against PTP, and IP timing against PTP.

To choose the external reference:

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Select the **Reference** menu and select the **Reference** submenu, as shown in Figure 59.

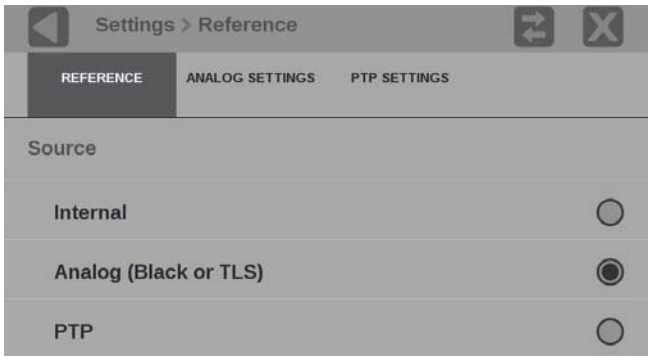


Figure 59: Input Reference options

3. Select from one of these reference options:
   - **Internal.** The timing is based on an internal clock.
   - **Analog.** Refers to a Black Burst (BB) or Tri-Level Sync (TLS) external reference. An analog external reference is connected to the REF BNC input on the back panel.
   - **PTP.** Refers to Precision Timing Protocol (PTP) external reference. PTP external reference must come through the 10GE SFP Port 1 input on the back panel.

NOTE. *When a reference selection is made the reference changes in the status bar and in the Timing application.*

Configure the analog reference settings

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Open the **Reference** menu and select the **Analog Ref Setting** submenu as shown in Figure 60.

Figure 60: Analog reference settings configuration

3. Select from one of these reference I/O options:
   - **Loop-Through.** The REF input is looped out the REF output BNC.
   - **Terminate Input.** The REF input is terminated at the REF input BNC. There is no signal at REF BNC.

Configure the PTP reference settings

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Open the **Reference** menu and select the **PTP Settings** submenu as shown in Figure 61.

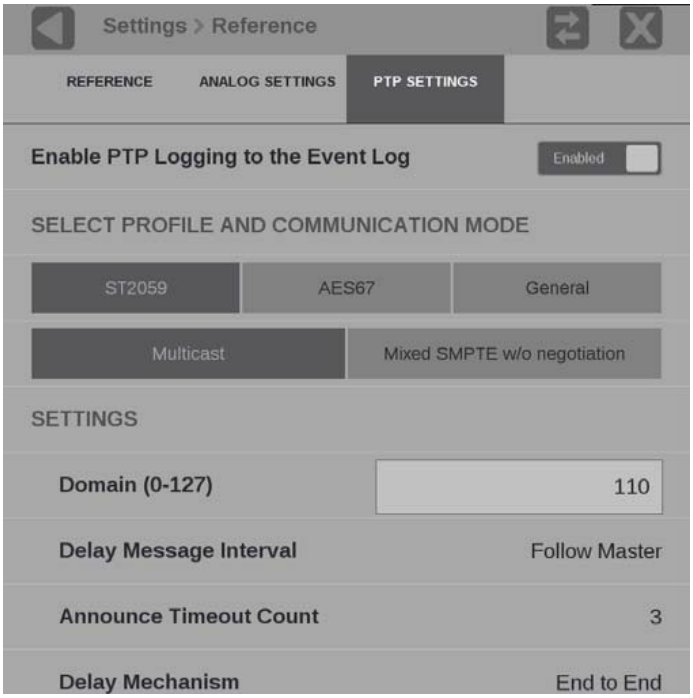


Figure 61: Editing PTP reference settings

3. To enable or disable PTP logging to the Event Log, select the control box to change the setting to the correct state.
4. Select the profile to configure: **ST2059**, **AES67**, or **General**. The default communication mode for each profile is Multicast.
5. If you selected the ST2059 profile and the communication mode will be a mixture of Multicast and Unicast, select **Mixed SMPTE w/o negotiation**.

NOTE. *On the SMPTE profile mixed mode, the PTP Announce and Sync messages are sent as Multicast. However, the Delay request and Delay Response messages are sent as Unicast.*

6. Select the **Domain (0-127)** box to open the editing display, as shown in Figure 62.

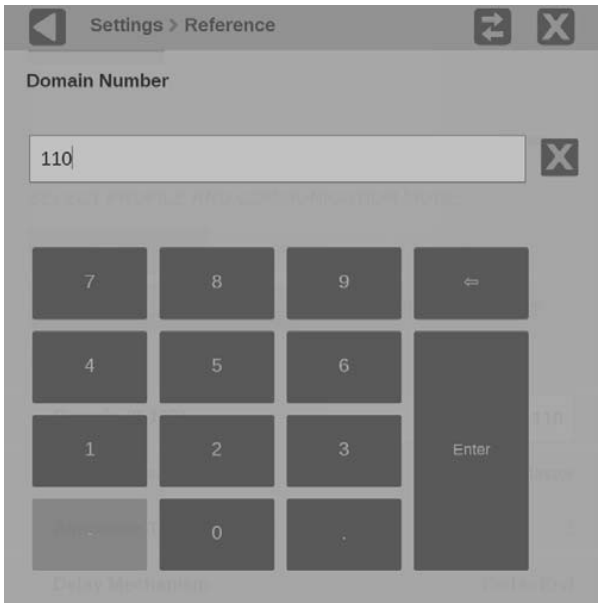


Figure 62: Domain number keypad for the PTP domain setting

7. Use the editing controls to enter a new domain number. Here are some notes on using the editor:
   - Select the icon to clear the existing domain number.
   - Select the **backspace** key to delete characters by backspacing over them.
8. When you are done editing the domain number, select the **Enter** key.
9. Repeat steps **4** to **6** for each PTP profile.

Set and recall the instrument presets

Instrument setups can become complex as you tailor them to monitor various parameters. To save set up time and ensure consistency, you can save and quickly access instrument setups in your instrument using the **Presets** icon on the instrument display.

NOTE. *For the MPX2-10 monitor, you can recall instrument presets from the front panel.* (See How to recall instrument presets.)

The instrument can store up to 36 separate instrument presets. The presets are divided into six groups, A through F, with each group containing 6 preset storage locations. The default preset names are A1 – A6, B1 – B6, C1 – C6, D1 – D6, E1 – E6, and F1 – F6.

All instrument settings except those set in the Utilities and Network Settings submenus of the Configuration menu are saved in a Preset. Settings that are not saved are those such as the clock setting, IP configuration, and network address. This is an overview of the settings saved in a Preset. Some settings are option dependent.

- Application assigned to each tile
- Application icon order in the application selector list
- Application specific settings
- Input selection and configuration
- PTP reference settings
- SDI Generator and IP Generator settings

Save and rename presets

To save a preset and to assign a user-defined name to the preset:

1. Set up the instrument exactly as you want it configured. This includes selecting the application display for each tile, and configuring inputs and the PTP reference settings.
2. Save the instrument settings as a preset:
   a. Select the **Presets** ( ) icon to open the Preset selection controls at the bottom of the PRISM display. (See Figure 63.)

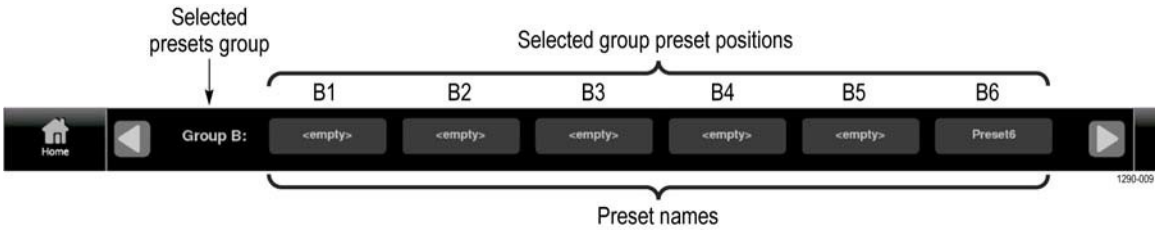


Figure 63: Preset selection controls (Group B shown)

b. Find the Preset button icon to use for the current instrument configuration. You can use the and arrow buttons or swipe left or right to go to the preset group (A–F).

NOTE. *When a preset has no content, <empty> is displayed on the preset button icon.*

c. When you have found the preset group to change, select and hold the preset button to assign the current instrument configuration to. The selected preset button is highlighted and a confirmation box appears. In the example, the Group B preset B6 is being saved. (See Figure 64.)

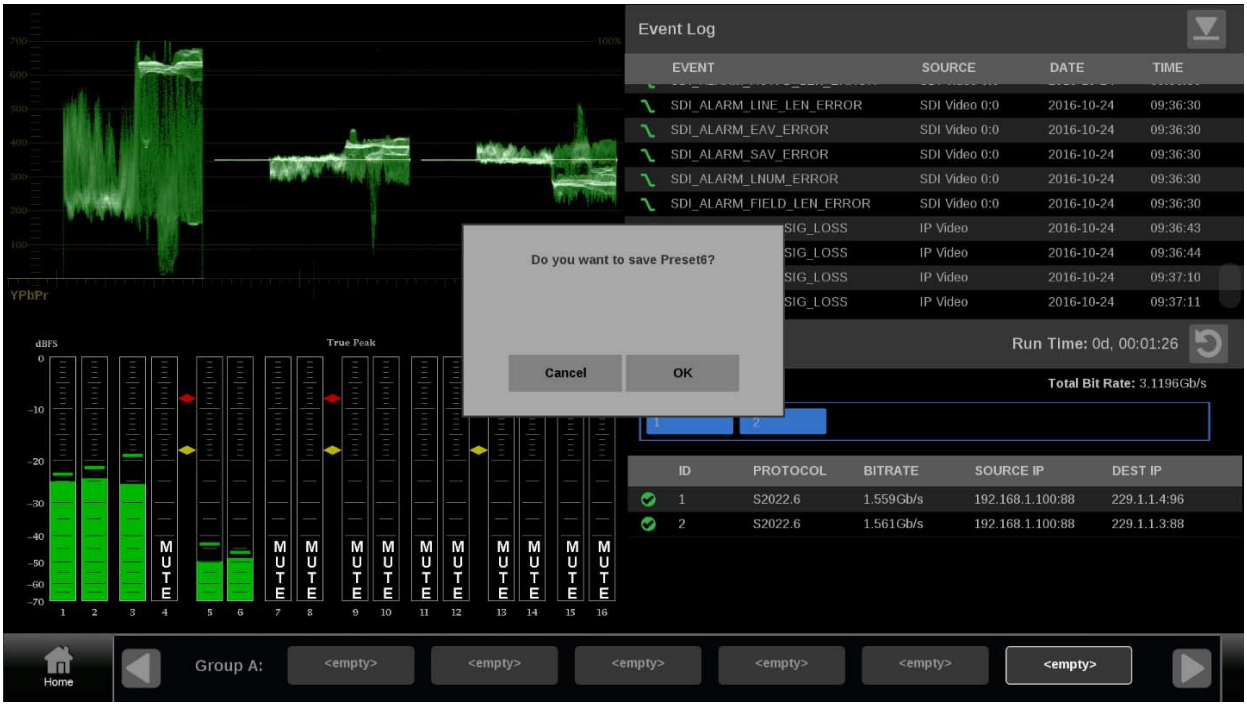


Figure 64: Assign a preset

d. Select **OK** to assign the preset or select **Cancel** to cancel the operation.

When you select OK, the preset name changes from <empty> to Preset <number>. The number is the preset position in the preset group. (See Figure 67.)

e. Select the **Home** icon ( ) or select anywhere in an application tile to close the Preset selection controls.

3. Assign a user-defined name to a preset:

a. Select the **Settings** icon ( ) to open the Settings menu.

b. Select **Presets** to open the Presets submenu.

c. Select **Rename** to open the Presets Rename submenu shown in Figure 65.

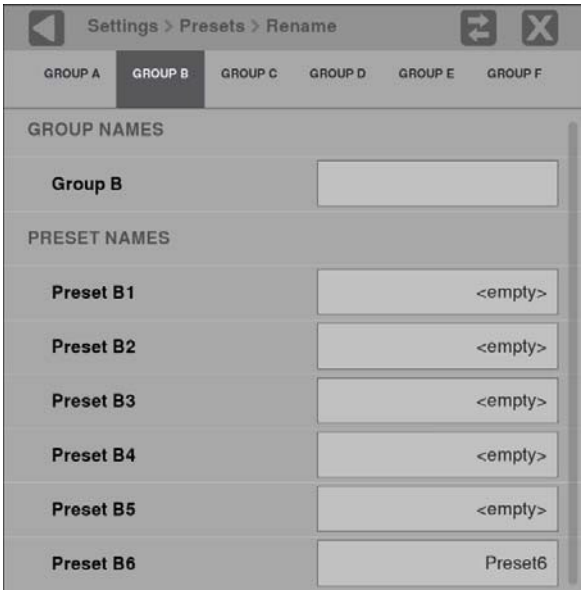


Figure 65: Example of Presets Rename submenu

d. Select the Preset group at the top of the submenu that corresponds to the preset you just saved. The example shows Group B being selected.

e. Select the preset name box you want to change. The editing display opens as shown in Figure 66.

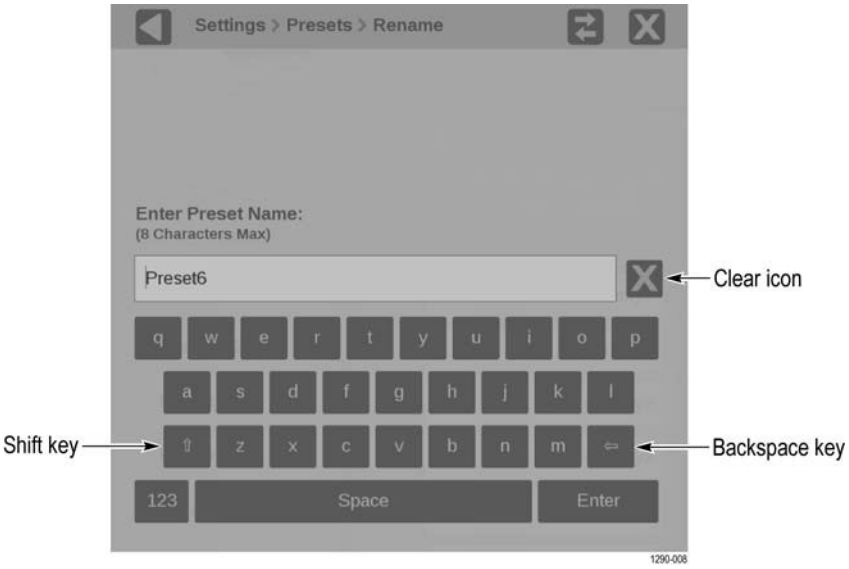


Figure 66: Editing a Preset name

f. Use the editing controls to enter a new name for the preset. Some notes on using the text editor:

- Enter a name with a maximum of 8 characters.
- Select the icon to clear the existing name.
- Select the **Shift** key to access capital letters.
- Select the **Backspace** key to delete characters by backspacing over them.
- Select the **123-abc** key to change between the letter keyboard, and the numbers and symbols keyboard.

g. When you are done editing the preset name, select the **Enter** key.

NOTE. *You can also assign a user-defined name to the selected preset group by selecting inside the Group Name box.*

Recall user-defined presets

1. Select the **Presets** icon ( ) at the bottom of the PRISM display to open the Preset selection controls. (See Figure 67.)

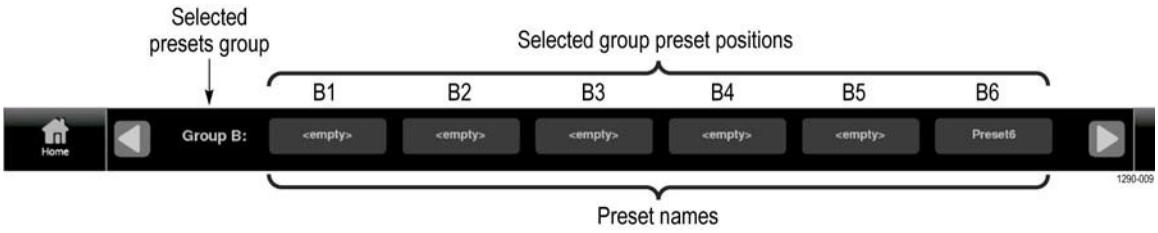


Figure 67: Preset selection controls (Group B shown)

2. Find the Preset to recall. Use the and arrow buttons or swipe left or right to go to the preset group (A–F).

NOTE. *When a preset has no content, <empty> is displayed on the preset button icon.*

3. When you have the preset group, select the preset button to recall. The selected preset button is highlighted and the instrument settings change to those assigned to the selected preset.

4. Select the **Home** icon ( ) or select anywhere in an application tile to close the Preset selection controls.

Recall the factory preset

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Select **Presets** to open the Presets submenu.
3. Select **Recall Factory Preset**. A confirmation box opens, shown in Figure 68.

Figure 68: Presets Rename submenu

4. Select **OK** to confirm the selection and to reset the instrument settings to the factory defaults. Table 9 lists the settings that are reset.

NOTE. *Custom presets are still available after recalling the factory preset.*

Table 9: Instrument settings that are reset by recalling the factory preset

Item	Setting
Tile 1 application	Waveform
Tile 2 application	Video Session
Tile 3 application	Picture

Item	Setting
Tile 4 application	Audio
SDI-In 1 input configuration	
Input name	SDI-In 1
Input type	SDI
Input connector	SDI 1
SDI-In 2 input configuration	
Input name	SDI-In 2
Input type	SDI
Input connector	SDI 2
SDI-In 3 input configuration	
Input name	SDI-In 3
Input type	SDI
Input connector	SDI 3
SDI-In 4 input configuration	
Input name	SDI-In 4
Input type	SDI
Input connector	SDI 4
SDI-SFP 1 input configuration	
Input name	SDI-SFP 1
Input type	SDI
Input connector	None selected
SDI-SFP 2 input configuration	
Input name	SDI-SFP 2
Input type	SDI
Input connector	None selected
PTP reference configuration	
PTP Logging to the Event Log	Enabled
Selected Profile	ST2059
ST2059 domain	127
ST2059 communication mode	Multicast
SDI Generator configuration	
Enable SDI Generator	Disabled
Reference	Internal
IP Generator configuration	
Enable IP ST2110 Generator	Disabled
Reference	Internal

Manage trace and graticule intensity

The brightness of an applications graticule and trace can be adjusted with the intensity sliders in the Display settings menu.

To adjust graticule and trace intensity:

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Select **Display** to open the Display submenu.
3. Use the icon to increase intensity or the icon to decrease intensity of the trace or graticules. (See Figure 69Figure 69.)

NOTE. *The intensity can also be adjusted by selecting anywhere in the slider or selecting and dragging the slider circle left or right.*

4. Close the Display settings menu.

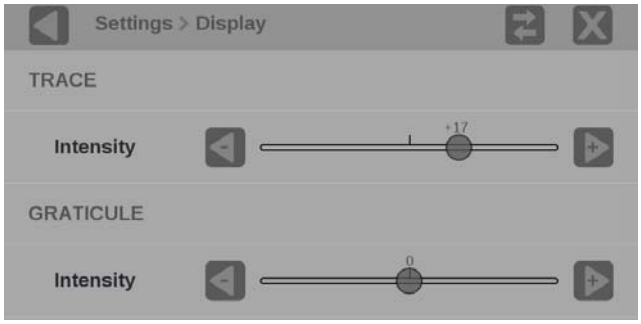


Figure 69: Trace and graticule intensity sliders

Set the time and date

To set the internal time and date used by the instrument to record events.

NOTE. *When the time and date settings are changed, the instrument must be rebooted to implement the changes.*

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Select **Utilities** to open the Utilities submenu.
3. Select **Time and Date** to open the submenu. The submenu has two tabs: TIME ZONE and TIME AND DATE.

WARNING. *Excess time changes can cause the loss of all license files. If the instrument license files are lost, servicing will be required. Time should only be changed less than ± 1 hour. Use the TIME ZONE tab to set the local time.*

4. Select **TIME ZONE** to open the submenu, shown in Figure 70.

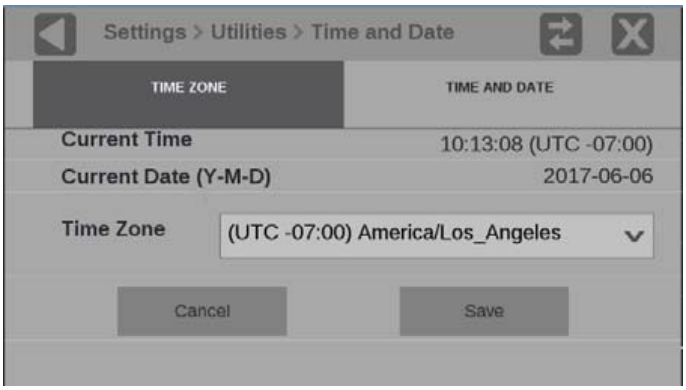


Figure 70: Time Zone submenu

5. Open the **Time Zone** drop-down list to select the correct time zone offset for your location. The selection names include the time offset from UTC and major cities within those time zones.
6. In the TIME AND DATE tab, adjust the time and date using the up and down arrows to adjust each parameter as needed. The time setting uses a 24-hour clock, so no AM/PM setting is required. (See Figure 71.)

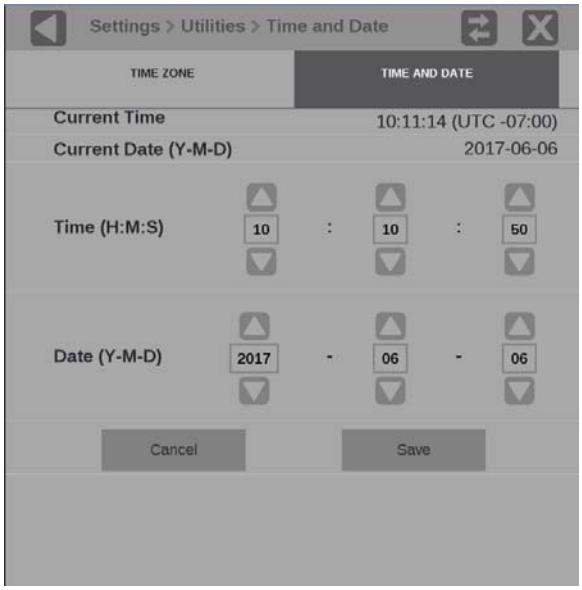


Figure 71: Time and Date submenu

7. When you are done setting the time and date parameters, select **Save**.
8. The message box, as shown in Figure 72, opens and asks if you want to reboot the instrument now or later to implement the time and date changes. Perform one of the actions:
    - Select **OK** to reboot the instrument immediately and implement the changes.
    - Select **Cancel** to cancel the operation.

Figure 72: Time and date change reboot message

Upgrade the instrument firmware

Before you begin

Telestream releases updates to product firmware to add new features or to fix reported problems. Check the Telestream website regularly for new firmware releases.

You do not need to perform a firmware upgrade if your instrument has the latest version of firmware already installed. To determine if the firmware on your instrument must be upgraded:

1. Power on the instrument.
2. Verify the current software version installed on the instrument:
   a. Select the **Settings** icon () to open the Settings menu.
   b. Select **Utilities** to open the Utilities submenu.
   c. Select **Version** to open the Version display.
   d. In the Software section, make a note of the version number installed on the instrument.

Instrument firmware version number	

3. Verify the latest version of firmware at the Telestream website:
   a. On a PC go to the Telestream website software page:

      www.telestream.net/video/resources.htm#Software.

   b. Click the product and model title that best matches your instrument (such as PRISM) and in the list, find the software-upgrade package for your instrument.
   c. Note the latest version number of the software-upgrade package(s).

Website firmware version number	

4. If the latest firmware version at the website is newer than the version on your instrument, you should upgrade the firmware.
5. Click the Firmware Release version for your instrument to download the update.
6. Go to the Upgrade the firmware procedure.

NOTE. *The time required to complete the upgrade is about 15 minutes.*

If you want the details of what has changed in the release, download the Release Notes for the version.

CAUTION. *After the instrument has started the upgrade process, DO NOT remove power from the instrument. If you do, the instrument flash will be corrupted, and the instrument will have to be sent to a Telestream factory service center to have the system firmware restored.*

NOTE. *If power to the instrument is lost before it begins erasing the internal flash, you can restart the firmware upgrade after the instrument reboots.*

Upgrade the firmware

1. Copy the upgrade file with a .bin file extension from the upgrade package onto a USB memory device. You need approximately 1 GB of available space on the USB device.

NOTE *If the upgrade package includes a readme.txt file, read the file before performing the upgrade. The file contains important information about the firmware release.*

2. Insert the USB memory device into a USB port on the PRISM monitor.
3. On the PRISM monitor, select the **Settings** icon ( ) to open the Settings menu.
4. Select **Utilities** icon to open the Utilities submenu.
5. Select **Firmware Upgrade**. After the USB device has been scanned, the display lists all of the files on the USB device with a .bin file extension.
6. Select the required file in the list, and then select **Install** to start the upgrade. (See Figure 73.)

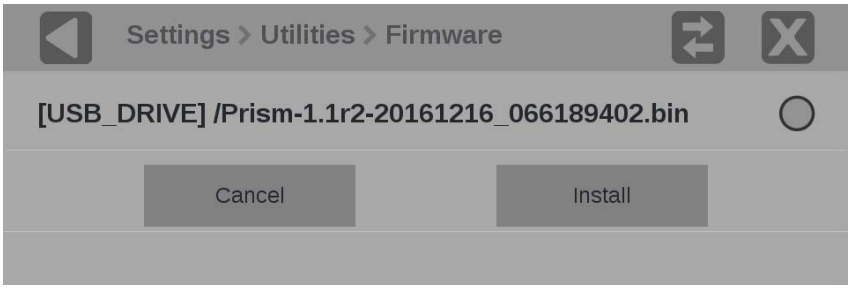


Figure 73: Select the firmware upgrade file

7. While the upgrade is in process, the message box, as shown in Figure 74, appears stating that the firmware installation is in progress.

CAUTION. *Removing the USB device or powering off the instrument before the upgrade is complete can cause upgrade failure. To prevent upgrade failure, wait until the Installation Complete message box is displayed before performing these actions. The upgrade may take up to five minutes.*

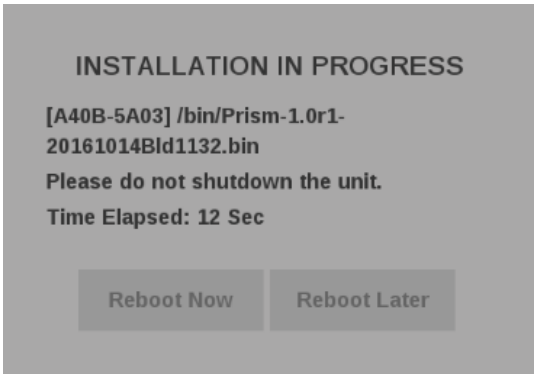


Figure 74: Upgrade Installation In-Process message box

8. Remove the USB device from the PRISM monitor.

Verify the firmware upgrade

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Select **Utilities** to open the Utilities submenu.
3. Select **Version** to open the Version display.
4. Verify the displayed firmware version number matches the version of the firmware upgrade package you installed.

Upgrade the software license

A software license upgrade allows you to add optional software features to your instrument. Go to www.telestream.net for the latest list of features that can be licensed.

Install the software license upgrade

To activate your licenses your instrument must be accessible by another computer on your local network. Your instrument does not need to access the internet.

To activate your licenses:

1. Connect your PRISM instrument to a local network and turn on power.
2. After the instrument has booted, find the IP address: select **Settings**, then **Network**, and finally select the **STATUS** tab.
3. Copy the IP address of the instrument under the CONTROL IP PORT heading.
4. Open a web browser and enter in the address bar the instrument IP address/licensePortal.html, for example,

   10.233.24.160/licensePortal.html.
5. Use the instructions in the Telestream License Activation section at the top of the web page. It's only possible to activate one license at a time.

For further assistance, contact our technical support team:

www.telestream.net/telestream-support/video/support.htm.

Verify the software license upgrade

1. Select the **Settings** icon ( ) to open the Settings menu.
2. Select **Utilities** to open the Utilities submenu.
3. Select **Options** to open the Options display.
4. Verify that the displayed option(s) match the option(s) you installed.

Functions

This section describes additional functions available on the PRISM monitor.

- Headphone and speaker volume, balance, and source adjustment
- Stream Capture

Headphone/speaker volume, balance, device, and source adjustment

In addition to the optional integrated speakers on MPX2-10, headphones can be connected to MPI2-10 or MPX2-10 products.

- MPI2-10 audio output rear panel connector (See Figure 10.)
- MPX2-10 audio output rear panel connector (See Figure 11.)
- MPX2-10 front panel headphone port

To access the volume, balance, and source controls:

1. Select the volume icon. (See Figure 75.)
2. Select the audio device to use.
3. Select the source from the list of available channel pairs.
4. Use the slider or arrow buttons to turn the volume up or down
5. Use the slider or arrow buttons to adjust the audio balance left or right
6. Use the mute button to mute the audio.

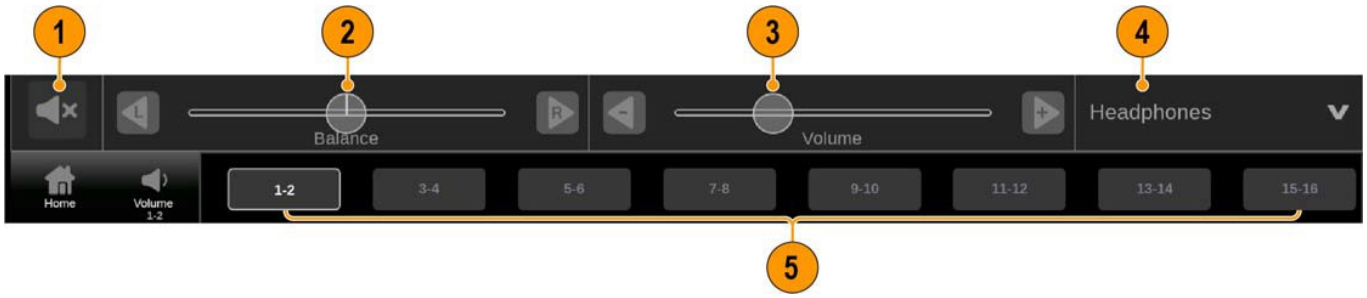


Figure 75: Mute, balance, volume, device, and source controls

Table 10: Audio control features and descriptions

Item	Description
1	**Mute**: Mute or Unmute Audio
2	**Balance**: Left / right balance control of selected audio pair
3	**Volume**: Volume control of selected audio pair

Item	Description
4	**Audio device**: Output audio device to control. This can be headphones using the audio ports or USB inputs, or the internal speakers on MPX2-10 (requires option SPKR). The name of the audio device in the list will depend on what port is used and the device itself: • Speakers: MPX2-10 integrated speakers • Headphones: Headphones plugged into the front or rear panel audio ports • USB AUDIO DAC: Headphones plugged into the MPX2-DUALDSP external display product audio ports • Unknown: Unidentified audio device plugged into the front or rear panel USB ports If a USB audio device supports device descriptors, the vendor supplied device name will appear in the list.
5	**Audio source**: Audio channel pair to monitor

WARNING. *To avoid damaging your hearing, always turn the volume down to the minimum before you put on headphones, and then turn the volume up slowly.*

Capture

The Capture feature has two modes: Screenshot and Stream. Screenshot capture takes an image of the entire screen and saves it to a USB device. Stream capture creates a PCAP file capturing up to 1.6 seconds of IP data at 10Gbps (approximately 2GB) on a USB device for further analysis. Both modes are useful for comparing sources or capturing transient events.

Requirements to use the Capture feature:

- MP2-IP-MEAS option installed
- USB 3.0 stick connected to the rear panel of the PRISM monitor

NOTE. *A USB 3.0 stick, plugged into one of the USB 3.0 ports, is strongly recommended when using the Stream Capture feature. Use the USB ports on the rear panel of the instrument. Using a USB 2.0 stick or USB 2.0 ports can cause the stream capture to take longer.*

NOTE. *Maximum stream capture PCAP files are approximately 2GB in size.*

How to take a screenshot capture

1. From the Settings menu, select **Capture**.

NOTE. *If the Capture configuration menu does not appear under the Settings menu, option MP2-IP-MEAS is not installed, but screen captures are still functional.*

2. Select **Screenshot** under Capture Type. (See Figure 76.)

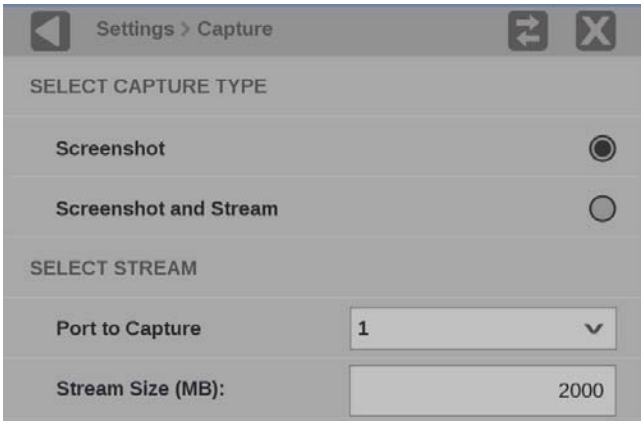


Figure 76: Selecting Screenshot

3. On the application bar select the Capture icon. A screenshot is saved to the device. (See Figure 77.)

Figure 77: Application bar – Capture

How to take a stream capture

1. Verify there is a USB stick connected to the PRISM monitor.
2. Select the Settings icon.
3. From the Settings menu, select **Capture**.

NOTE. *If the Capture configuration menu does not appear under the Settings menu, option MP2-IP-MEAS is not installed and stream captures are disabled.*

4. Select **Screenshot and Stream** under SELECT CAPTURE TYPE. (See Figure 78.)
5. Select the **Port to Capture** drop-down menu to select from inputs 10G SFP **1** or **2**.

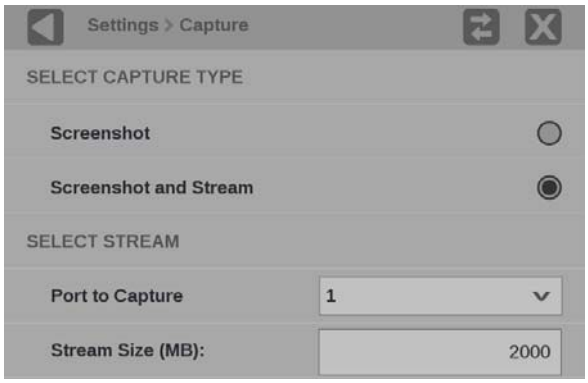


Figure 78: Selecting Screenshot and Stream

6. Select **Stream Size (MB)** to open an on-screen keypad to set the size of the capture. (See Figure 79.)

NOTE. *The minimum stream size is 1MB and the maximum size is 2000 MB.*

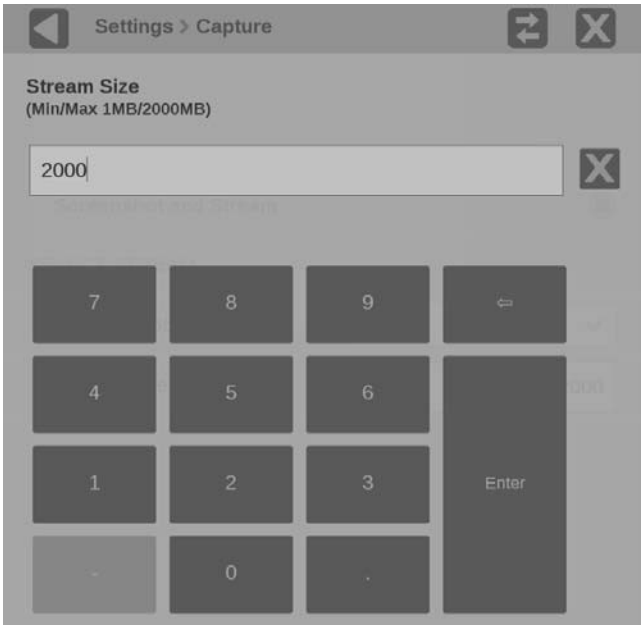


Figure 79: Stream Size settings

7. Select to close settings.

8. Select the **Capture** icon on the application bar to start the process. When the capture type is Screenshot and Stream, a percentage is displayed under the Capture icon. (See Figure 80.)

Figure 80: Stream capture icon with percentage shown

NOTE. *Select the Capture icon again to stop the stream capture early. The Capture icon is the only element you can interact with on the PRISM monitor while the capture and save are taking place.*

9. A screenshot and .pcap file are saved to an attached USB device. The monitor displays the name of the file and the path to the file on the USB device upon completion.

10. Select **OK** to close the dialog box.

Application information

This section describes the monitoring and measurement applications available on the PRISM monitor. Each of these applications can be viewed in four-tile, half-tile, or full-screen mode: Double tap or double click in the application to change between modes.

Select and hold on an application tile to show the menu banner and the application selector icon  . Select this icon, or the banner again, to display all of the available application icons.

NOTE. *Some displays require a specific option to be installed. For example, the IP Graph application is not accessible unless you have Option MP2-IP-MEAS.*

Base instrument applications

These applications are available on every PRISM monitor, unless otherwise noted:

Application icons	Description
	Waveform display application. Use this application to view the voltage-versus-time display of the video signal.
	Vector application. Use this application to call up the Vector, which plots color difference signals for viewing hue and amplitude, but not luminance.
	Audio application. Use this application to view a level meter display of the audio in the monitored signal, along with a Lissajous display and Channel Correlation meter for monitoring two channel audio phase (Lissajous, Channel Correlation, and Audio Session require Option MP2-AUD). Also included are Test level and Peak program level indicators.
	Picture application. Use this application to view the picture generated by the video signal.
	Video Session application. Use this application to view timing offsets between the incoming SDI video signals and Black Burst/Tri-Level Sync external reference signals.

Application icons	Description
	Timing application. Use this application to view timing offsets between the incoming SDI video signals and Black Burst / Tri-Level Sync external reference signals.
	Event Log application. Use this application to view a log of detected errors.
	IP Status application. Use this application to see an overview of the monitored IP stream and see the status of each program in the stream.

Option MP2-IP-MEAS applications

These additional applications are available when Option MP2-IP-MEAS is installed:

Application icons	Description
	IP Session application. Use this application to view various performance parameters of the IP stream including Layer 2, video and PTP parameters.
	IP Graphs application. Use this application to view trend graphs of various performance parameters of the IP stream including total bit rate, session bit rate, PIT, RTP sequence errors, video CRC errors, and TS-DF (Time Stamped Delay Factor).
	PIT Histogram application. Use this application to view a histogram of the PIT (Packet Interval Time) to monitor network delay variation statistics.
	PTP Graphs application. Use this application to view trend graphs of various performance parameters of the PTP signal include Master-to-Slave and Slave-to-Master delays and variances.

Application icons	Description
	Timing application. Adds features to standard Timing application including to view timing offsets between the incoming 2022-6 and 2110-20 video signals and PTP signals.
	Stream Timing application. Use this application to view the timing of the ST2110 video, audio, and data as it was received relative to the embedded RTP time stamps.

Option MP2-GEN applications

These additional applications are available when Option MP2-GEN is installed:

Application icons	Description
	IP Generator application. Use this application to provide an IP test signal to check the receiver device and signal path.
	SDI Generator application. Use this application to provide an SDI test signal to check the receiver device and signal path.

Option MP2-ENG applications

This additional application is available when Option MP2-ENG is installed:

Application icons	Description
	Datalist application. Use this application to see the digital data contained and analysis of incoming SDI data.
	Ancilliary (ANC) Data Session. Allows you to monitor all ancillary data present in a signal.

Option PHY applications

These additional applications are available when Option PHY is installed (Software option MP2-FMT-4K required for 12G support):

Application icons	Description
	Jitter Display application. Use this application to display the wave shape of the jitter and allows you to view additional time-domain information.
	Eye Display application. Use this application to view an eye pattern diagram of the SDI input only.

Option MP2-PROD applications

These additional applications are available when Option MP2-PROD is installed:

Application icons	Description
	Stop Display application. Use this application to monitor video signals with a variety of transfer functions in a consistent manner.
	Diamond display application. Use this application to reliably detect invalid colors.
	Lightning display application. Use this application to show luma and chroma amplitudes and verify component timing using a color-bar signal.
	CIE application. Use this application to check the chromaticity of the video against various color gamut limits.

Option MP2-DLBY applications

This additional application is available when Option MP2-DLBY is installed:

Application icons	Description
	Dolby Status application. Use this application to show metadata content in the selected Dolby audio stream.

Optional features

These features are only available when specific options are installed:

- **Convert to Rec. 709**. Use this setting to allow the trace displays to convert camera logs to Rec. 709. The Convert to Rec. 709 settings is available when Option MP2-PROD is installed.
- **IP Stream Capture**. Use this application to capture IP streams to a PCAP file. The maximum capture size is 2 GB, which allows for the capture of 10 seconds of HD video. IP Stream Capture is available when Option MP2-IP-MEAS is installed.

Viewing installed options

To view options installed on the instrument, select **Setting,** then select **Utilities**, and then select **Options**.

Status indicators

Many of the application displays include status icons, which provide a quick method for viewing signal status. These icons may appear:

 Indicates that the signal parameter has not been in an error condition.

 Indicates that the signal parameter was in an error condition but the error has now cleared.

 Indicates that the signal parameter is currently in an error condition.

 Indicates that the signal parameter is not being monitored for an error condition.

Waveform display application

The Waveform display is a signal level versus time display of the video signal. (See Figure 81.)

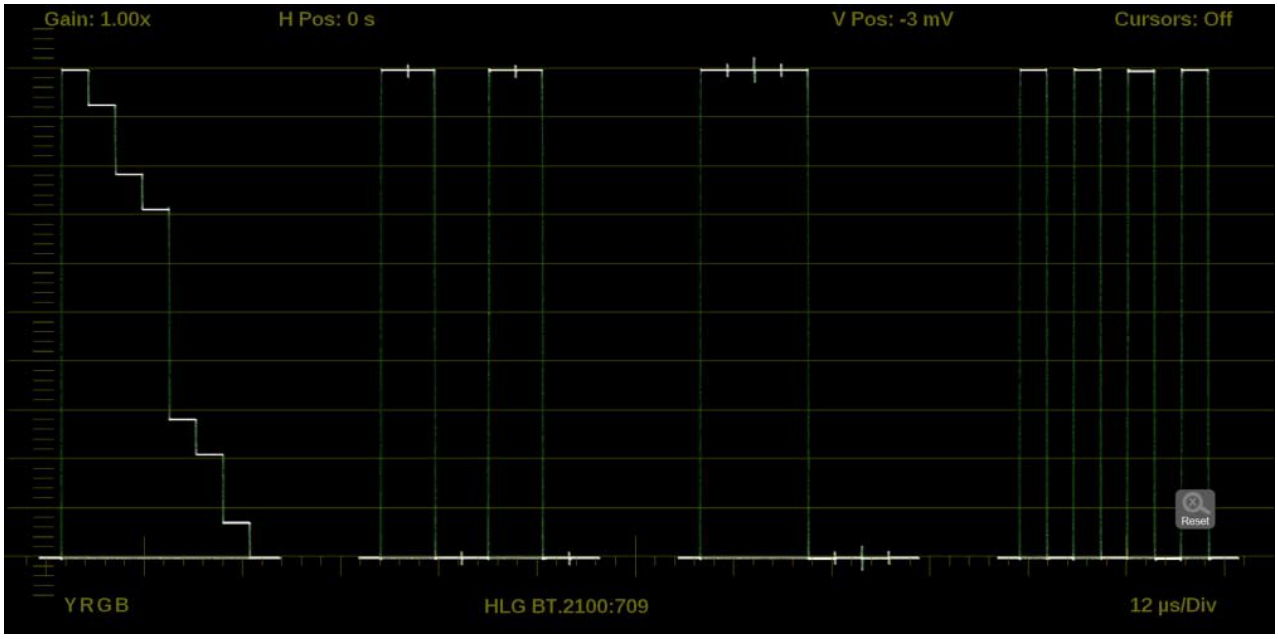


Figure 81: Waveform display application

Waveform application banner

Select and hold anywhere on the Waveform application tile to open the available options. (See Figure 82.)

Figure 82: Waveform application banner

These options adjust how the Waveform application is displayed:

- The icon expands the Waveform application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the Waveform application settings menu to adjust the tile settings.

NOTE. *After the Waveform application settings menu is opened, an icon appears. Select this icon to move the settings menu horizontally.*

Waveform application settings menu

The Waveform application settings menu figure shows the available options. (See Figure 83.)

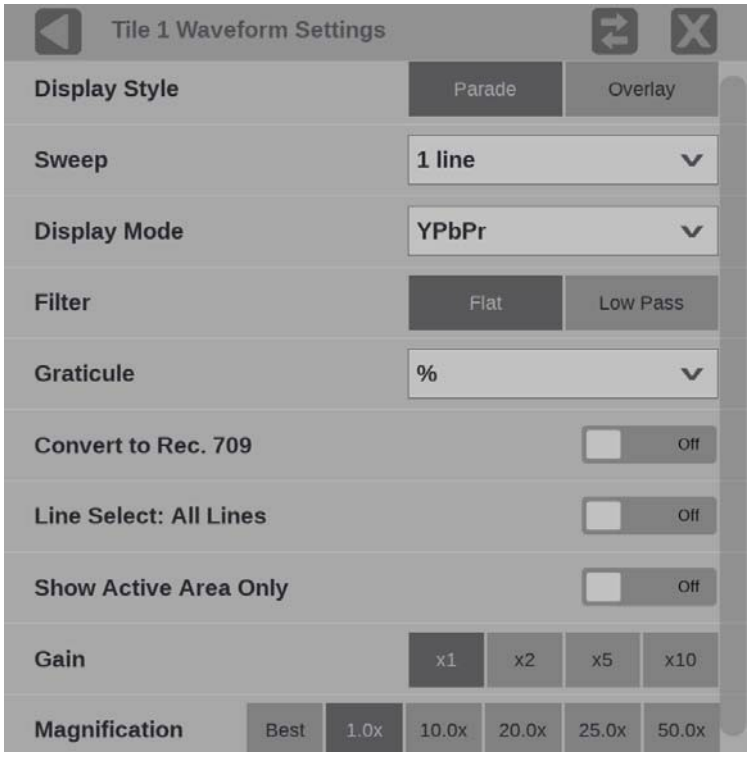


Figure 83: Waveform application settings menu

Display Style. Select one of the buttons to choose how the signal components are displayed in the active tile:

- **Parade**. All the components are shown one beside the other.
- **Overlay**. All the components are drawn at the same location so they appear one on top of the other.

Sweep. Select the drop-down menu to select the waveforms to view between the lines or fields. The available sweep options depend on which display style is active.

- When the Parade display style is active you can select from **1 line** or **1 field**.
- When Overlay display style is active you can select from **1 line**, **2 line**, **1 field**, or **2 field**.

Display Mode. Select the drop-down menu to select from these choices (only available while displaying SDI inputs) in the menu:

- **Y**. Displays the input as Luma (Y) components.
- **RGB**. Displays the input as Red (R), Green (G), and Blue (B) components.
- **YPbPr**. Displays the input as Luma (Y) and color difference (Pb, Pr) components.
- **YRGB**. Displays the input as Luma (Y), Red (R), Green (G), and Blue (B) components.

Filter. Select one of the buttons to set the waveform filter. This is useful for isolating a specific characteristic of the input. For example, you may use a Low Pass filter for quick camera exposure setting.

These filters are available:

- **Flat**. Display with the full available bandwidth
- **Low Pass**. Display only the low frequency part of the signal

Graticule. Select the drop-down menu to choose a vertical scale value: %, mV, Code Value, Stop, Reflectance, or Nits.

NOTE. *The Code Value vertical unit is a hex value. The Stop, Reflectance and Nits scale are drawn differently depending on the Gamma setting in the input menu.*

Convert to Rec. 709. Move this slider to **On** to allow the trace displays to convert the Gamma and Color Gamut settings for the signal to SDR Narrow and BT. 709 (requires Option MP2-PROD).

NOTE. *Conversion to Rec. 709 automatically converts to BT.709, otherwise the graticule selection must be manually changed.* (See Configure the instrument for HDR/WCG monitoring.)

Conversion to Rec. 709 mode is not supported for SD signals.

Line Select. Set the slider to **On** to select 1 Line or Off to select All Lines.

If **1 Line** is selected, the display only shows results for the selected line in the picture. The line can be selected using the on-screen tools. (See Line Select function.) Or the line can be selected directly on the Picture. (See Figure 91.)

Show Active Area Only. Use the button to turn Show Active Area Only **On** or **Off**. When the option is on it removes the trace of vertical / horizontal blanking data.

Gain. Use the button to change the gain to **x1**, **x2**, **x5**, or **x10**.

Magnification. Use the button to change the magnification to **Best View**, **x1**, **x10**, **x20**, **x25**, or **x50**.

Waveform application on-screen tools

You can change the gain, horizontal position, vertical position, cursors, display mode, display format, and selected line, without opening the Waveform settings menu, through on-screen tools. Select the tool/button for the setting you want to adjust. All the available tools are located on the top and bottom of the display and are highlighted for a few seconds when the application is first opened or if you select anywhere in the middle of the application tile. (See Figure 84.)

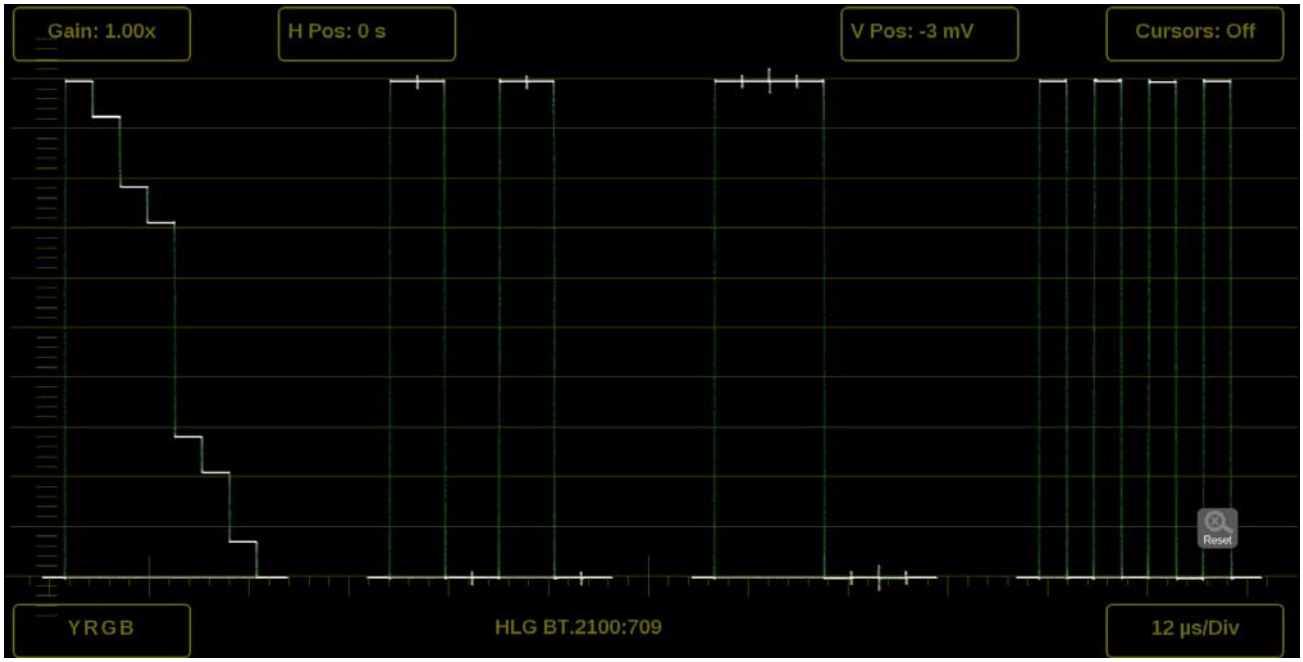


Figure 84: Available on-screen tools for the Waveform application

Gain. Increase or decrease the magnification of the trace display.

1. Select the **Gain** button to expand the available magnification options drop down list. (See Figure 85.)
2. Select one of the preset magnifications for fixed gain.
3. Select Variable Gain; select **VAR: Off**, this changes it to VAR: On. Variable gain allows you flexibility in changing the gain factor between 0.5x to 20.0x.

   The limits of the variable gain change depending on the gain factor you select.

   - 1.0x has a range of 0.25x to 2.00x gain.
   - 2.0x has a range of 0.50x to 4.00x gain.
   - 5.0x has a range of 1.25x to 10.00x gain.
   - 10.0x has a range of 2.50x to 20.00x gain.

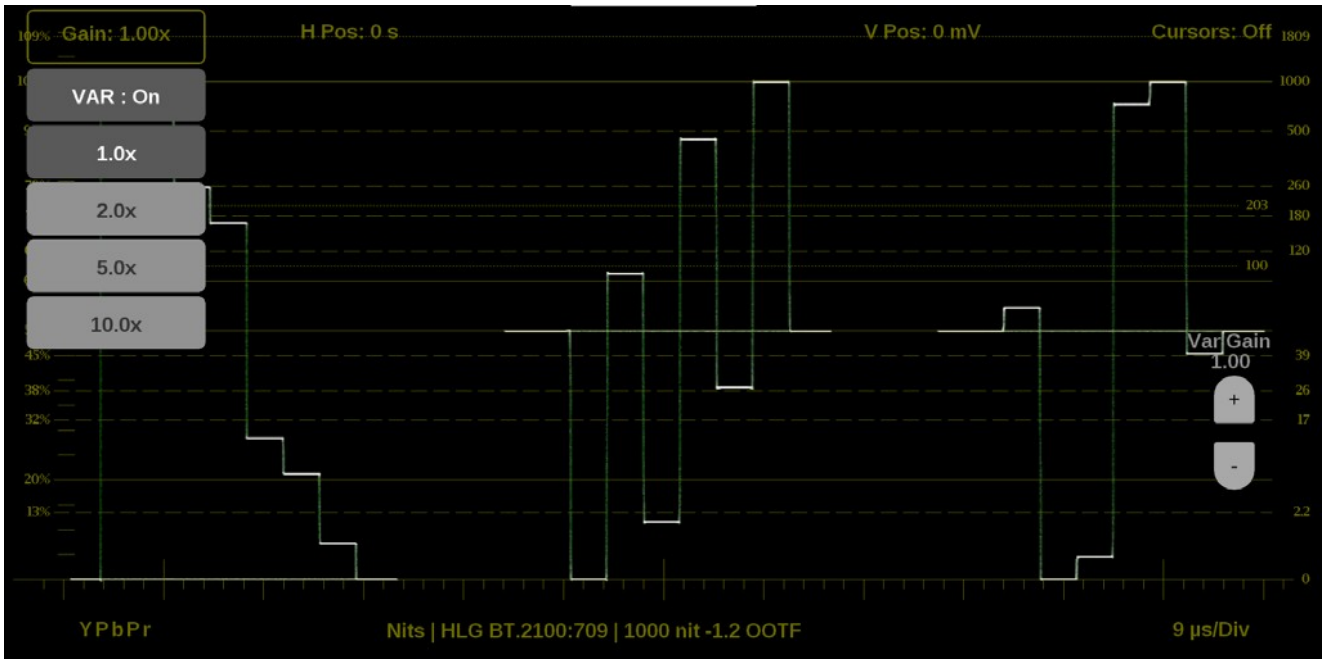


Figure 85: Waveform on-screen tools – Gain

To adjust the gain:

- Use a pinch gesture on a touchscreen to change the scale of the trace for large increment changes.
- For small increment changes, select the plus or minus buttons to adjust the gain.
- The scroll wheel on a mouse adjusts the variable gain.
- Use the Reset icon to remove variable gain adjustments.

Horizontal and vertical position. Adjust the position of the trace display.

1. Select the **H Pos** button to allow incremental adjustment of the horizontal trace. (See Figure 86.)
    - Select and drag to move the trace. This method can be performed without using the button.
    - Use a mouse scroll wheel to move the trace.
    - For incremental adjustments, use the plus or minus buttons to adjust the horizontal position.
    - Use the Reset icon to reset the horizontal position adjustment to default.

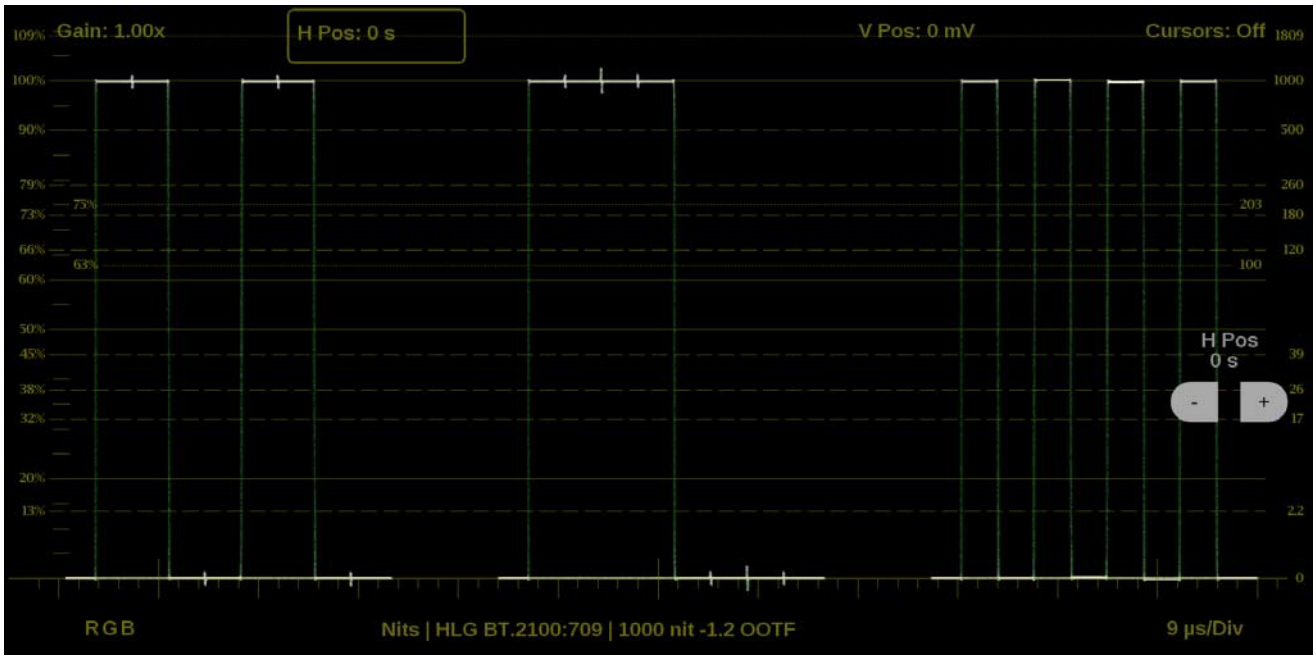


Figure 86: Waveform on-screen tools – horizontal position

2. Select the **V Pos** button to adjust the vertical trace. (See Figure 87.)
    - Select and drag to move the trace. This method can be performed without using the button.
    - Use a mouse scroll wheel to move the trace.
    - For incremental adjustments, use the plus or minus button to adjust the vertical position.
    - Use the Reset icon to reset the vertical position adjustment to default.

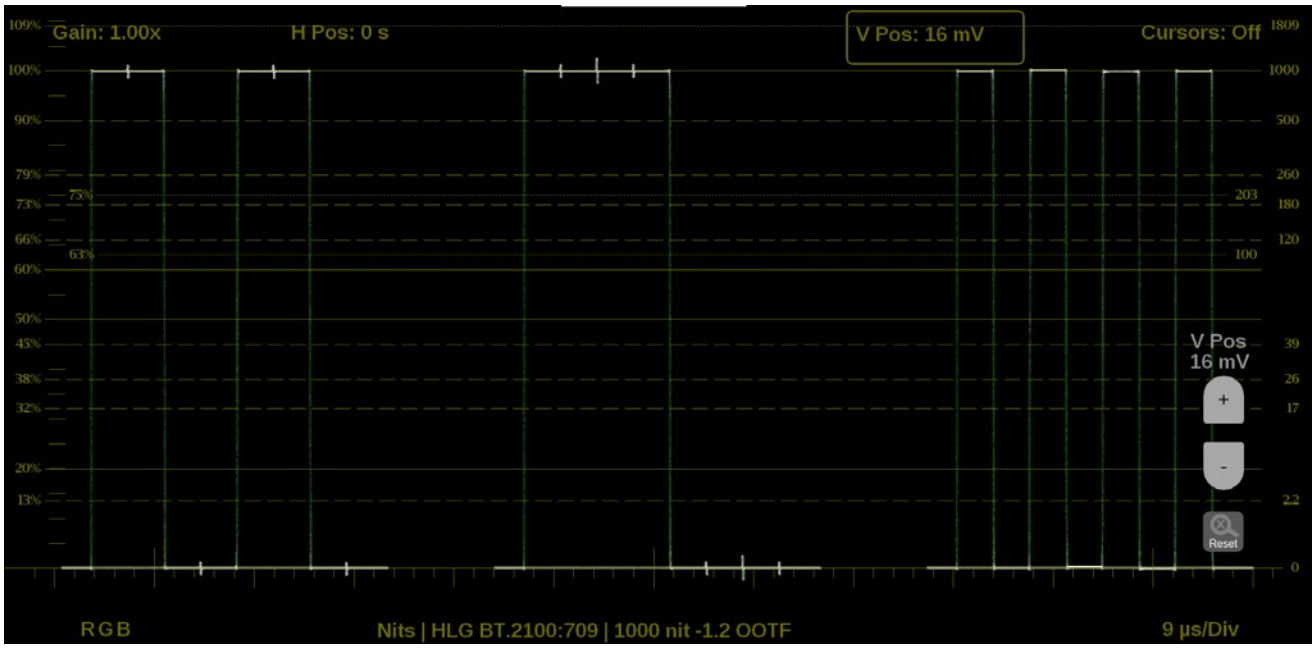


Figure 87: Waveform on-screen tools – vertical position

Cursors. Make precise measurements with time and voltage cursors.

1. Select the **Cursors** button to show the time and voltage cursor options. (See Figure 88.)
2. Select the **T** button to **On** to display two time cursors.
3. Select anywhere on the display to hide the **T** and **V** buttons.
4. Select, hold, and drag anywhere on the T1 or T2 cursor to mark exact times in the trace. The cursors highlight yellow when moved. The timestamp of each cursor and the delta are displayed on the right side of the application.

NOTE. *The cursor tab provides an easy way to adjust each cursor.*

5. Change the **V** button to **On** to display two voltage cursors.
6. Select the **V Units** button to change the voltage units between percentage (%), millivolts (mv), or code value (CV).
7. Select anywhere on the display to hide the buttons.
8. Select, hold, and drag anywhere on the V1 or V2 cursor to mark exact times in the trace. The cursors highlight yellow when moved. The voltage measurement at each cursor and the delta are displayed on the right side of the application.

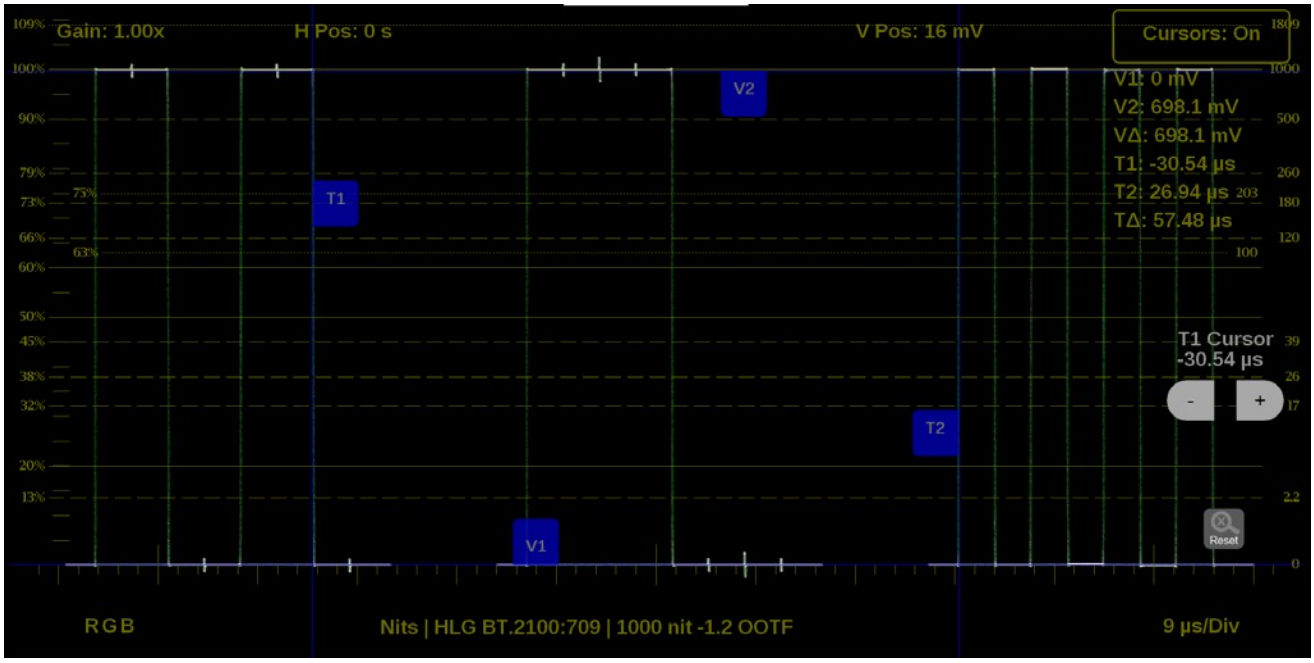


Figure 88: Waveform on-screen tools – time and voltage cursor values and deltas

NOTE. *The time and voltage cursor positions are retained if the trace is moved horizontally and vertically or if the gain is adjusted.*

Display Mode. Change how the waveforms are displayed.

1. Select the button in the bottom left corner of the application to expand the available display options. (See Figure 89.)
2. Select one of the display options.
3. Each option can be filtered by the individual waveforms to display.
   - Use **YPbPr** to display any combination of the **Y**, **Pb**, and **Pr** waveforms.
   - Use **RGB** to display any combination of the **R**, **G**, and **B** waveforms.
   - Use **YRGB** to display any combination of the **Y**, **R**, **G**, and **B** waveforms.

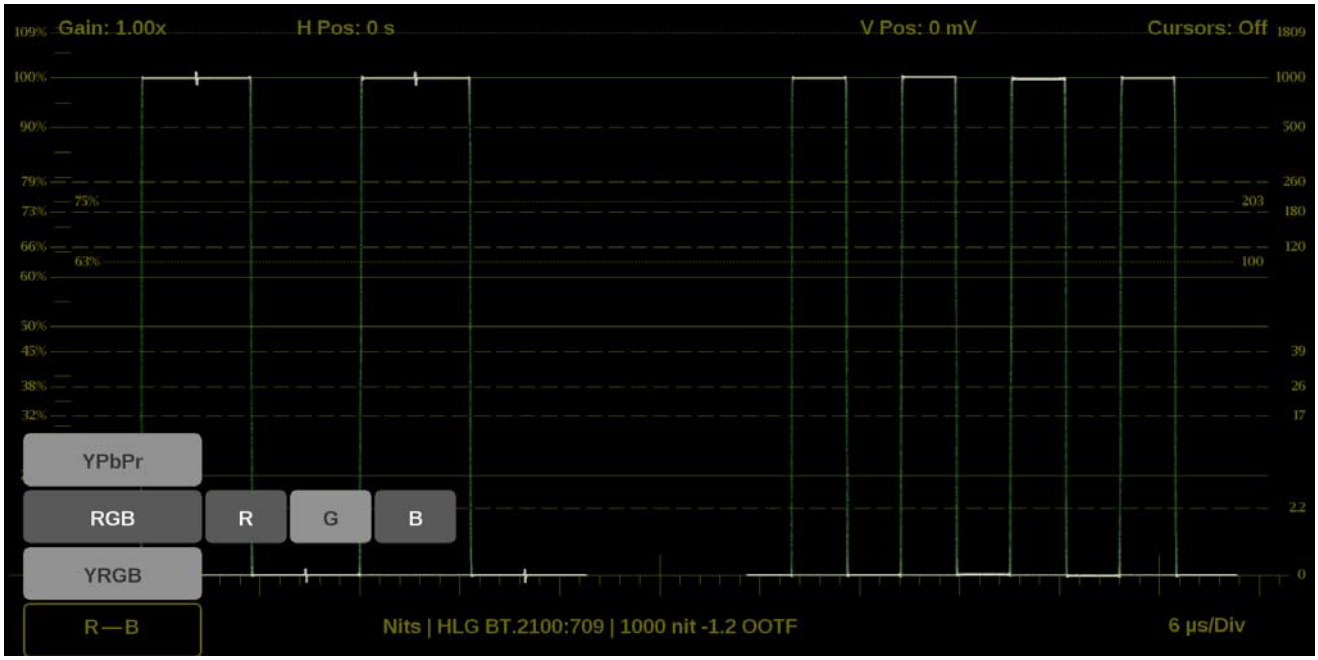


Figure 89: Waveform on-screen tools – Display Mode

Display format. Change the Display Style, Sweep, and Magnification of the waveform.

1. Select the button in the bottom right corner of the application to expand the available display format options. (See Figure 90.)
2. Select the **Mag** option to adjust the magnification to **Best View**, **x1**, **x10**, **x20**, **x25**, or **x50**.
3. Select the Display Style option to switch between **Parade** or **Overlay**.
4. The Sweep options depend on which Display Style is active.
    - When the Parade display style is active you can select from **1 line** or **1 field**.
    - When Overlay display style is active you can select from **1 line**, **2 line**, **1 field**, or **2 field**.

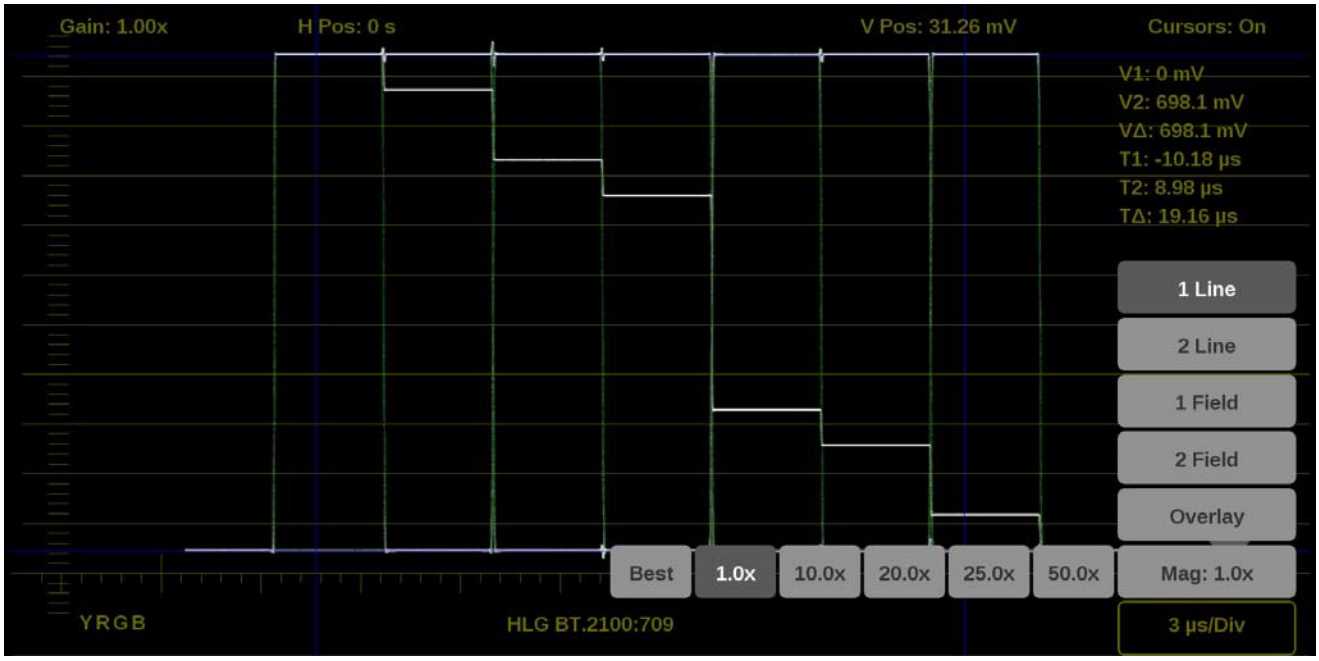


Figure 90: Waveform on-screen tools – display format

Line Select function. Line Select allows you to select a single picture line to monitor in the display. By default **All Lines** is selected and all lines are monitored. To turn on **Line Select** (and choose the line to monitor):

1. Select the **Lines** button at the bottom of the application. (See Figure 91.)
2. Select **1 Line**.

- To scroll through lines, select the + and — buttons.
- To enter a specific line to monitor, select **Line Sel.** and enter the line on the keypad.

The Line number describes the *frame* line number, the Pic Line, next to it, describes the *picture* line number.

NOTE. *A line selected in any trace display is automatically monitored in all other trace displays.*

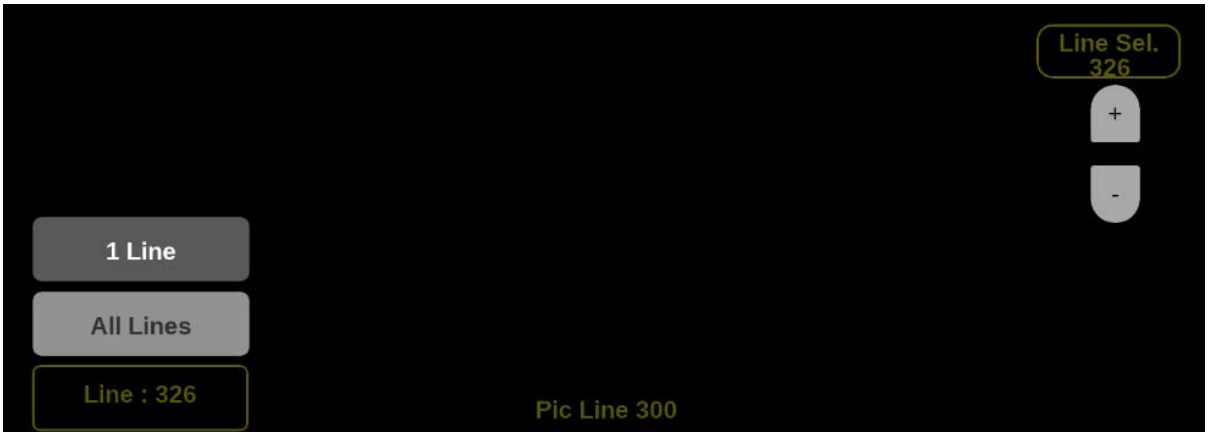


Figure 91: Waveform on-screen tools – Line Selects

Vector application

The Vector application provides an X-Y plot of color difference signals allowing the operator to match skin tones and color of ITU-R BT 709 or 2020 color space. With Option MP2-PROD, transfer function/color space conversion allows for an ITU-R BT 709 color space to verify wide color gamut compatibility.

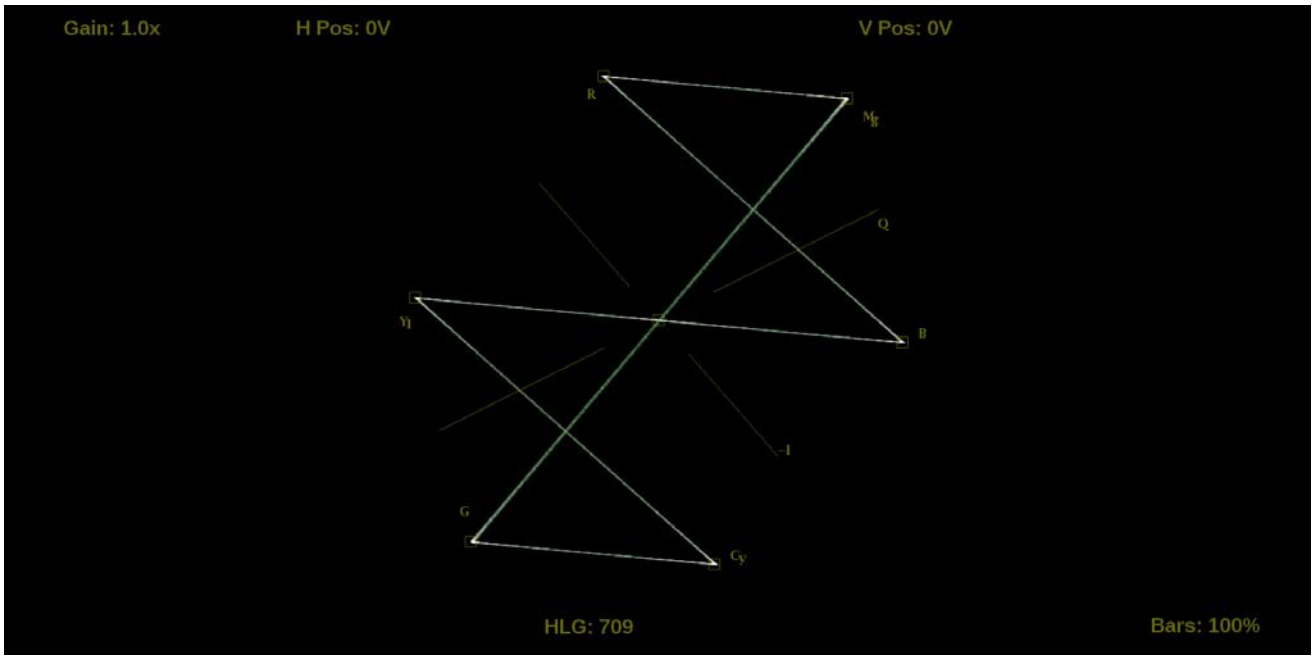


Figure 92: Vector application display

Vector application banner

Select and hold anywhere on the Vector application tile to open the available options. (See Figure 93.)

Figure 93: Vector application banner

These options adjust how the Vector application is displayed:

- The icon expands the Vector application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the Vector application settings menu to adjust the tile settings.

NOTE. *After the Vector application settings menu is opened, an icon is displayed. Select this icon to move the settings menu horizontally.*

Vector application settings menu

The Vector application settings menu figure shows the available options. (See Figure 94.)

Figure 94: Vector application settings menu

Bar Targets. Use this setting to choose 75% or 100% scaling.

IQ Axis. Use the button to turn the **IQ Axis On** or **Off**.

Gain. Use this setting to select one of the trace vector magnifications: **x1**, **x2**, **x5** or **x10**.

Convert to Rec. 709. Turn this setting **On** to allow the trace displays to convert the Gamma and Color Gamut settings for the signal to SDR Narrow and BT. 709 (requires Option MP2-PROD).

NOTE. *Convert to Rec. 709 auto converts to BT.709, otherwise the graticule selection must be manually changed.* (See Configure the instrument for HDR/WCG monitoring.)

Convert to Rec. 709 mode is not supported for SD signals.

Line Select. Line Select allows you to choose the picture lines to monitor in the display. Either **All Lines** or **1 Line** can be selected.

If **1 Line** is selected then the display will only show results for the selected line in the picture. The line can be selected using the on-screen tools. (See Line Select function.) Or the line can be selected directly on the Picture. (See Figure 100.)

Vector application on-screen tools

You can change the gain, horizontal position, vertical position, and bar targets without opening the Vector settings menu through on-screen tools. Select the tool/button for the setting you want to adjust. All the available tools are located on the top and bottom of the display and are highlighted for a few seconds when the application is first opened or if you select anywhere in the middle of the application tile.

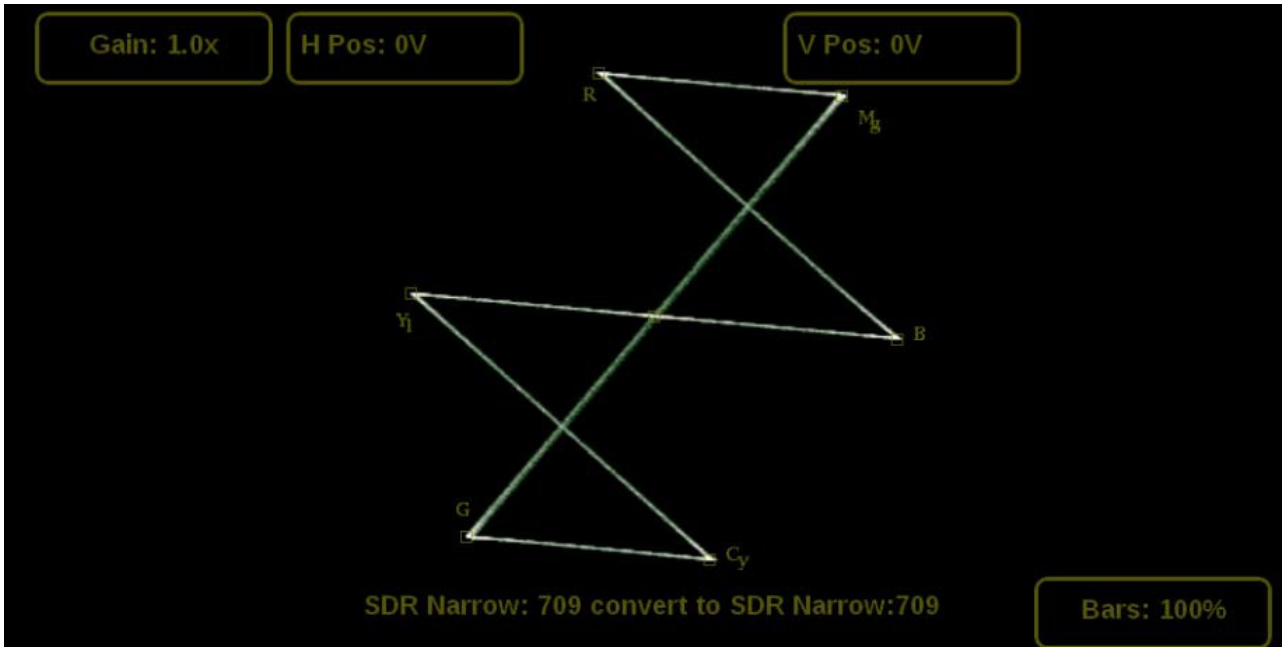


Figure 95: Available on-screen tools for the Vector application

Gain. Increase or decrease the magnification of the trace display.

1. Select the **Gain** button to expand the available magnification options drop down list. (See Figure 96.)
2. Select one of the preset magnifications for fixed gain.
3. Select Variable Gain; select **VAR: OFF** to change it to VAR: On. Variable gain allows you flexibility in changing the gain factor between 0.5x to 20.0x.

   The limits of the variable gain change depending on the gain factor you select.

   - **1.0x** has a range of **0.25x** to **2.00x** gain.
   - **2.0x** has a range of **0.50x** to **4.00x** gain.
   - **5.0x** has a range of **1.25x** to **10.00x** gain.
   - **10.0x** has a range of **2.50x** to **20.00x** gain.

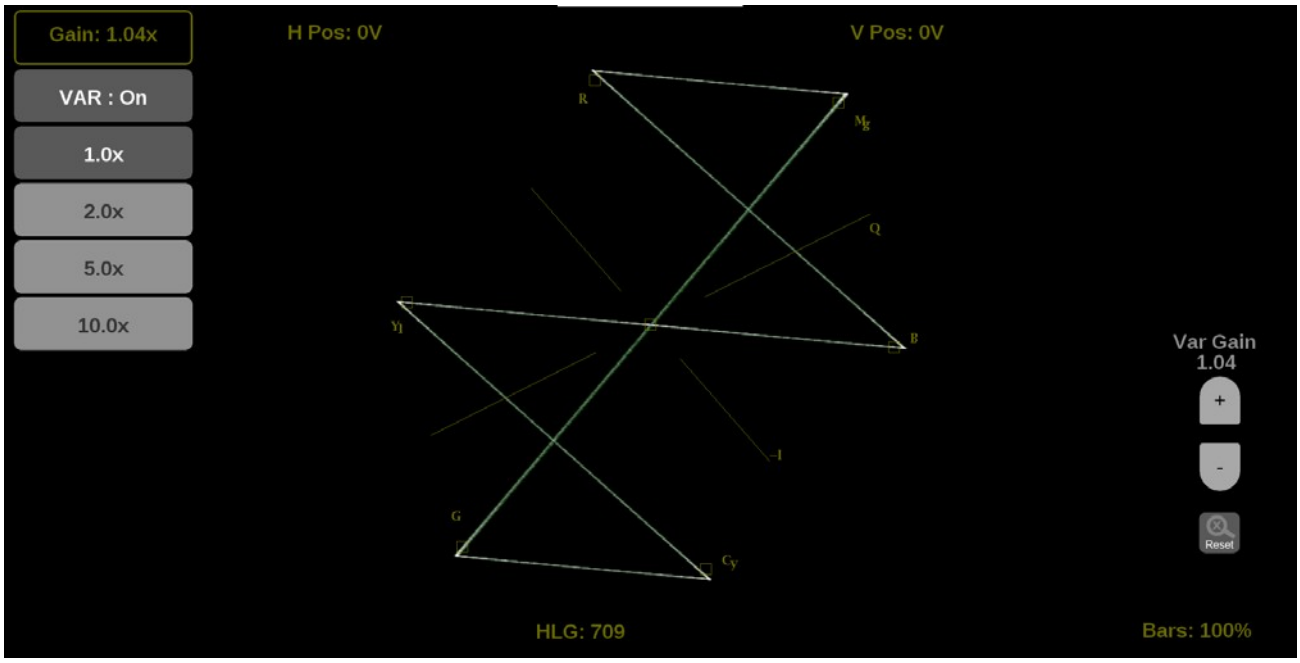


Figure 96: Vector on-screen tools – Gain

Use these methods to adjust the gain:

- On a touchscreen use a pinch gesture to change the scale of the trace for large increment changes.
- For small increment changes, select the plus or minus button to adjust the gain. The scroll wheel on a mouse also adjusts the variable gain.
- Use the Reset icon to remove variable gain adjustments.

Horizontal and vertical position. Adjust the position of the trace display.

1. Select the **H Pos** button to allow adjustment of the horizontal trace. (See Figure 97.)
    - Select and drag to move the trace. This method can be performed without using the button.
    - Use a mouse scroll wheel to move the trace.
    - For incremental adjustments, use the plus or minus button to adjust the horizontal position.
    - Use the Reset icon to reset the horizontal position adjustment to default.

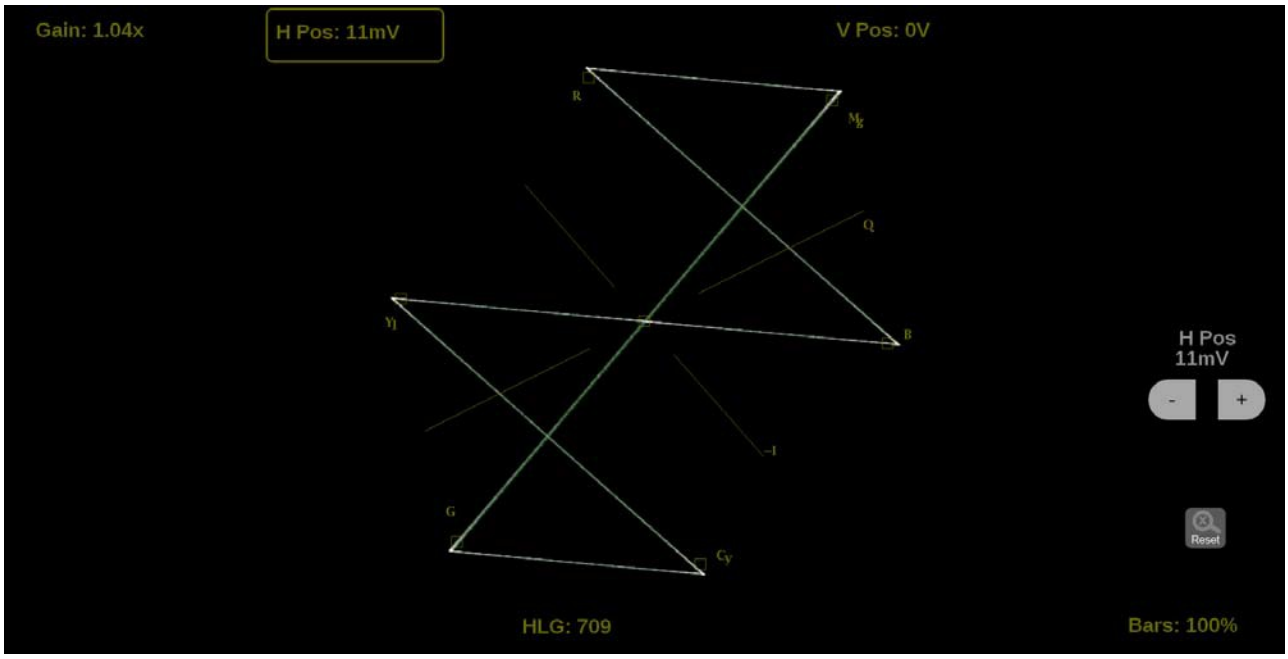


Figure 97: Vector on-screen tools – horizontal position

2. Select the **V Pos** button to allow adjustment of the vertical trace. (See Figure 98.)
    - Select and drag to move the trace. This method can be performed without using the button.
    - Use a mouse scroll wheel to move the trace.
    - For incremental adjustments, use the plus or minus button to adjust the vertical position.
    - Use the Reset icon to reset the vertical position adjustment to default.

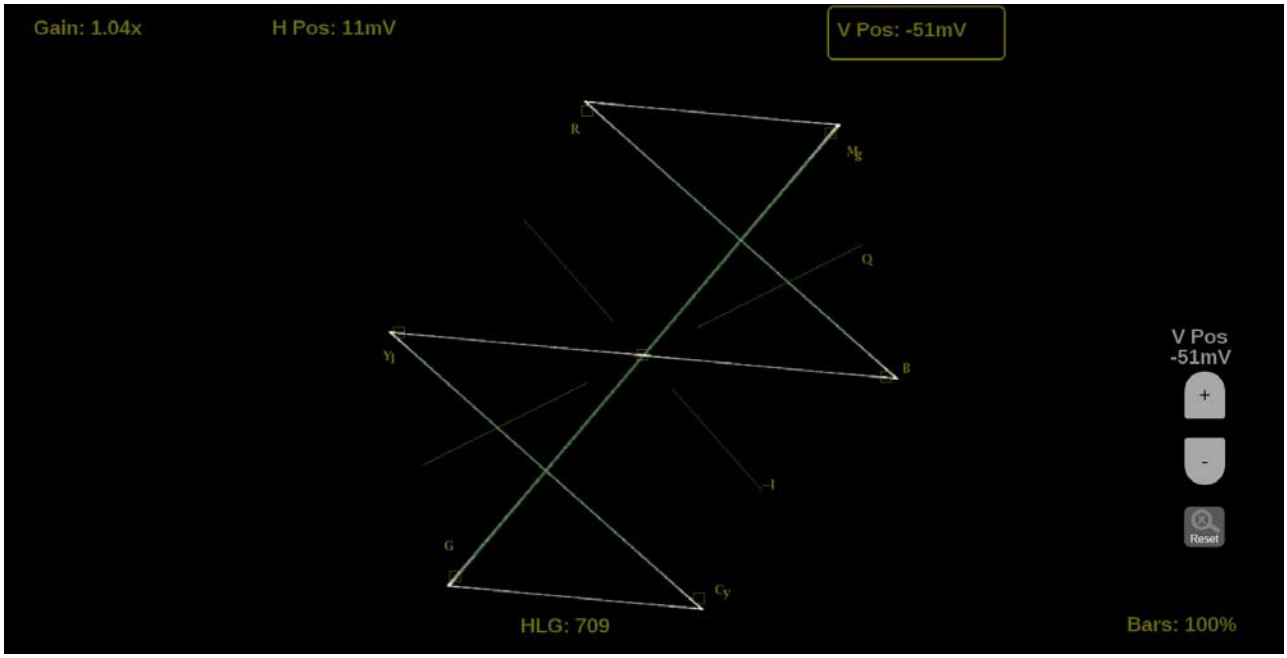


Figure 98: Vector on-screen tools – vertical position

Bar Targets. Change the scaling of the Vector display.

1. Select the **Bars** button in the bottom right corner of the application to expand the available options. (See Figure 99Figure 99.)
2. Select the between **75%** or **100%** scaling.

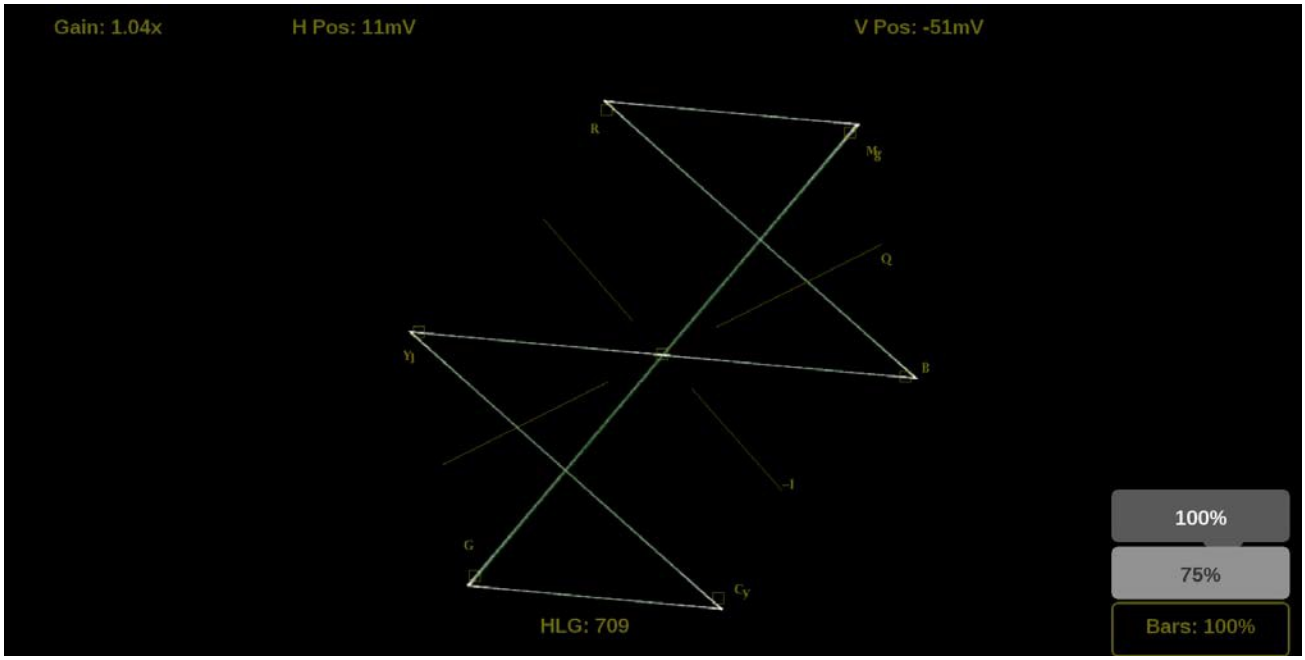


Figure 99: Vector on-screen tools – Bar Targets

Line Select function. Line Select allows you to select a single picture line to monitor in the display. By default All Lines is selected and all lines are monitored.

To turn on Line Select (and choose the line to monitor):

1. Select the **Lines** button at the bottom of the application. (See Figure 100.)
2. Select **1 Line**.
   - To scroll through lines, select the + and — buttons.
   - To enter a specific line to monitor, select **Line Sel.** and enter the line on the keypad.

     The Line number describes the *frame* line number, the Pic Line, next to it, describes the *picture* line number.

NOTE. *A line selected in any trace display is automatically monitored in all other trace displays.*

Figure 100: Vector on-screen tools – Line Select

Audio application

The Audio application provides a level meter display with multiple ballistic settings, and optional Audio Session and Lissajous with Channel Correlation displays. Audio Session shows instantaneous measurements of the level meters and the Lissajous and Channel Correlation displays show audio phase information. Dolby E decoding can be performed on a specified SDI input channel pair.

NOTE. *The Lissajous, Channel Correlation meter, and Audio Session displays require software option MP2–AUD. Dolby E decoding requires option MP2-DLBY.*

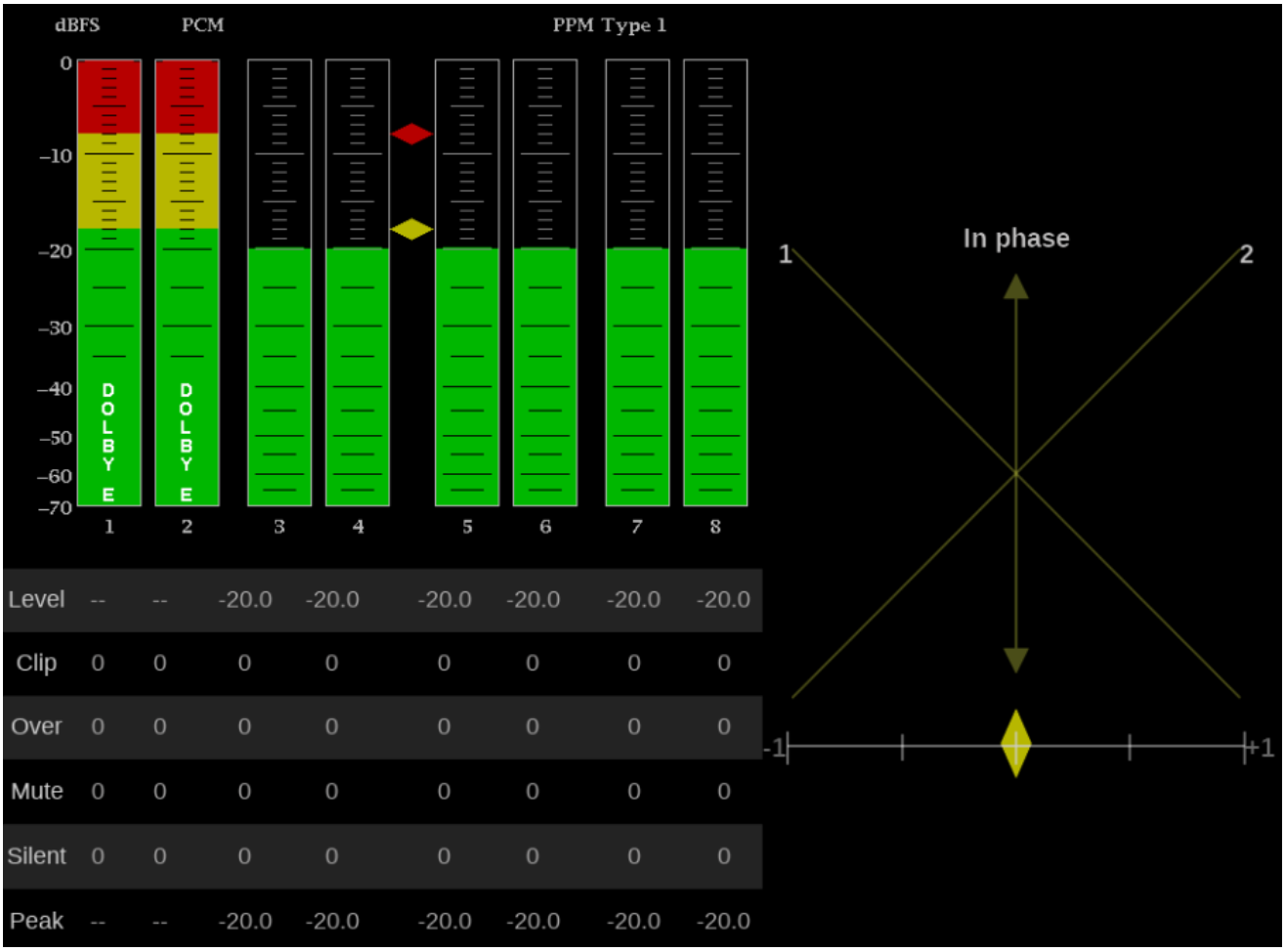


Figure 101: Audio application display

Audio application banner

Select and hold anywhere on the Audio application tile to open the available options. (See Figure 102.)

Figure 102: Audio application banner

These options adjust the Audio application appearance:

- The icon expands the Audio application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the Audio application settings menu to adjust the tile settings.

NOTE. *After the Audio application settings menu is opened, the icon displays. Select this icon to move the settings menu horizontally.*

Audio application settings menu

The Audio application settings menu figure shows the available options. (See Figure 103.)

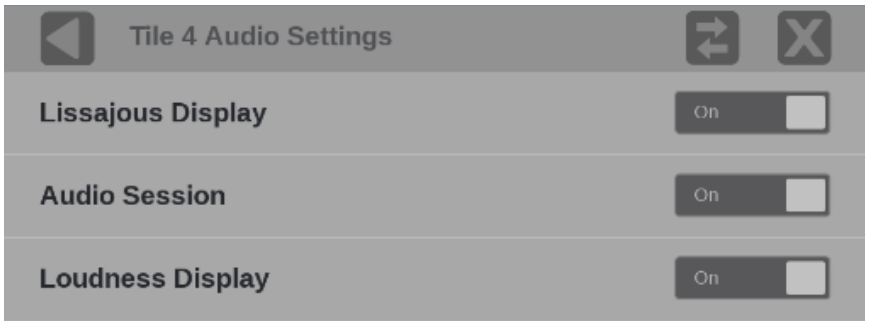


Figure 103: Audio application settings

Lissajous Display. Turns on a visual of a user-specified pairing of channel inputs with channel correlation meter. (See Figure 104.)

Audio Session: Turns on several performance parameters for an overview of the audio input signal.

Loudness Display: Turns on a visual of the audio loudness measurements.

NOTE. *The number of audio bars is time code depending on the enabled AUX audio features. When no AUX audio feature is enabled, up to 16 channel bars are displayed and 8 channel bars are shown when any AUX audio feature is enabled.*

To see the hidden audio bars,

1. Click in the Audio bar area. Arrows appear on both sides of the Audio bars.
2. Click the left or right arrow to see the hidden Audio bars. This hides the visible Audio bars.

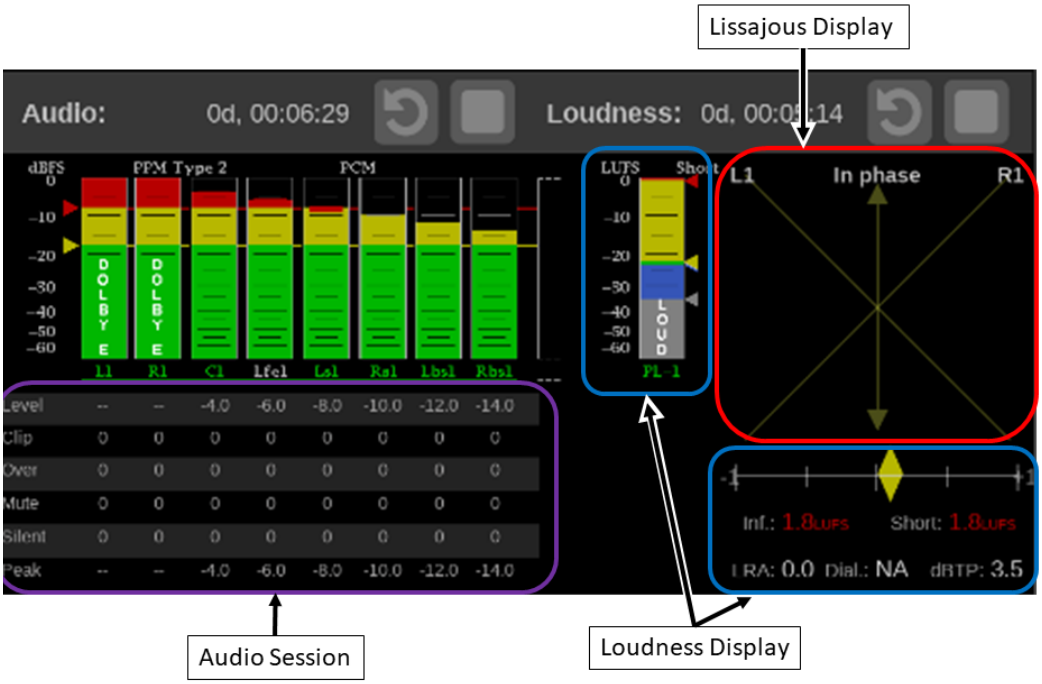


Figure 104: Elements of the Audio application display

NOTE. *The Reset and Run-Stop buttons on the left of the tile border are for the Audio Session. The buttons on the right control the Loudness display.*

When Audio Session is enabled the Audio application banner appears. The banner includes controls for run/pause and run-time reset of the Audio Session data. (See Figure 105.)

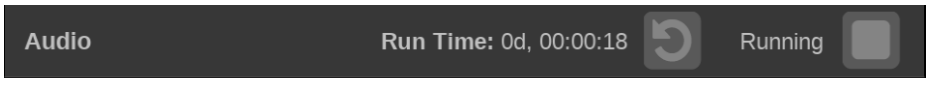


Figure 105: Audio Session controls

NOTE. *Dolby E decoding is performed when the SDI input settings indicate that Dolby audio is available and the channel pair is specified.* (See Configure SDI inputs.)

In-bar messages

Ballistics: Displays the selected ballistics for the level meter dynamic response. Go to Audio in the global Settings menu to change the ballistics.

Level meters: Level meters are vertical bar graphs on which the height of the bar indicates the amplitude of the audio program in the corresponding input channel. The meter levels are color coded based on their relationship to the Test Level and Peak Program level indicators:

- The meter bars are displayed below the Test level in a green color.
- Between the Test level and the Peak Program level, the meter bars are displayed in a yellow color.
- Above the Peak Program level, the meter bars are displayed in a red color.

Test level and Peak program level indicators: Diamond-shaped markers between the level bars indicate the default Test Level (-18 dBFS) and Peak Level (-8 dBFS) limits for the display. Test level is also known as Reference level or Line-up level.

Level meter scale and units: By default, the units are in dB relative to full scale (dBFS). The 0 dB mark is digital Full scale.

Lissajous display: The phase of a selected pair of audio channels is plotted on a soundstage plot. Soundstage plots the two channels at 45 degree angles, with the mono combination appearing on the vertical axis, much like a left-right image in a studio.

To select the audio channel pair to plot on the Lissajous display, select the Volume icon on the Status Bar and choose from the list of available channel pairs.

Channel Correlation meter: Displays the channel correlation under the Lissajous display.

- For identical or highly correlated signals, the indicator is white and moves to the far right (+1).
- For highly correlated signals, the indicator is green and moves to the right (towards +1).
- For uncorrelated signals, the indicator is yellow and tends to stay in the middle (around 0).
- For anti-correlated signals (one goes up when the other goes down), the indicator is red and moves to the left (towards -1).

This instrument displays messages within the level meter bars. These are messages that can appear and are shown in order of priority:

UNLOCKED. The instrument is not locked to an incoming signal on the indicated input channel. Data cannot be decoded and all data and other errors are ignored. This means that if an input is selected, nothing recognizable is present on the input, or if embedded audio is selected, the VIDEO input is unrecognizable.

PARITY. The incoming subframe does not have even parity as specified by the digital audio standards. The data sample is unreliable and is ignored. The level

meters and Lissajous display treat the sample as a zero sample.

CRC ERR. The CRC code in the channel status packet is incorrect. Sometimes the CRC code is set to zero, indicating that the signal is missing; when this is the case, this message is not displayed.

MUTE. The number of consecutive all-zero samples equals or exceeds the # Samples for Mute setting.

SILENCE. The signal is at or below the specified Silence Level for a time exceeding the Duration for Silence setting.

V BIT. Indicates that the Validity bit is set high for one or more data samples. In the AES/EBU standard, a set validity bit indicates that the sample is not suitable for conversion to audio. By default, the level meter bars and Lissajous display treat the affected samples as zero samples.

NOT PRESENT. Indicates that an audio bar is not present in the current audio input. For example, if a Dolby Digital input has a coding mode indicating a reduced number of channels.

DOLBY E. Indicates that Dolby E encoded audio is present on the channel.

CLIP. Indicates the number of times the audio level was at the digital code for the maximum amplitude for ten consecutive samples.

OVER. Indicates the number of times the audio level exceeded 0dB for over-level duration of 1 second.

Picture application

The Picture display lets you see the picture generated by the video signal.

Figure 106: Picture application display (Copyright 2008, Blender Foundation / www.bigbuckbunny.org)

Picture application banner

Select and hold anywhere on the Picture application tile to see the available options. (See Figure 107.)

Figure 107: Picture application banner

These options adjust the Picture application appearance:

- The icon expands the Diamond application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the Diamond application settings menu to adjust the tile settings.

NOTE. *After the Picture application settings menu is opened, the icon displays. Select this icon to move the settings menu horizontally.*

Picture application settings menu

The Picture application settings menu figure shows the available options. (See Figure 108.)

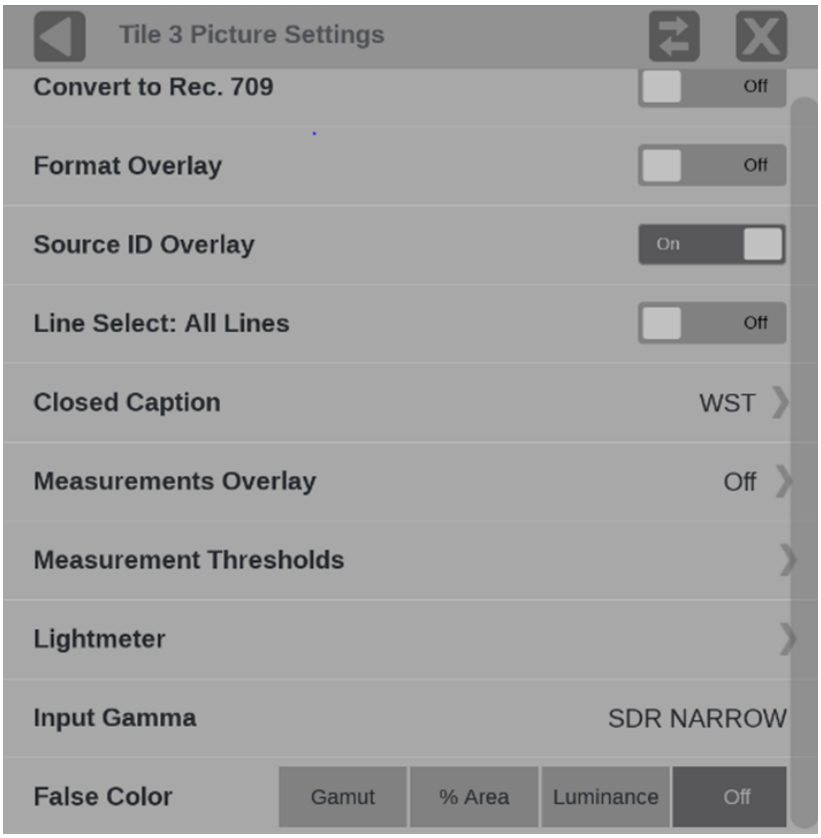


Figure 108: Picture application settings menu

Convert to Rec. 709. Set to **On** to allow the trace displays to convert camera logs to Rec. 709 (requires Option MP2-PROD).

NOTE. *Convert to Rec. 709 mode is not supported for SD signals. In full screen mode, there is no cropping. Pictures are decimated horizontally or vertically to obtain the correct aspect ratio. This decimation may cause some artifacts.*

Format Overlay. Set to **On** to display the format information on top of the picture. The placement of the format information window is set by the user through drag and drop.

Source ID Overlay. Provides an overlay of the video source on the Picture application. The source data carries ANC data conforming to SMPTE 291M. The default DID is 0x53 and SDID is 0x49. Set them as required. The source ID is limited to a maximum 15 ASCII characters.

To enable the Source ID Overlay, open the Picture Setting menu and then set the Source ID Overlay to **On**. Select and drag the overlay to the correct location on the application.

Line Select. Line Select allows you to select the picture line to monitor in the

available trace displays, including Waveform, Stop, Vector, Diamond, Lightning, and CIE. Either All Lines (Line Select is Off) or 1 Line (Line Select is On) can be selected.

If 1 Line is selected then a horizontal line appears on the picture. Select and drag the line to choose a line to monitor. The selected line number is noted on the line.

Closed Caption. Settings for closed captions/subtitles formats and services. See Closed Caption for more information about this feature.

Measurements Overlay. The visibility of the available picture measurements can be adjusted by selecting this menu item. See Picture Measurements for more information about this feature.

Measurement Thresholds. Threshold for the HDR picture measurements are made in this menu. See Picture Measurements for more information about this feature.

Lightmeter. Displays the light level (in nits or stops) at the point marked by the Lightmeter cursor in the Picture display. See Configure the Lightmeters for more information about this feature.

Input Gamma. Reports the input Gamma set in the **Settings** menu for the selected input.

False Color. Three false color displays are available, which apply a color palette to the picture to highlight attributes associated with images.

- **Gamut.** Used for a quick check of gamut compliance to Rec. 709 and P3 gamut limits.
- **% Area.** A fixed false-color palette is applied to regions of the picture: Brightest, Area, and Darkest.
- **Luminance.** Create a user defined false color palette based on luminance values. See Luminance False Color for more information about this feature.

Closed Caption/Subtitles

Tools for closed captions/subtitles decode and display.

- **CC information overlay.** Provides closed captions/subtitles format, and service/page and presence.
- **CC/Teletext.** Selects the closed captions/subtitles format and service.

To turn on the CC Information Overlay:

Select **Closed Caption** from the Picture Settings menu and set the CC Information Overlay to **On**. (See Figure 109.) The overlay provides closed captions/subtitles format and service information. To move the overlay, select and drag it to the new location.

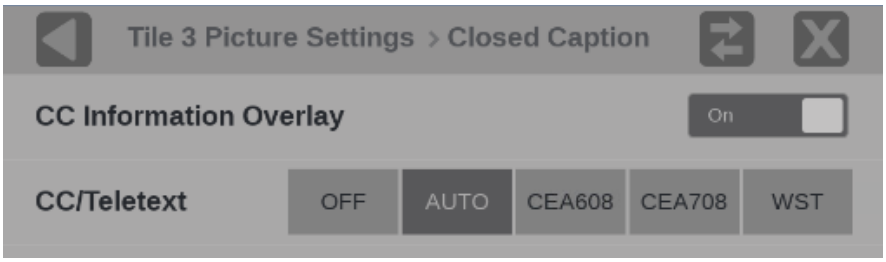


Figure 109: Closed Caption settings with CC Information Overlay turned on

To set the CC/Teletext:

Select a format to decode and open the service options.

- **OFF**: Turns off the closed caption decoding. The overlay remains in the Picture tile if it is on.
- **Auto**: Detects and selects the closed captions/subtitles format in the signal and presents the service options. Select the appropriate input.
- **CEA 608**: A standard format of closed captions/subtitles data used in the U.S., Canada, and Mexico for analog TV transmissions. If a service has no activity for 10 seconds, it is considered missing.

  In the CEA608 Channel, select, from 1 to 4, the appropriate input.
- **CEA 708**: A standard format of closed captions/subtitles data in the U.S. and Canada for digital TV transmissions. If a service has no activity for 10 seconds, it is considered missing.

  In the CEA708 Service, select, from 1 to 6, the appropriate input.
- **WST**: Also called Teletext, it is a standard format of closed captions/subtitles used in many parts of the world. Support includes OP-47 and 2031.

  In Teletext Page, set the page number: Select the up or down arrow, or select the number and use the pop-up keypad, to enter the page number for your region.

NOTE: Each Picture tile can select a closed caption format and a service.

Picture measurements

An overlay containing a selectable set of picture measurements can be shown on the picture application, including HDR measurements. (See Figure 110.) The placement of the measurement overlay is set by the user through drag-and-drop.

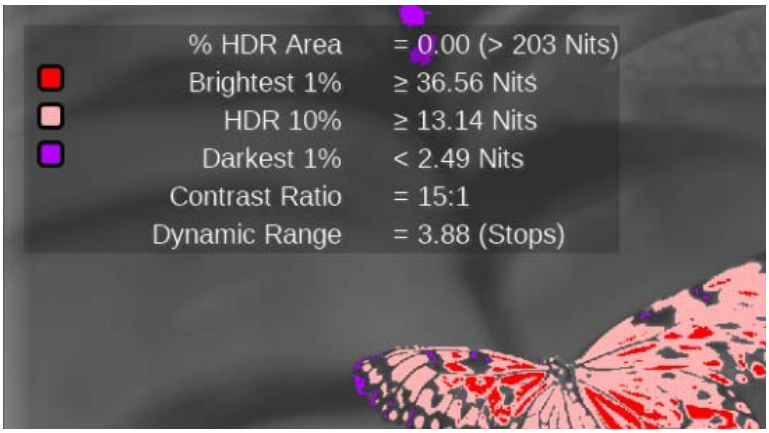


Figure 110: False Color display with Picture Measurements Overlay

Selecting Picture Measurements. Select picture measurements to display.

1. Select and hold in the Picture app and then select the icon.
2. Select the **Measurements Overlay** menu item.
3. Set Measurements Overlay to **On.** (See Figure 111.) This turns on the measurements overlay in the Picture application. After it is visible, the overlay window can be dragged to any location in the Picture tile.

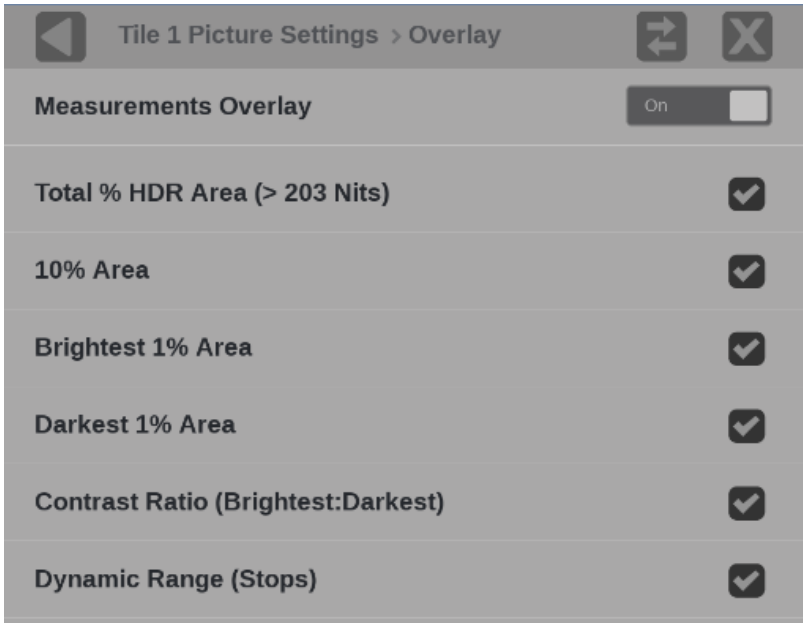


Figure 111: Picture Settings with Measurement Overlay menu

Select the picture measurements to see in the overlay. For many of the parameters a threshold setting is required. See the Measurements Threshold menu for setting these thresholds. (See Figure 112.)

These measurements are available.

Settable thresholds are indicated by x:

- Total % HDR Area. The Nits threshold for this measurement can be set.

- X% Area. In Nits
- Brightest x% Area, in Nits
- Darkest x% Area, in Nits
- Contrast Ratio (Brightest:Darkest)
- Dynamic Range (Stops = Log2(Brightest x% / Darkest x%)).

Setting Picture Measurement Thresholds. To select the thresholds for those picture measurements that require them, select and hold in the Picture app and then select the icon. Select the **Measurement Thresholds** menu item. (See Figure 112.)

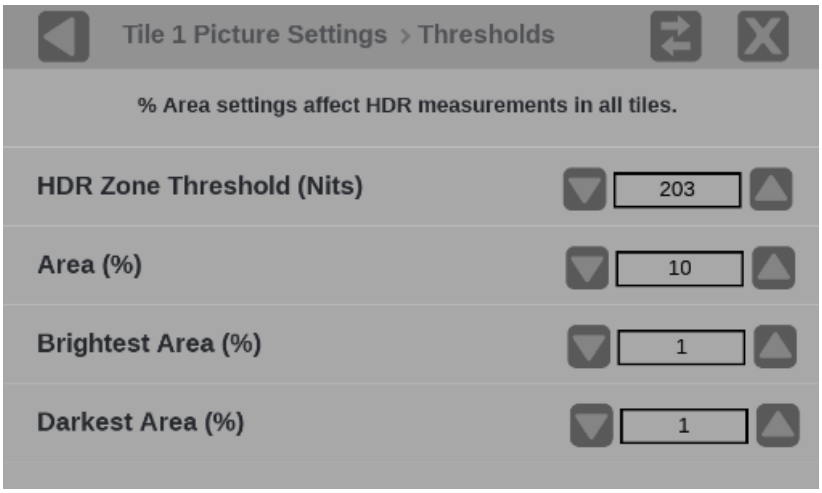


Figure 112: Picture Settings with Measurement Threshold menu

The threshold settings:

- **HDR Zone Threshold (Nits).** Any picture value higher than this threshold, in nits, is considered in the HDR zone.
- **Area (%).** Defines the brightest percentage of the picture used to determine the bright threshold in nits.
- **Brightest Area (%).** Defines the brightest percentage of the picture used to determine the HDR threshold in nits.
- **Darkest Area (%).** Defines the darkest percentage of the picture used to determine the dark threshold in nits.

Configure the Lightmeters

The Lightmeters measure the light level, in nits or stops, at the point marked by the Lightmeter cursor in the Picture application. Proper operation requires selecting the appropriate gamma curve in the input settings. (See Choose the appropriate Gamma Curve.)

NOTE. *The readout is the average luminance of a 5x5 pixel area in a 1920x1080 picture, a 10x10 pixel area in a 3840x2160 picture, and a 20x20 pixel are in a 7680x4320 picture.*

To turn on or change the Lightmeters:

1. Open the Picture Settings menu and select **Lightmeter**.
2. Set the Lightmeter Overlay to **On**.
3. Select the number of needed Lightmeter cursors (up to 5). (See Figure 113.)

NOTE. *The Lightmeters all use the same method for measurements. The color of the Lightmeter cursor is just for identification.*

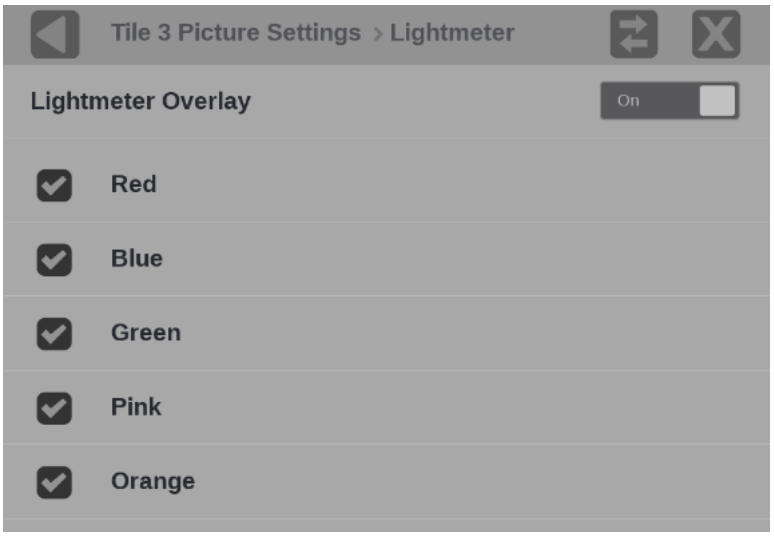


Figure 113: Lightmeter overlay menu and available cursors

The Lightmeters are visible in the Picture application. (See Figure 114.)

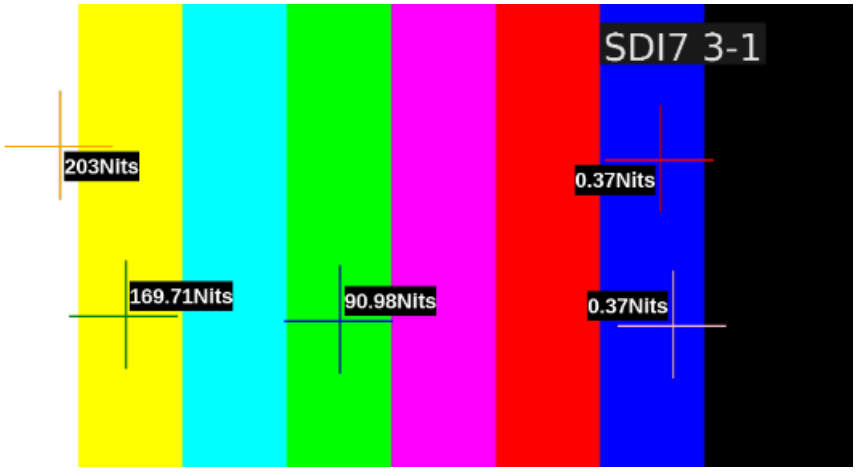


Figure 114: Lightmeter cursors in the Picture tile

To adjust the Lightmeters cursors:

- To move the Lightmeter cursors, select any part of the crosshairs or the measurement numbers and drag the target to the new location. The measurement updates automatically.
- To remove a selected Lightmeter cursor from the Picture, unselect the color in the Settings menu.

- To remove all the Lightmeters cursors from the Picture, unselect all of the Lightmeter colors or set the Lightmeter Overlay to **Off**.

Luminance False Color

The Luminance False Color display replaces pixels that fall within a specified range of Nits or Stops values to a color that you specify. Up to 9 configurable ranges can be defined. For example, you can use the Luminance False Color display to tag pixels that are within a specified HDR range.

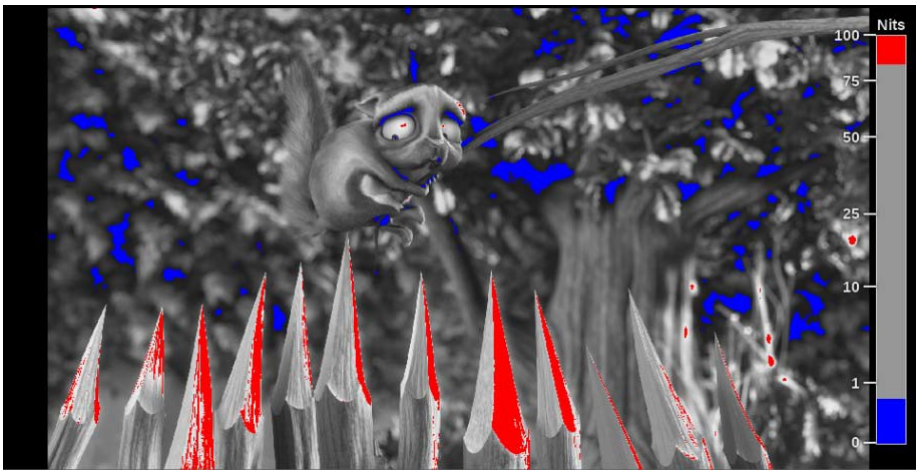


Figure 115: Luminance False Color display with Meter Overlay

The false color ranges are defined in nits or stops, depending on the gamma curve set up in the input (select **Settings**, and then **Input**). If a camera-based gamma curve is set, such as S-Log2, the false color ranges will be in stops. If a display-based gamma curve is set, such as SDR Narrow, the false color ranges will be in nits.

These controls adjust the Luminance False Color display:

Meter Overlay. Move the slider to **On** to turn on the Meter Overlay in the Picture application. The overlay shows the false color definitions in Nits or Stops made in the Luminance False Color table at the bottom of the menu. The overlay can be moved to the right, bottom, left, or top of the image; select and drag the meter.

Default. By default, the false colors are defined according to the BT.2408 specifications if a display-based gamma curve is set for the input, or a typical camera specification if a camera-based gamma curve is set for the input. If changes are made to the false color ranges in the Luminance False Color table, an indication that the default settings have changed is shown. Select the **Default** button to reset the ranges to their default settings.

Luminance False Color table. The Luminance False Color table allows you to customize up to 9 different false color ranges as defined by a minimum and maximum Nits or Stops value. The pixel values are displayed in either Code Value or Percent but selecting the readout in the table header.

Specific colors can be displayed by selecting the check box in the Enable column of the table. (See Figure 116.) You can change the Nits or Stops range even if the check box is not set.

To adjust the Nits or Stops range tap anywhere in the row you want to change. You can adjust the Minimum and Maximum value in the range using the up and down arrows or select in the number field and a numeric entry keypad appears. Enter the line number and select **Enter** to close. The false colors in the Picture and the Meter Overlay are updated as adjustments are made.

If the range for one color overlaps the range for another color, the color that is higher in the table overlaps the colors lower in the table.

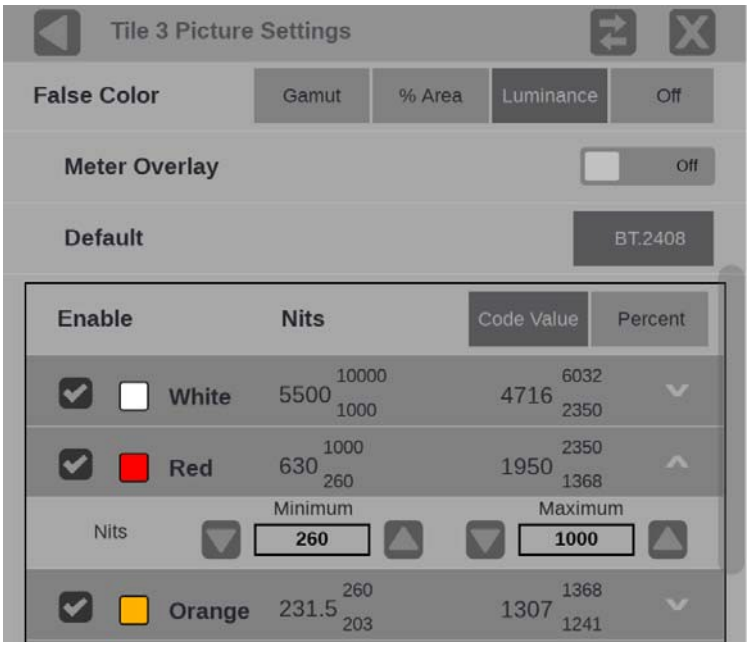


Figure 116: Picture settings with the Luminance False Color table

Video Session application

Use this application to view various performance parameters of the SDI video signal or the decoded IP stream. Select any of the four tab titles to view the associated information: SDI Format, VPID 352, Bit Level, or CRC Status. (See Figure 117.)

Figure 117: Video Session application – SDI FORMAT tab display

Video Session application banner

Select and hold anywhere on the Video Session application tile to open the available options. (See Figure 118.)

Figure 118: Video Session application banner

These options adjust the Video Session application appearance:

- The icon expands the Video Session application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.

Elements of the top-level Video Session application display

The elements at the top of the Video Session application are shared between the four tabs:

- **INPUT**: Shows the selected input source on the top line and shows the detected format, sample structure, and transport of the input signal on the second line.
- **Display tabs**: Click one of the four tabs to view the associated display. Each of the tabs has a status indicator to provide a quick view of the status of the parameters contained in each tab.
  - **SDI FORMAT**. Use this tab to view the status of various SDI signal parameters on the input signal.
  - **VPID 352**. Use this tab to view the status of the SMPTE352M VPID on the input signal. For 3G-SDI signals, VPID is required on the primary link (Link A).
  - **BIT LEVEL**. Use this tab to view if there are any stuck bits in the input signal.
  - **CRC STATUS**. Use this tab to view the status of CRC and Checksum errors in the video signal.
- **Run Time**. The instrument maintains a running monitoring session for the Video Session application. The Run Time readout displays the amount of time that has elapsed during the current monitoring session. The time is displayed as **DD, HH:MM:SS**, where DD is the number of days, HH is the number of hours, MM is the number of minutes, and SS is the number of seconds.
- **Clear icon**. Use the  icon to clear or reset the monitoring session.
- **Running / Stopped icons**. When the monitoring session is running (collecting error data), use the  icon to stop the session. When the monitoring session is stopped (no error data collection and no display updates), use the  icon to restart the session.

SDI FORMAT tab display

Use the SDI FORMAT tab display to view the status of various SDI signal parameters on the input signal. (See Figure 117Figure 118.)

Elements of the SDI FORMAT tab display.

- **SAV Place Err**: Indicates whether a Start-of-Active-Video Placement Error has occurred.
- **EAV Place Err**: Indicates whether an End-of-Active-Video Placement Error has occurred.
- **Field Length Err**: Indicates whether a Field Length Error has occurred.
- **Line Length Err**: Indicates whether a Line Length Error has occurred.

- **Line Number Err**: Indicates whether a Line Number Error has occurred.
- **Ancilliary Data**: Indicates whether Ancillary Data is present in the video signal. The displayed values are either Present or None for SD signals, or Y and C Present and None for HD and 3 Gb/s signals.
- **Statistics**: This section of the display shows the status and statistical values for certain errors. For information about the errors in this section, view the help file in your instrument: while the Video Session is active in a tile, select the HELP button.
- **Status**: Shows the status of the associated error as either OK, Invalid, Missing, or Error.

VPID 352 tab display. Use the VPID 352 tab display to view the VPID values of the SMPTE352M payload. For 3G-SDI signals, VPID is required on the primary link (Link A). (See Figure 119Figure 117.)

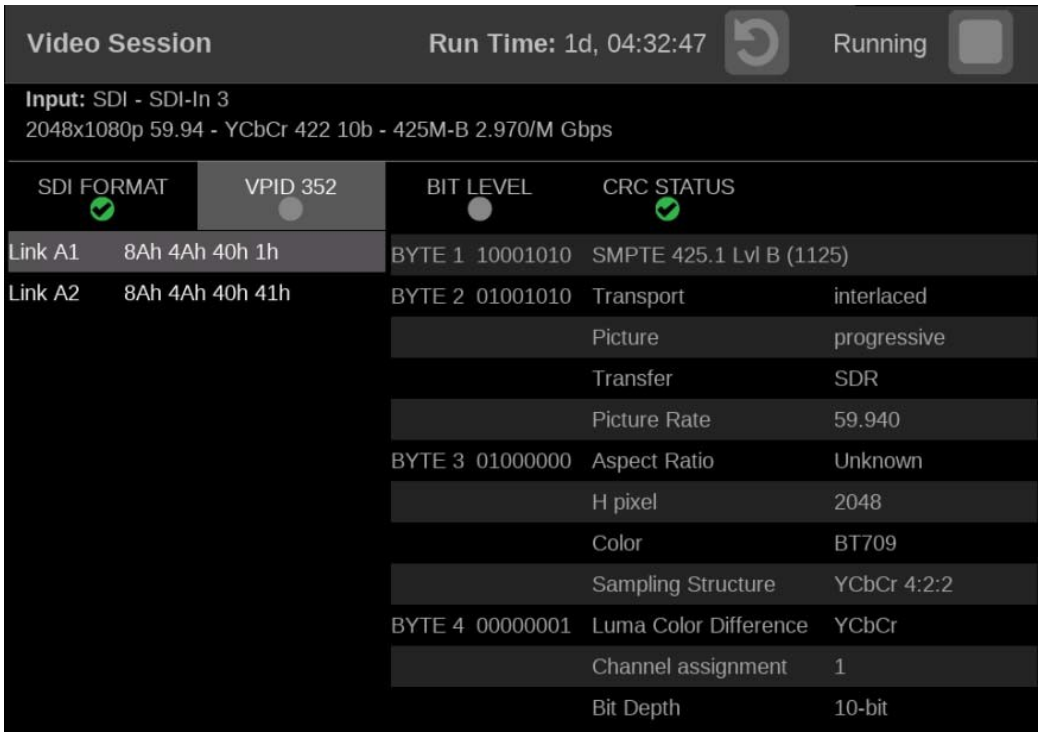


Figure 119: Video Session application — VPID 352 tab display for 3G-SDI Level B signal

Elements of the VPID 352 tab display. The VPID 352 tab consists of two panes:

- **Left pane**: Indicates the presence of a SMPTE 352M payload. The number of data streams determines the number of links, with the VPID values shown in hex. You may select a link to display the decoded VPID information in the right pane.
- **Right pane**: Contains the decoded VPID of the selected link.

BIT LEVEL tab display

Use the BIT LEVEL tab display to view if there are any stuck bits in the input signal. (See Figure 120.)

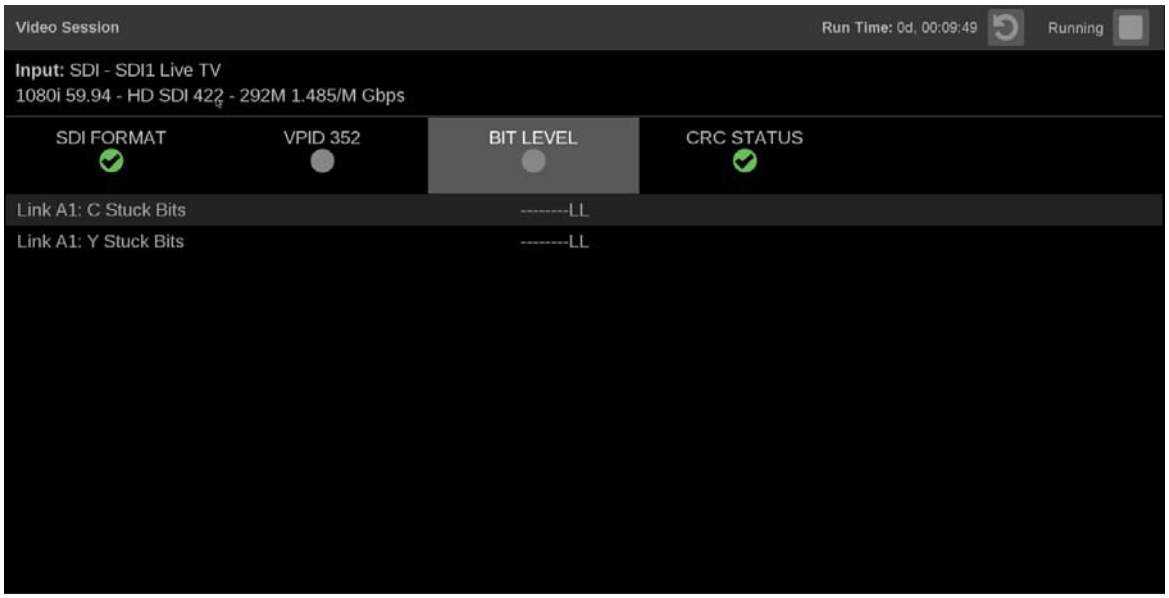


Figure 120: Video Session application – BIT LEVEL tab display

Elements of the BIT LEVEL tab display.

- **Y Stuck Bits**: Displays which of the luminance video bits are stuck. If the readout is " ---", then none of the bits are stuck.

NOTE. *For 8-bit video, because the unused bits are always low, "-------LL" is displayed when no other bits are stuck.*

- **C Stuck Bits**: Displays which of the Chrominance video bits are stuck. If the readout is " ---", then none of the bits are stuck.

CRC STATUS tab display

Use the CRC STATUS tab display to view the status of CRC and Checksum errors in the video signal. (See Figure 121.)

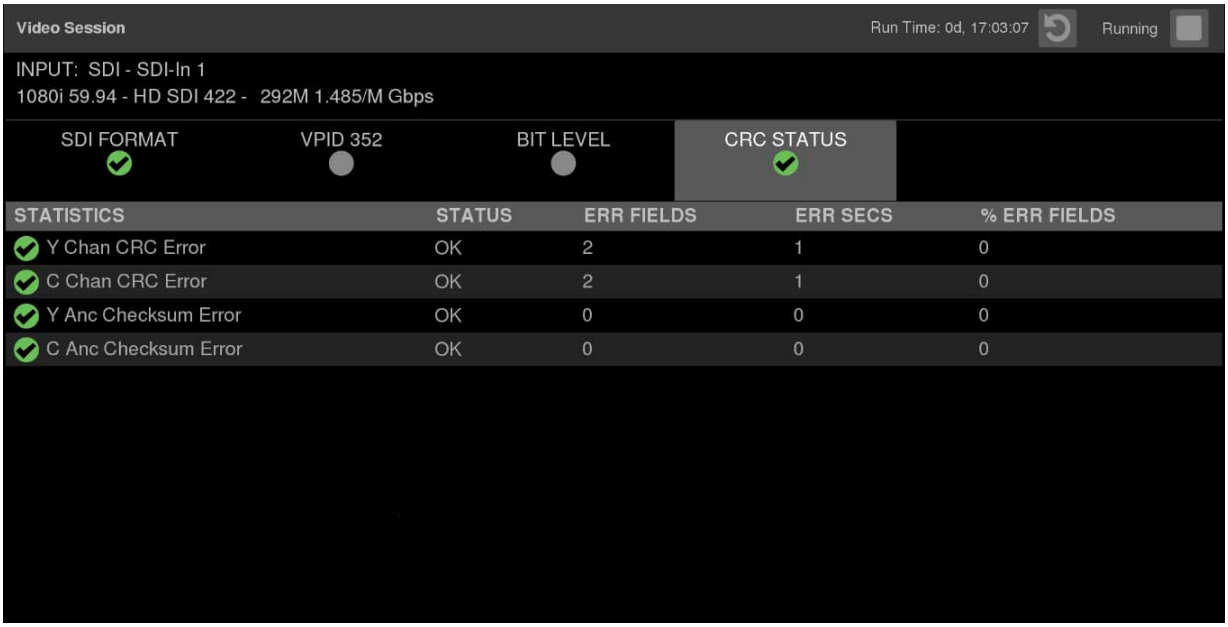


Figure 121: Video Session application – CRC STATUS tab display

Elements of the CRC STATUS tab display.

NOTE. *The instrument uses the SMPTE RP165 standard for error checking. For HD and 3 Gb/s signals, the CRCs change on every video line.*

- **Y Chan CRC Error**: Displays the status of the Y channel embedded CRC (Cyclical Redundancy Check) that was calculated for the video signal. Using a known test signal, the CRC status can be used to verify integrity through a system. An error means that the Y Channel embedded CRC value does not match the calculated CRC value, which indicates that a transmission error has occurred.
- **C Chan CRC Error**: Displays the status of the C channel embedded CRC (Cyclical Redundancy Check) that was calculated for the video signal. Using a known test signal, the CRC status can be used to verify integrity through a system. An error means that the C Channel embedded CRC value does not match the calculated CRC value, which indicates that a transmission error has occurred.

- **Y Anc Checksum Error**: Displays the status of the Y channel ancillary embedded checksum value that was calculated for the video signal. Using a known test signal, the checksum status can be used to verify integrity through a system. An error means that the Y Channel embedded checksum value does not match the calculated checksum value, which indicates that a transmission error has occurred.
- **C Anc Checksum Error**: Displays the status of the C channel ancillary embedded checksum value that was calculated for the video signal. Using a known test signal, the checksum status can be used to verify integrity through a system. An error means that the C Channel embedded checksum value does not match the calculated checksum value, which indicates that a transmission error has occurred.

The CRC Status display is also divided into four columns:

- **Status**: Shows the status of the associated error:
  - **OK**: No error is currently detected.
  - **Invalid**: The data for the item is currently invalid.
  - **Missing**: The data for the item is currently missing.
  - **Error**: The associated error is currently in an error state.
- **Err Fields**: The number of fields, since the last reset, that contained at least one error.
- **Err Secs**: The number of seconds, since the last reset, that contained at least one error.
- **% Err Fields**: Shows a calculated number showing the percentage of all fields since the last reset that contained at least one error.

Timing application

The Timing application uses a reference to evaluate the timing of the input of single-link SDI, quad-link SDI, or IP formats (ST2022-6 or ST2110-20). The timing of the input is compared to the expected frame time according to the reference alignment.

SDI versus Black Burst is available in standard. SDI versus PTP, IP versus PTP, Black Burst versus PTP requires Option MP2-IP-MEAS.

For analog references (Black Burst or Tri-Level sync) the relative position of the horizontal and vertical sync pulses are compared to the input signal. In the case of PTP the current time is obtained and compared to the SMPTE Epoch. When an input is configured for ST2022-7 style redundant streams, circles for Path 1 (green) and Path 2 (blue) will appear, otherwise only a single path will display. (See Figure 122.) When the input signal is fully aligned with the reference, both circles will be in the center of the display indicated by the + symbol.

NOTE. *PTP must be locked to use the Timing application with PTP references.*

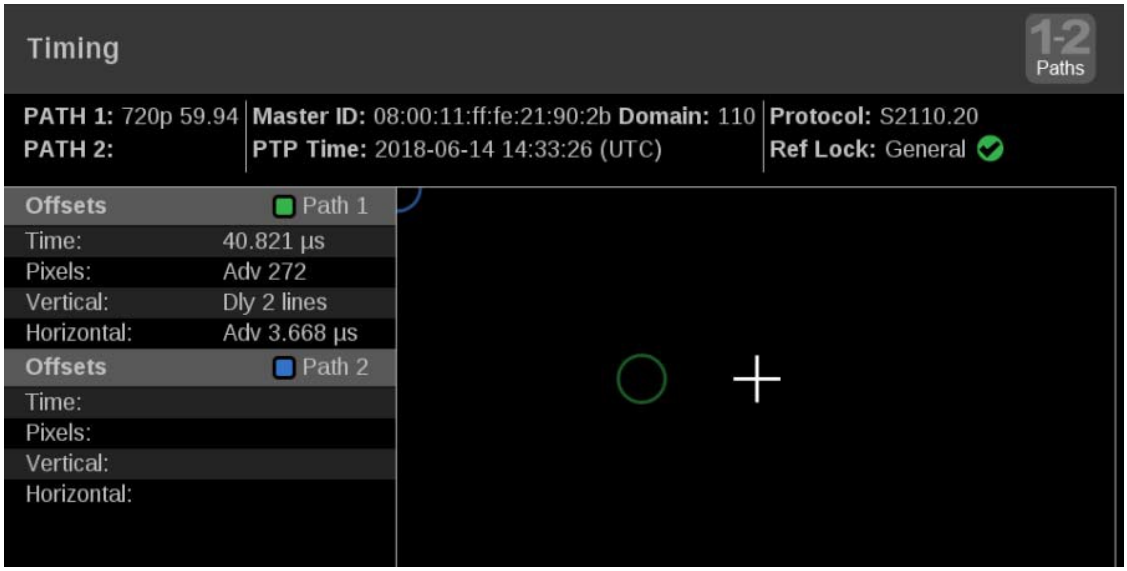


Figure 122: Timing application display for IP signals

Timing application banner

Select and hold anywhere on the Timing application tile to open the available options. (See Figure 123.)

Figure 123: Timing application banner

These options adjust the Timing application appearance:

- The icon expands the Timing application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the Timing application settings menu to adjust the tile settings.

Timing application settings menu

Measurement Mode. Use the menu to change the measurement mode between options. (See Figure 124.)

- **Video to Reference.** The input video signal (SDI or IP) is compared relative to the reference input (analog or PTP).
- **Analog to PTP.** Used in a hybrid system to compare the analog reference to the PTP reference to ensure synchronization.

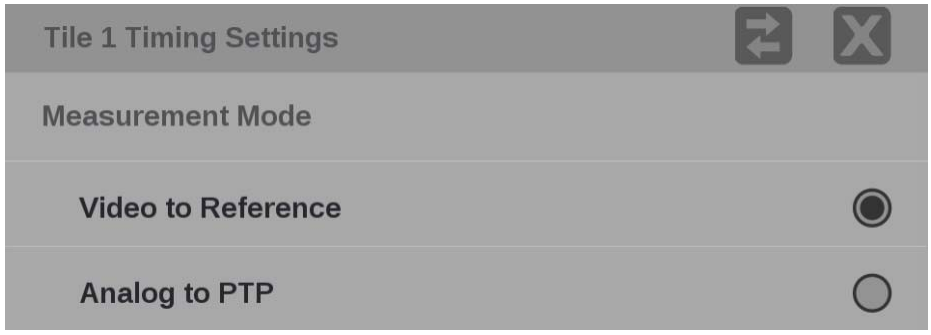


Figure 124: Timing Settings menu

Elements of the Timing application display

- **Path 1 and Path 2**: Displays the IP video format if an IP input signal is selected.

NOTE. *You can switch between Path 1, Path 2, or both Path 1-2 using the Path button at the top right of the application display.*

- **Master ID** and **Domain**: Displays the reference Source and Domain.
- **PTP Time**: Time of day derived from the PTP signals.
- **Protocol**: Displays the input protocol.
- **Ref Lock**: A  (check in green) indicates the PRISM is locked to the reference. A  (x in red) indicates the PRISM is not locked to the reference.
- **Reference Indicator**: A cross-hair indictor centered in the display represents the reference signal.
- **Circle**: The circle represents the timing of the input signal. A signal that is early will be above or to the left of the cross hair. A signal that is late will be below or to the right.
- **Offsets**: The difference in timing between the input and reference. A positive number, or "delayed" value, means the input occurs after the reference. A negative number, or "advanced" value, means the input occurs before the reference.
    - **Time**: The total difference in frame timing between the input and reference
    - **Pixels**: The timing difference between the reference and input signal, expressed as in pixels, instead of time units, after the vertical offset has been removed. This has a range of +-1/2 a line for the input format.
    - **Vertical Offset**: The timing difference between the reference and input signal, expressed as the number of lines of delay for the input video format. This has a range of +-1/2 field for progressive signals and +-1/2 frame for interlace signals.
    - **Horizontal Offset**: The timing difference between the reference and input signal, expressed as the line time which remains from the total delay after the vertical offset has been removed. This has a range of +-1/2 a line for the input format.

Additional offset displays are available for Quad Link SDI signals (See Figure 125.):

- **Link Offsets**: Time delays of Links B, C, and D relative to Link A. These time delays are also shown graphically under the timing display window.
- **Max Link Offset**: Maximum time delay between any two links.

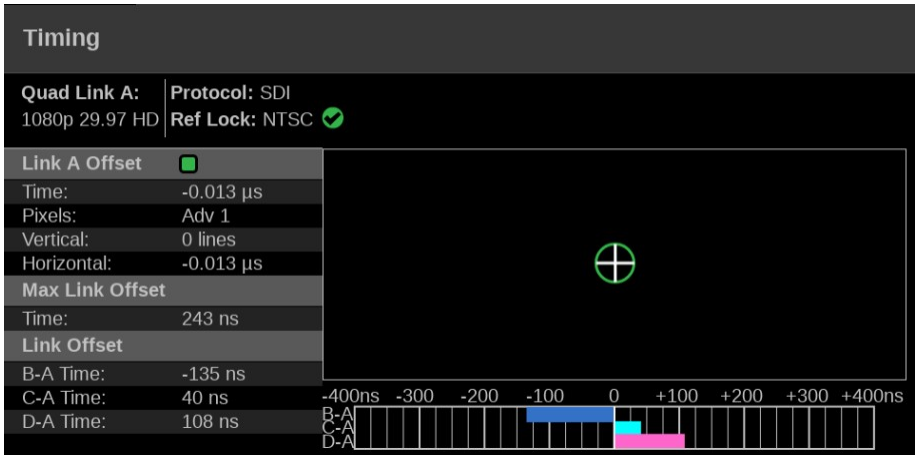


Figure 125: Timing application display for Quad Link SDI signals

Timing offsets for IP signals

Because ST2022-6 streams are complete SDI signals encapsulated in IP, the timing measurement treats these IP signals as if they were SDI. So the timing system detects the start of the IP frame, then extrapolates to the 0h point of the encapsulated SDI. Then using PTP as the reference, the ideal alignment point for that frame rate is calculated based on the PTP epoch. Finally the offset between the ST2022-6 signal and the ideal alignment is displayed. The display shows both absolute time and the time parsed into lines or horizontal delay as time and pixels.

For ST2110-20 streams, the Timing application displays the time of the first packet of the frame. Since ST2110 does not include blanking, the first packet is nominally coincident with the first active line in the SDI raster. This means that it is normal for the ST2110 streams to be delayed by the lines in the vertical blanking of a given format. This value varies up to 42 lines for some formats. According to ST2110-21, both gapped and linear flows should have the start of frame delayed by the equivalent of vertical blanking.

Use cases for measuring timing

One use case for the Timing application is to measure the delay in a gateway and network. If a properly timed SDI signal is applied to a gateway, then the timing measurement on the resulting IP flow will display the combined latency in the gateway and the network.

Each ST2110 stream also carries time stamps. The Stream Timing application allows for the analysis of these time stamps.

Event Log application

The Event Log application provides a view of detected errors. (See Figure 126Figure 126.) The display buffer for the application shows 1,000 log entries.

Figure 126: Event Log application display

Event Log application banner

Select and hold anywhere on the Event Log application tile to open the available options. (See Figure 127.)

Figure 127: Event Log application banner

These options adjust the Event Log application appearance e:

- The icon expands the Event Log application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the Event Log application settings menu to adjust the tile settings.

Event Log application settings menu

Undo Reset. Select this button to undo the last reset of the logged events. (See Figure 128.)

Figure 128: Event Log application settings menu

Elements of the Event Log application display

- **Reset icon**. Use the icon to hide old log items. Select the icon to hide all log items, so only new log items are displayed. Use the **Undo Reset** button in the settings menu to display the log items that were previously hidden.
- **Go to Bottom icon**. Use the icon to go to the end of the currently displayed Event Log buffer where you can monitor any new events. (See Figure 129.) The most recent events are at the bottom of the event list.

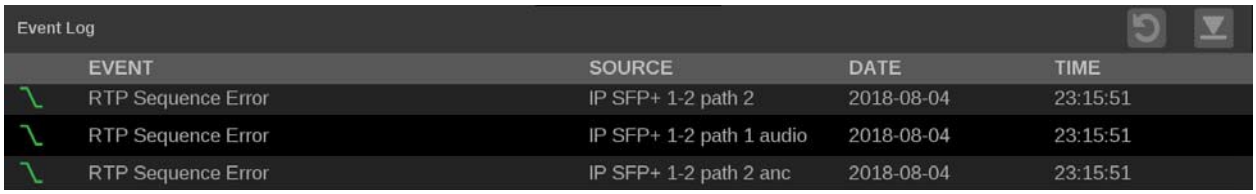


Figure 129: Event application Go to Bottom icon

The Error Log is also divided into four columns:

- **Event**: Shows the current state of the log entries:
  - **Red** (rising edge) items are detected errors.
  - **Green** (falling edge) items are errors that have cleared.
  - **Red / Green** (rising and falling edge) items indicate a momentary error that requires no action.
  - **White** items are informational and identify a change in instrument state.
- **Source**: Shows the inputs on which the errors have occurred.
- **Date**: Shows the date and time, according to the internal clock, that the error occurred in the form YYYY-MM-DD.
- **Time:** Shows the time, according to the internal clock, that the error occurred in the form HH:MM:SS.

Alert messages

Table 11 lists the different types of alarms in the Event Log of the instrument and a description of what causes each alarm.

Table 11: Event log alarm types

Alarm Type	Description
Video signal lost	Indicates a missing or unlocked video signal regardless of IP or SDI. ***NOTE.*** *The video stream may be not decodable or corrupted.*
Format unsupported	Indicates an unsupported video format.
Standard definition detected	Indicates the presence of standard definition video.
Video format changed	Indicates the detection of a video format change.
Video format mismatch	Indicates a mismatch between the detected and the configured video format.
RTP Sequence Error	Indicates that a sequence error was detected in incoming RTP stream. ***NOTE.*** *Sequence errors can be caused by dropped, out of order, or duplicated packets. A sequence error can also be triggered when the sequence number within a flow will not change.*
RTP Header Invalid	Indicates an error was detected in RTP header.
RTP Timestamp Error	Indicates the RTP timestamp is corrupt or is not updating at the correct frequency for the specified media type.
RTP Marker Frequency Error	Indicates that RTP marker bit is not designated at the correct frequency for the specified media type. ***NOTE.*** *If this alarm is present the frequency off is off by ± 1 Hz.*
HBRMT Sequence Error	Indicates a sequence error was detected in SMPTE 2022.6 HBRMT header. ***NOTE.*** *This alarm will not trigger with 2110. HBRMT has its own sequence header and clock.*
HBRMT Header Invalid	Indicates an error was detected in the S2022.6 HBRMT header.
HBRMT Timestamp Error	Indicates an error was detected in the S2022.6 HBRMT Timestamp.
S2022.7 path missing	Indicates one of the datapaths in a S2022.7 seamless switching configuration is missing.
Combined RTP sequence error	Indicates an RTP sequence error was detected in the combined output of a media stream protected using RTP packet reordering or S2022.7 seamless switching.
Data rate invalid or unstable	Indicates that the detected data rate of a video input is unstable or nonstandard. ***NOTE.*** *If this alarm is triggered the hardware has indicated that the AUX out cannot lock. The Incoming video data rate is unstable or off.*
PTP Unlocked	Indicates that Precision Time Protocol is unlocked or missing.
SDI active field length error	Indicates the active field length of SDI video is incorrect.
SDI total field length error	Indicates the total field length of SDI video is incorrect.

Alarm Type	Description
SDI EAV placement error	Indicates an incorrect total line length (EAV-EAV).
SDI SAV placement error	Indicates an incorrect active line length (SAV-EAV).
SDI line number error	Indicates an incorrect encoded transport line number was detected.
SDI Y-channel CRC error	Indicates an SDI line checksum error was detected on the Y Luma channel.
SDI C-channel CRC error	Indicates an SDI line checksum error was detected on the C Chroma channel.
SDI Y-channel ANC checksum error	Indicates an ancillary data checksum error was detected on the Y Luma channel or in SD video.
SDI C-channel ANC checksum error	Indicates an ancillary data checksum error was detected on the Chroma channels.
SMPTE 352M payload ID missing	Indicates a mandatory SMPTE352M video payload identifier packet is missing.
Inter-link format mismatch	Indicates a multi-link SDI signal has incompatible formats on one or more links.
SDI AUX out unlocked	Indicates the SDI auxiliary output is unlocked.
External reference lost	Indicates the external reference signal is not detected.
Drifting	Indicates Timing drift and is displayed in the status bar next to VID/REF.

IP Status application

The IP Status application provides an overview of the monitored IP stream and shows the status of each program in the stream. (See Figure 130.) After the input signals have been subscribed to using the input settings menu, the traffic on the SFP ports can be viewed using the IP Status application. Depending on the network switch deployed, the traffic may not appear in the IP Status application immediately.

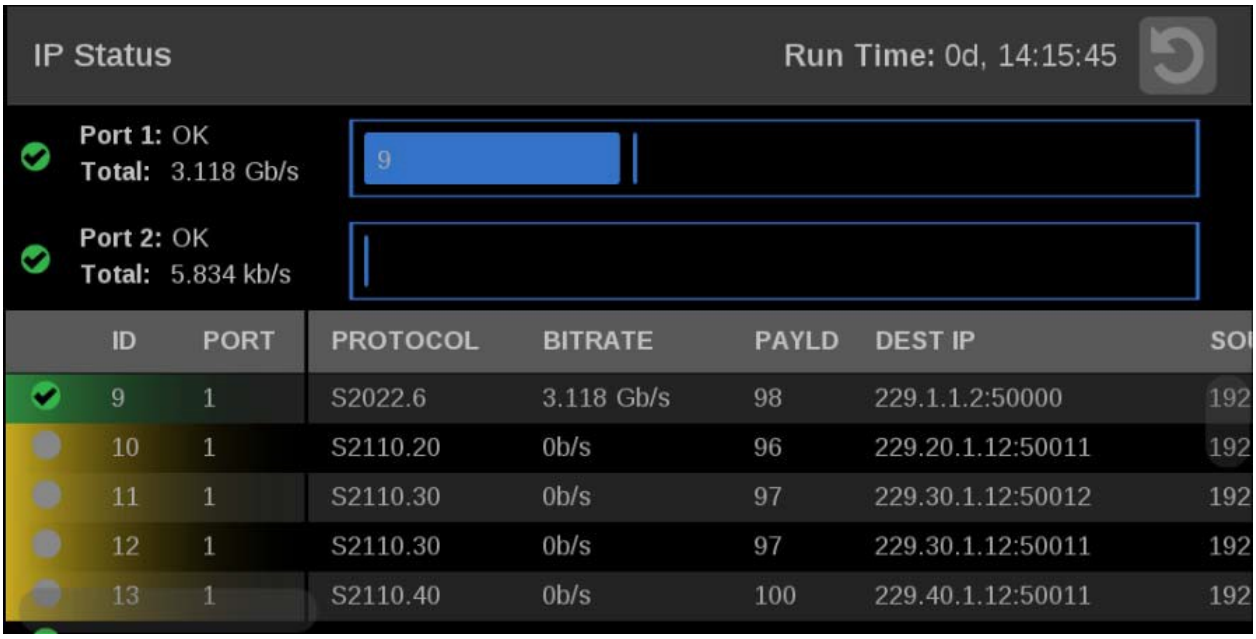


Figure 130: IP Status application display

IP Status application banner

Select and hold anywhere on the IP Status application tile to open the available options. (See Figure 131.)

Figure 131: IP Status application banner

These options adjust the IP Status application appearance:

- The icon expands the IP Status application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the IP Status application settings menu to adjust the tile settings. Use this menu to select Port 1, Port 2, or Both.

NOTE. *After the IP Status application settings menu is opened, the icon displays. Select this icon to move the settings menu horizontally.*

To view Port 1 and Port 2

1. Launch the IP Status application in one of the tiles (select and hold in the tile and select **IP Status** from the list of applications).
2. Open the IP Status settings menu; select and hold in the tile and select the icon. (See Figure 132.)
3. In the IP Status settings menu select **Both** to monitor both Port 1 and Port 2.

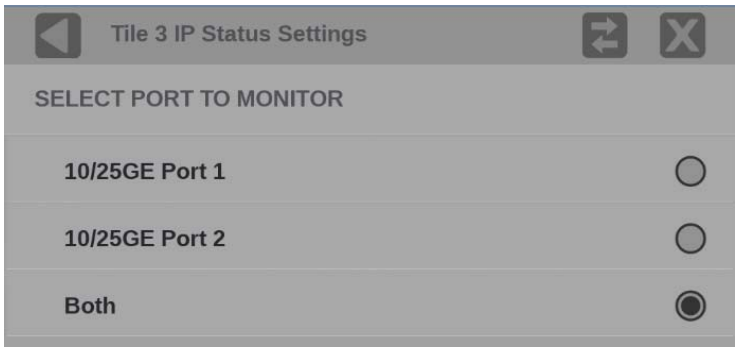
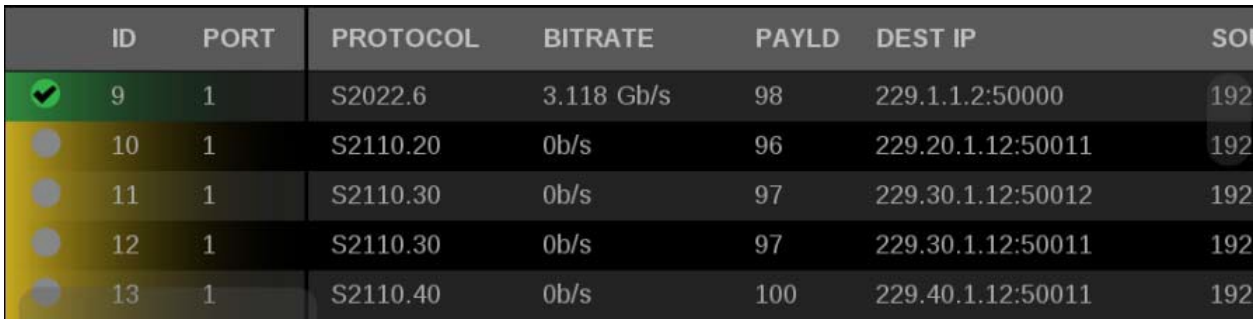


Figure 132: IP Status port settings

With both ports selected there are two traffic bars showing the amount of traffic on each port and a traffic table that now indicates a Port column. (See Figure 133.)

- The active monitored streams are always displayed at the top of the list.
- The columns are sortable.
- The selected input is now highlighted in the ID column.
- When the row has a yellow gradient it indicates a signal that was present and is now gone. Select the reset button at the right side of the banner (at top) to clear the signals that are no longer there.



	ID	PORT	PROTOCOL	BITRATE	PAYLD	DEST IP	SO
✓	9	1	S2022.6	3.118 Gb/s	98	229.1.1.2:50000	192
	10	1	S2110.20	0b/s	96	229.20.1.12:50011	192
	11	1	S2110.30	0b/s	97	229.30.1.12:50012	192
	12	1	S2110.30	0b/s	97	229.30.1.12:50011	192
	13	1	S2110.40	0b/s	100	229.40.1.12:50011	192

Figure 133: IP Status application with yellow and green gradients

Status indicators

Indicates that the signal parameter has not been in an error condition.

Indicates that the signal parameter was in an error condition but the error has now cleared.

Indicates that the signal parameter is currently in an error condition.

Indicates that the signal parameter is not being monitored for an error condition.

Elements of the IP Status application display

- **Port 1 and Port 2**: Status of Port 1 and Port 2.
- **Total**: Shows the total bit rate of the video in the IP stream.
- **IP stream bandwidth bar**: The blue bar outline at the top of the display represents the total bandwidth of the 10 GbE pipe (10.3125 Gb/s). The blue bars inside the outline show the relative bandwidth size of items in the IP stream compared to the total available bandwidth of the stream. Numbers inside the blue bars correspond to the ID numbers listed in the display.
- **Run Time**. The instrument maintains a running IP Status Session. The Run Time readout displays the amount of time that has elapsed during the current IP Status Session. The time is displayed as "DD, HH:MM:SS", where DD is the number of days, HH is the number of hours, MM is the number of minutes, and SS is the number of seconds.
- **Clear icon**. Use the icon to reset the status session. After a reset, items will appear in the list in the order they are detected.
- **Yellow gradient**: When an item in the list has a yellow gradient, it indicates the item was previously detected in the stream but is no longer present. The yellow gradient can also indicate messages, which occur only for a few seconds. Use the icon to reset the display to view only the items currently in the stream. (See Figure 130.)
- **Green gradient**: When an item in the list has a green gradient it indicates the item is a currently monitored stream. Use the icon to reset the display to view only the items currently in the stream. (See Figure 130Figure 133.)

The IP Status application is also divided into these columns:

- **ID**: Shows the ID number of each item in the IP stream. The ID numbers correspond to the numbers in the blue bar at the top of the display.
- **PORT**: Shows the Port number being monitored.
- **PROTOCOL**: Shows the protocol being used by each item in the IP stream.
- **BITRATE**: Shows the bitrate of each item in the IP stream.
- **PAYLD**: Shows the RTP Payload Type number of each IP stream.
- **DEST IP**: Shows the destination IP address and port number of the monitored stream in the format <destination IP address>**:**<port number>.
- **SOURCE IP**: Shows the source IP address and port number of the monitored stream in the form <source IP address>**:**<port number>.
- **DEST MAC**: Shows the destination MAC address of the monitored stream.
- **SOURCE MAC**: Shows the destination MAC address of the monitored stream.
- **PTP DOM**: Shows the PTP domain of the monitored stream.
- **SEQ ERR**: Shows the number of sequencing errors in the monitored stream.
- **RTP CLK**: Shows the RTP clock of the monitored stream.
- **RTP MARK**: Shows the RTP marker frequency of the monitored stream.

IP Session application

The IP Session application uses three tabs to display status of various IP stream parameters. Select any of the tab titles to view the associated information: Layer 1/2, Video, Audio, Data, PTP, or NMOS. (See Figure 134.)

NOTE. *Option MP2-IP-MEAS must be installed to use the IP Session application.*

The display will show only Path 1 unless you enable ST2022-7 Seamless Switching, (See Configure the instrument for HDR/WCG monitoring.)

There is a difference between "Port" and "Path". The Port is the physical SPF port that is used to input the 10 GbE signal. Path 1 and Path 2 are the signal paths to be used for seamless switching. This differentiation is being made since it is possible for both Path 1 and Path 2 to use a single Port.

Figure 134: IP Session application display

IP Session application banner

Select and hold anywhere on the IP Session application tile to open the available options. (See Figure 135.)

Figure 135: IP Session application banner

These options adjust the IP Session application appearance:

- The  icon expands the Diamond application tile to the full screen. The  icon collapses the tile back to its original size.
- The  icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The  icon sets the tile to quarter tile size.

Elements of the top-level IP Session application display

The elements at the top of the IP Session application are shared between the three tabs:

- **Display tabs**: Click one of the three tabs to view the associated display. Each of the tabs has a status indicator to provide a quick view of the status of the parameters contained in each tab.
  - **Layer 1/2**. Use this tab to view the status of various signal parameters in the physical and link layers.
  - **Video**. Use this tab to view the status of the video in the stream.
  - **Audio**. Use this tab to view the status of the audio in the stream.
  - **Data**. Use this tab to view the status of the data in the stream.
  - **PTP**. Use this tab to view PTP parameters.
  - **NMOS**. Use this tab to view information on the registration server and the last Session Description Protocol (SDP) files received.
- **Run Time**. The instrument maintains a running monitoring session for the IP Session application. The Run Time readout displays the amount of time that has elapsed during the current monitoring session. The time is displayed as "DD, HH:MM:SS", where DD is the number of days, HH is the number of hours, MM is the number of minutes, and SS is the number of seconds.
- **Clear icon**. Use the  icon to clear or reset the monitoring session.
- **Running / Stopped icons**. When the monitoring session is running (collecting error data), use the  icon to stop the session. When the session is stopped (no error data collection and no display updates), use the  icon to restart the session.

LAYER 1/2 tab display

Select the LAYER 1/2 tab to view the status of these signal parameters. (See Figure 136.)

Figure 136: IP Session application – Layer 1/2 tab display

Elements of the Layer 1/2 tab display.

- **Layer 1:**
  - **10GbE Link** or **25GbE Link:** Shows the status of the link connection.
    - **Disconnected**: No SFP module present.
    - **No Signal**: No input signal detected.
    - **OK**: Locked to input signal.
  - **SFP Loss of Signal (LOS)**
    - **Disconnected**: No SFP module present.
    - **OK**: Locked to input signal.

NOTE. *Functionality of this signal will vary depending on the brand of SFP installed. The signal is intended as a preliminary indication that the received signal strength is below a range specified by the SFP vendor. Such an indication typically points to non-installed cables, broken cables, or a disabled, failing or a powered off transmitter at the far end of the cable.*

- **Layer 2:**
    - **Lock**: Shows the lock status of the link:
        - **OK**: The 10/25G Ethernet Phy Rx port is successfully locked to the inbound Ethernet signal.
        - **ERROR**: The 10/25G Ethernet Phy Rx port lost lock to the incoming Ethernet signal during the last second. This indicates there is likely a physical layer problem with the link.
    - **CRC Error** columns:
        - **STATUS**: There have been no overflow errors in the Ethernet MAC during the last second.
        - **ERR SECS**: An errored second is an interval of a second during which any error has occurred, regardless of whether that error was a single bit error, or a complete loss of communication for that entire second.
- **Layer 2 Metrics**
    - **Rx Bytes**: A count of the number of bytes received.
    - **Rx BER High**: Indicates that the Sync Header BER is greater than 10^-4.
    - **Rx CRC Errors**: A count of the number of CRC errors detected.
    - **Rx Frames Ok**: A count of the number of Ethernet frames received without error.
    - **Rx Frames Errored**: A count of the number of Ethernet frames received with errors detected.
    - **Rx Undersize Packets**: A count of the number of Ethernet frames received that are less than 64 bytes long.
    - **Rx Oversize Packets**: A count of the number of Ethernet frames received that are greater than 1522 bytes long.
    - **Tx Bytes**: A count of the number of bytes transmitted.
    - **Tx Frames Ok**: A count of the number of Ethernet frames transmitted without error.
    - **Tx Frames Errored**: A count of the number of Ethernet frames transmitted with errors detected.

VIDEO tab display Select the VIDEO tab to view the status of the video in the stream. (See Figure 137.)

Figure 137: IP Session application – VIDEO tab display

Elements of the VIDEO tab display.

- **L3 IP**
  - **Source Addr**: Lists the source addresses for the L3 IP layer.
  - **Destination Addr**: Lists the destination addresses for the L3 IP layer.
- **L4 UDP**
  - **Source Port**: Lists the source ports for the L4 UDP layer.
  - **Destination Port**: Lists the destination ports for the L4 UDP layer.

- **L5 RTP**: Lists these parameters of the L5 RTP (Real Time Protocol) layer. RTP Datagrams are defined in IETF RFC 3550.
    - **Version**: Identifies the version of RTP and should be a value of 2.
    - **Padding**: Indicates whether padding bytes are present. Possible values are:
        - **false**: Indicates no extra padding bytes are at the end of the RTP packet.
        - **true**: Indicates that padding octets have been added to the RTP packet that are not part of the payload.
    - **Extension**: Indicates whether an extension is present. Possible values are:
        - **false**: Indicates no extension is present.
        - **true**: Indicates an extension is present.
    - **CSRC**: Identifies the Contributing Source IDs. This value should be set to zero.
    - **Marker**: This value should be set to 1 to indicate the last Media Datagram of the video frame. The value is set to 0 for all other Media Datagrams and should be 0 for most packets.

NOTE. *For 2022-6 signals, the status indicator will turn red if the Marker Bit Frequency does not match the frame rate indicated in the HBRMT header. For 2110 signals, the status indicator will turn red if the Marker Bit Frequency does not match the measured field rate of the detected format.*

    - **Payload type**: Identifies the type of RTP payload:
        - **98**: Indicates a SMPTE 2022.6 High Bit-rate Media transport.
        - **99**: Indicates a SMPTE 2022.5 High Bit-rate Media Forward Error Correction (FEC) payload.
        - **33**: Indicates a SMPTE 2022.2 Constant Bit Rate MPEG-2 Transport Stream Adaptive Sample Picture Encapsulation (ASPEN) payload.

NOTE. *The Payload type for ST2110 streams should be between 96 and 127. The Payload type is set by the user/device.*

- **Sequence number**: RTP sequence counter that changes by one for each RTP Media Datagram that is sent.

NOTE. *The status indicator turns red if the received RTP sequence numbers do not continuously change by 1 on every packet.*

- **Time Stamp**: The timestamp reflects the sampling instant of the first octet in the RTP datagram. This value can be used to determine packet sequence errors and jitter calculations to be made.

NOTE. *For 2022-6 signals, the status indicator turns red if the Time Stamp field does not change at the rate of 27 MHz on every packet. For 2110 signals, the status indicator turns red if the Time Stamp field does not change at the start of every field or frame at the rate of 90 kHz on every packet.*

- **SSRC**: Identifies the Synchronization Source ID and is set in compliance with RFC3550. This identifier is chosen randomly and should be unique so no two SSRC have the same value with an RTP session.

- **Interface Sampling Frequency Error**: This error indicates that the incoming video is arriving at a frequency outside of the supported range to maintain stable video lock. The signal on the SDI Out video connector may be affected. Possible interface sampling frequency declaration in stream header is incorrect for the stream type being carried.

NOTE. *The status indicator turns red if the received frame rate is not stable enough during conversion to SDI. Marker Bit Frequency Errors can also trigger this indicator.*

- **HBRMT**: Lists these parameters of the High Bit Rate Media Payload Header:

NOTE. *The HBRMT parameters do not apply to ST2110-20 streams.*

- **Video Source Format**: Identifies whether source formatting is present:
  - **Not Present**: Indicates no Source Format information is present.
  - **Present**: Indicates source formatting is present.
- **Video Source ID**: Identifies the video source:
  - **Primary (0x0)**: Indicates a primary stream.
  - **Protect (0x1)**: Indicates a protected stream.
  - **Reserved (n)**: When n is a number other than 0 or 1, indicates that a reserved value is being used.

- **Frame Count**: The Video Frame counter changes in value for the next RTP sequence and rolls over after 255.

NOTE. *The status indicator turns red if the frame count field does not change by 1 at the start of every frame.*

- **Reference for time stamp**: Identifies the time stamp reference:
  - **Unlocked (0x0)**: Indicates the time stamp is not locked to any particular source.
  - **Reserved (0x1)**: Indicates an illegal value.
  - **UTC (0x2)**: Indicates the time stamp is locked to a UTC time source.
  - **Private (0x3)**: Indicates the time stamp is locked to a private time source.
- **Video Payload Scrambling**: Identifies the payload scrambling status:
  - **Unscrambled (0x0)**: Indicates the payload is not scrambled.
  - **Reserved (n)**: When n is a number other than 0, indicates a reserved value is being used.
- **FEC usage**: Identifies the FEC usage status:
  - **No FEC (0x0)**: Indicates no forward-error correction is being used.
  - **Column (0x1)**: Indicates column FEC is being used.
  - **Col/Row (0x2)**: Indicates column and row FEC are being used.
  - **Reserved (n)**: When n is a number greater than 2, indicates a reserved value is being used.
- **Clock Frequency**: Identifies the video word clock frequency of the payload video. Possible values are:
  - **0000**: No time stamp
  - **0001**: 27 MHz
  - **0010**: 148.5 MHz
  - **0011**: 148.5 /1.001 MHz
  - **0100**: 297 MHz
  - **0101**: 297/1.001 MHz
  - **0110-1111**: Reserved
- **Reserved**: This value should be set to 0.

- **Video Source Format fields**: These Video Source Format field values are displayed:
  - **MAP**: Identifies which SMPTE mapping scheme is used. Possible values are: Direct (0x0), LevelB (0x1), 2xHD (0x2), or Reserved (n).
  - **FRAME**: Identifies the raster size. Possible values are: Unspecified (0x0), 720x480i (0x10), 720x576i (0x11), 1920x1080i (0x20), 1920x1080p (0x21), 1920x1080sf (0x22), 2048x1080p (0x23), 2048x1080sf (0x24), or 1280x720p (0x30).
  - **F rate**: Identifies the frame rate. Possible values are: Unknown/Unspecified frame rate 2.970 GHz signal (0x00), Unknown/Unspecified frame rate 2.970/1.001 GHz signal (0x01), Unknown/Unspecified frame rate 1.485 GHz signal (0x02), Unknown/Unspecified frame rate 1.485/1.001 GHz signal (0x03), Unknown/Unspecified frame rate 0.270 GHz signal (0x04), Reserved (0x04-0x0f), 60 (0x10), 60/1.001 (0x11), 50 (0x12), Reserved (0x13), 48 (0x14), 48/1.001 (0x15), 30 (0x16), 30/1.001 (0x17), 25 (0x18), Reserved (0x19), 24 (0x1A), 24/1.001 (0x1B), Reserved (0x1C-0xFF).
  - **Sample**: Identifies the pixel sampling/quantization scheme. Possible values are: Unspecified (0x0), 4:2:2/10bit (0x1), 4:4:4/10bit (0x2), 4:4:4:4/10bit (0x3), 4:2:2/12bit (0x5), 4:4:4/12bit (0x6), 4:4:4:4/12bit (0x7), or 4:2:2:4/12bit (0x8).
  - **Fmt-Reserve**: This bit is reserved for future use and is set to 0.
- **Video TimeStamp**: Shows the value of a free running counter that is synchronous with the interface word clock of the encapsulated video. This timestamp is fixed at the transmitter to the first information contained in the datagram.
- **Header Extension**: Indicates the number of 4-octet Header Extension words that come after the HBRMT payload.

Audio tab display

Select the AUDIO tab to view the status of the audio in the stream. (See Figure 138.)

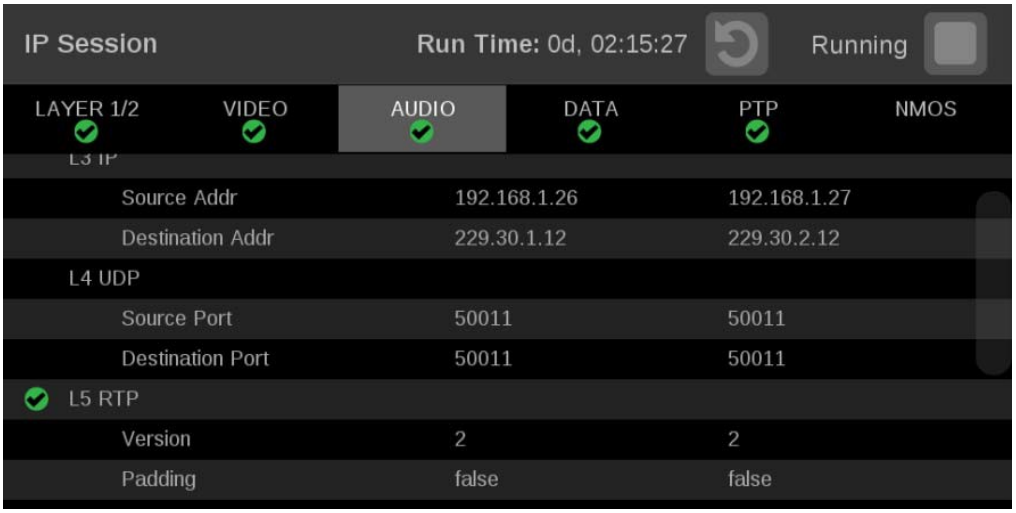


Figure 138: IP Session application – AUDIO tab display

Elements of the AUDIO tab display.

- **L3 IP**
  - **Source Addr**: Lists the source addresses for the L3 IP layer.
  - **Destination Addr**: Lists the destination addresses for the L3 IP layer.
- **L4 UDP**
  - **Source Port**: Lists the source ports for the L4 UDP layer.
  - **Destination Port**: Lists the destination ports for the L4 UDP layer.
- **L5 RTP**: Lists these parameters of the L5 RTP (Real Time Protocol) layer. RTP Datagrams are defined in IETF RFC 3550.
  - **Version**: Identifies the version of RTP and should be a value of 2.
  - **Padding**: Indicates whether padding bytes are present. Possible values are:
    - **false**: Indicates no extra padding bytes are at the end of the RTP packet.
    - **true**: Indicates that padding octets have been added to the RTP packet that are not part of the payload.
  - **Extension**: Indicates whether an extension is present. Possible values are:
    - **false**: Indicates no extension is present.
    - **true**: Indicates an extension is present.

- **CSRC**: Identifies the Contributing Source IDs. This value should be set to zero.
- **Marker**: This value should be set to 1 to indicate the last Media Datagram of the video frame. The value is set to 0 for all other Media Datagrams and should be 0 for most packets.
- **Payload type**: Identifies the type of RTP payload.
- **Sequence number**: RTP sequence counter that changes by one for each RTP Media Datagram that is sent.

NOTE. *The status indicator turns red if the received RTP sequence numbers do not change by 1 on every packet.*

- **Time Stamp**: The timestamp reflects the sampling instant of the first octet in the RTP datagram. This value can be used to determine packet sequence errors and jitter calculations to be made.

NOTE. *The status indicator turns red if the Time Stamp field does not change at 48 kHz rate on every group of audio samples.*

- **SSRC**: Identifies the Synchronization Source ID and is set in compliance with RFC3550. This identifier is chosen randomly and should be unique so no two SSRC have the same value with an RTP session.

Data tab display

Select the DATA tab to view the status of the data in the stream. (See Figure 139.)

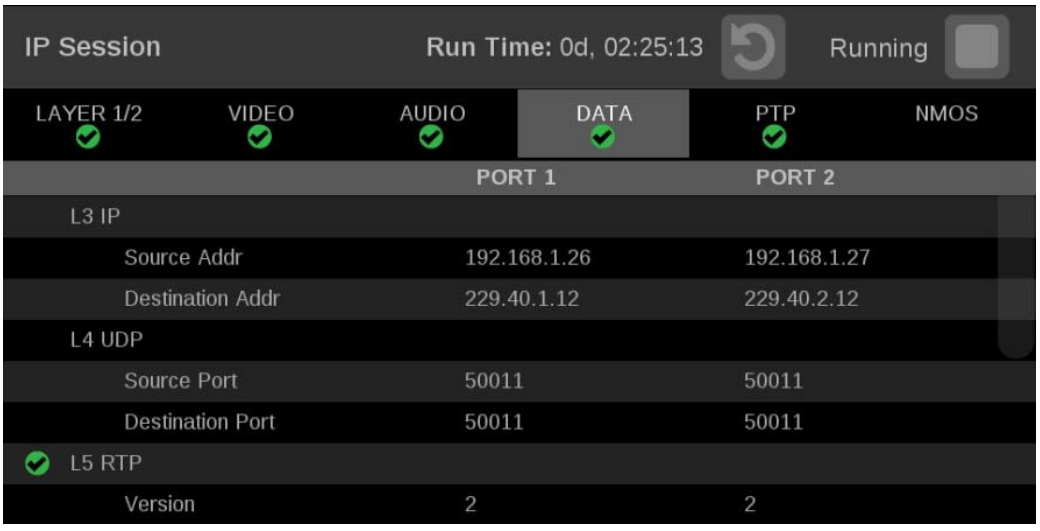


Figure 139: IP Session application – DATA tab display

Elements of the DATA tab display.

- **L3 IP**
  - **Source Addr**: Lists the source addresses for the L3 IP layer.
  - **Destination Addr**: Lists the destination addresses for the L3 IP layer.
- **L4 UDP**
  - **Source Port**: Lists the source ports for the L4 UDP layer.
  - **Destination Port**: Lists the destination ports for the L4 UDP layer.
- **L5 RTP**: Lists these parameters of the L5 RTP (Real Time Protocol) layer. RTP Datagrams are defined in IETF RFC 3550.
  - **Version**: Identifies the version of RTP and should be a value of 2.
  - **Padding**: Indicates whether padding bytes are present. Possible values are:
    - **false**: Indicates no extra padding bytes are at the end of the RTP packet.
    - **true**: Indicates that padding octets have been added to the RTP packet that are not part of the payload.
  - **Extension**: Indicates whether an extension is present. Possible values are:
    - **false**: Indicates no extension is present.
    - **true**: Indicates an extension is present.
  - **CSRC**: Identifies the Contributing Source IDs. This value should be set to zero.
  - **Marker**: This value should be set to 1 to indicate the last Media Datagram of the video frame. The value is set to 0 for all other Media Datagrams and should be 0 for most packets.

NOTE. *For 2022-6 signals, the status indicator will turn red if the Marker Bit Frequency does not match the frame rate indicated in the HBRMT header. For 2110 signals, the status indicator will turn red if the Marker Bit Frequency does not match the measured field rate of the detected format.*

  - **Payload type**: Identifies the type of RTP payload.
  - **Sequence Number**: RTP sequence counter that changess by one for each RTP Media Datagram that is sent.
  - **Time Stamp**: The timestamp reflects the sampling instant of the first octet in the RTP datagram. This value can be used to determine packet sequence errors and jitter calculations to be made.

NOTE. *For 2022-6 signals, the status indicator turns red if the Time Stamp field does not change at the rate of 27 MHz on every packet. For 2110 signals, the status indicator turns red if the Time Stamp field does not change at the start of every field or frame at the rate of 90 kHz on every packet.*

- **SSRC**: Identifies the Synchronization Source ID and is set in compliance with RFC3550. This identifier is chosen randomly and should be unique so no two SSRC have the same value with an RTP session.

PTP tab display

Select the PTP tab to view the status of the PTP elements in the stream. (See Figure 140.) PTP is currently only supported on 10/25 GbE SFP Port 1; for instructions on locking to PTP, see Configure reference settings.

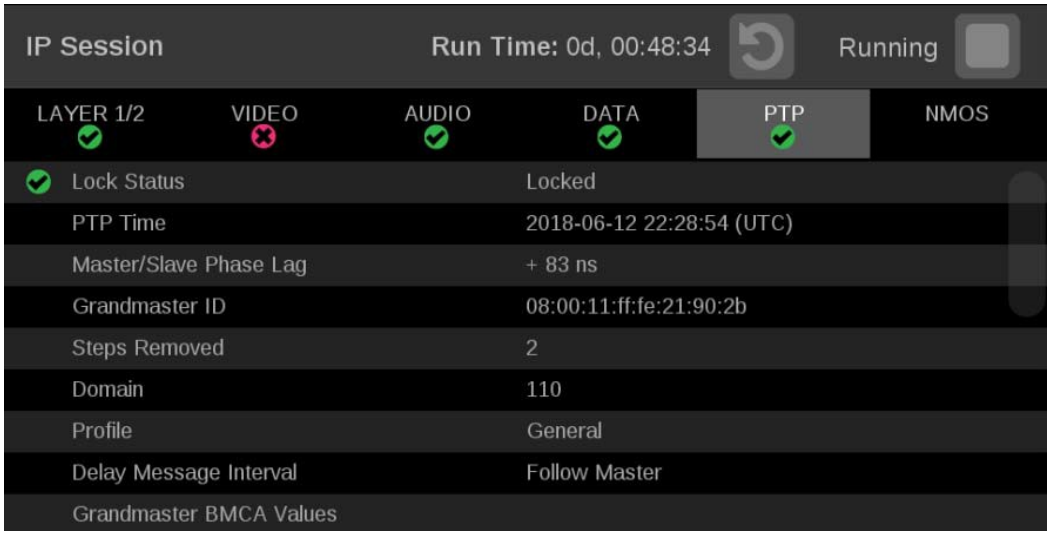


Figure 140: IP Session application – PTP tab display

Elements of the PTP tab display.

- **Lock Status**: Indicates whether the instrument PTP slave is locked to the master PTP signal for the selected domain. These values may appear:
  - **No master present**: Indicates that the master PTP clock has not been detected on the selected domain.
  - **Locked**: Indicates that the master PTP clock is detected and there is less than 1000 ns of phase lag between the master clock and the instrument.
  - **Unlocked**: Indicates that the master PTP clock is detected and there is greater than 1000 ns of phase lag between the master clock and the instrument.
- **PTP time**: Shows the time derived from the PTP Master as UTC (Coordinated Universal Time).
- **Master/Slave Phase Lag**: Shows the detected offset between the master and slave clocks.

- **Grandmaster ID**: Shows the MAC Address of PTP Master with the bytes **ff:fe** inserted in the middle. This ID is also used in the BMCA as a tiebreaker when all of the parameters match down through priority 2.
- **Steps Removed**: Shows the number of communication paths traversed between the local clock and the Grandmaster clock.
- **Domain**: Shows the domain being used. Domains allow multiple PTP services to coexist simultaneously on one physical Ethernet connection.
- **Profile**: Shows the profile being used: General, AES67, or ST2059. This is the user-selected profile set on the Settings > Reference configuration menu page and is not detected on the input.
- **Delay Message Interval**: For Multicast communication mode, the only delay message interval allowed is "Follow Master". In this mode, the slave will set the delay request rate according to the information sent by the master in the delay response message.

NOTE. *The PRISM monitor currently supports Multicast communication mode and SMPTE mixed mode without negotiation. In later firmware releases, other communication modes will be supported.*

- **Grandmaster BCMA Values**: Lists these values for the Grandmaster BCMA (Best Master Clock Algorithm) in order of precedence:
    - **Priority 1**: This parameter defines which clocks are allowed to be considered as masters. To be considered as a master, the value should be set to 128 or less. Priority 1 is the first criteria in the BMCA, so if Priority 1 is set to a lower value than other devices on the system, then it will be chosen even if the clock quality is poor. Typically, all the masters in a domain should have the same value for the Priority 1 parameter.
    - **Clock Class**: This value characterizes the TAI (International Atomic Time) traceability. The clock class value varies to indicate the type of reference in use by the Grandmaster clock. For example, when locked to GPS the PTP grandmaster will report a class 6. However, if in holdover mode after locking to GPS, then it will report a class of 7.
    - **Clock Accuracy**: This value characterizes the clock accuracy for the purpose of determining the best master clock.
    - **Clock Variance**: This value is reported by the PTP master to indicate the variance of the clock over a one second interval. A lower number indicates a more stable clock and will be preferred by the BMCA.
    - **Priority 2**: This parameter is used to break the tie between masters that have the same clock quality. Several values may be used to define a hierarchy of devices. Most profiles use 128 as a default, so a value of 127 or lower would indicate a preferred master.
- **Clock Source**: The clock source field is not used by the BMCA. The field is set to indicate the type of reference in use by the Grandmaster clock.

- **Communication Mode**: There are three basic message modes for PTP: Multicast, Unicast, and mixed Multicast and Unicast. For full Multicast or Unicast modes, all of the PTP messages are sent in the selected mode type.

NOTE. *The PRISM monitor currently supports Multicast communication mode and SMPTE mixed mode without negotiation. In later firmware releases, other communication modes will be supported.*

For some profiles, such as some telecom profiles and the SMPTE ST2059 profile, a mixture of Multicast and Unicast are allowed. On the SMPTE profile unique mixed mode, the Announce and Sync messages are sent as multicast. However, the Delay request and Delay Response messages are sent as Unicast.

Some points to understand about communication modes:

  - Whatever mode is chosen, the master and slave must match or be compatible
  - Multicast and Mixed mode may need IGMP joins and leaves Full

    Unicast must have the master address in all slave AMTs
  - Unicast without negotiation does not allow master to regulate load
  - Two masters can be used on different domains to serve slaves on different communication modes

- **Delay Mechanism**: Shows the delay mechanism mode being used:

NOTE. *The PRISM monitor currently supports only the End-to-End delay mechanism.*

  - **End-to-End**: In this mode, the sync, follow-up, delay-request, and delay-response messages go through the network all the way between the master and slave. End-to-End mode is useful in PTP networks where some or all devices are not PTP aware.
  - **Peer-to-Peer**: In this mode, the Pdelay request and Pdelay response messages are local to each link in the network. Each device determines the local link and device delays. The sync message from the master then collects the corrections as it propagates from the master to slave. Peer-to-Peer mode is useful in PTP networks where the routing configuration changes. For Peer-to-Peer mode to work well, all of the devices need to be PTP aware.

- **Message rates:**
  - **Announce**: Displays the rate of the Announce messages received from the master. Typical values are 1 to 4 messages a second but a wide range is allowed by some profiles. If the value is lower than expected then it may indicate a problem in the network or the master.
  - **Sync**: Displays the rate of the Sync messages received from the master. Typical values are 1 to 16 messages a second, but some profiles allow much higher rates. If the value is lower than expected then it may indicate a problem in the network or the master.
  - **Delay Request**: Displays the rate of the Delay Request messages sent by the slave. In multi-cast mode, the Delay Request rate is required to be set in response to a field in the Delay Response message from the master. Typically the master sets this field so the Delay Request message rate is equal to the Sync message rate.

NOTE. *For SMPTE mixed mode, PRISM sets the delay Request rate equal to the Sync message rate received from the master.*

  - **Delay Response**: Displays the rate of the Delay Response messages received from the master. Each Delay Request should have a matching Delay Response, so if the value is lower than expected then it may indicate a problem in the network or the master

NMOS tab display

Select the NMOS tab to view the registration server information, server list and the last SDP file received. (See Figure 141.)

Figure 141: IP Session application – NMOS tab display

Elements of the NMOS tab display.

- **Registration server**: Shows the **Host Name** and **IP Address** of the registration server. (See Figure 142.)
- **Registration Server List**: Select the Registration Server List tab to view the Host Name, IP Address and Priority of the servers registered to this instrument using NMOS.

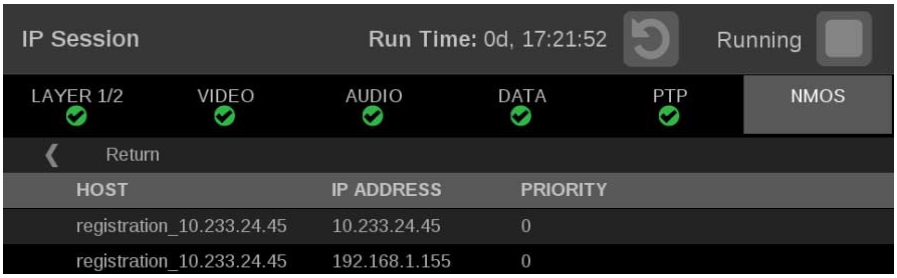


Figure 142: Registration Server List display

NOTE. *Select* ***Return*** *to go back to the main IP Session NMOS menu.*

- **Last SDP File Received**: Select the Last SDP File Received tab view video, audio, and data SDP files. These files contain information used to configure input signals from the registration servers. (See Figure 143.)

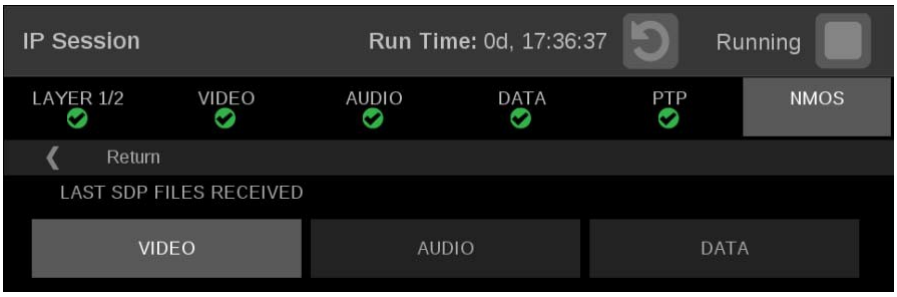


Figure 143: Last SDP File Received display

NOTE. *Select* ***Return*** *to go back to the main IP Session NMOS menu.*

IP Graphs application

Use the IP Graphs application to view various graphs that show aspects of the IP stream. As you scroll through the various graphs, the top of the selected graph moves to the top of the display area to help view the complete graph. The displayed graph is included in a saved preset.

NOTE. *Option MP2-IP-MEAS must be installed to use the IP Graphs application.*

The IP Graphs application has been enhanced to include Path 1 and Path 2, if ST2022-7 monitoring is configured. The graph data can be switched between viewing only Path 1, Path 2, or both by using the **Path** button in the upper right of the screen.

NOTE. *The Path button only works with 2022-7 seamless switching enabled in input configuration.*

IP Graphs application banner

Select and hold anywhere on the IP Graphs application tile to open the available options. (See Figure 144.)

Figure 144: IP Graphs application banner

These options adjust the IP Graphs application appearance:

- The icon expands the IP Graphs application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the IP Graphs application settings menu to adjust the tile settings. Use this menu to adjust Trend Interval.

NOTE. *After the IP Graphs application settings menu is opened, the icon displays. Select this icon to move the settings menu horizontally.*

IP Graphs application settings menu

Trend Interval. Use the drop-down menu to change the interval to 1 minute, 5 minute, 10 minute, 30 minute, 1 hour, 3 hour, 6 hour, 12 hour, or 1 day. (See Figure 145.)

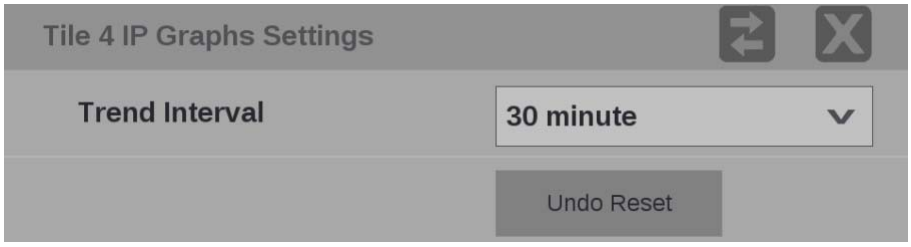


Figure 145: IP Graphs application settings menu

Elements of the top-level IP Graphs application display

The elements at the top of the IP Graphs application are shared between all graphs. (See Figure 146.)

NOTE. *Only Path 1 displays unless you enable ST2022-7 Seamless Switching,* (See Configure the instrument for HDR/WCG monitoring.)

- **Port 1 and Port 2**: Shows the physical ports on the instrument.
- **Src/Dest**: Lists the source and destination addresses of the IP stream.
- **Protocol**: Lists the protocol being used by the monitored stream.
- **PRS**: Shows the Packet Read Schedule (PRS) defined in the input video settings.
- **Clear icon**. Use the icon to clear or reset the monitoring session.
- **Path button**: Use the Path button to switch between Path 1, Path 2, or both Path 1 and Path 2.
- **Stream type button**: Use this button to switch between the video, audio, or data stream IP graphs.
- **Res**: Lists the resolution of the graph display.

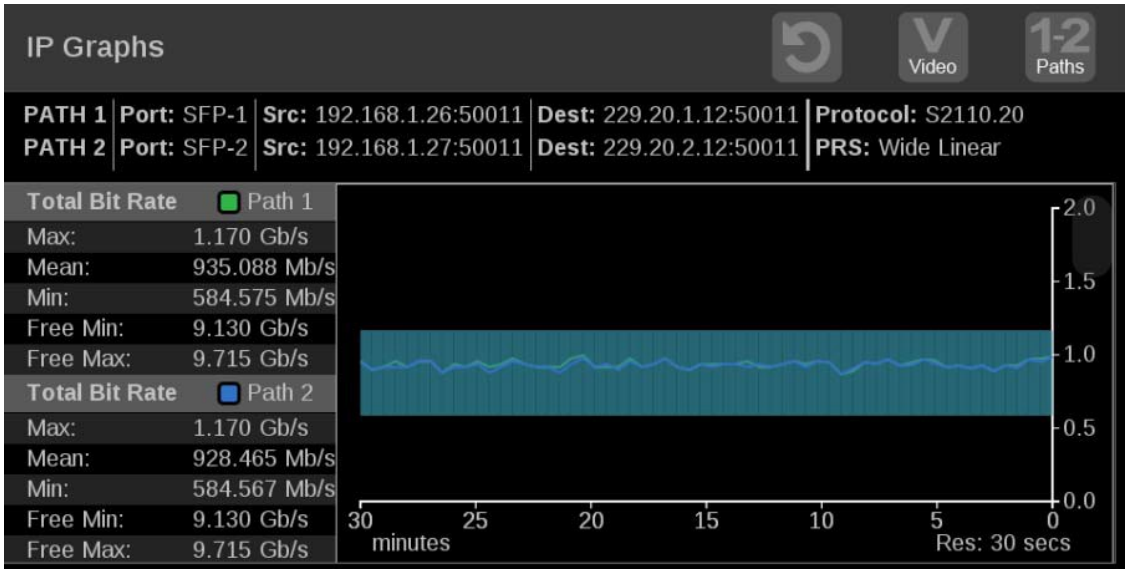


Figure 146: IP Graphs application display

Total Bit Rate graph

The Total Bit Rate graph shows the total bit rate currently on the 10/25 GbE input. The maximum available bandwidth is 10.3 Gb/s.

These readouts appear:

- **Max**: Shows maximum bandwidth used during the time window.
- **Mean**: Shows the mean bandwidth used during the time window.
- **Min**: Shows the minimum bandwidth used during the time window.
- **Free Min/Max**: Shows the minimum and maximum available bandwidth that is not being consumed.

Session Bit Rate graph

The Session Bit Rate graph shows the data rate of the currently selected input stream. (See Figure 147.)

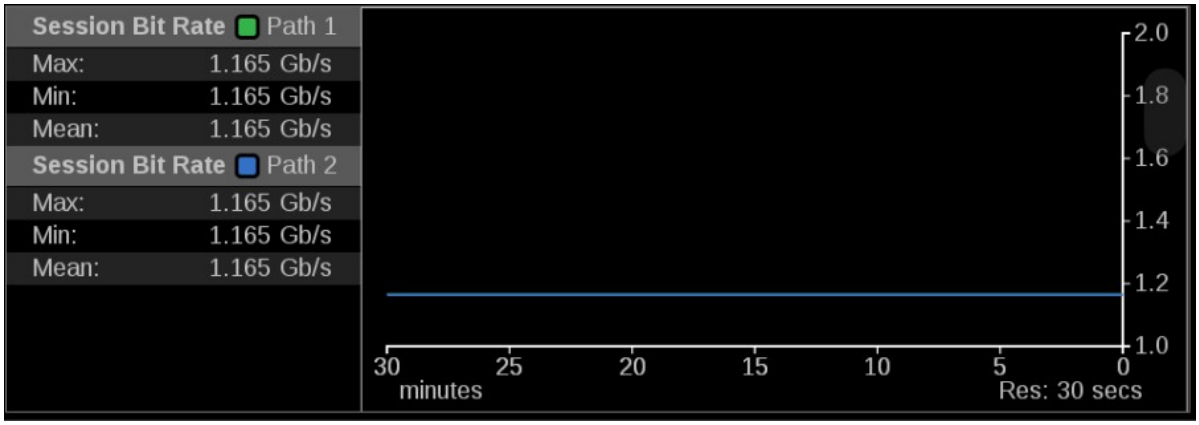


Figure 147:IP Graphs application – Session Bit Rate graph

PIT graph

The PIT (Packet Interval Time) graph shows the difference in arrival time between sequential packets of the active stream. This is one indication of the packet jitter and dropped packet rate. The colored bars represent the range from minimum to maximum for all of the packets within that time interval. (See Figure 148.)

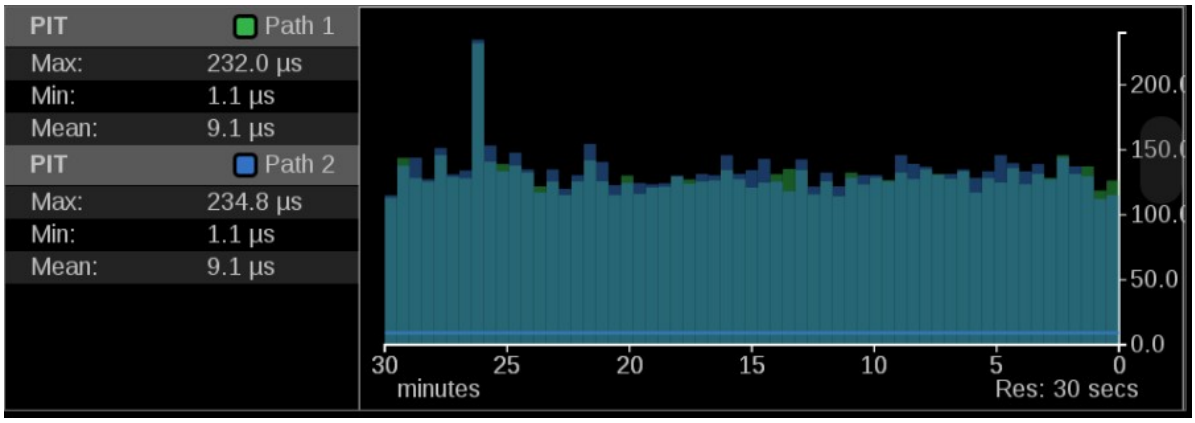


Figure 148:IP Graphs application – PIT graph

RTP Sequence Error graph

The RTP Sequence Error: Shows the RTP sequence information and reports if any packet is received out of order. (See Figure 149.)

Reconstructed path errors: In addition to counting Path 1 and Path 2 RTP sequence errors, the number of packets that could not be corrected is shown. An output packet could be uncorrected if it is dropped on both paths or there is too much skew between the paths resulting in a buffer overflow.

The number of reconstructed path errors also applies to situations when ST2022-7 is turned off. Packets could pass uncorrected if they are dropped or if reordering results in an input buffer overflow.

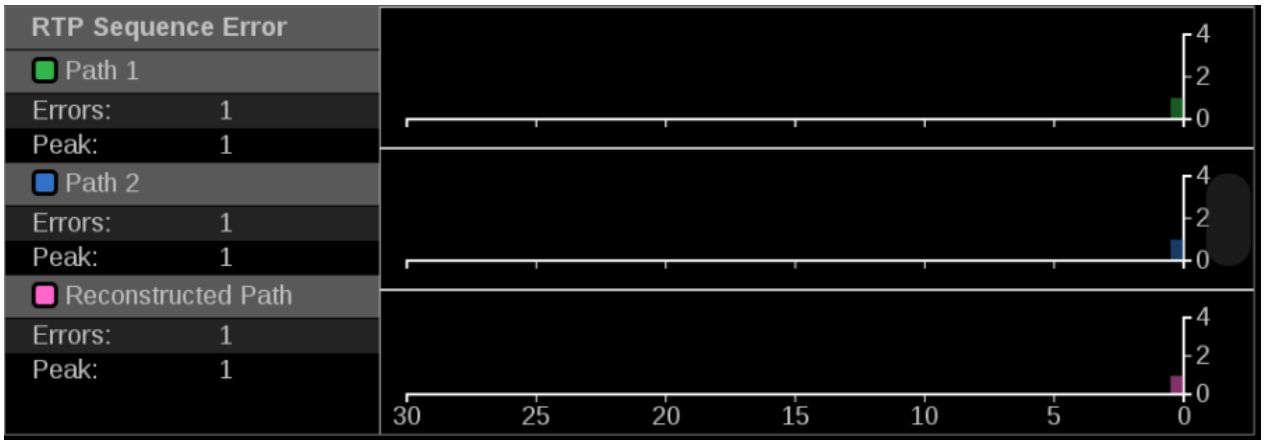


Figure 149:IP Graphs application – RTP Sequence Error graph

Path1–Path2 Differential graph

Path Differential represents the time difference between the Path 1 and Path 2 streams in a ST2022-7 system. (See Figure 150.) As the path differential gets larger, it becomes more difficult for equipment receiving the data to properly process both paths, depending on the size of the input buffer in the equipment.

The ST2022-7 specification defines Path Differential as an absolute value, but the Path1-Path2 Differential graph shows the signed value of Path 1 minus Path 2. A positive value means that Path 2 is lagging Path 1. (See Figure 151.)

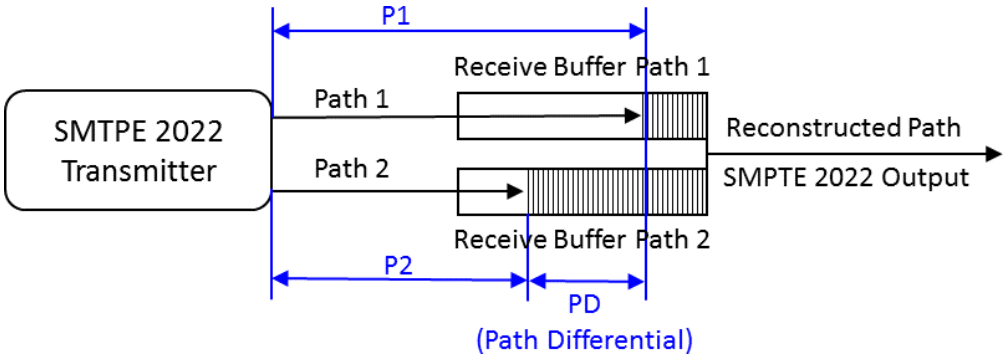


Figure 150: Seamless protection switching of SMPTE ST-2022-7 IP stream

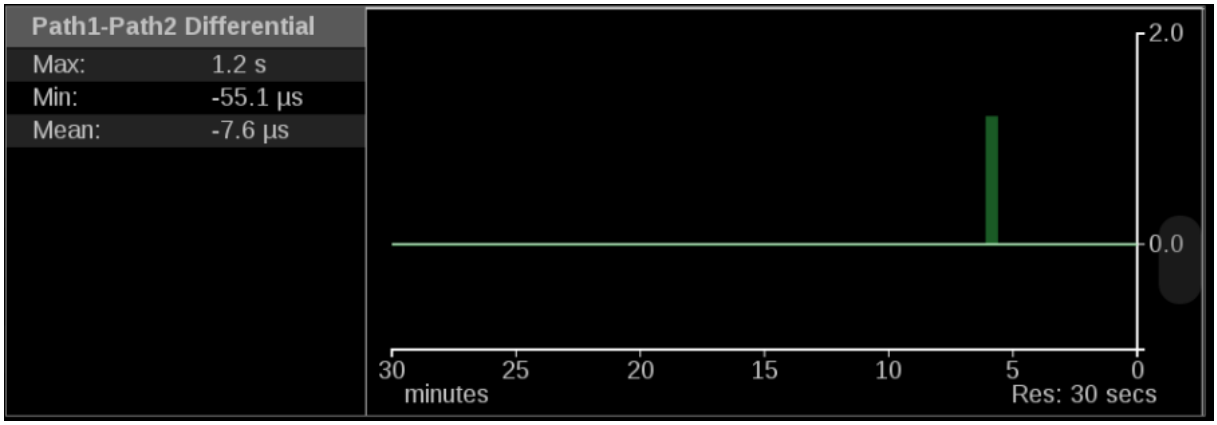


Figure 151: IP Graphs application – Path1–Path2 Differential graph

NOTE. *The measurement range of Path1-Path2 differential measurement is 1 second.*

NOTE. *The Path1-Path2 differential measurement is not supported for ST2110-30.*

CMAX and VRX Buffer graph

ST2110-21 specifies a timing model for ST2110-10 video RTP streams with these parametric models:

- A network compatibility model to regulate the burst characteristics of senders, which promotes the compatibility with the switches. The **CMAX** section provides a trend graph for this type of modeling. (See Figure 152.)
- A virtual receiver buffer model to ensure there is no buffer overflow/underflow in the receiver that could cause the packet loss and picture quality degradation. The **VRX Buffer** section provides a trend graph for this type of modeling.

Both trend graphs help engineers properly setup the packet delivery timing in the RTP packet sender.

NOTE. *The CMAX and VRX trend graphs are only available for 2110 streams.*

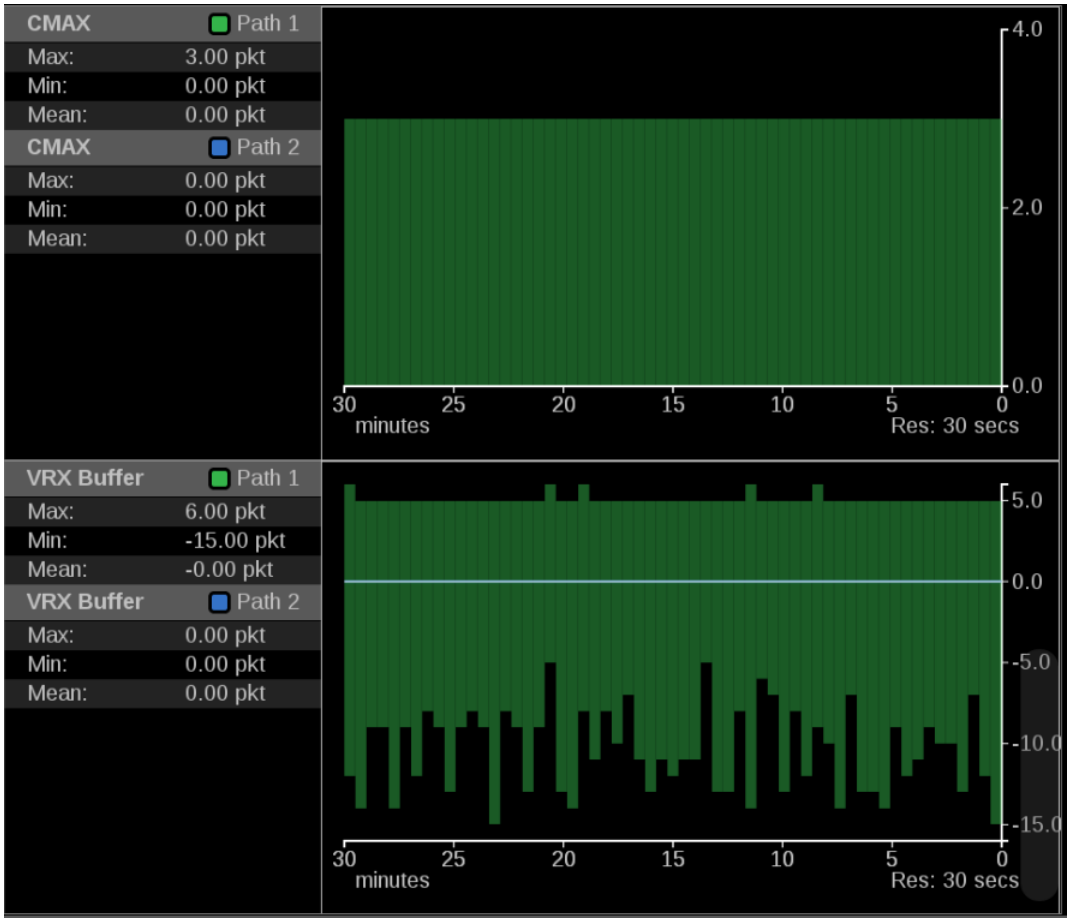


Figure 152: IP Graphs application – CMAX and VRX Buffer graph

PIT Histogram application

Use the PIT (Packet Interval Time) Histogram application to monitor the network delay variation statistics. (See Figure 153.)

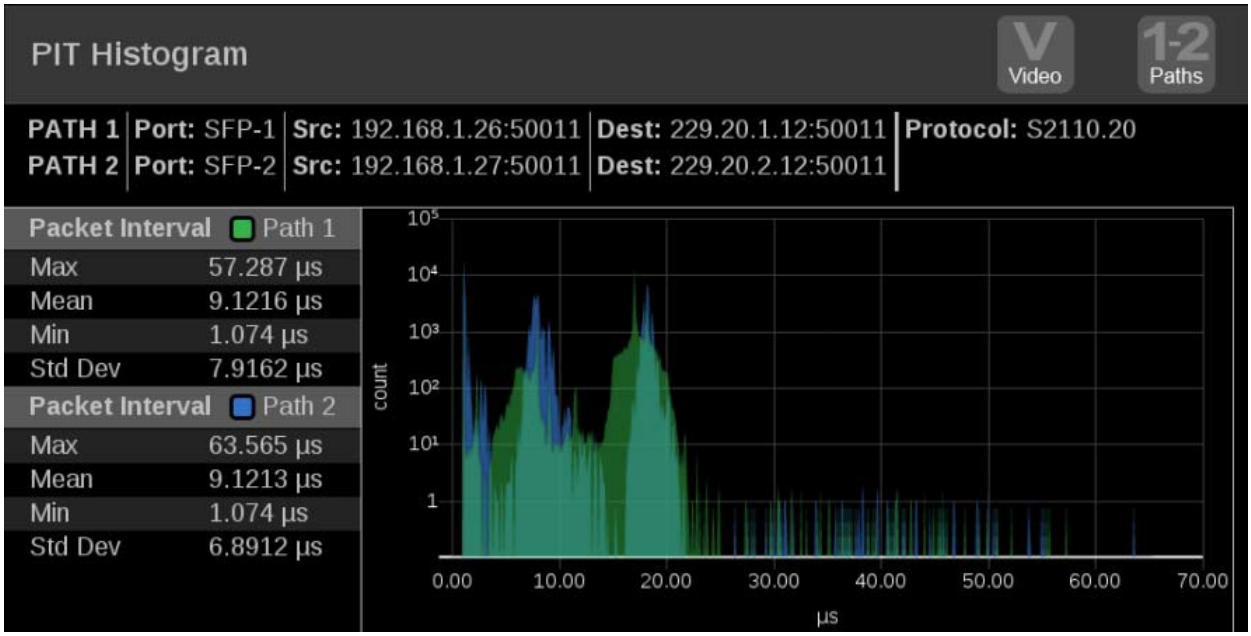


Figure 153: PIT Histogram application display

PIT Histogram application banner

Select and hold anywhere on the PIT Histogram application tile to open the available options. (See Figure 154.)

Figure 154: PIT Histogram application banner

These options adjust the PIT Histogram application appearance:

- The icon expands the PIT Histogram application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the PIT Histogram application settings menu to adjust the tile settings. Use this menu to set the y-axis scaling.

NOTE. *After the application settings menu is opened, the icon displays. Select this icon to move the settings menu horizontally.*

PIT Histogram application settings menu

Y-Axis Scaling. Use this option to switch the y-axis scaling between Log and Linear. (See Figure 155.)

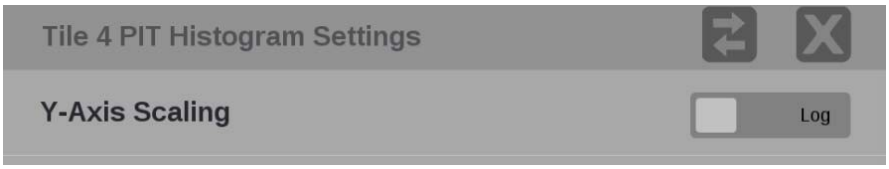


Figure 155: PIT Histogram application settings menu

Elements of the PIT Histogram application

- **Port 1 and Port 2**: Shows the physical port(s) on the instrument.
- **Src/Dest**: Lists the source and destination addresses of the IP stream.
- **Protocol**: Lists the protocol being used by the monitored stream.
- **Path button**: Use the Path button, in the upper right corner of the tile, to switch between Path 1 only (green), Path 2 only (blue), or both Path 1 and Path 2 data (cyan where Path 1 and 2 are overlapped).

NOTE. *The Path button only works with 2022-7 seamless switching enabled in input configuration.*

- **Stream type button**: Use this button to switch between the video, audio, or data stream IP graphs.

NOTE. *The stream type button is only available with 2110 streams.*

- **Packet Interval information**:
  - **Max**: Shows maximum packet interval time.
  - **Mean**: Shows the mean packet interval time.
  - **Min**: Shows the minimum packet interval time.
  - **Std Dev**: Shows the standard deviation of the packet interval time.
- **Pinch and zoom control**: Use the pinch-out gesture on the graph to zoom in. After using the zoom in gesture, the text **Zoomed** will be displayed on the x axis of the graph. (See Figure 156.)

NOTE. *When using a keyboard and mouse, click and drag to zoom in.*

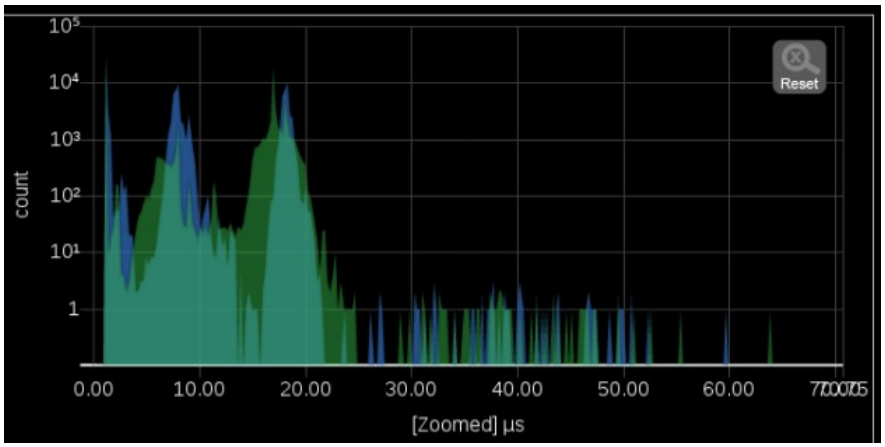


Figure 156: Zooming in on the PIT Histogram graph

Select the **Reset** button (

) to set the graph back to autoscale mode.

NOTE. *The Reset button is only displayed after zooming in.*

PTP graphs application

Use the PTP Graphs application to monitor the message timing between Master and Slave in a PTP network.

For more information on PTP operations and settings, (See Configure reference settings.) and (See PTP introduction.)

NOTE. *Option MP-IP-MEAS must be installed to use the PTP Graphs application.*

PTP Graphs application banner

Select and hold anywhere on the PTP Graphs application tile to open the available options. (See Figure 157.)

Figure 157: PTP Graphs application banner

These options adjust the PTP Graphs application appearance:

- The icon expands the PTP Graphs application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the PTP Graphs application settings menu to adjust the tile settings. Use this menu to adjust the PTP Trend Interval.

NOTE. *After the PTP Graphs application settings menu is opened, the icon displays. Select this icon to move the settings menu horizontally.*

PTP graphs application settings menu

Trend Interval. The PTP Trend Interval setting is the extent of the horizontal axis on the graph. Use the drop-down menu to change the interval to 1 minute, 5 minute, 10 minute, 30 minute, 1 hour, 3 hour, 6 hour, 12 hour, or 1 day. (See Figure 158.)

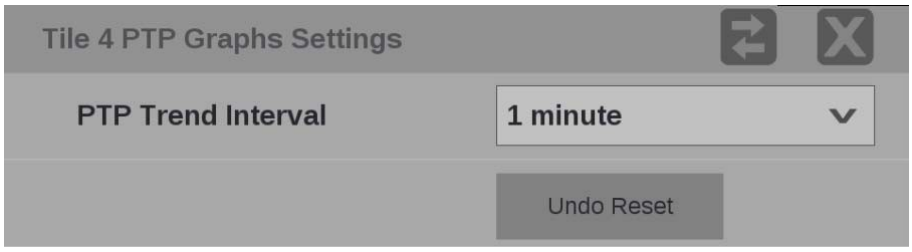


Figure 158: PTP Graphs application settings menu

Elements of the PTP Graph

The PTP graphs are useful in observing the effects of traffic on the PTP messages and the operation of transparent and boundary clocks. Non-PTP aware switches may have significant PTP delay variations, while transparent and boundary clocks will have much less variation and total delay. (See Figure 159.)

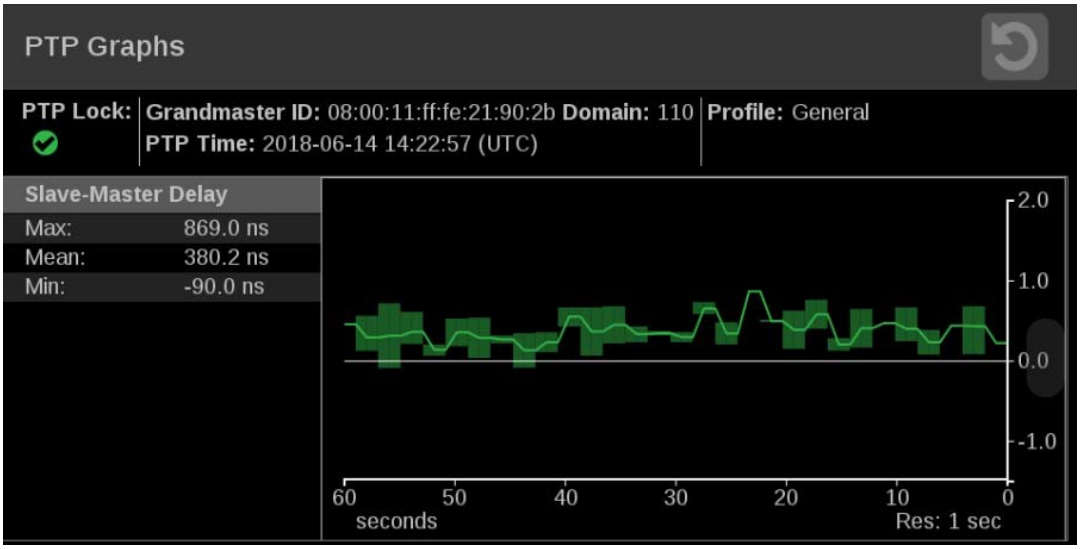


Figure 159: PTP Master-Slave Delay and Variation graphs

- Top of the display:
    - **PTP Lock**: Shows the status of the PTP lock.
    - **Grandmaster ID**: Displays the reference Source and Domain.
    - **PTP Time:** Time of day derived from the PTP signals.
    - **Profile**: Shows the profile which has been selected in the reference settings menu. This is not detected from the incoming PTP messages.
    - **Resolution**: The time measurement for each bar on the display. Longer graph settings collect data into larger bins to be displayed. This range and resulting resolution are selected in the setting menu for PTP graphs.
- **Trace Types**: There are four displays available. For each one, the Max, min and average are show on the left, while the traces vs time is shown on the right. The traces indicate the Max, and Min envelop, as well as the average for each time bin. The time scale can be adjusted in the settings menu—select and hold the menu bar to access this menu. The data is logged for 1 days so you can go back and look at long term trends.

  Use the slider to move the displays up or down.
    - **Master Slave Delay graph**: This indicates the difference in the time stamps for the PTP Sync messages which go from the master to the slave. So this display will indicated effects of the downstream network delay and adjustments made to the slave clock. After the slave is locked and the timing is stable, then the perturbation on this graph are largely due to network variations. Traffic will often cause some messages to be delayed so then the maximum delay will increase.

      As the PTP is locking, the slave clock will be adjusted, so the trace may have large swings or jumps. As the system locks the Master to Slave and Slave to master delays should converge on the same value. This value represents the average network delay between the master and slave for the traffic in both direction.

      If the network delay is too unstable, then the PTP may never be able to lock. This will appear as large variations on this trace.
    - **Master Slave Variation graph**: The master to slave variation, is derived from the same data as the master to slave delay. The absolute value of the changes in delay are filtered according to RFC1889 and displayed. This display then shows a measure of the variation of the network delay. A low value will indicate that a PTP slave will have an easy time locking, a large value will indicate it may be challenging for a PTP slave to get a good lock.
    - **Slave toMaster Delay graph**: This indicates the difference in the time stamps for the PTP Delay Request messages which go from the slave to the master. So this display indicated effects of the upstream network delay and adjustments made to the slave clock. After the slave is locked and the timing is stable, then the perturbation on this graph are largely due to network variations. Traffic often causes some messages to be delayed so then the maximum delay increases.

As the PTP is locking, the slave clock will be adjusted, so the trace may have large swings or jumps. As the system locks the Master to Slave and Slave to master delays should converge on the same value. This value represents the average network delay between the master and slave for the traffic in both direction.

If the network delay is too unstable, then the PTP may never be able to lock. This will appear as large variations on this trace.

- **Slave to Master Variation graph**: The master to slave variation, is derived from the same data as the master to slave delay. The absolute value of the changes in delay are filtered according to RFC1889 and displayed. This display then shows a measure of the variation of the network delay. A low value will indicate that a PTP slave will have an easy time locking, a large value will indicate it may be challenging for a PTP slave to get a good lock.
- **PTP Phase Lag graph**: The PTP phase lag is the error in the slave clock phase as measured by the PTP timestamps. This value is used to adjust the slave clock to drive the error toward zero.

  It is the phase error of the phase locked loop, which controls the slave clock. The phase lag is a reasonable estimate of how well the PTP slave is locked to the master, however the phase lag does not indicate if there is any asymmetry in the network.

Stream Timing application

The Stream Timing application shows the timing of the video, audio, and data as it was received relative to the embedded RTP time stamps. (See Figure 160.) It also shows the relative delay between audio and video, and the data and video, which is the amount of delay needed to realign the two essence types.

NOTE. *The Stream Timing application requires Option MP2-IP-MEAS.*

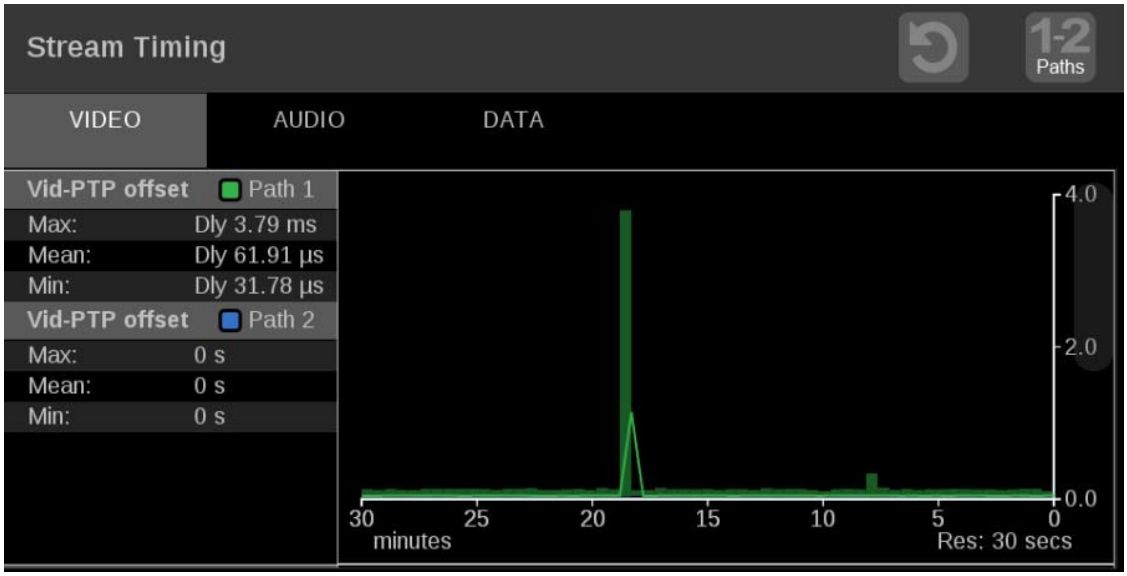


Figure 160: Stream Timing application display

Stream Timing application banner

Select and hold anywhere on the Stream timing application tile to open the available options. (See Figure 161.)

Figure 161: Stream Timing application banner

These options adjust the Stream Timing application appearance:

- The icon expands the Stream Timing application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the Stream Timing application settings menu to adjust the tile settings.

NOTE. *After the application settings menu is opened, the icon displays. Select this icon to move the settings menu horizontally.*

Stream Timing application settings menu

Trend Interval. Use the drop-down menu to change the interval to 1 minute, 5 minute, 10 minute, 30 minute, 1 hour, 3 hour, 6 hour, 12 hour, or 1 day. (See Figure 162.)

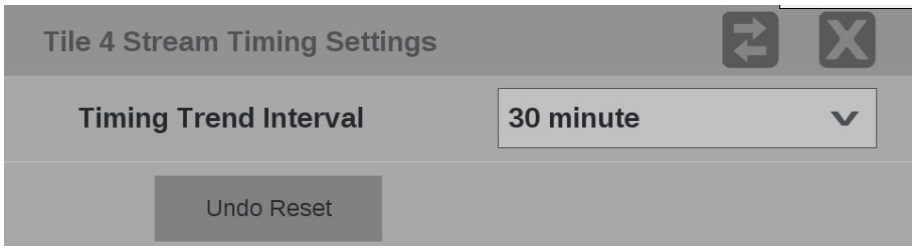


Figure 162: Stream Timing application settings menu

Undo Reset. Use this button to undo the last clear or reset of the monitoring session.

Elements of the Stream Timing application display

The elements at the top of the Stream Timing application are shared between all graphs:

NOTE. *Only Path 1 will display unless you enable ST2022-7 Seamless Switching,* *(See Configure the instrument for HDR/WCG monitoring.)*

- **Clear icon**. Select the icon to clear or reset the monitoring session.
- **Path button**: Select the **Path** button to switch between Path 1, Path 2, or both Path 1 and Path 2.
- **Stream type tabs**: Use these tabs to switch between the video, audio, or data stream offset graphs.
- **Res**: Lists the resolution of the graph display.

- **Stream type tabs**: Use these tabs to switch between the video, audio, or data stream offset graphs.
- **Res**: Lists the resolution of the graph display.

Video offset tab

The **Vid-PTP offset** graph shows timing of the video stream as it was received against the PTP. (See Figure 163.) This data is the same as the data used in the Timing display, but it is graphed versus time.

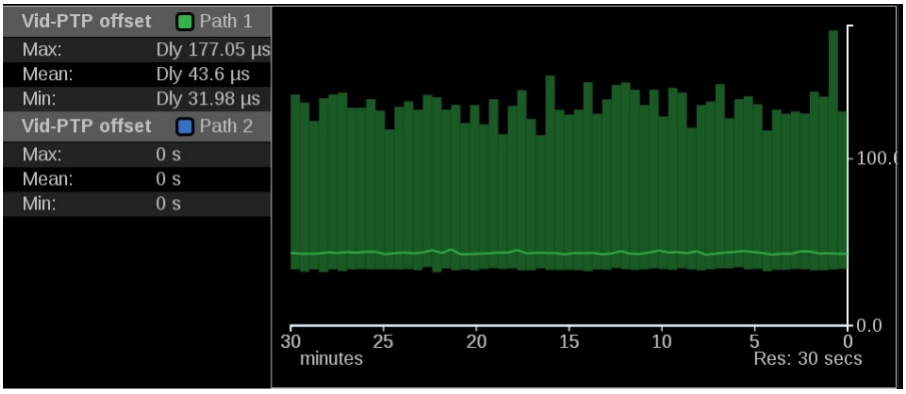


Figure 163: Stream Timing application – Video to PTP graph

The **Vid-RTP offset** graph shows timing of the video stream as it was received relative to the embedded RTP time stamps. (See Figure 164.)

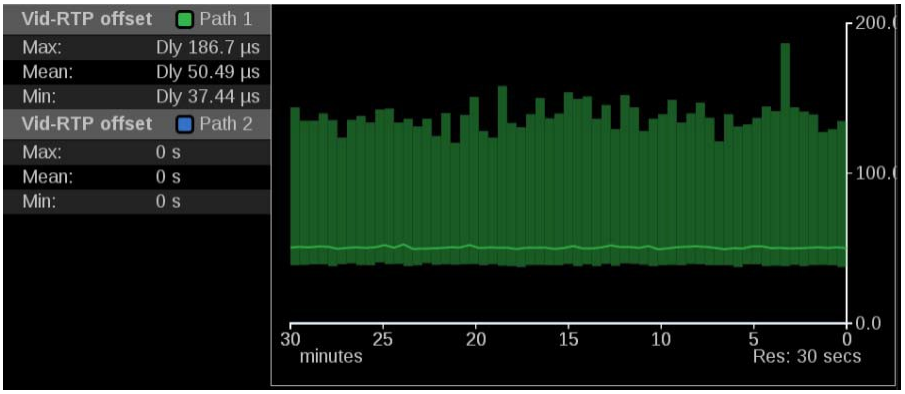


Figure 164: Stream Timing application – Video to RTP graph

Audio offset tab

The Aud-Vid offset graph shows the relative delay between audio and video streams. (See Figure 165.) This value indicates the amount of delay that must be applied to realign the signals according to the time stamps.

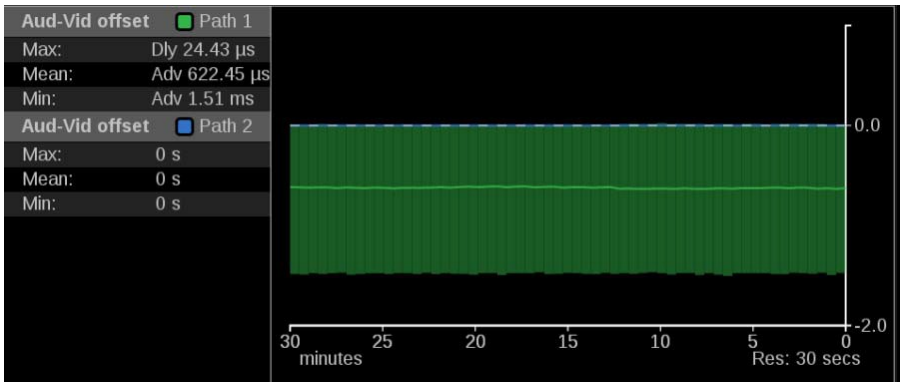


Figure 165: Stream Timing application – Audio to Video graph

The Aud-RTP offset graph shows timing of the audio stream as it was received relative to the embedded RTP time stamps. (See Figure 166.)

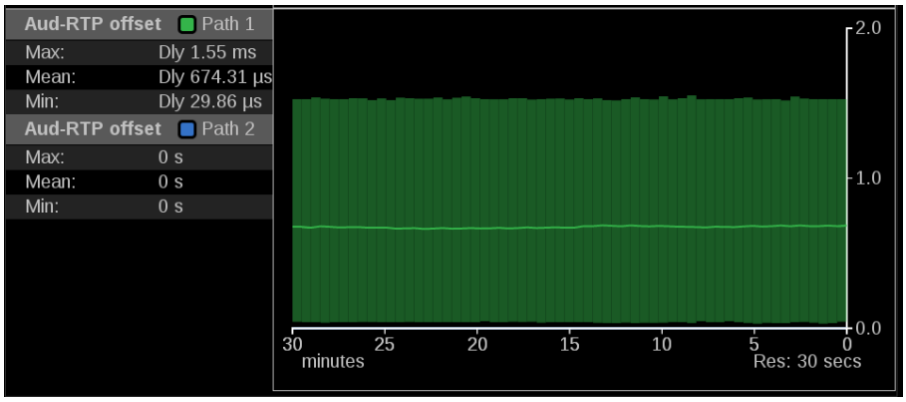


Figure 166: Stream Timing application – Audio to RTP graph

Data offset tab

The Data-Vid offset graph shows the relative delay between data and video streams. (See Figure 167.) This value indicates the amount of delay that must be applied to realign the signals according to the time stamps.

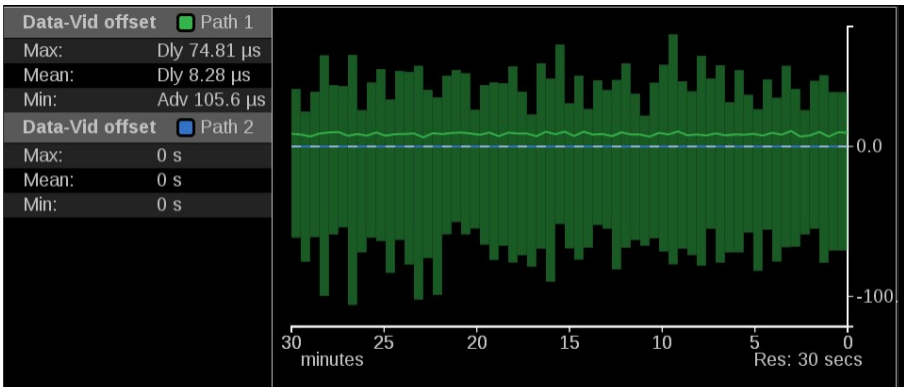


Figure 167: Stream Timing application – Data to Video graph

The Data-RTP offset graph shows timing of the data stream as it was received relative to the embedded RTP time stamps. (See Figure 168.)

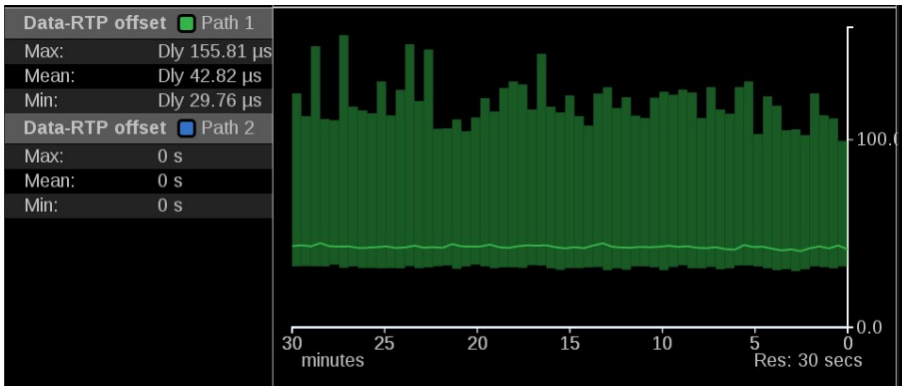


Figure 168: Stream Timing application – Data to RTP graph

IP Generator application

The IP Generator application provides ST2110 -20/-30 with ST2022-7 test signals that can be used to check the receiver device and the signal path. (See Figure 169.)

NOTE. *The IP Generator application requires Option MP2-GEN.*

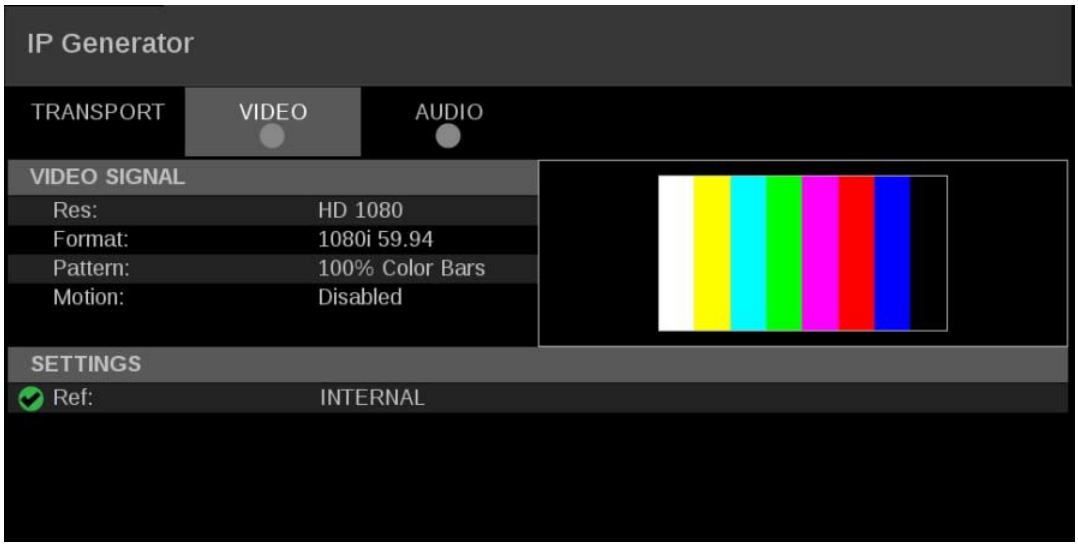


Figure 169: IP Generator application display

IP Generator application banner

Select and hold anywhere on the IP Generator application tile to open the available options. (See Figure 170.)

Figure 170: IP Generator application banner

The options adjust the IP Generator application tile:

- The icon expands the Diamond application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the Diamond application settings menu to adjust the tile settings.

NOTE. *After the application settings menu is opened, the icon displays. Select this icon to move the settings menu horizontally.*

IP Generator application settings menu

Use these options to configure the video and audio IP Generator settings. (See Figure 171.)

NOTE. *Select the **Save** button at the bottom of the window to save your configuration.*

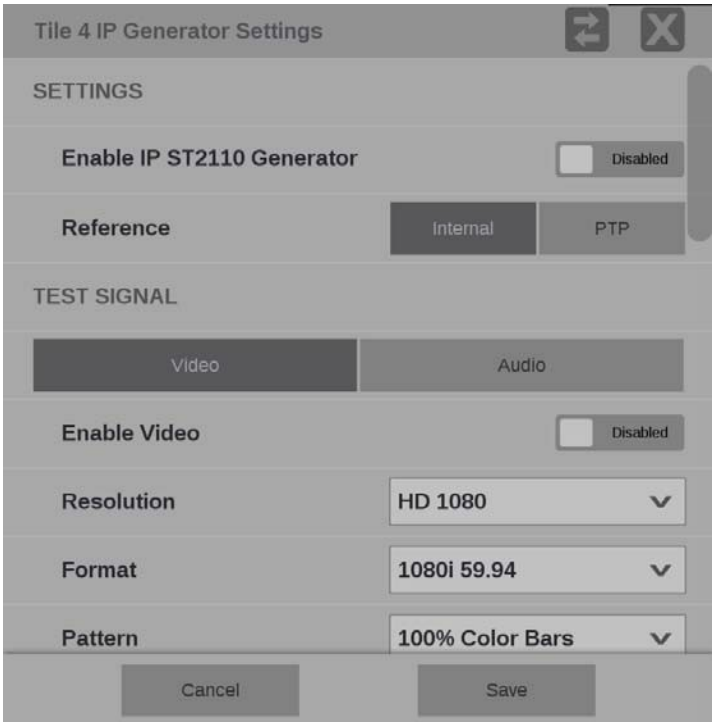


Figure 171: IP Generator application settings menu

Enable IP ST2110 Generator. Select this button to set the IP ST2110 Generator to **Enabled** or **Disabled**.

Reference. Select this option to set the IP Generator reference to **Internal** or **PTP**.

Video test signal options

These options are available when the Video button under the Test Signal settings is selected.

- **Enable Video**: This slider enables and disables the video test signal.
- **Resolution**: Open this drop-down list to choose a resolution: **SD**, **HD 720**, **HD 1080**, or **3G LevelA**.
- **Format**: Open this drop-down list to choose a format:
  - **525i 59.94**: available for format SD only
  - **625i 50**: available for format SD only

- **720p 50**: available for format HD 720 only
- **720p 59.94**: available for format HD 720 only
- **720p 60**: available for format HD 720 only
- **1080i 50**: available for format HD 1080
- **1080p 50**: available for format 3G LevelA
- **1080i 59.94**: available for format HD 1080
- **1080p 59.94**: available for format 3G LevelA
- **1080i 60**: available for format HD 1080
- **1080p 60**: available for format 3G LevelA

- **Pattern**: Use this drop-down list to select from the patterns: **Black** or **100% Color Bars**.
- **Motion**: Select this button to enable or disable horizontal motion of the color bars.

NOTE. *The Motion option is unavailable when Pattern is set to Black.*

Video Transport. These options are available under the Video Transport settings.

- **Packing Mode**: Use this option to select one of these packing modes:
  - **Block**: Block Packing Mode is based on 180 byte blocks and supports many formats.
  - **General**: General Packing Mode uses the open packing standards of RFC 4175.
- **RTP Payload Type**: Use this setting to give the generated IP stream a RTP Payload Type number between 96 to 127.

NOTE. *Each generated IP stream must have a unique RTP Payload Type number.*

- **Packet Read Schedule (PRS)**: Use this option to select one of these read schedules:
  - **Gapped**: Gapped PRS reads packets at an equally spaced sequence throughout the active field or frame interval and accounts for vertical blanking (gaps).
  - **Narrow (Linear)**: Narrow (linear) PRS reads the packets at an equally spaced sequence throughout a video frame.

Video Port SFP 1 and SFP 2. When the Video button under the Test Signal settings is selected video port SFP 1 and SFP 2 can be Enabled or Disabled using the button next to name of each port.

When enabled, each port is configured using the Destination Address and Destination Port.

NOTE. *The Source IP Address, Source Port, Source MAC Address, and Destination MAC Address are automatically configured based on the Destination Address and Destination Port.*

Figure 172: Video Port SFP configuration

Audio test signal options

These options are available when the Audio button under the Test Signal settings is selected.

- **Enable Audio**: Select this button to enable or disable the audio test signal.
- **Channels**: Use this setting to select either 2 or 8 channels.
- **Frequency**: Use this setting to select a 1 kHz frequency or Multiple
- frequencies.
- **Amplitude**: Use this setting to choose from these selections:
  - **Mute**: always available
  - **-20 dBFS**: available when Frequency is set to 1 kHz
  - **-18 dBFS**: available when Frequency is set to 1 kHz
  - **Multiple**: available when Frequency is set to Multiple
- **Sample Depth (all Channels)**: This setting lists the sample depth of all channels.

The audio test signal has these values in each channel when the Frequency and Amplitude is set to Multiple in the settings menu.

Table 12: Multiple frequencies and levels per channel

Chan	Amp (dBFS)	Freq (Hz)
1	-18	240
2	-22	480
3	-20	360
4	-28	120
5	-24	600
6	-26	1200
7	-30	1800
8	-32	2400

Audio Transport. These options are available under the Audio Transport settings.

- **Packet Time**: Use this option to select between 125 µs or 1 ms packet times.
- **RTP Payload Type**: Use this setting to give the generated IP stream a RTP Payload Type number.

NOTE. *Each generated IP stream must have a unique RTP Payload Type number.*

Audio Port SFP 1 and SFP 2. When the Audio button under the Test Signal settings is selected audio port SFP 1 and SFP 2 can be enabled or disabled using the button next to name of each port.

When enabled, each port is configured using the Destination Address and Destination Port.

NOTE. *The Source IP Address, Source Port, Source MAC Address, and Destination MAC Address will be automatically configured based on the Destination Address and Destination Port.*

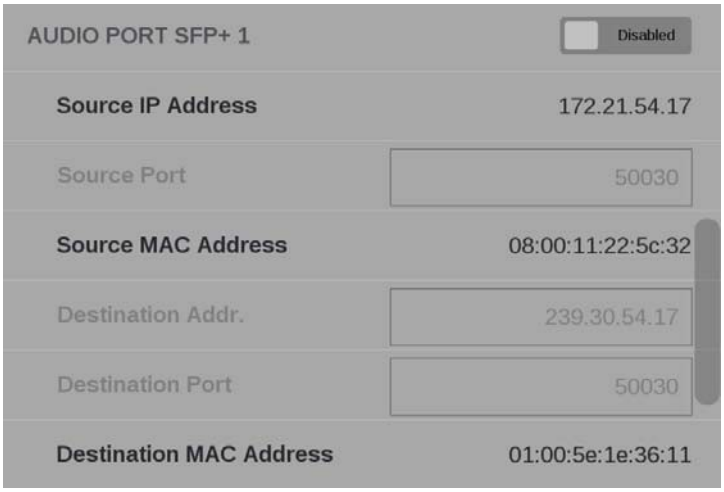


Figure 173: Audio port configuration

Elements of the IP Generator application display

Three display tabs provide information regarding the generated IP streams. Select one of the tabs to view the associated display.

TRANSPORT tab display. Use the TRANSPORT to view the status of the generated IP streams. (See Figure 174.)

Figure 174: IP Generator application – TRANSPORT tab display

VIDEO tab display. Use this tab to view the settings of the generated video stream. (See Figure 175.)

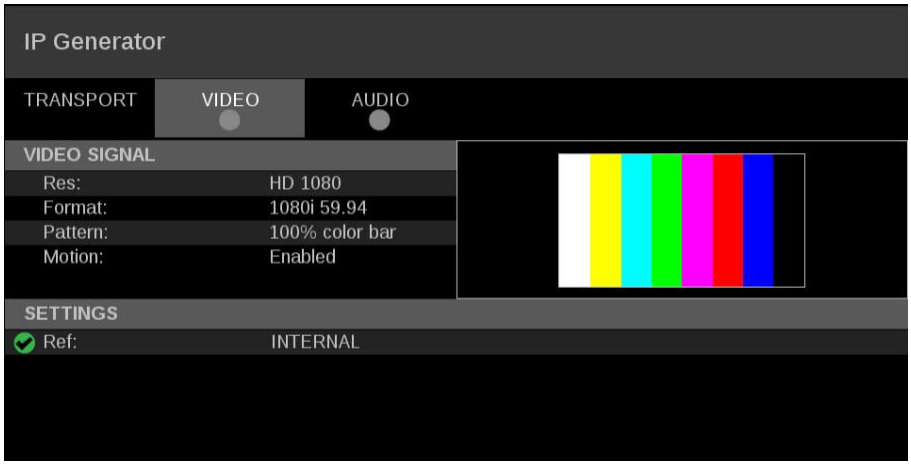


Figure 175: IP Generator application – VIDEO tab display

AUDIO tab display. Use this tab to view the settings of the generated audio stream. (See Figure 176.)

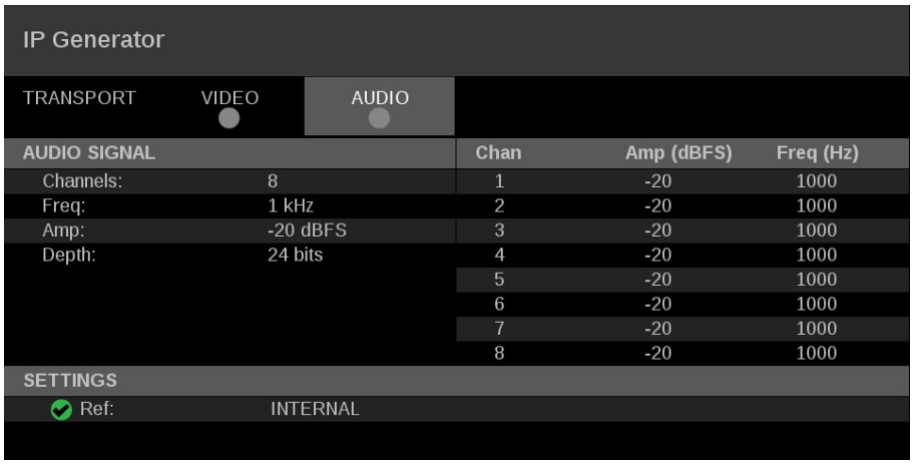


Figure 176: IP Generator application – AUDIO tab display

SDI Generator application

The SDI Generator application provides SDI video signals that can be used to check the receiver device and the signal path.

NOTE. *The SDI Generator application requires Option MP2-GEN.*

Figure 177: SDI Generator application display

SDI Generator application banner

Select and hold anywhere on the SDI Generator application tile to open the available options. (See Figure 178.)

Figure 178: SDI Generator application banner

These options adjust the SDI Generator application appearance:

- The icon expands the SDI Generator application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the SDI Generator application settings menu to adjust the tile settings.

NOTE. *After the application settings menu is opened, the*  *icon displays. Select this icon to move the settings menu horizontally.*

SDI Generator application settings menu

These options configure the SDI Generator settings. (See Figure 179.)

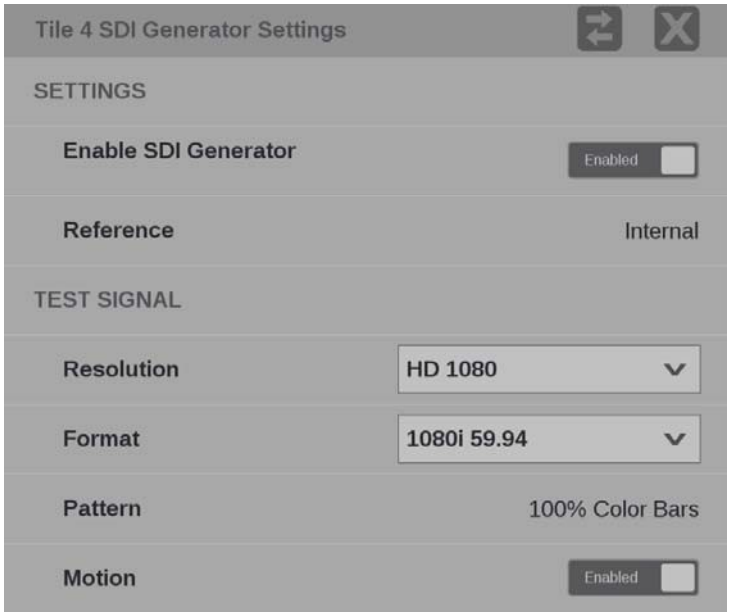


Figure 179: SDI Generator application settings menu

Enable SDI Generator. Select this button to set the SDI Generator to Enabled or Disabled.

Reference. The SDI Generator uses an internal reference.

Test signal options

These options are available to configure the test signal.

- **Resolution**: Use this drop-down list to select from these resolutions:
- **SD**, **HD 720**, **HD 1080**, **3G LevelA**, **3G LevelB**, **6G UHD**, or **12G UHD**.
- **Format**: Use this drop-down list to select from these formats:
  - **525i 59.94**: available for format SD only
  - **625i 50**: available for format SD only
  - **720p 50**: available for format HD 720 only
  - **720p 59.94**: available for format HD 720 only
  - **720p 60**: available for format HD 720 only
  - **1080i 50**: available for format HD 1080 only
  - **1080p 50**: available for format 3G LevelA or 3G LevelB only
  - **1080i 59.94**: available for format HD 1080 only
  - **1080p 59.94**: available for format 3G LevelA or 3G LevelB only
  - **1080i 60**: available for format HD 1080 only
  - **1080p 60**: available for format 3G LevelA or 3G LevelB only
  - **3840p 23.98**: available for format 6G UHD only
  - **3840p 24**: available for format 6G UHD only
  - **3840p 25**: available for format 6G UHD only
  - **3840p 29.97**: available for format 6G UHD only
  - **3840p 30**: available for format 6G UHD only
  - **3840p 50**: available for format 12G UHD only
  - **3840p 59.94**: available for format 12G UHD only
  - **3840p 60**: available for format 12G UHD only
- **Pattern**: The only pattern available is **100% Color Bars**.
- **Motion**: Select this button to enable or disable horizontal motion of the color bars.

Elements of the SDI Generator application display

Use the **VIDEO** tab to view the settings of the generated SDI stream.

NOTE. *SDI audio and data generation is not yet available.*

Datalist application

Datalist allows you to see the digital data contained in SDI frames for HD, 3G Level A, and single link 12G formats so you can perform in-depth monitoring and analysis of incoming SDI data. 4K Quad Link signals can be monitored by looking at the individual links as separate inputs.

NOTE. *Datalist requires software option MP2-ENG or MP2-QC.*

Datalist application banner

Select and hold anywhere on the Datalist application tile to open the available options. (See Figure 180.)

Figure 180: Datalist application banner

These options adjust the Datalist application appearance:

- The icon expands the Datalist application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.

NOTE. *The display readouts will only display when the tile is expanded to full screen.*

Elements of the Datalist display

The expand icon ( ) expands or collapses the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. Use the collapse icon ( ) to bring the tile back to its original size.

The Datalist display shows the digital data from the selected SDI input. (See Figure 181: Datalist display.) It is updated approximately once per second and updating can be controlled by the Run/Pause button in the application banner.

While the application is running or paused, you can scroll through the SDI data: Scroll vertically by touch swipe or use the mouse scroll wheel. Scroll horizontally by touch swipe or click-and-drag. Alternately, you can use the navigation controls described in Figure 181.

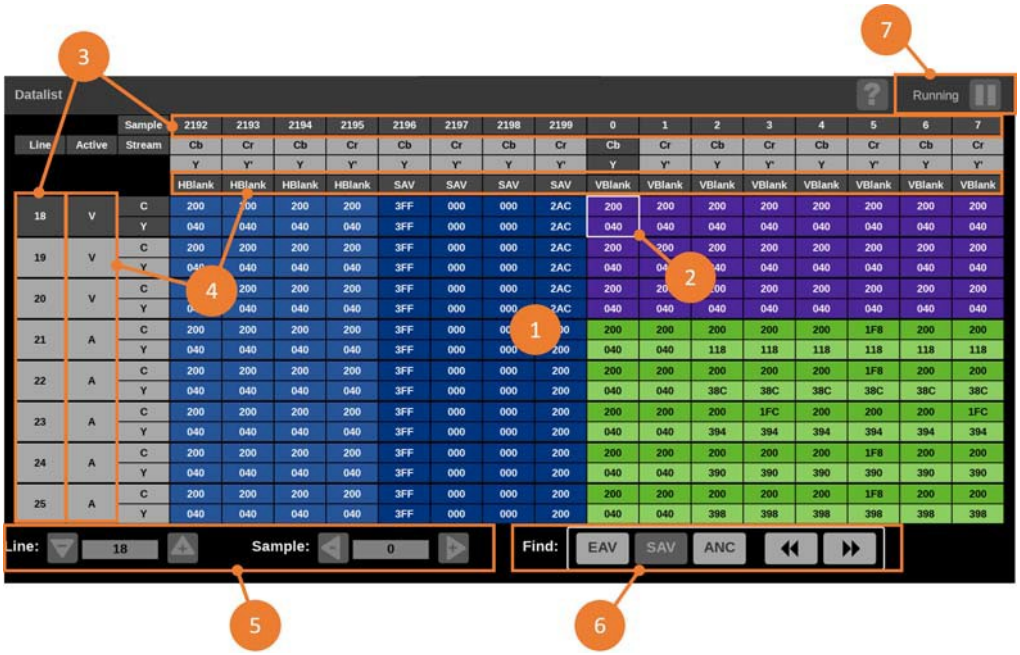


Figure 181: Datalist display

Table 13: Descriptions of elements in the Datalist display

Item	Description
1	SDI frame data: The SDI frame data is color coded for easier identification. Select the ? key in the application banner for help in decoding the SDI data types.
2	Selected SDI sample: The SDI sample that is selected by the Line and Sample controls at the bottom of the application.
3	Line and Sample numbers
4	Line and Sample data types
5	Line and Sample selection: Use these controls to go to a specific sample and line. The number can be entered directly by selecting the current number; this opens a keyboard. Enter the line or sample number and select Enter to go to that location.
6	SDI frame shortcuts: Use these controls to go to the next EAV, SAV, and ANC location after the selected SDI sample. For example, to go to the next SAV location, select the SAV button and then select the fast forward button.
7	Run/Pause control: Select this button to run and pause the SDI frame updates. Pausing will allow you to examine a single SDI frame in more detail.

Ancilliary (ANC) Data Session

The ANC Data Session application allows you to examine all the ancillary data present in a signal. The instrument continually monitors the signal and tells you when changes in the presence of data occur. The ANC Session displays the presence and status of all ANC data present.

NOTE. *PRISM monitors the first 4 links of the 8 logical SDI links in Quad Link 3G LB and Quad Link 12G.*

NAME	DID	SDID	LINK	LOCATION(S)	OCCURRENCE	NOTE
S352M VPID	41	1	Y	Line 572 Sample 1928	Field	
S12.2 Anc TC	60	60	Y	Line 571 Sample 1928	Field	02:25:01:13.1
S299-1 Ctrl Grp 4	E0	--	Y	Line 571 Sample 2005	Field	
S299-1 Ctrl Grp 3	E1	--	Y	Line 571 Sample 1987	Field	
S299-1 Ctrl Grp 2	E2	--	Y	Line 571 Sample 1969	Field	
S299-1 Ctrl Grp 1	E3	--	Y	Line 571 Sample 1951	Field	

Figure 182: ANC Session

Elements of the ANC Session application

- **DID**: Data identifier of the packet; permissible values range from 1 to 0xFF (255) inclusive.
- **SDID**: Secondary data identifier of the packet; permissible values range from 0 through 0xFF (255) inclusive.
- **OCCURRENCE**: Notes the last time a packet occurred.
- **LINK**: Virtual link or stream the ANC data is present on.
- **LOCATION(S)**: The transport line number the ANC data is present on.

Jitter Display application

The Jitter Display application shows the wave shape of the jitter and allows you to view additional time-domain information, such as whether there are jitter components that are synchronous or nearly synchronous to the video line or frame. (See Figure 183.)

NOTE. *This application requires hardware option PHY and software Option MP2-FMT-4K to enable 12G-SDI. This application is only valid on SDI 1.*

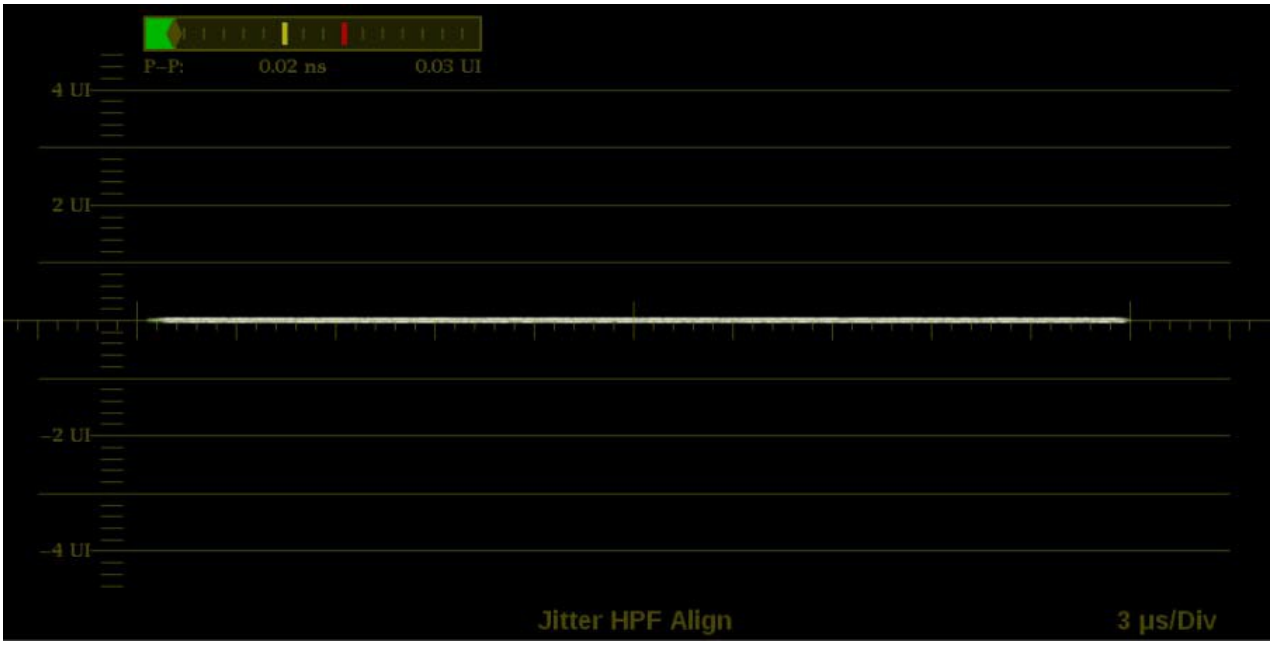


Figure 183: Jitter Display application display

Jitter Display application banner

Select and hold anywhere on the Jitter Display application tile to open the available options. (See Figure 184.)

Figure 184: Jitter Display application banner

These options adjust the Jitter Display application appearance:

- The icon expands the Jitter Display application tile to the full screen. The icon collapses the tile back to its original size.

NOTE. *The display readouts will only display when the tile is expanded to full screen.*

- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.

- The icon opens the Jitter Display application settings menu to adjust the tile settings.

NOTE. *After the Jitter Display application settings menu is opened, the icon displays. Select this icon to move the settings menu horizontally.*

Jitter Display application settings menu

The Jitter Display application settings menu figure shows the available options. (See Figure 185.)

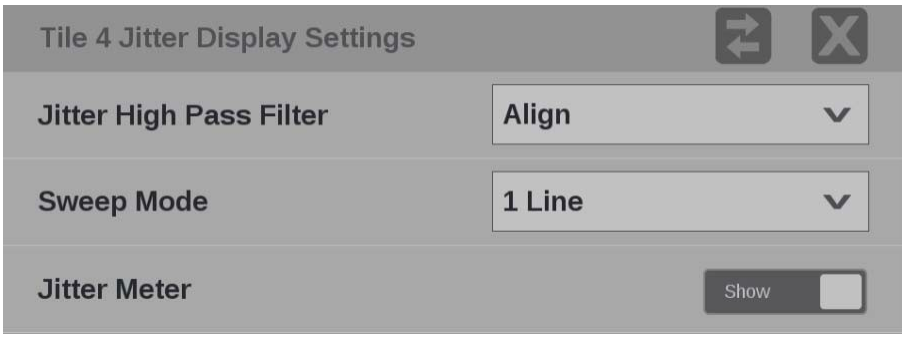


Figure 185: Jitter Display application settings menu

Jitter High Pass Filter. Use the drop-down menu to select the high pass filter to Timing, Align, 10 Hz, 100 Hz, 1 kHz, 10 kHz, or 100 kHz.

Sweep Mode. Use the drop-down menu to select 1 Line, 2 Line, 1 Field, or 2 Field.

Jitter Meter. Use the button to hide or show the jitter meter at the top of the display.

NOTE. *Eye measurements are displayed when the Jitter Display application is in full screen mode.*

Eye Display application

The Eye Display presents an eye pattern diagram of the SDI signal to verify electrical characteristics of the SDI transport layer. (See Figure 186.) Use this application to make automated eye measurements on SD, HD, and 4K SDI signals.

NOTE. *This application requires hardware Option PHY and software option MP2-FMT-4K to enable 12G-SDI. This application is only valid on SDI 1.*

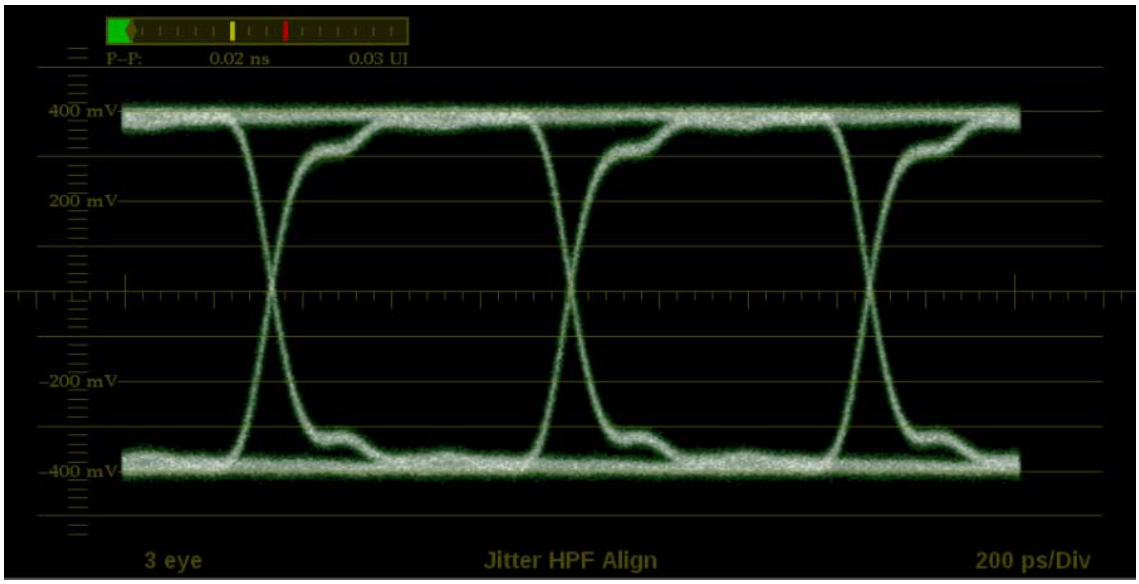


Figure 186: Eye Display application display

Eye Display application banner

Select and hold anywhere on the Eye Display application tile to open the available options. (See Figure 187.)

Figure 187: Eye Display application banner

These options adjust the Eye Display application appearance:

- The icon expands the Eye Display application tile to the full screen.
- The icon collapses the tile back to its original size.

NOTE. *The display readouts will only display when the tile is expanded to full screen.*

- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile.
- The icon sets the tile to quarter tile size.
- The icon opens the Eye Display application settings menu to adjust the tile settings.

NOTE. *Ater the Eye Display application settings menu opens, the icon displays. Select this icon to move the settings menu horizontally.*

Eye Display application settings menu

The Eye Display application settings menu figure shows the available options. (See Figure 188.)

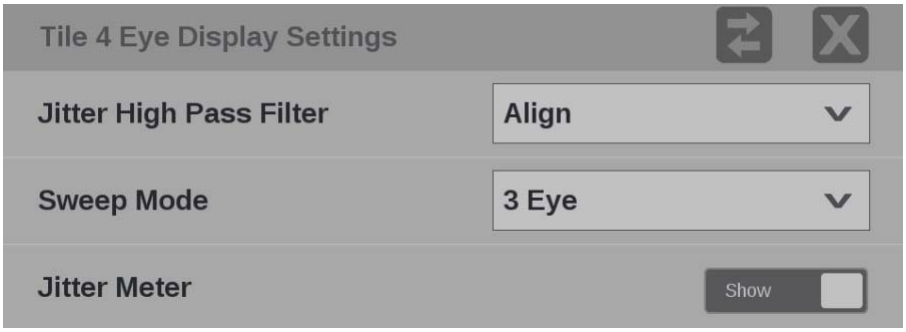


Figure 188: Eye Display application settings menu

Jitter High Pass Filter. Use the drop-down menu to select the high pass filter to Timing, Align, 10 Hz, 100 Hz, 1 kHz, 10 kHz, or 100 kHz.

NOTE. *For multi-piece displays, the filter setting applies to both pieces.*

Sweep Mode. Use the drop-down menu to select 3 Eye, 20 Eye, 1 Field, or 2 Field.

Jitter Meter. Use the button to hide or show the jitter meter above the eye pattern.

NOTE. *Eye measurements are displayed when the Eye Display application is in full screen mode.*

Stop Display application

The Stop Display provides a tool to monitor video signals with a variety of transfer functions in a consistent manner. It helps the Director of Photography (DP), Cinematographer, and Lighting Engineer to communicate to create a scene.

NOTE. *Stop Display is enabled with Option MP2-PROD and is affected by the Gamma and Color Gamut settings. For additional information regarding these settings, refer to the Configure and select the signal inputs section.*

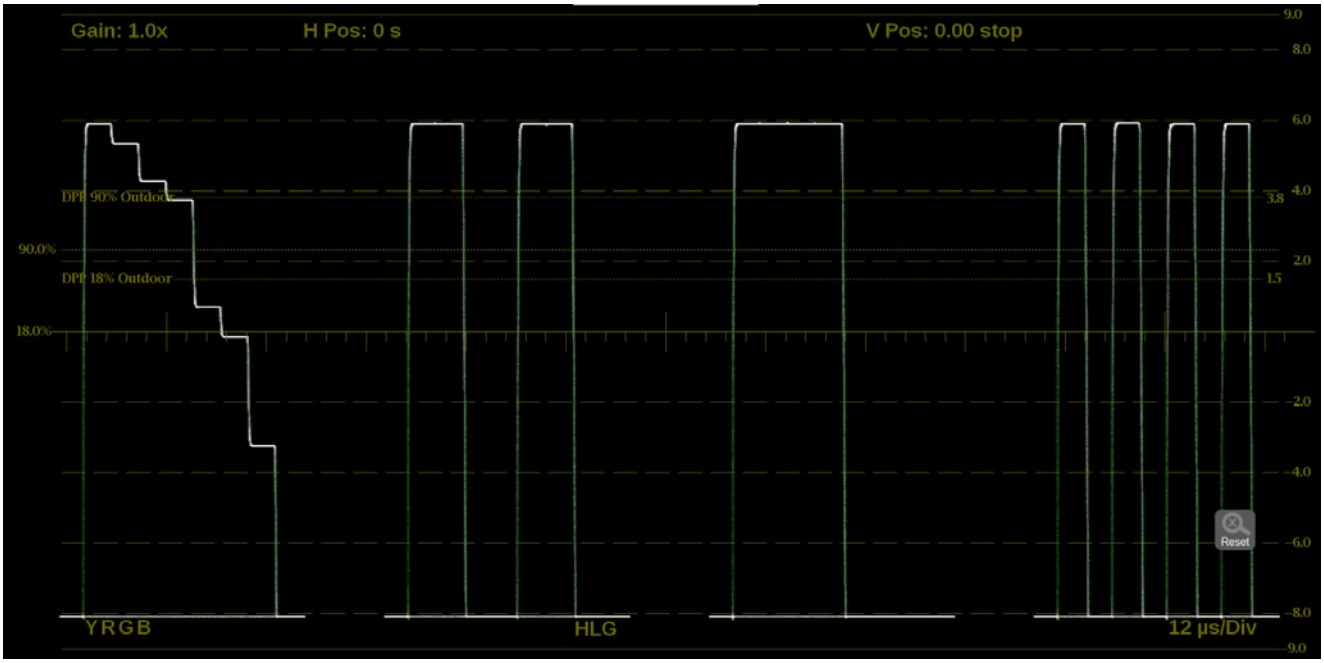


Figure 189: Stop Display application

Stop Display application banner

Select and hold anywhere on the Stop Display application tile to open the available options. (See Figure 190.)

Figure 190: Stop Display application banner

These options adjust the Stop Display application appearance:

- The icon expands the Stop Display application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the Stop Display application settings menu to adjust the tile settings.

NOTE. *After the Stop Display application settings menu is opened, the icon displays. Select this icon to move the settings menu horizontally.*

Stop Display application settings menu

The Stop Display application settings menu figure shows the available options. (See Figure 191.)

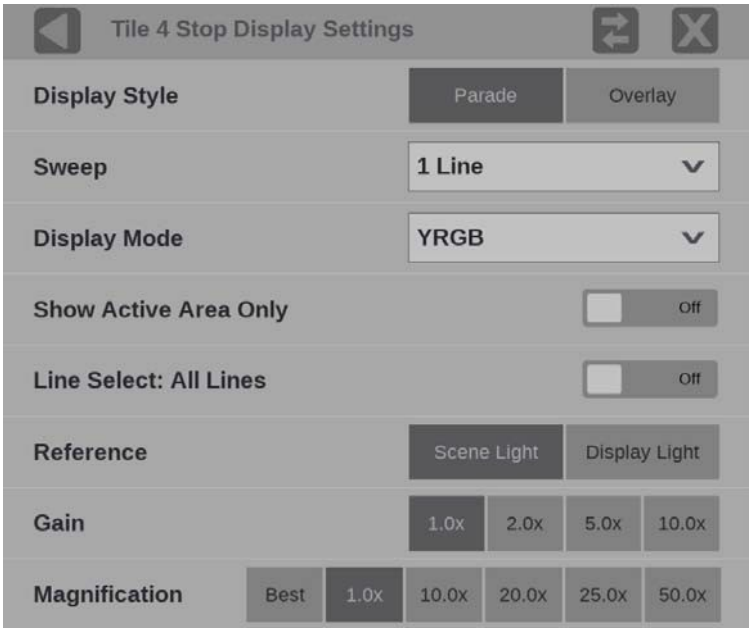


Figure 191: Stop Display application settings menu

Display Style. Choose how the signal components are displayed in the active tile, use the Display Style buttons to select:

- **Parade**. All the components are shown one beside the other.
- **Overlay**. All the components are drawn at the same location so they appear one on top of the other.

Sweep. Use the drop-down menu to select the waveforms to view between the lines or fields and/or make timing measurements on them. The available sweep options depend on which display style is active.

- When the Parade display style is active you can select from 1 line or 1 field.
- When Overlay display style is active you can select from 1 line, 2 line, 1 field, or 2 field.

Display Mode. Use the drop-down menu to select from these choices (only available while displaying SDI inputs) in the menu:

- **Y**. Displays the input as Luma (Y) components.
- **RGB**. Displays the input as Red (R), Green (G), and Blue (B) components.
- **YRGB**. Displays the input as Luma (Y), Red (R), Green (G), and Blue (B) components.

Show Active Area Only. Use the button to turn Show Active Area Only On or Off. When the option is On it removes the trace of vertical / horizontal blanking data.

Line Select. Line Select allows you to choose the picture lines to monitor in the display. Either All Lines or 1 Line can be selected.

If **1 Line** is selected then the display will only show results for the selected line in the picture. The line can be selected using the on-screen tools. (See Line Select function.) Or the line can be selected directly on the Picture. (See Figure 198.)

Reference. Use the reference buttons to choose between Scene Light (Stops) and Display Light (Nits).

Gain. Use the button to adjust the gain to x1, x2, x5, or x10.

Magnification. Use the button to adjust the magnification to Best View, x1, x10, x20, x25, or x50.

Stop Display application on-screen tools

You can change the gain, display mode, and sweep without opening the Stop Display settings menu through on-screen tools. Select the tool/button for the setting you want to adjust. (See Figure 192.) All the available tools are located on the top and bottom of the display and are highlighted for a few seconds when the application is first opened or if you select anywhere in the middle of the application tile.

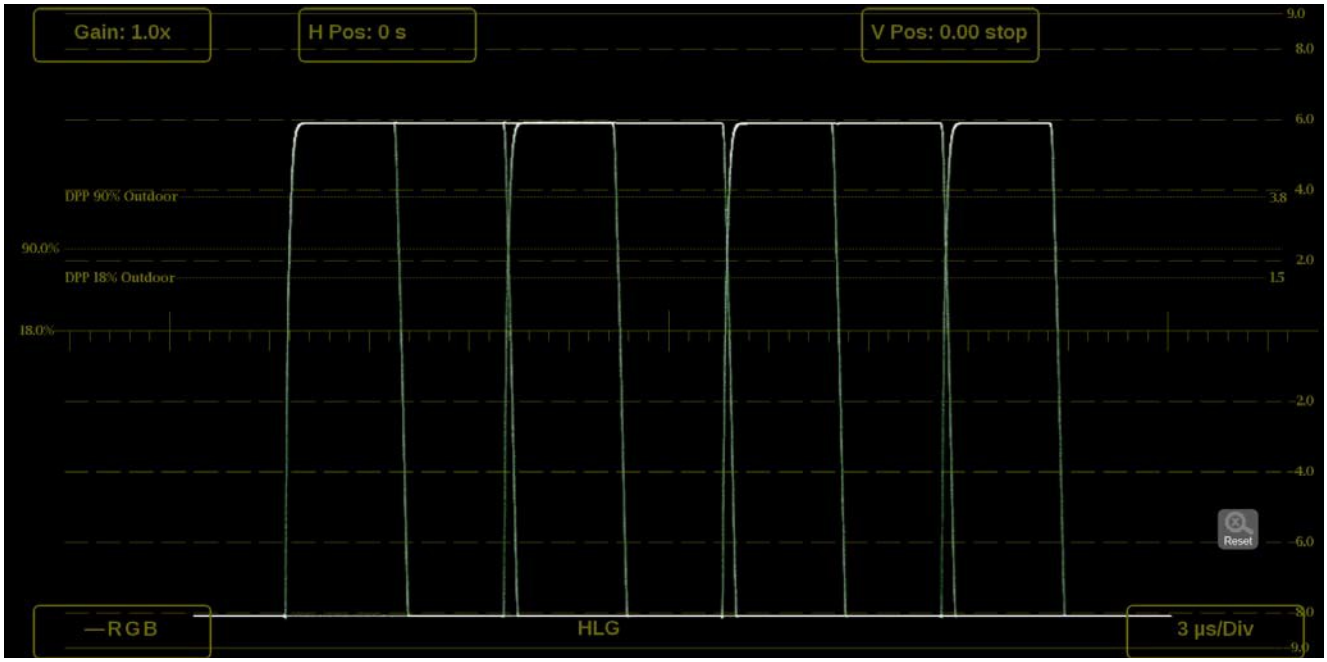


Figure 192: Available on-screen tools for the Stop Display application

Gain. Increase or decrease the magnification of the trace display.

1. Select the **Gain** button to expand the available magnification options drop-down list. (See Figure 193.)
2. Select one of the preset fixed gain values from the drop-down list. Choose between 1.0x, 2.0x, 5.0x, or 10.0x.
3. Use the Reset icon to reset the gain to 1.0x.

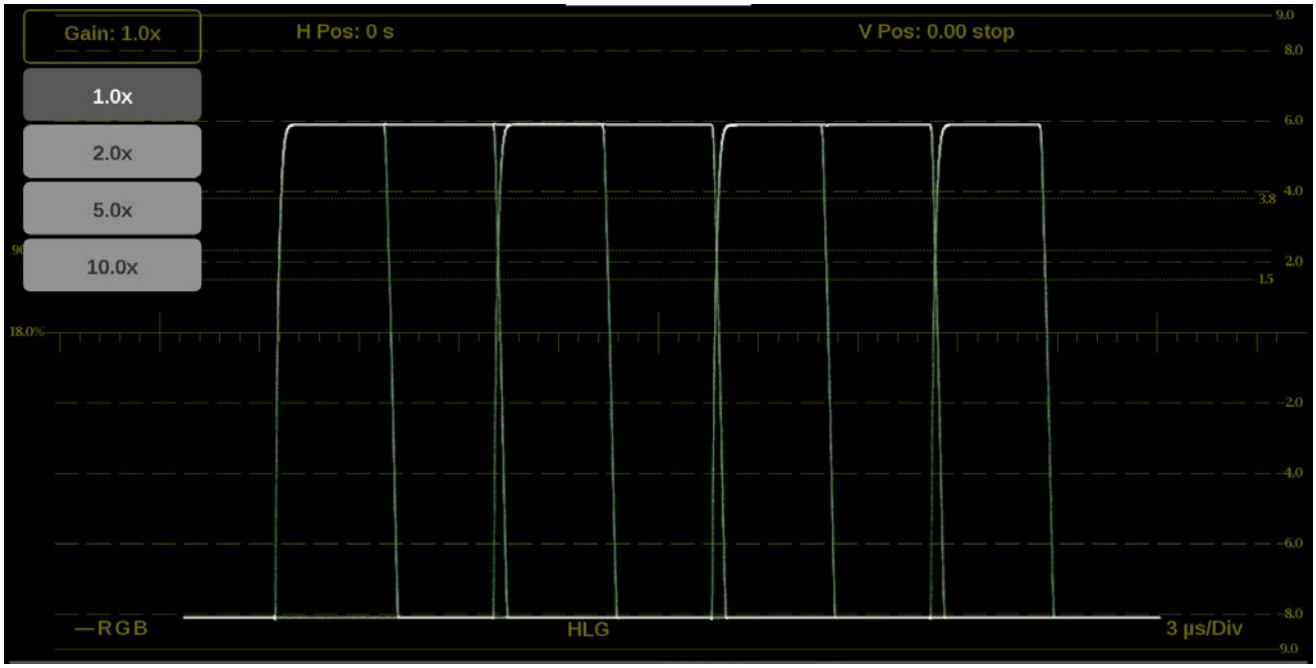


Figure 193: Stop Display on-screen tools–Gain

Horizontal and vertical position. Adjust the position of the trace display.

1. Select the **H Pos** button to allow adjustment of the horizontal trace. (See Figure 194.)
    - Select and drag to move the trace. This method can be performed without using the button.
    - Use a mouse scroll wheel to move the trace.
    - For incremental adjustments, use the plus or minus button to adjust the horizontal position.
    - Use the Reset icon to reset the horizontal position adjustment to default.

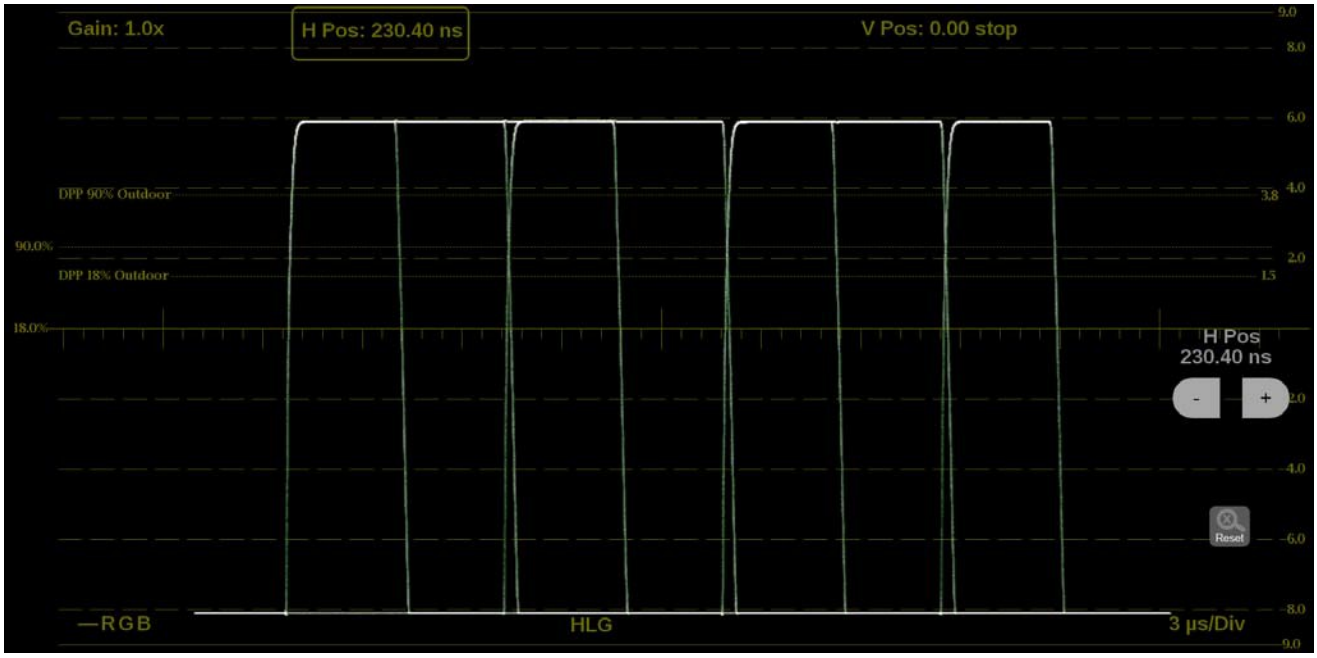


Figure 194: Stop Display on-screen tools – horizontal position

2. Select the **V Pos** button to allow adjustment of the vertical trace. (See Figure 195.)
    - Select and drag to move the trace. This method can be performed without using the button.
    - Use a mouse scroll wheel to move the trace.
    - For incremental adjustments, use the plus or minus button to adjust the vertical position.
    - Use the Reset icon to reset the vertical position adjustment to default.

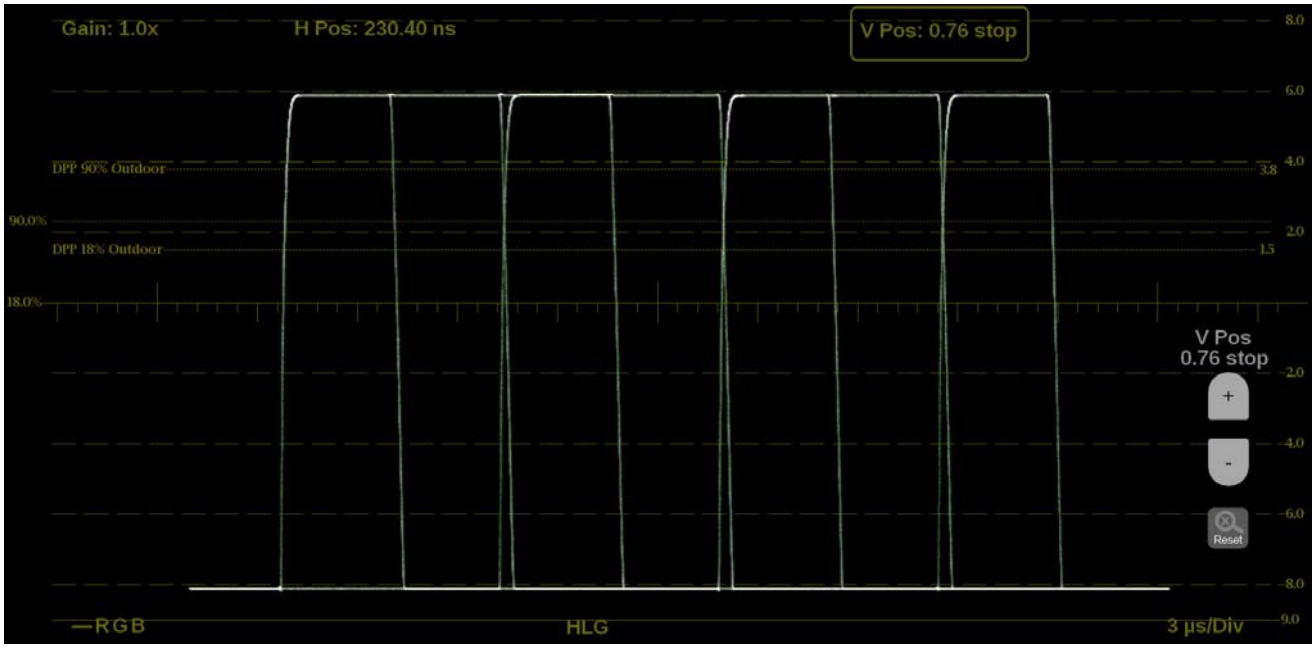


Figure 195: Stop Display on-screen tools – vertical position

Display Mode. Change how the signal components are displayed.

1. Select the button in the bottom left corner of the application to expand the available display options. (See Figure 196.)
2. Select the display style of the signal components. Use YRGB to display any combination of the Y, R, G, and B waveforms.

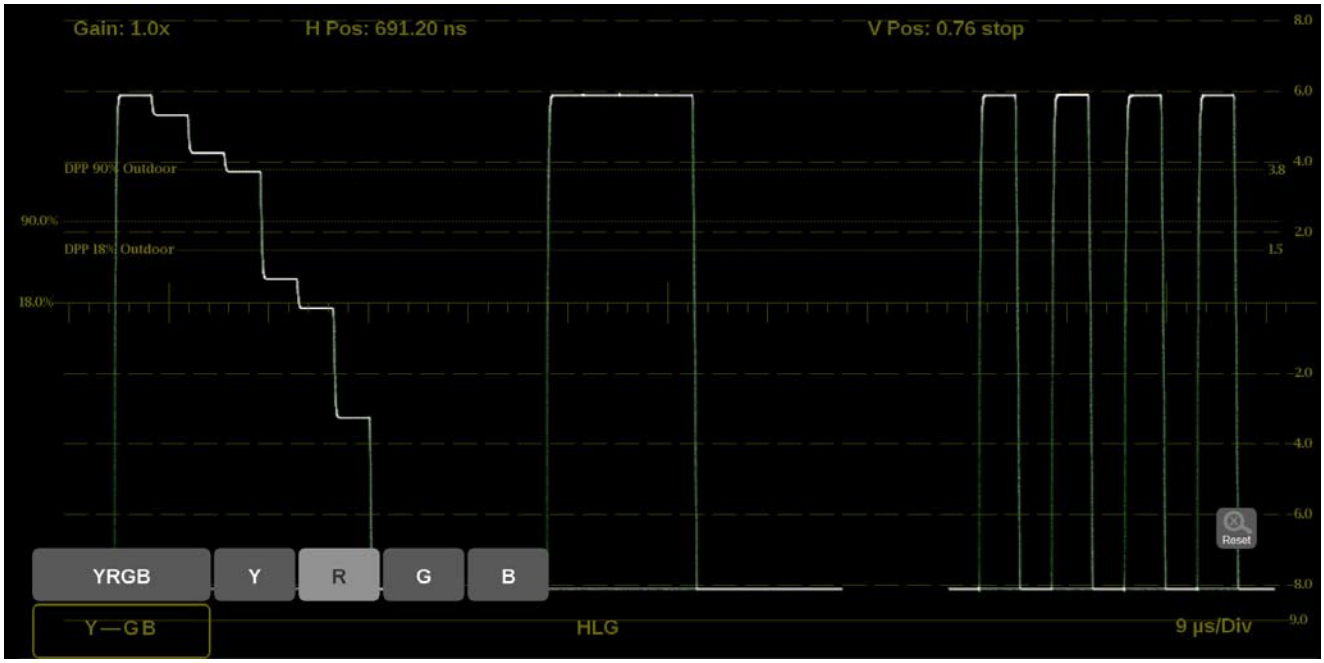


Figure 196: Stop Display on-screen tools – Display Mode

Display format. Change the Display Style, Sweep, and Magnification of the Stop Display.

1. Select the button in the bottom right corner of the application to expand the available display format options. (See Figure 197.)
2. Select the **Mag** option to adjust the magnification to Best View, x1, x10, x20, x25, or x50.
3. In Display Style select **Parade** or **Overlay** to switch between the options.
4. The Sweep options depend on which Display Style is active.
    - When the Parade display style is active you can select from 1 line or 1 field.
    - When Overlay display style is active you can select from 1 line, 2 line, 1 field, or 2 field.

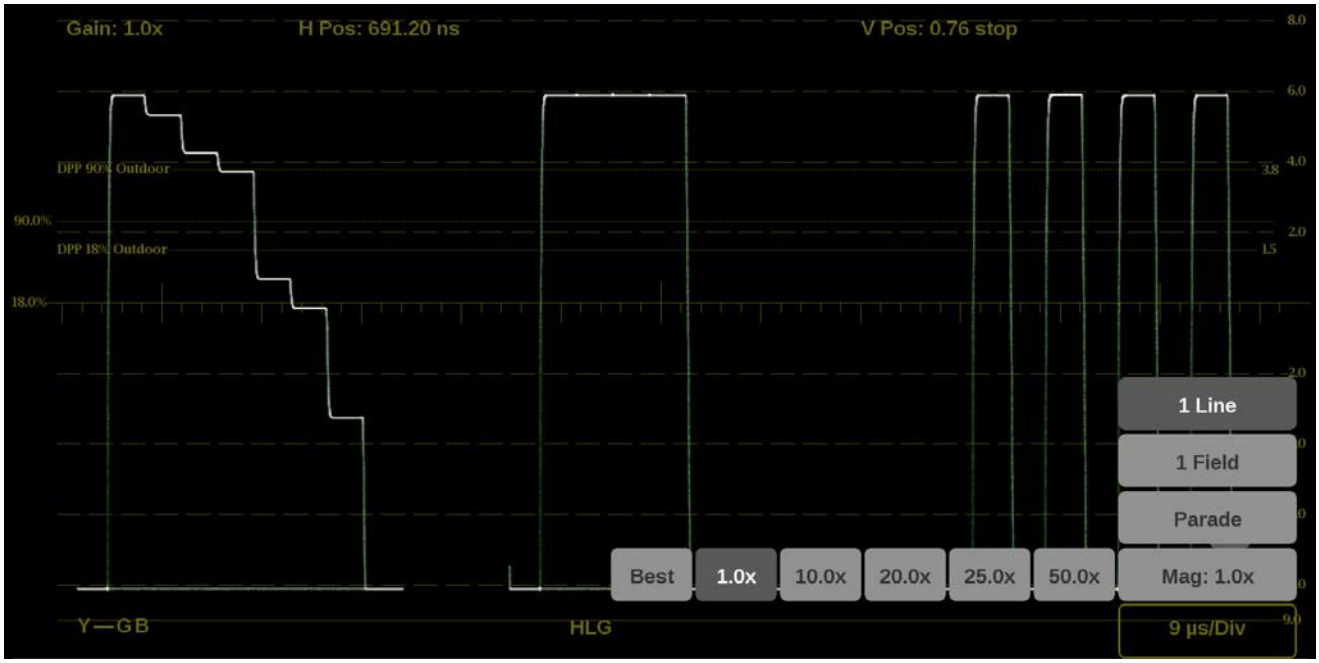


Figure 197: Stop Display on-screen tools – display format

Line Select function. Line Select allows you to select a single picture line to monitor in the display. By default All Lines is selected and all lines are monitored.

To turn on:Line Select (and choose the line to monitor):

1. Select the **Lines** button at the bottom of the application. (See Figure 198.)
2. Select **1 Line**.

- To scroll through lines, select the + and — buttons.
- To enter a specific line to monitor, select **Line Sel.** and enter the line on the keypad.

The Line number describes the *frame* line number, the Pic Line, next to it, describes the *picture* line number.

NOTE. *A line selected in any trace display is automatically monitored in all other trace displays.*

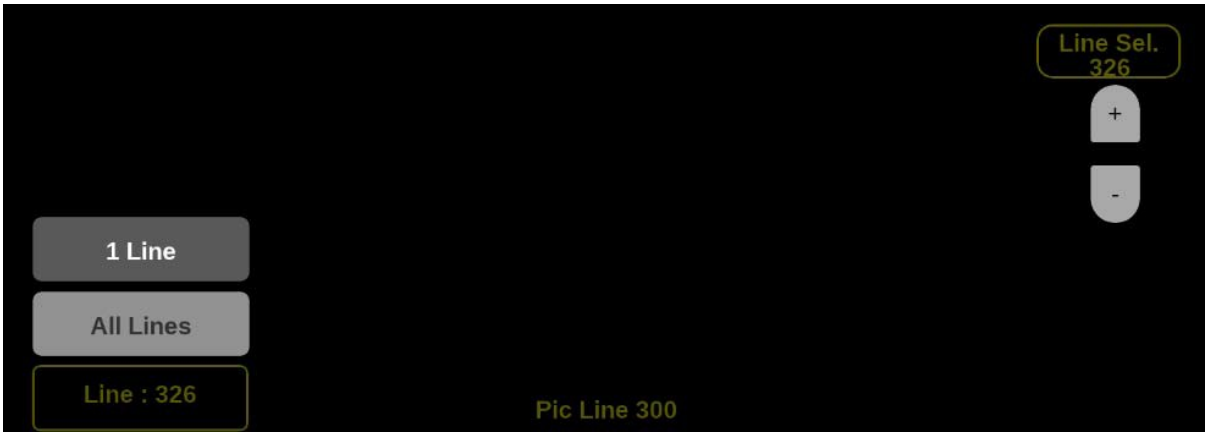


Figure 198: Stop Display on-screen tools – Line Select

Diamond display application

The Diamond application provides a tool for white and black balancing at camera setup and for color gamut adjustment at color editing and QC. For additional information on how to use the Diamond display application, refer to the Checking gamut section.

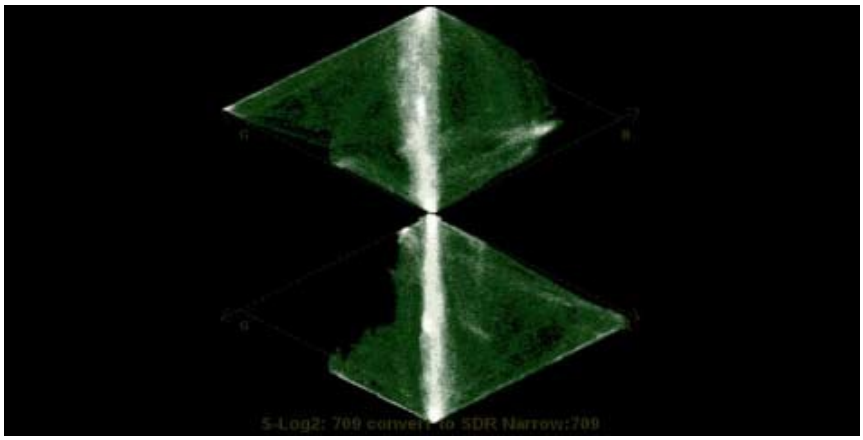


Figure 199: Diamond display application

Diamond application banner

Select and hold anywhere on the Diamond application tile to open the available options. (See Figure 200.)

Figure 200: Diamond application banner

These options adjust how the Diamond application is displayed:

- The icon expands the Diamond application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the Diamond application settings menu to adjust the tile settings.

NOTE. *After the Diamond application settings menu is opened, the icon displays. Select this icon to move the settings menu horizontally.*

Diamond application settings menu

The Diamond application settings menu shows the available options. (See Figure 201.)

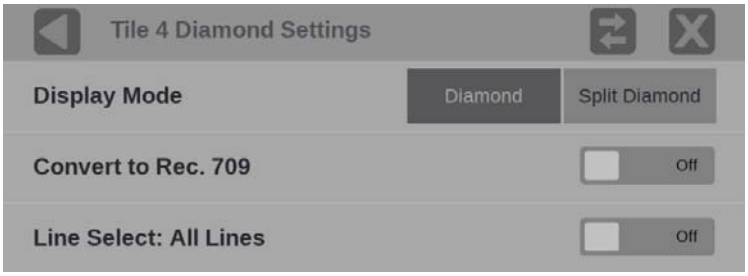


Figure 201: Diamond application settings menu

Display Mode. Select one of the options:

- **Diamond**. The Normal Diamond display shows Gamut violations of the SDI input if translated to RGB color space.
- **Split Diamond**. The Split Diamond display offsets the two halves of the Diamond to allow you to better see negative RGB Gamut errors.

Convert to Rec. 709. Turn this setting **On** to allow the trace displays to convert the Gamma and Color Gamut settings for the signal to SDR Narrow and BT. 709 (requires Option MP2-PROD).

NOTE. *Convert to Rec. 709 auto converts to BT.709, otherwise the graticule selection must be manually changed* (See Configure the instrument for HDR/WCG monitoring.)

Convert to Rec. 709 mode is not supported for SD signals.

Line Select. Line Select allows you to choose the picture lines to monitor in the display. Either **All Lines** or **1 Line** can be selected.

If **1 Line** is selected then the display will only show results for the selected line in the picture. The line can be selected using the on-screen tools. (See Line Select function.) Or the line can be selected directly on the Picture. (See Figure 204.)

Checking gamut

The Diamond display effectively shows how the R, G, and B signals relate. The Diamond display is a good tool for detecting gamut errors.

To form the Diamond display, the instrument converts the Y, P_b, and P_r components recovered from the serial signal to R, G, and B. To predictably display all three components, they must lie between peak white, 700 mV, and black, 0 V.

For a signal to be in gamut, all signal vectors must lie within the G-B and G-R diamonds. Conversely, if a signal vector extends outside the diamond, it is out of gamut. The direction of an excursion out of gamut indicates which signal is excessive. Errors in green amplitude affect both diamonds equally, while blue amplitude errors affect only the top diamond and red errors affect only the bottom diamond. (See Figure 202.)

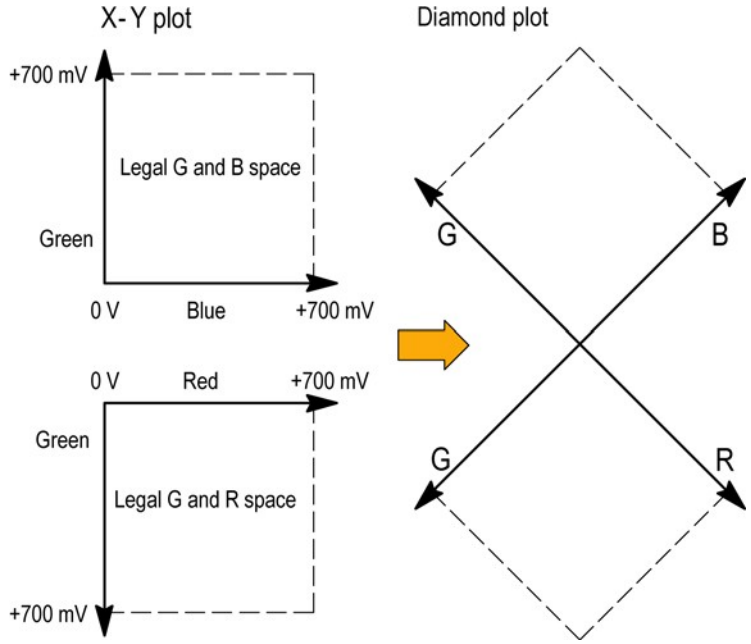


Figure 202: Diamond display plot

Compare the signal to the display to determine out-of-gamut components. Be aware of these details:

- The intensity of a vector indicates its duration.
- A momentary out-of-gamut condition appears as a faint trace. Long duration violations show as a bright trace.

When evaluating out-of-gamut components, consider these examples. (See Figure 203.)

- Example A:
  R - Ok
  G > 700 mV B - Ok
- Example B:
  R - Ok G - Ok
  B > 700 mV
- Example C:
  R - Ok
  G - Ok, 350 mV
  B < 0 mV

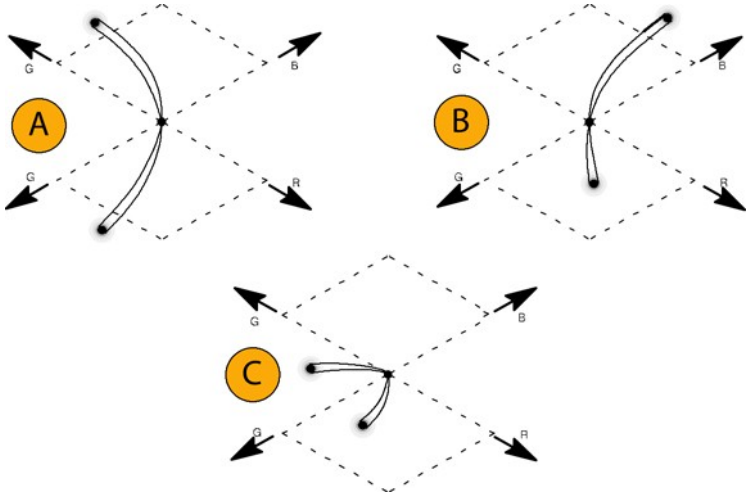


Figure 203: Out-of-gamut examples

NOTE. *Bending of the transitions indicates timing delays. When a color bar signal is applied, the vertical axis becomes an indicator of delay errors.*

Monochrome signals appear as vertical lines. Nonlinear component processing, such as from a gamma corrector that alters white balance, can cause deviations along the vertical axis.

Diamond application on-screen tools

Line Select function. Line Select allows you to select a single picture line to monitor in the display. By default All Lines is selected and all lines are monitored.

To turn on Line Select (and choose the line to monitor):

1. Select the **Lines** button at the bottom of the application. (See Figure 204.)
2. Select **1 Line**.
   - To scroll through lines, select the + and — buttons.
   - To enter a specific line to monitor, select **Line Sel.** and enter the line on the keypad.

The Line number describes the *frame* line number, the Pic Line, next to it, describes the *picture* line number.

NOTE. *A line selected in any trace display is automatically monitored in all other trace displays.*

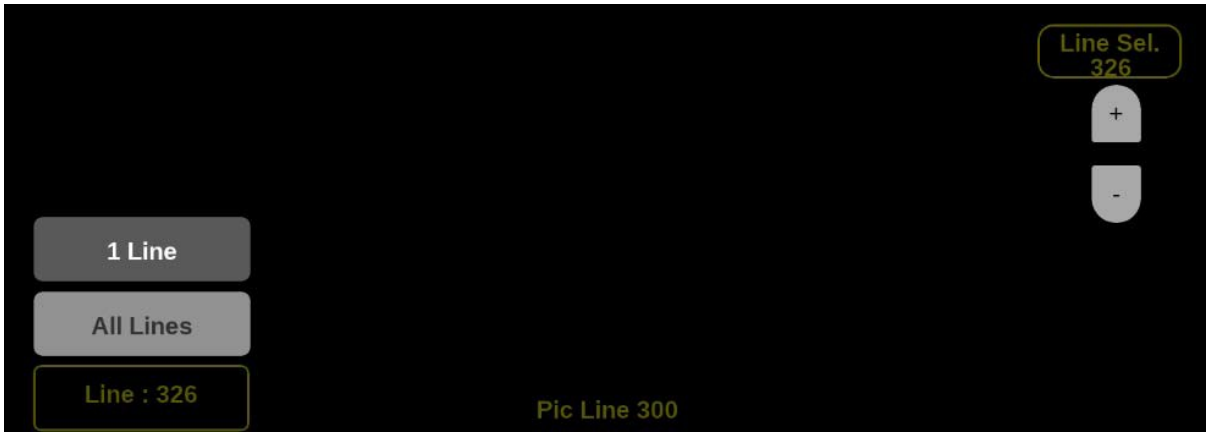


Figure 204: Diamond on-screen tools – Line Select

Lightning display application

The Lightning display application shows luma and chroma amplitudes and helps verify component timing using a color-bar signal. (See Figure 205.) Using a test signal in component format, this display helps make precise, accurate measurements of interchannel amplitude and timing.

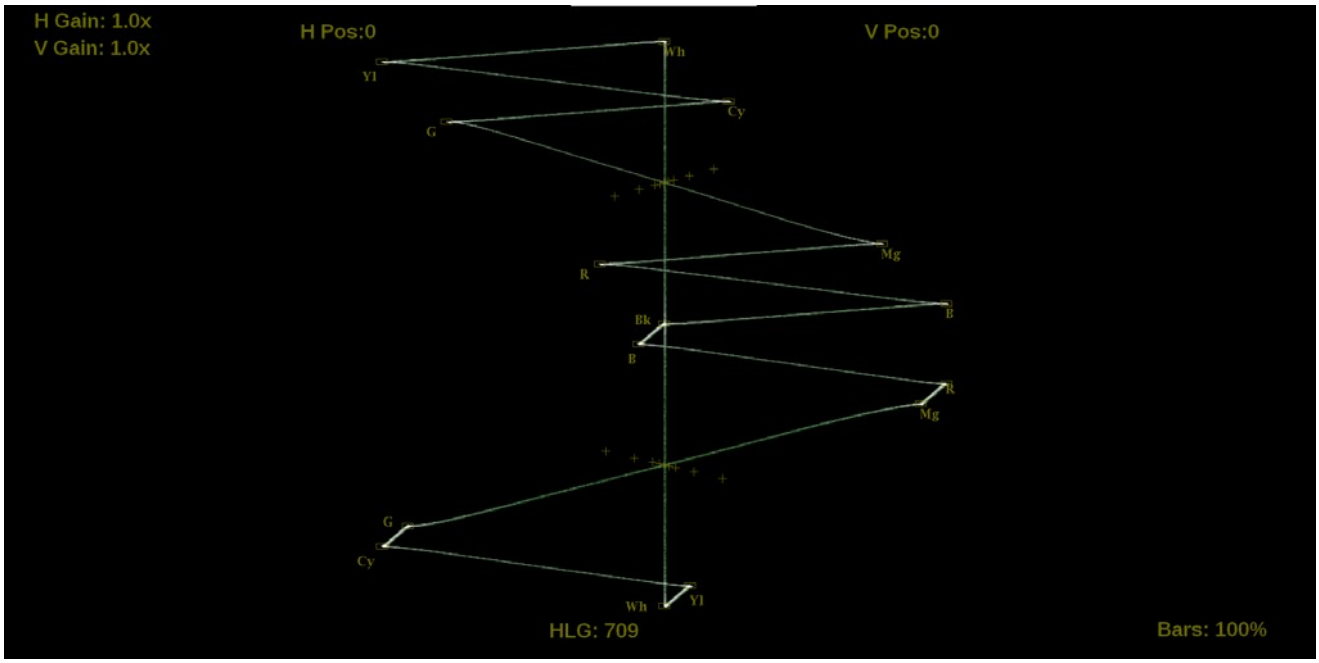


Figure 205: Lightning display application

Lightning application banner

Select and hold anywhere on the Lightning application tile to open the available options. (See Figure 206.)

Figure 206: Lightning application banner

These options adjust how the Lightning application is displayed:

- The icon expands the Lightning application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the Lightning application settings menu to adjust the tile settings.

NOTE. *After the Lightning application settings menu is opened, the icon displays. Select this icon to move the settings menu horizontally.*

Lightning application settings menu

The Lightning application settings menu figure shows the different choices. (See Figure 207.)

Figure 207: Lightning application settings menu

Bar Targets. Adjust the bar targets to **75%** or **100%** with this setting.

V Gain. Use this setting to adjust the vertical gain by **x1**, **x2**, **x5**, or **x10** magnification.

H Gain. Use this setting to adjust the horizontal gain by **x1**, **x2**, **x5**, or **x10** magnification.

Convert to Rec. 709. Turn this setting **On** to allow the trace displays to convert the Gamma and Color Gamut settings for the signal to SDR Narrow and BT. 709 (requires Option MP2-PROD).

NOTE. *Convert to Rec. 709 auto converts to BT.709, otherwise the graticule selection must be manually changed* (See Configure the instrument for HDR/WCG monitoring.)

Convert to Rec. 709 mode is not supported for SD signals.

Line Select. Line Select allows you to choose the picture lines to monitor in the display. Either **All Lines** or **1 Line** can be selected.

If **1 Line** is selected then the display will only show results for the selected line in the picture. The line can be selected using the on-screen tools. (See Line Select function.) Or the line can be selected directly on the Picture. (See Figure 214.)

Lightning application on-screen tools

You can change the horizontal gain, vertical gain, horizontal position, vertical position, and bar targets without opening up the Vector settings menu through on-screen tools. Select the tool/button for the setting you want to adjust. All the available tools are located on the top and bottom of the display and are highlighted for a few seconds when the application is first opened or if you select anywhere in the middle of the application tile. (See Figure 208.)

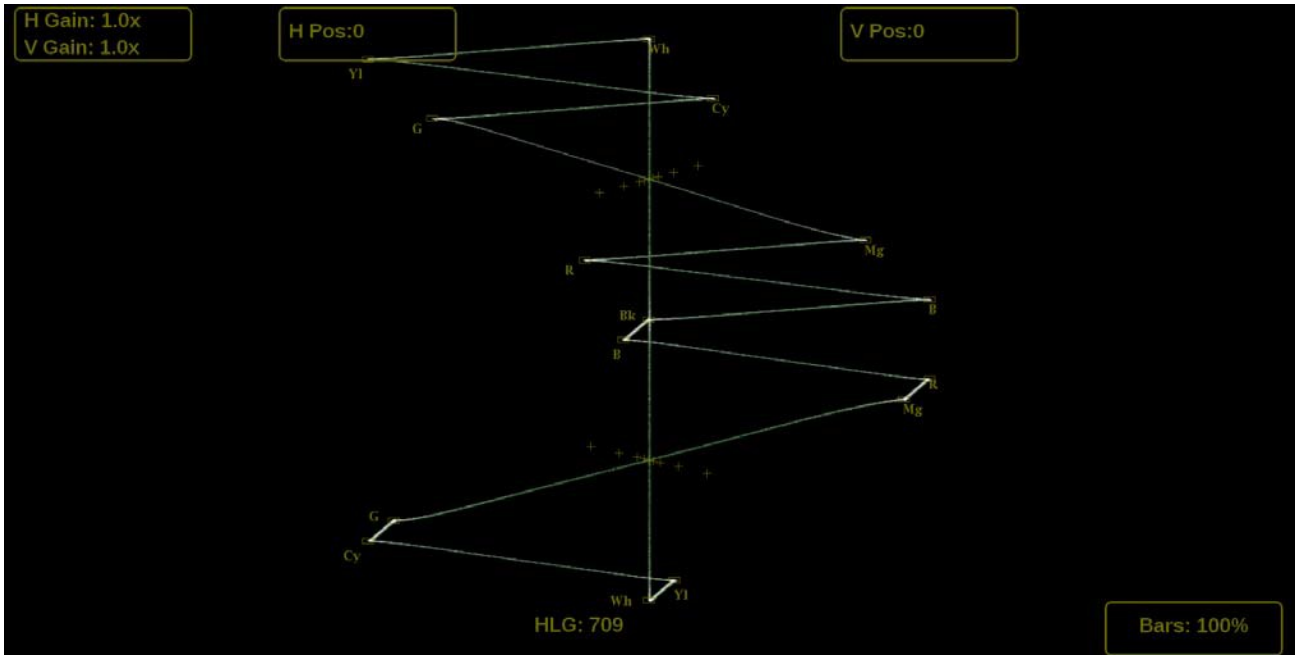


Figure 208: Available on-screen tools for the Lightning application

Horizontal and vertical gain. Increase or decrease the magnification of the horizontal and vertical trace displays.

1. Select the button to in the top left corner to expand the available options drop down list. (See Figure 209.)
2. Select the **H Gain** or **V Gain** to choose one of the preset magnifications for fixed horizontal and vertical gain.
3. Select **VAR** to change from **VAR: Off** to **VAR: H** or **VAR: V**. VAR: H opens the H Var Gain, which allows incremental changes in the horizontal gain. VAR: V opens the V Var Gain, which allows incremental changes in the vertical gain. Variable gain allows flexibility in changing the gain factor between 0.5x to 20.0x.

   The limits of the variable gain change depending on the gain factor you select:

   - 1.0x has a range of 0.25x to 2.00x gain.
   - 2.0x has a range of 0.50x to 4.00x gain.
   - 5.0x has a range of 1.25x to 10.00x gain.
   - 10.0x has a range of 2.50x to 20.00x gain.

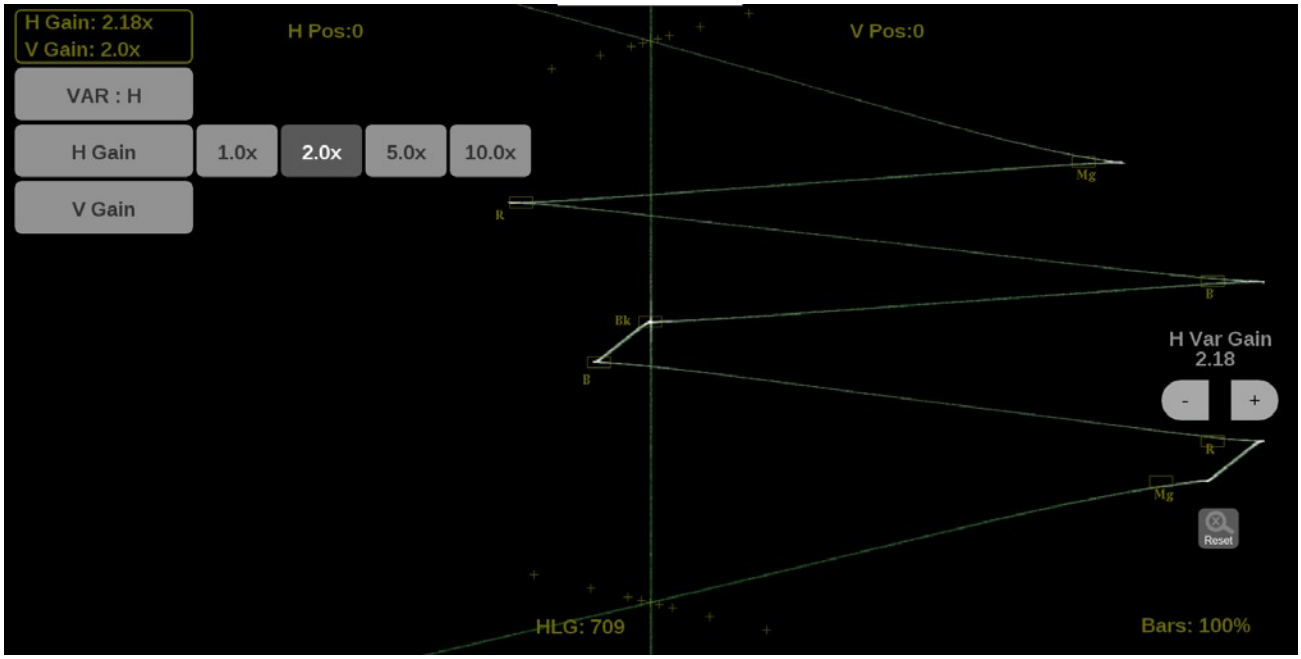


Figure 209: Lightning on-screen tools – horizontal gain

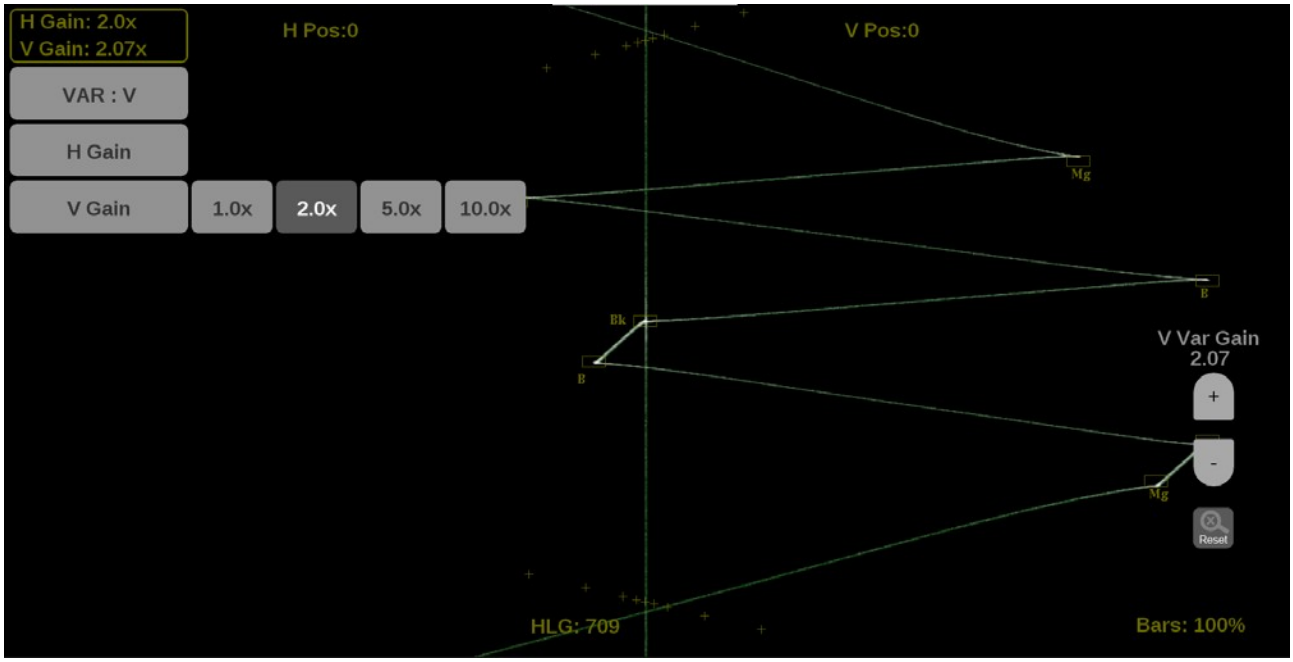


Figure 210: Lightning on-screen tools – vertical gain

To adjust the gain:

- On a touchscreen use a pinch gesture to change the scale of the trace for large increment changes.
- For small increment changes, select the plus or minus button to adjust gain.
- The scroll wheel on a mouse can adjust the variable gain.
- Use the Reset icon to remove variable gain adjustments.

Horizontal and vertical position. Adjust the position of the trace display.

1. Select the **H Pos** button to allow adjustment of the horizontal trace. (See Figure 211.)
    - Select and drag to move the trace. This method can be performed without using the button.
    - Use a mouse scroll wheel to move the trace.
    - For small incremental adjustments, use the plus or minus button to adjust the horizontal position.
    - Use the Reset icon to reset the horizontal position adjustment to default.

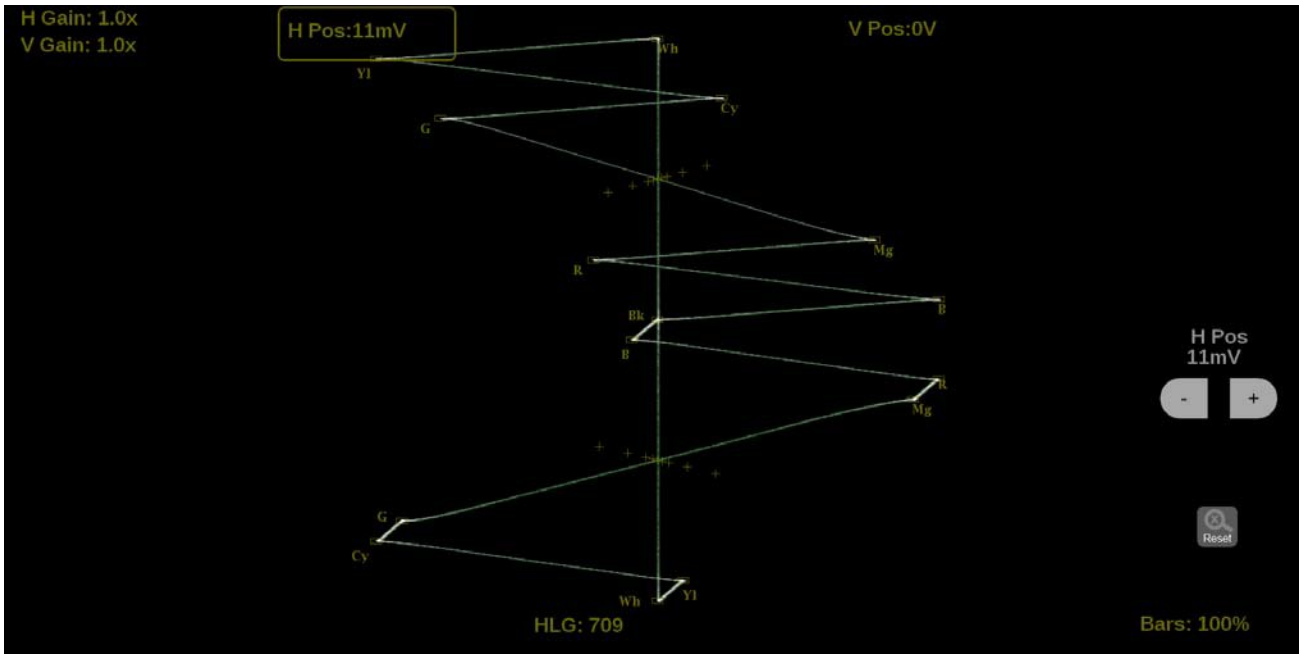


Figure 211: Lightning on-screen tools – horizontal position

2. Select the **V Pos** button to allow adjustment of the vertical trace. (See Figure 212.)
    - Select and drag to move the trace. This method can be performed without using the button.
    - Use a mouse scroll wheel to move the trace.
    - For small incremental adjustments, use the plus or minus button to adjust the vertical position.
    - Use the Reset icon to reset the vertical position adjustment to default.

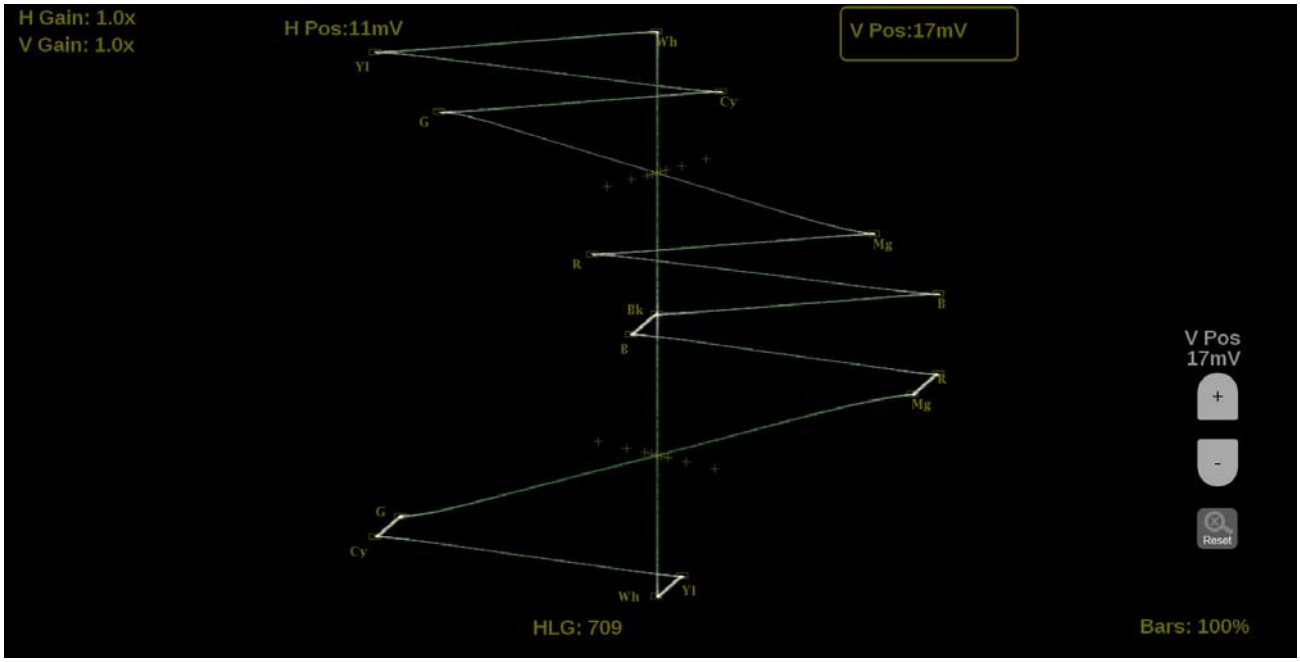


Figure 212: Lightning on-screen tools – vertical position

Bar Targets. Change the scaling of the Lightning display.

1. Select the **Bars** button in the bottom right corner of the application to expand the available options. (See Figure 213.)
2. Select **75%** or **100%** scaling.

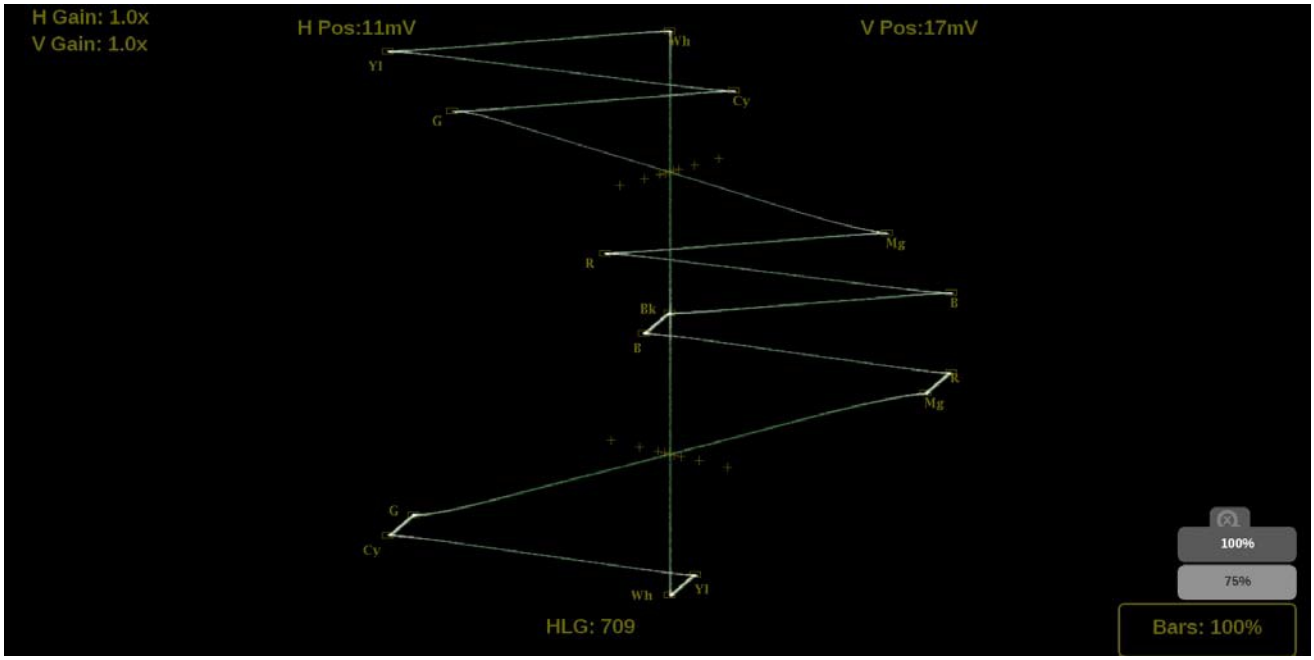


Figure 213: Lightning on-screen tools – Bar Targets

Line Select function. Line Select allows you to select a single picture line to monitor in the display. By default All Lines is selected and all lines are monitored. To turn on Line Select (and choose the line to monitor):

1. Select the **Lines** button at the bottom of the application. (See Figure 214.)
2. Select **1 Line**.
    - To scroll through lines, select the + or — buttons.
    - To enter a specific line to monitor, select **Line Sel.** and enter the line on the keypad.

The Line number describes the *frame* line number, the Pic Line, next to it, describes the *picture* line number.

NOTE. *A line selected in any trace display is automatically monitored in all other trace displays.*

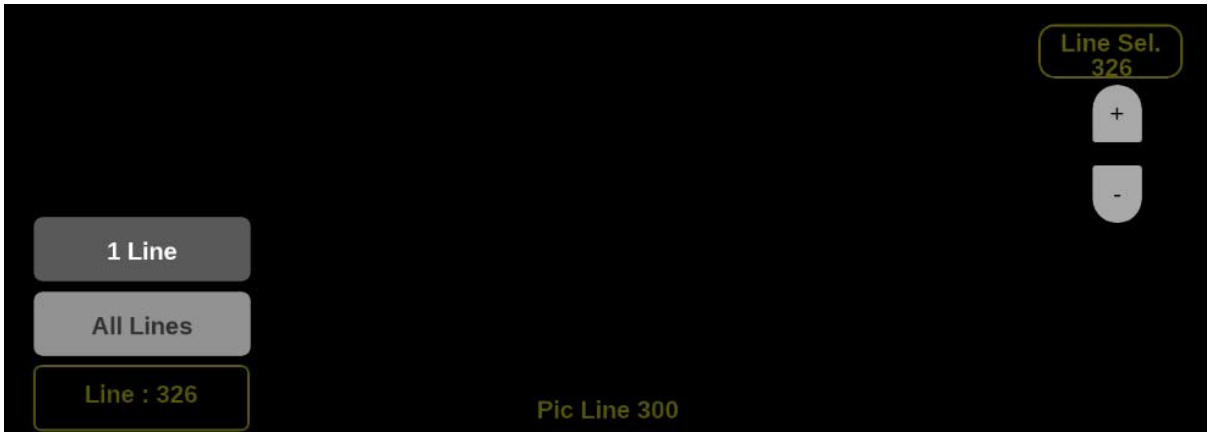


Figure 214: Lightning on-screen tools – Line Select

CIE application

The CIE display application shows video data as it is plotted in a 1931 or 1976 CIE diagram. (See Figure 215.) CIE diagrams are used to check the chromaticity of the video signal and determine compliance to the standard color Gamut limits shown on the CIE diagram. In addition to the BT.2020, P3, and Rec. 709 limits shown, the D65 white point is also indicated.

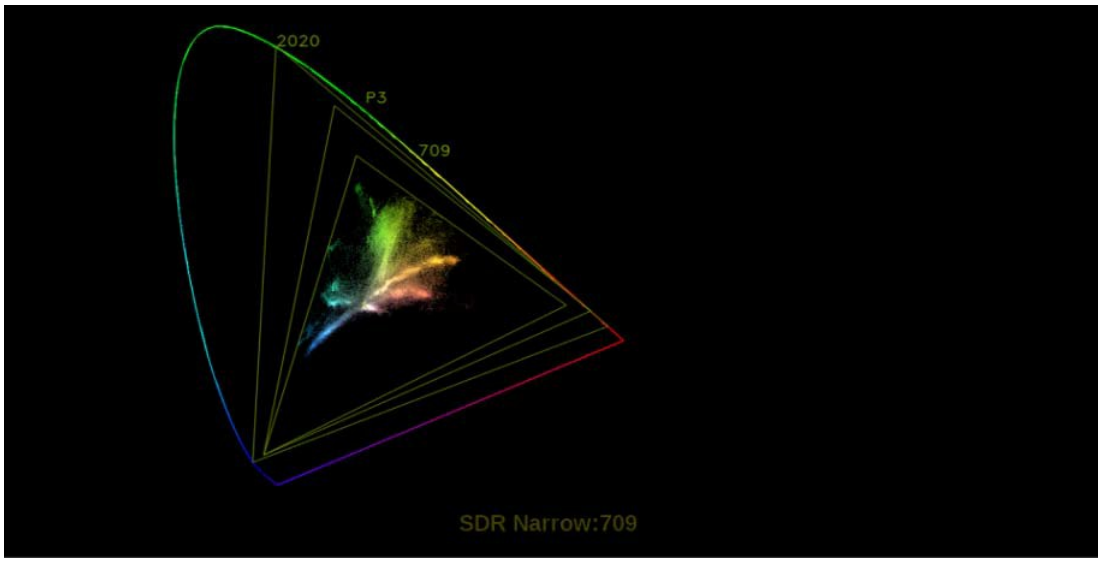


Figure 215: CIE application display

CIE application banner

Select and hold anywhere on the CIE application tile to open the available options. (See Figure 216.)

Figure 216: CIE application banner

These options adjust the CIE application appearance:

- The icon expands the CIE application tile to the full screen. The icon collapses the tile back to its original size.
- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the CIE application settings menu to adjust the tile settings.

NOTE. *After the CIE application settings menu is opened, the* ⇄ *icon displays. Select this icon to move the settings menu horizontally.*

CIE application settings menu

The CIE application settings menu figure shows the different choices. (See Figure 217.)

Figure 217: CIE application settings menu

Color Space. Select either **CIE 1931** or **CIE 1976** diagrams.

Trace Appearance. You can plot the video data on the CIE display in either Monochrome or Color. If Color is selected, the plotted video data will be colored with the corresponding CIE diagram colors. If Color is not selected, the plotted video data will be gray.

Line Select. Line Select allows you to choose the picture lines to monitor in the display. Either All Lines or 1 Line can be selected.

If 1 Line is selected, the display only shows results for the selected line in the picture. The line can be selected using the on-screen tools. (See Line Select function.) Or the line can be selected directly on the Picture. (See Figure 218.)

CIE application on-screen tools

Line Select function. Line Select allows you to select a single picture line to monitor in the display. By default All Lines is selected and all lines are monitored.

To turn on Line Select (and choose the line to monitor):

1. Select the **Lines** button at the bottom of the application. (See Figure 218.)
2. Select **1 Line**.
   - To scroll through lines, select the + or — buttons.
   - To enter a specific line to monitor, select **Line Sel.** and enter the line on the keypad.

The Line number describes the *frame* line number, the Pic Line, next to it, describes the *picture* line number.

NOTE. *A line selected in any trace display is automatically monitored in all other trace displays.*

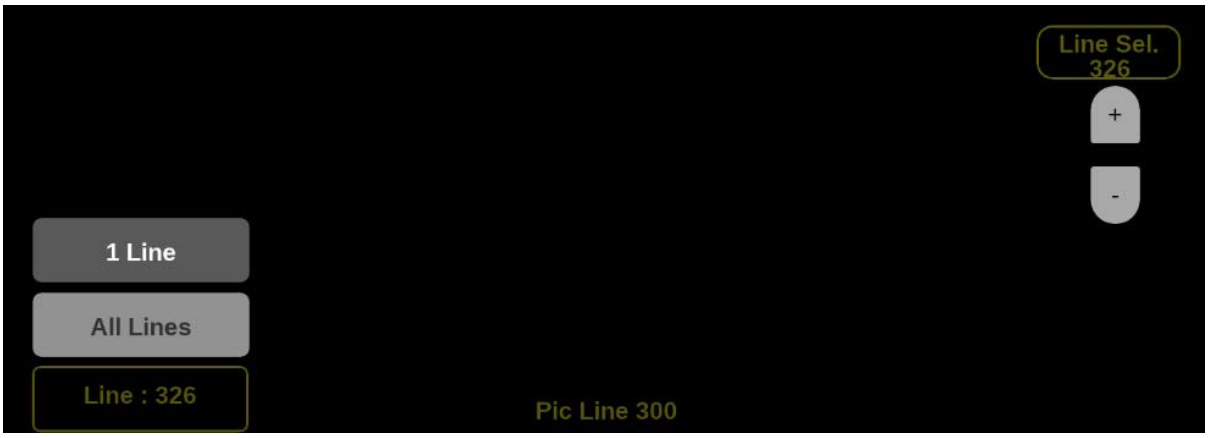


Figure 218: CIE on-screen tools – Line Select

Dolby Status application

Dolby audio metadata for the currently monitored SDI input can be viewed in the Dolby Status application. (See Figure 219.) The application tile indicates if Dolby audio is not available in the currently monitored SDI input.

NOTE. *The Dolby Status application requires software options MP2-AUD or MP2-DLBY.*

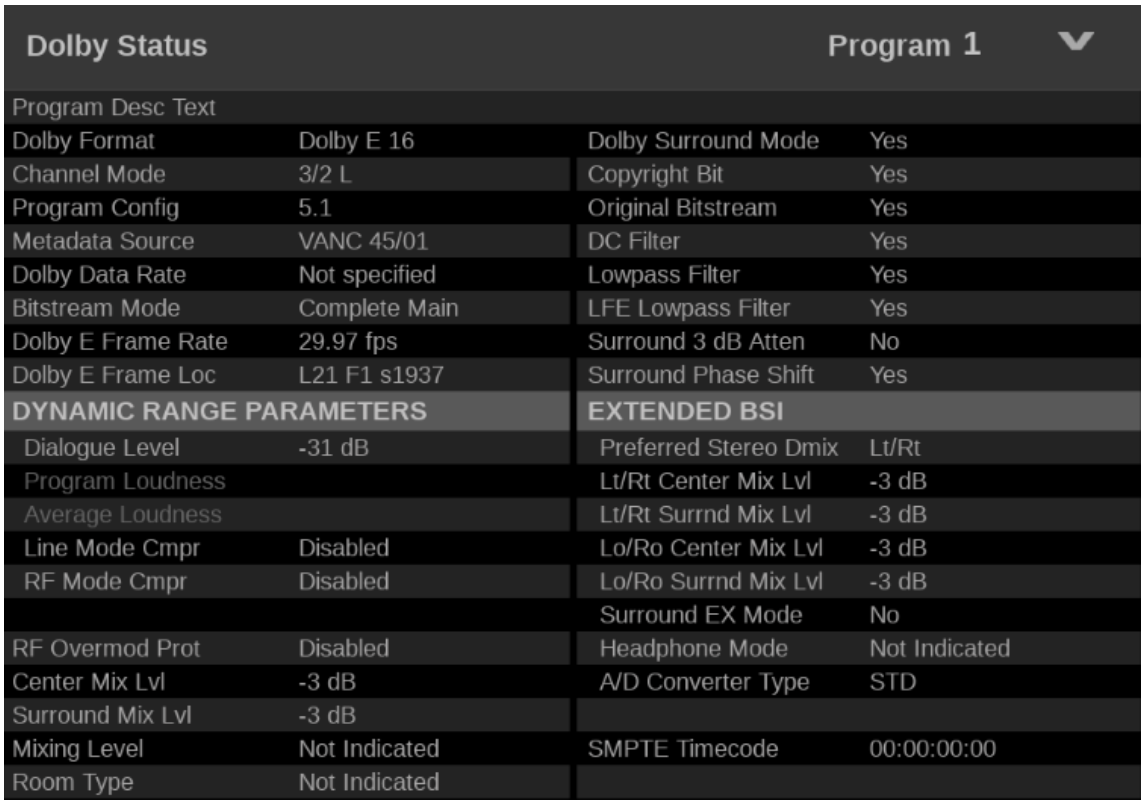


Figure 219: Dolby Status application

Dolby Status application Banner

Select and hold anywhere on the Dolby Status application tile to open the available options. (See Figure 220.)

Figure 220: Dolby Status application banner

These options adjust the Dolby Status application appearance:

- The icon expands the SDI Generator application tile to the full screen. The icon collapses the tile back to its original size.

- The icon expands the tile vertically. If the tile expands, it covers the tile above or below, depending on whether you are expanding the top or bottom quarter tile. The icon sets the tile to quarter tile size.
- The icon opens the SDI Generator application settings menu to adjust the tile settings.

NOTE. *After the Dolby Status application settings menu opens, the icon displays. Select this icon to move the settings menu horizontally.*

Dolby Status application settings menu

The Dolby Status application settings menu figure shows the available options. (See Figure 221.)

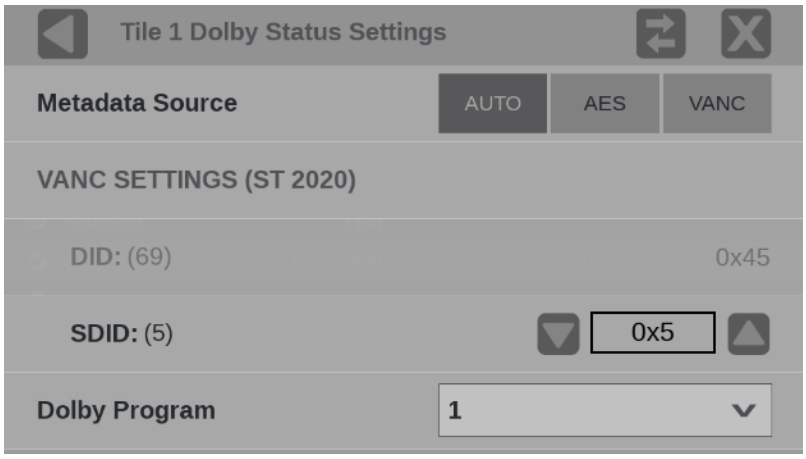


Figure 221: Dolby Status application settings menu

Metadata Source lets you select the source of the Dolby E metadata, either from the incoming Dolby E audio, if your instrument is decoding Dolby E audio, or VANC metadata if the Dolby E is externally decoded.

- **Auto** selects the Dolby E audio by default as the metadata source, if it is available. If Dolby E audio is not available, it uses VANC audio.
- **AES** selects the Dolby E audio as the metadata source. The Dolby Status app is blank if Dolby E is not being decoded.
- **VANC** selects the decodes and displays the VANC metadata source. The SDID must be properly selected.

DID: Data Identifier of the requested packet; is set to 0x45 (69 decimal) and is not changeable.

SDID: Secondary Data Identifier of the requested packet.

An SDID value of 01h is used when there is only one audio program associated with a video signal, and there is no intended association between VANC packets with an SDID value of 01h and a specific audio channel pair.

See Annex E for further information on how to assign SDID values.

Table 14: Association between SDID values and the first audio channel pair of an audio program

Audio Channel Pair	SDID
No association	01h
Channel pair 1/2	02h
Channel pair 3/4	03h
Channel pair 5/6	04h
Channel pair 7/8	05h
Channel pair 9/10	06h
Channel pair 11/12	07h
Channel pair 13/14	08h
Channel pair 15/16	09h

Annex E Assigning SDID Values (Normative)

When multiple audio programs are carried by, or associated with, a single video signal, the SDID value is used to identify the VANC data packets carrying the audio metadata for each of the audio programs.

The audio channels making up an audio program are assigned to consecutively numbered or consecutively arranged audio channel pairs. The VANC packets carrying the audio metadata for a specific audio program are identified by setting the SDID values of these packets to the value associated with the lowest numbered audio channel pair of the group of audio channel pairs carrying the complete audio program, as shown in Table 14.

For example, if there is a six-channel program carried in the first three audio channel pairs and a stereo program carried by the fourth audio channel pair, then the VANC packets carrying the metadata for the six-channel program would have their SDID value set to 02h because the program starts in audio channel pair 1/2. The VANC packets carrying the metadata for the stereo program would have their SDID value set to 05h because the stereo program starts in audio channel pair 7/8.

Dolby Program. Use the drop-down menu to select the Dolby program number to monitor.

The Program number in the top right of the Dolby Status app border is the same as the Dolby Program number in the Dolby Status Settings. Select the arrow and select the number of the program to monitor.

Elements of the Dolby Status display

This is a list of some of the elements in the Dolby Status application. For a complete list of the elements that might appear, see the Dolby Metadata Guide available at www.dolby.com.

Program Description Text: A 32-character ASCII text field used by the program author to describe the audio program; for example, the name of the program (Movie Channel Promo), the program source (Football Main Feed), or the program language (Danish).

Dolby Format: Indicates the Dolby Format. This indicator is also tied to the Dolby Format Error/Alarm: if the Alarm is asserted, the Dolby Format is displayed in red.

Channel Mode (or Audio Coding mode): Indicates the active channels within the encoded bit stream, representing it in a ratio, X/Y, where X is the number of front channels (Left, Center, Right) and Y is the number of rear (Surround) channels. If the LFE Channel is present, an L is appended at the end of the channel mode.

Program Configuration: Determines how the audio channels are grouped within a Dolby E bitstream. Up to eight channels can be grouped together in individual programs, where each program contains its own metadata.

Metadata Source: Indicates the input from which the Dolby Content is sourced.

Dolby Data Rate: For Dolby E it indicates the data rate that would be used to encode a Dolby Digital bitstream.

Bitstream Mode: Describes the audio service contained within the Dolby Digital bitstream. A complete audio program may consist of a main audio service (a complete mix of all the program audio), an associated audio service comprising a complete mix, or a main service combined with an associated service. For more information about possible values, see the instrument online help; when the Dolby Status display is active in a tile, select the HELP button.

Dolby E Frame Rate: Indicates the Dolby E frame rate. If Dolby Frame Rate is not the same as the video Frame Rate, the rate value is displayed in red.

Dolby E Frame Loc: Displays the location (line number and sample number) of the SMPTE337 preamble.

Dialogue Level: Represents the long-term, A-weighted average level of dialog within a presentation, Leq(A).

PTP operational overview

This section provides an overview of PTP network operation. Not all of the functionality described is currently available in the PRISM monitor.

PTP introduction

PTP master selection

In a PTP network, all the masters on the network are evaluated by the Best Master Clock Algorithm (BMCA). The BMCA runs on all devices, and chooses a master based on several parameters. Some of the parameters relate to clock quality; conversely the Priority 1 and Priority 2 parameters are set by the user to influence the choice of a master:

NOTE. *The PRISM monitor has no role in setting the priority parameters or in providing information to the BMCA.*

- Priority 1. This parameter defines which clocks are allowed to be considered as masters. To be considered as a master, the value should be set to 128 or less. Priority 1 is the first criteria in the BMCA, so if Priority 1 is set to a lower value than other devices on the system, then it will be chosen even if the clock quality is poor. Typically, all the masters in a domain should have the same value for the Priority 1 parameter.
- Priority 2. This parameter is used to break the tie between masters that have the same clock quality. Several values may be used to define a hierarchy of devices. Most profiles use 128 as a default, so a value of 127 or lower would indicate a preferred master.
- The final tie-breaker in the BMCA is the clock ID. This is usually the MAC address so it provides a unique value by which the BMCA can choose.

Network topology

In a typical IEEE1588 PTP network, many devices may be either masters or slaves. If the current master stops working, all the devices that are capable of being a master broadcast their clock quality and a new master is selected.

For video networks it may make sense to depart from the telecom-style PTP topology and dedicate devices to be only masters or slaves. This is the approach supported by the PRISM monitor, which allows for a more traditional primary and backup master structure controlling a range of slave devices. The BMCA is still used to select the active master and the network still takes the place of the ECO in the legacy Black-burst/Tri-level network. The PRISM monitor is a slave-only device

The five basic PTP timing messages

The five basic timing messages in a PTP system are described in this section. Other messages are present in some instances. For example, grant requests and responses appear in unicast systems, and Type Length Value (TLV) management messages appear in SMPTE ST2059 profile systems.

Announce message The Announce message is sent by the master to advertise its capability. This message contains the clock quality and priority settings needed for the BMCA to evaluate which device is the best master.

Sync message The Sync message is sent by the master and is used to measure the propagation delay from the master to slave. The sync message may contain the timestamp indicating when it was sent, or that time may be in the follow-up message. The receiver must timestamp the sync message upon receipt. These two timestamps are usually called t1 and t2 and provide the first delay measurement.

Follow-up message The follow-up message is sent only in cases where the PTP network hardware is not capable of inserting the timestamp or corrections into the Sync message. (See One-step and two-step operation.)

Delay request message The Delay request is sent by the slave. The time at which it is sent is noted by the slave, but is not included in the message. This time is usually called t3. When the delay request is received by the master, the master timestamps the receive time. This timestamp is usually called t4.

Delay response message The delay response is sent from the master to the slave. The response contains the t4 time stamp from when the master received the delay request. After the slave receives the delay response, it has the second pair of timestamps needed to calculate the second delay measurement of the slave to master delay.

Message timing Figure 222 shows the relationships between the five PTP timing messages.

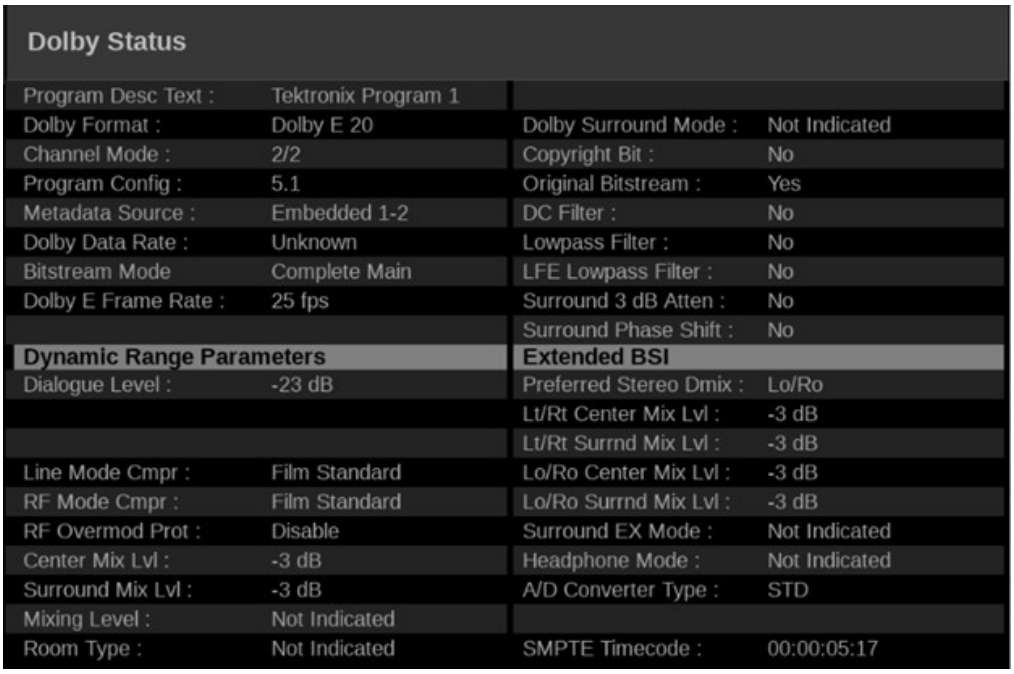


Figure 222: Dolby Status menu

Profiles and domains

Multiple domains and profiles can coexist on the same network.

Profiles

The IEEE1588 standard defines multiple parameters, such as the rates for Sync and Announce messages, and optional functions such as grandmaster clusters. Specific industries wanting to use PTP are encouraged to define their own "profile," which allows the PTP standard to be tuned for specific applications. The profile defines the default and range of each parameter, and defines with options are required, allowed or prohibited.

In the Prism monitor, the user should select the PTP profile (General, ST2059, or AES67). The user can then modify the profile parameters and save as part of an instrument preset. The allowed range of the parameters is restricted to that which is allowed for the selected profile type.

Domains

The IEEE1588 standard defines "domains," which allow multiple PTP services to coexist simultaneously on one physical Ethernet connection. For example, on a given network one master and several slaves can be using domain 0 while a second master and other slaves are using domain 1. These two PTP services are
independent. One use for this is to have masters on different domains provide PTP on different profiles. For example, domain 0 might be an AES67 profile, domain 1 could be a master using the AVB (802.1AS) profile, and domain 127 could be a master on the SMPTE ST2059 profile.

One-step and two-step operation

Some PTP messages have a time stamp associated with them. This time stamp indicates the time of the local clock when the message was sent or received. In some cases, the hardware is capable of embedding the time stamp in the message as it is sent. This is known as "one-step" mode since the message and its associated time are sent together.

In other cases, the hardware is not capable of inserting the time into the message, so instead it is sent in a second follow-up message. This is called "two-step" mode since there are two messages.

It is interesting to note that in End-to-End mode, only the Sync message is effected by the one-step and two-step setting since it is the only message that needs the transmit time stamp inserted. In a similar fashion, Peer-to-Peer mode has some messages that may require follow-up support.

The IEEE1588 standard specifies that all slaves are required to operate with either one-step or two-step message types. One type of device which often requires two-step operation is a Transparent Clock, since it has to calculate the residence time of a message and insert that time into the message or the follow-up message.

Multicast, Unicast, and Mixed Communication modes

There are three basic message modes for PTP: Multicast, Unicast, and mixed Multicast and Unicast. For full Multicast or Unicast modes, all of the PTP messages are sent in the selected mode type.

For some profiles, such as some telecom profiles and the SMPTE ST2059 profile, a mixture of Multicast and Unicast are allowed. On the SMPTE profile unique mixed mode, the Announce and Sync messages are sent as multicast. However, the Delay Request and Delay Response messages are sent as Unicast.

Some points to understand about communication modes:

- Whatever mode is chosen, the master and slave must match or be compatible Multicast and Mixed mode may need IGMP joins and leaves
- Full Unicast must have the master address in all slave AMTs Unicast without negotiation does not allow master to regulate load
- Two masters can be used on different domains to serve slaves on different communication modes

All of the master and slave devices on a given domain must use compatible communication modes. For most profiles, this means the master and slave communication modes need to match exactly. On the SMPTE profile, the Multicast and Mixed modes are compatible, so a master in any of these modes should work with a slave in any of those modes.

Multicast system messages

Multicast messages are broadcast and so they can be received without knowing the address of the sender. This allows a slave to hook up to the network, receive the announce messages and discover the identity of the master. Multicast in some networks requires the devices to use IGMP to join and leave the multicast group.

In Multicast PTP systems, the master sets the rate of the announce and sync messages. The master also sends the maximum allowed delay request rate in the delay response message. Ideally, the slave uses that value to set the delay request rate, although some slaves set this rate independently. The delay request rate is typically the same as the sync rate, but it may be higher or lower.

Unicast system messages

Unicast messages require the address of the master be entered into the Acceptable Master Table (AMT) in each slave. If there are multiple masters, the IP address for each master must be entered in the AMTs of all the slaves.

In Unicast PTP systems, the slave must have the address of the master in its acceptable master table because the slave initiates the communication with the master. The slave sends several grant requests to the master requesting specific rates for each message type. If the master accepts the grant requests, it will send grant acknowledges. If the master denies the grant, the slave may send a new grant request at a lower rate. This process may continue for several iterations until the master and slave agree on a rate. The master and slave will then start exchanging the PTP messages. If the master cannot support any of the rates requested by the slave, then the slave will not be able to lock to the master.

Mixed mode system messages

In mixed mode systems, some messages are Multicast and some are Unicast. For the SMPTE ST2059 profile, the Announce and Sync messages are sent as Multicast. This allows devices to discover the active master. The Delay Request messages are configured as Unicast, in some case with negotiation, and in other cases without negotiation.

SMPTE profile system messages

For SMPTE profile systems, a given domain must use one type of message for all Announce, Sync, and follow-up messages. Therefore, all masters and slaves on that domain must be configured for either Multicast or they all must be configured for Unicast.

For SMPTE mixed mode, the Announce, Sync, and follow-up messages are configured as Multicast, whereas the delay requests can be Multicast, Unicast, or Unicast without negotiation. To use this combination with an SPG8000A master clock generator, set the master and slave to any of the modes: Multicast, Mixed, or Mixed without negotiation. The masters will support all of the slave modes simultaneously.

BMCA operation

The Best Master Clock Algorithm (BMCA) is used to choose the active master on the domain. This is partially explained in the introduction to this document. The BMCA operation varies somewhat as function of communication mode.

Multicast mode

In Multicast mode, the active master sends announce messages which all other masters and slaves can receive. So all devices can evaluate the BMCA and decide on the best master. If any device detects that its BMCA rating is better than the current master, it will send an announce and take over as the active master.

Unicast mode

In Unicast mode, slaves only get Announce messages if they establish a grant from the master. Therefore, each slave must set up a grant with every device in its AMT. Since the masters do not set up grants from other masters, they do not have the information to evaluate the BMCA and know if they are the active master. It is up to the slaves to evaluate the BMCA based on the announce message they get from each master in their AMT. Each slave then decides which master is the best and sets up grants for the other message types. If slaves on a given network have a different list of masters in their AMT, they may choose a different master.

Mixed mode

In a SMPTE ST2059 mixed environment, the announce message is Multicast. Therefore, the BMCA can use the Multicast conventions.

Compensating for causes of asymmetric delay

Several factors can cause the PTP message delay to be different for the messages sent from the master to slave as opposed to the messages the other direction from the slave to master. Unless corrected, this propagation delay asymmetry will cause an offset in the clock phase equal to ½ the difference in the two path delays. There are 4 main causes of asymmetric delay: Rate mismatch in the ports on a switch, Traffic mismatch on the two paths, message type mismatch, and cable delay variation. This section contains suggestions on how to design the system to minimize the delay asymmetry. Alternatively, some slaves provide a way to manually enter a correction value to cancel the delay error.

Rate mismatch

Rate mismatch in a switch causes a delay asymmetry because the switch does a “store and forward” on messages. This means the entire message must be stored in the buffer before it starts to be “forwarded” or sent out. For example, for a 100 Mb input and 1 Gb output, the switch must wait for the entire message to clock in at the slow rate before it can start outputting the message at the high rate. Conversely for a 1 Gb/s input and 100 Mb/s output, the entire packet is quickly read in at the faster rate, so then the output can start sooner, but at a lower rate.

While the total time is the same for both directions, the delay on the fast-in, slow-out direction is shorter on the packets which contain the PTP timestamps. This effect is significant on a 100 Mb/1 Gb rate mismatch, but much less significant on a 1 G/10 G switch since the message time at 1 Gb/s is quite short. If the switch supports Transparent Clock (TC) mode, then this rate mismatch delay effect is corrected by the TC delay correction.

Traffic mismatch

Another cause of asymmetric delay is traffic mismatch on the two paths. If there is a high percentage of traffic utilization on the master to slave path, then most of the PTP messages may be delayed significantly. If the traffic on the other direction is significantly different, then the messages on the path may not suffer the same delay.

This effect can be quite large depending on the traffic, the quality of the switch, and the number of switches in the network. To reduce this effect, a user should avoid large loading on the PTP network, use high-quality switches that avoid this delay variance, or use PTP Transparent mode switches which will insert residence time information to allow the slave to correct for this delay.

Setting the Diff Serve QoS on the switch and configuring the PTP messages with an appropriate DSCP can also mitigate the effects of traffic delay.

Message type mismatch

Another cause of delay asymmetry is message type mismatch. For example, if the sync message is Multicast and the delay request is Unicast, then some switches may process the messages differently and cause a differential delay. Since the SMPTE profile allows a mixed mode operation, switches should be evaluated to ensure they do not have this effect. If transparent mode switches are used, then this effect should be corrected by the slave.

Cable delay variation

The actual propagation delay through Cat 5 cable can be significantly different in one direction versus the other direction. This can be due to the twist rate on the pairs, routing inside the sheath, material differences, etc. The PTP system is incapable of removing this effect, so the best way to prevent this is to use high-quality cable with a minimum variation in the physical propagation delay.