Leader DIGEST CATALOG

Vol.4

Leader

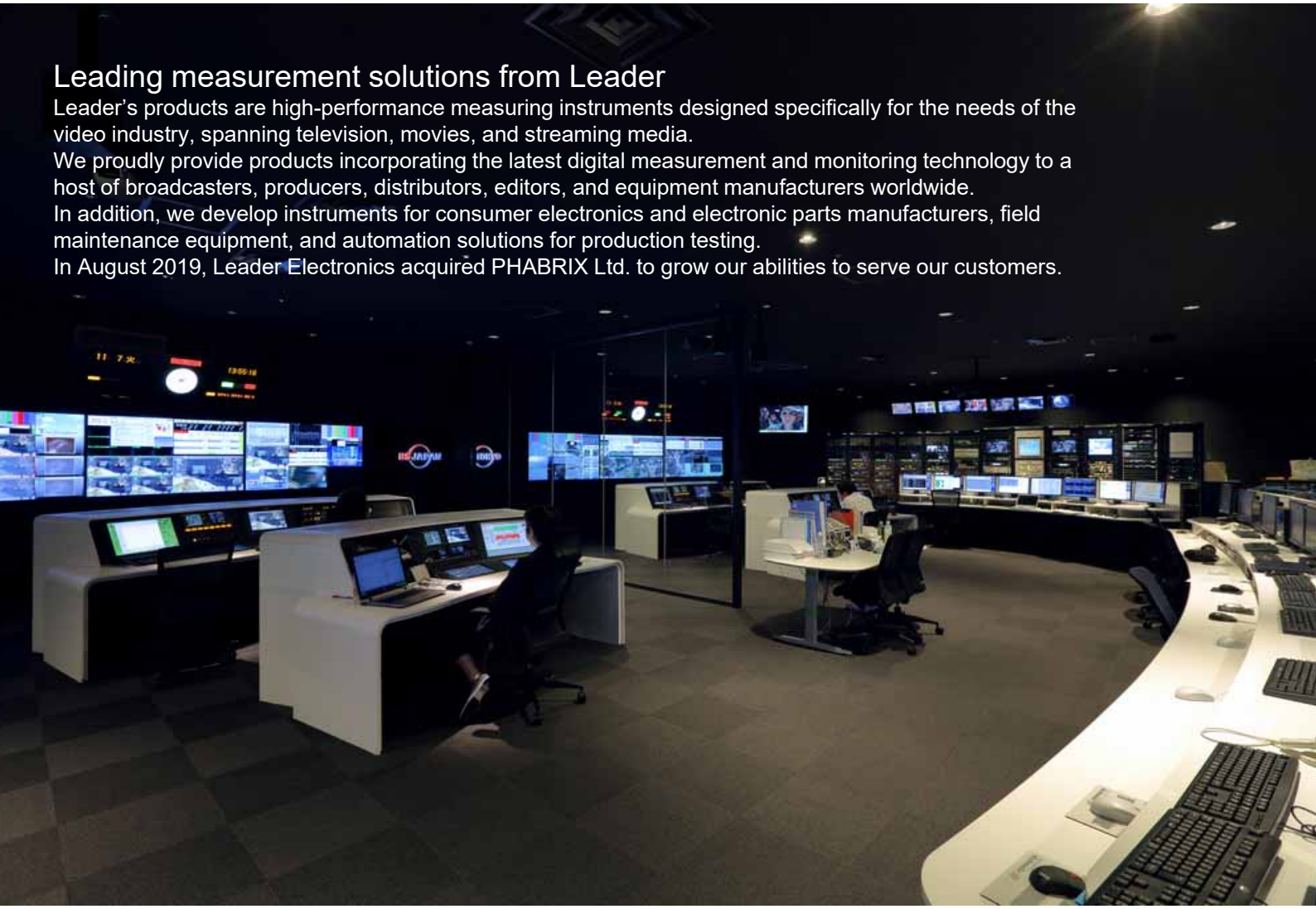
Company Profile

Engineering the future of test and measurement.

Since its founding in 1954, Leader Electronics has constantly refined measurement technology to support innovation within our industry. That commitment is even stronger today, in this time of drastic change.
Leader Electronics continues to expand its global business in the field of electronic measurement instruments and video distribution, providing revolutionary hardware and software solutions to help solve our customers' evolving challenges.

Leading measurement solutions from Leader

Leader's products are high-performance measuring instruments designed specifically for the needs of the video industry, spanning television, movies, and streaming media.
We proudly provide products incorporating the latest digital measurement and monitoring technology to a host of broadcasters, producers, distributors, editors, and equipment manufacturers worldwide.
In addition, we develop instruments for consumer electronics and electronic parts manufacturers, field maintenance equipment, and automation solutions for production testing.
In August 2019, Leader Electronics acquired PHABRIX Ltd. to grow our abilities to serve our customers.



ZEN SERIES

The ZEN series LV5600 / LV5300A / LV5350 WAVEFORM MONITORS and LV7600 / LV7300 RASTERIZERS are precision measurement tools to address all your video and audio testing needs. Designed with the future in mind, the Zen series supports up to 12G‐SDI as well as up to 25G video over IP interfaces by adding hardware or software options. The test and measurement of video signals is straightforward with waveform, vector, picture and eye pattern displays. Comprehensive status displays, error logs and an ANC Data Viewer help you troubleshoot your system when there are problems. The Zen series also offers complete audio monitoring, for discrete digital, analog, or embedded audio. Audio monitoring views include multichannel level metering, Lissajous, status, and loudness measurement. The JPEG-XS option has been newly added to the lineup to support an even wider range of IP systems.

LV5600

2K/4K/IP/4 INPUT WAVEFORM MONITOR

4K | 12GSDI | 6GSDI | 3GSDI | HDSDI | SDSDI | 25G IP | 10G IP | EYE

ZEN WAVEFORM MONITOR LV5600

Display Size：7 inches
Dimensions (WHD mm) 215x132x298
(3U ½ Rack size)

LV7600

2K/4K/IP/4 INPUT RASTERIZER

4K | 12GSDI | 6GSDI | 3GSDI | HDSDI | SDSDI | 25G IP | 10G IP | EYE

ZEN RASTERIZER LV7600

Dimensions (WHD mm)：426x44x300
(1U Full Rack size)

LV5300A

2K/4K/2 INPUT WAVEFORM MONITOR

4K | 12GSDI | 6GSDI | 3GSDI | HDSDI | SDSDI | EYE

ZEN WAVEFORM MONITOR LV5300A

EYE Pattern
Display Size：7 inches
Dimensions (WHD mm) :215x132x120 (3U ½ Rack size)
Power supply：DC10V～DC18V

LV5350

2K/4K/2 INPUT WAVEFORM MONITOR

4K | 12GSDI | 6GSDI | 3GSDI | HDSDI | SDSDI

ZEN WAVEFORM MONITOR LV5350

Display Size：7 inches
Dimensions (WHD mm) :215x85 x120 (3U ½ Rack size)
Power supply：DC10V～DC18V

LV7300

2K/4K/2 INPUT RASTERIZER

4K | 12GSDI | 6GSDI | 3GSDI | HDSDI | SDSDI | EYE

ZEN RASTERIZER LV7300

Dimensions (WHD mm)：215x44x300 (1U 1/2 Rack size)
Power supply：DC10V～DC18V

LV7290

REMOTE CONTROLLER

Enables long distance operation through Ethernet
Controls up to 8 units from one controller
Applicable model:
LV5900/LV5600/LV5300A/LV5350/LV7600/LV7300
Dimensions (WHD mm)：482x44x110 (1U Full Rack size)

ZEN Series Options

■LV5600/ LV7600 Hardware options

Description	Model		Function
	LV5600	LV7600	
SDI INPUT	LV5600-SER01		SD,HD,3G SDI input *1
SDI INPUT/EYE	LV5600-SER02A		SD,HD,3G SDI input and EYE pattern display *1
DIGI/ANA AUDIO	LV5600-SER03	LV7600-SER03	Digital/ Analog audio input & output display
DOLBY	LV5600-SER04	LV7600-SER04	Dolby Digital, Dolby E decode and metadata *2
10G IP INPUT	LV5600-SER05	LV7600-SER05	10G IP input *1
25G IP INPUT	LV5600-SER06	LV7600-SER06	25G IP input *1 *3

*1 A minimum of one of LV5600-SER01, LV5600-SER02A, LV5600-SER05 or LV5600-SER06 required for LV5600
A minimum of one of LV5600-SER01, LV5600-SER02A, LV7600-SER05 or LV7600-SER06 required for LV7600

*2 Requires LV5600-SER03 for LV5600, LV7600-SER03 for LV7600

*3 For 4K, only a single stream is supported. You also need the SER28

■LV5600/ LV7600 Software options

Description	Model		Function
	LV5600	LV7600	
HDR	LV5600-SER23	LV7600-SER23	HDR measurement
TSG	LV5600-SER24	LV7600-SER24	SDI signal generation *1
FOCUS ASSIST	LV5600-SER25	LV7600-SER25	Focus assist display
LAYOUT	LV5600-SER26	LV7600-SER26	Customized layout /Display assignment
TALLY	LV5600-SER27	LV7600-SER27	Tally display
4K	LV5600-SER28	LV7600-SER28	4K signal support(3G-Quad,3G-Dual,HD-Quad)
12G-SDI	LV5600-SER29	LV7600-SER29	12G-SDI / 6G-SDI *2
VIDEO NOISE METER	LV5600-SER30	LV7600-SER30	Camera signal to noise measurement
COLORIMETRY ZONE	LV5600-SER31	LV7600-SER31	Colors outside the color gamut display function
25G IPTSG	LV5600-SER32	LV7600-SER32	25G IP signal generation function *3
JPEG-XS	LV5600-SER33	LV7600-SER33	JPEG-XS Analyzer/Decode/JPEG-XS IP signal generation function *4
EXTENDED VECTOR	LV5600-SER40	LV7600-SER40	RGB Vector , YCbCr Vector

*1 To support 4K, LV5600-SER28 and LV7600-SER28 are required. To support 12G-SDI, LV5600-SER28 + LV5600-SER29 and LV7600-SER28 + LV7600-SER29 are required.

*2 LV5600-SER28 is required for LV5600. LV7600-SER28 is required for LV7600.

*3 LV5600-SER06 is required for LV5600. LV7600-SER06 is required for LV7600. To support 4K, LV5600-SER28 and LV7600-SER28 are required.

*4 LV5600-SER06 is required for LV5600. LV7600-SER06 is required for LV7600. To support 4K, LV5600-SER28 and LV7600-SER28 are required. To support JPEG-XS TSG, LV5600-SER32 and LV7600-SER32 are required.

■LV5300A / LV5350 / LV7300 Hardware options

Description	Model			Function
	LV5300A	LV5350	LV7300	
SDI INPUT	–	Standard feature	LV7300-SER01	SD,HD,3G SDI input *1
SDI INPUT/EYE	Standard feature	–	LV7300-SER02	SD,HD,3G SDI input and EYE pattern display *1
BATTERY ADAPTER V MOUNT	LV5300-SER11	LV5350-SER11	–	V mount type battery adapter
BATTERY ADAPTER QR GOLD	LV5300-SER12	LV5350-SER12	–	QR gold mount type battery adapter

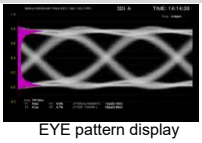
*1 Either LV7300-SER01 or LV7300-SER02 is required for LV7300.

■LV5300A / LV5350 / LV7300 Software options

Description	Model			Function
	LV5300A	LV5350	LV7300	
AUDIO	LV5300-SER20	LV5350-SER20	LV7300-SER20	AUDIO display – 8 channels of embedded plus phase
CLOSED CAPTION	LV5300-SER21	LV5350-SER21	LV7300-SER21	EIA-608, 708, TELETEXT, Japanese subtitle display
CIE	LV5300-SER22	LV5350-SER22	LV7300-SER22	CIE Chart display
HDR	LV5300-SER23	LV5350-SER23	LV7300-SER23	HDR measurement
TSG	LV5300-SER24	LV5350-SER24	LV7300-SER24	SDI signal generation
FOCUS ASSIST	LV5300-SER25	LV5350-SER25	LV7300-SER25	Focus assist display
LAYOUT	LV5300-SER26	LV5350-SER26	LV7300-SER26	Customized layout
TALLY	LV5300-SER27	LV5350-SER27	LV7300-SER27	Tally display
4K	LV5300-SER28	LV5350-SER28	LV7300-SER28	4K(12G-SDI/6G-SDI/3G-SDI Dual)
EXTENDED VECTOR	LV5300-SER40	LV5350-SER40	LV7300-SER40	RGB Vector , YCbCr Vector

LV5600-SER01 LV7300-SER01
SDI INPUT
LV5600-SER02A LV7300-SER02
SDI INPUT WITH EYE PATTERN

Options add SDI inputs to the product.
The LV5600-SER02A and LV7300-SER02 options offer SDI inputs with EYE pattern and Jitter functions.
NOTE: The LV5300A comes standard with EYE, and EYE features are not available on the LV5350.


EYE pattern display with histogram

LV5600-SER03 LV7600-SER03
DIGITAL/ANALOG AUDIO
LV5600-SER04 LV7600-SER04
DOLBY E DECODING FUNCTION

Supports AES/EBU Audio and Analog Audio in/out. Features include audio bars, Lissajous, surround, loudness displays and Lip Sync(AV delay) as well as audio error reporting.
Additionally LV5600-SER04 / LV7600-SER04 option is installed, Dolby E, Dolby Digital, Dolby Digital Plus can be decoded and displayed.

LV5600-SER05 LV7600-SER05
10G IP INPUT (SMPTE ST 2022-6,SMPTE 2110-20)
LV5600-SER05 LV7600-SER05
25G IP INPUT (SMPTE ST 2022-6,SMPTE 2110-20)

IP interface options for LV5600 / LV7600, supporting SMPTE ST 2022-6, SMPTE 2110-20/-30/-40, NMOS IS-04 and IS-05 for 3G/HD and 4K video.

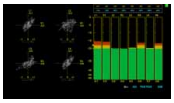
LV5300-SER11 LV5350-SER11
BATTERY IDX
LV5300-SER12 LV5350-SER12
BATTERY ANTON BAUER

LV5300-SER11/LV5350-SER11
Battery mount adapter for V mount Battery

LV5300-SER12/LV5350-SER12
Battery mount adapter for Anton Bauer battery

LV5300-SER20 LV5350-SER20 LV7300-SER20
AUDIO DISPLAY FUNCTION

Provide Lissajous, and surround displays, Lip Sync(AV delay) , in addition to monitoring channel levels and errors such as mutes or clicks.


Audio display

LV5300-SER21 LV5350-SER21 LV7300-SER21
CLOSED CAPTION

Decode and display closed caption of CEA-608/CEA-708, Teletext and OP47 subtitle with rendering on the picture.

Closed caption display

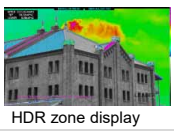
LV5300-SER22 LV5350-SER22 LV7300-SER22
CIE CHART DISPLAY FUNCTION

Enable support for ITU-R BT.601, ITU-R BT.709, and ITU-RBT.2020 colorimetry.
(LV5600 and LV7600 are standard features.)


xy chromaticity Display

LV5600-SER23 LV7600-SER23
LV5300-SER23 LV5350-SER23 LV7300-SER23
HDR FUNCTION

Enable complete monitoring of the luminance levels of HDR signals, with support for HLG, PQ, and S-Log 3 as specified in ITU-R BT.2100. Luminance levels are shown in Nits, accounting for the OOTF.


HDR zone display

LV5600-SER24 LV7600-SER24
LV5300-SER24 LV5350-SER24 LV7300-SER24
SDI SIGNAL GENERATION FUNCTION

Options provide HD SDI test pattern generation for 2K-HD/3G and 4K-3G quad/12G SDI formats. Please note, for 12G-SDI test signals, both the 4K and 12G-SDI options are required. (LV5300A, LV5350 and LV7300 are output from SDI output terminal 2 according to the output setting.)

LV5600-SER25 LV7600-SER25
LV5300-SER25 LV5350-SER25 LV7300-SER25
FOCUS ASSIST FUNCTION

Enable focus detection, using a new algorithm optimized for high resolution images. Focus can easily be adjusted with sensitivity even in low contrast scenes.


Focus Assist (Green indicates focus)

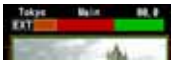
LV5600-SER26 LV7600-SER26
LV5300-SER26 LV5350-SER26 LV7300-SER26
CUSTOMIZED LAYOUT FUNCTION

LV5600-SER26, LV7600-SER26, LV5300-SER26, LV5350-SER26, LV7300-SER26 enables both the location and size of displays such as waveform, vector, picture to be customized by the user. With display assignment, any given signal can also be rendered in up to 4 different views. (Display assignment is only for LV5600-SER26 and LV7600-SER26)


Customized layout display

LV5600-SER27 LV7600-SER27
LV5300-SER27 LV5350-SER26 LV7300-SER27
TALLY DISPLAY FUNCTION

Enable remote tally display. In the LV5600 and LV7600, camera ID, iris and tally are available via RS - 422/485 connectors.

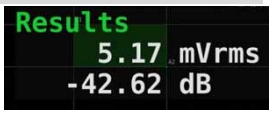

ID／Iris／Tally display

LV5600-SER28 LV7600-SER28
LV5300-SER28 LV5350-SER28 LV7300-SER28
4K FORMAT
LV5600-SER29 LV7600-SER29
12G-SDI

LV5600/LV7600
LV5600/LV7600 supports 4K formats of 3G-SDI dual and quad-link, HD-SDI quad link when the LV5600-SER28 or LV7600-SER28 is installed. LV5600 SER29/ LV7600-SER29 is required for 4K 12G SDI.
LV5300A/LV5350/LV7300
LV5300A/LV5350/LV7300 supports 4K 12G-SDI (single link) when LV5300-SER28, LV5350-SER28, or LV7300-SER28 is installed.

LV5600-SER30 LV7600-SER30
VIDEO NOISE METER

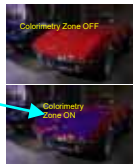
Enables measurement of the video noise included in the intensity or RGB components of SDI signals. A window for measuring noise can be set. Selectable area for measurement to allow for effects of the lens or similar.



Noise meter display

LV5600-SER31 LV7600-SER31
COLORIMETRY ZONE DISPLAY

This feature simplifies the task of identifying the reproduction errors which can occur when transmitting video content produced in BT.709, DCI-P3 or BT.2020 wide color gamut or when converting content from BT.2020 to narrow color gamut.

LV5600-SER32 LV7600-SER32
4K/HD IP TEST PATTERN GENERATOR

IP test pattern signal generation function that can generate HD and 4K (3840 x 2160) test patterns in compliance with the IP transmission standard (SMPTE ST 2110-20/30/31/40).
* LV5600SER06 / LV7600-SER06 is required.

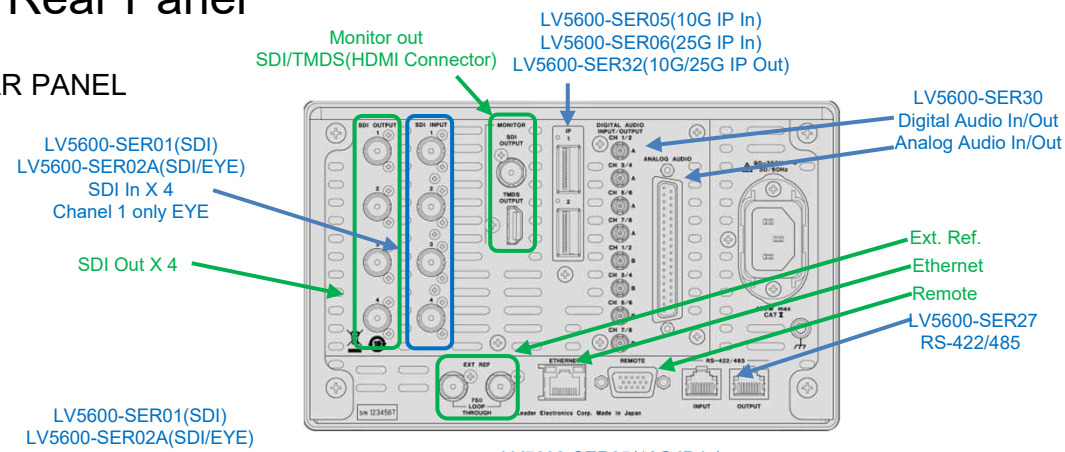
LV5600-SER33 LV7600-SER33 NEW
JPEG-XS DECODE / ANALYZER / JPEG-XS IP TEST PATTERN GENERATOR

IP test pattern signal generation function that can generate HD and 4K (3840 x 2160) test patterns in compliance with the IP transmission standard (SMPTE ST 2110-22).
* LV5600-SER06 is required for LV5600. LV7600-SER06 is required for LV7600. To support 4K, LV5600-SER28 and LV7600-SER28 are required. To support JPEG-XS TSG, LV5600-SER32 and LV7600-SER32 are required.

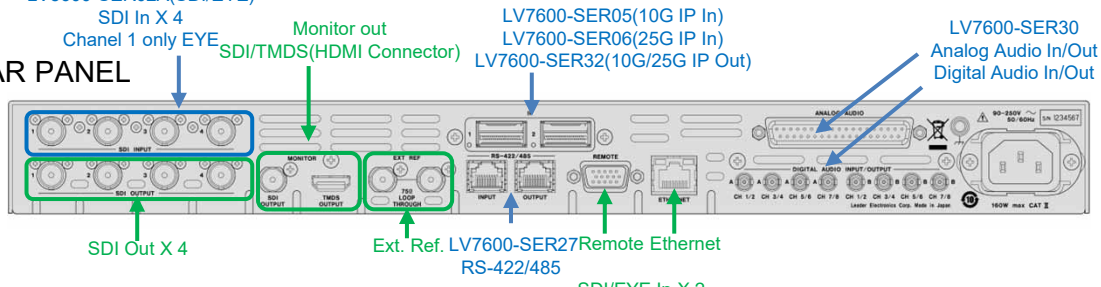
JPEG XS

ZEN Series Rear Panel

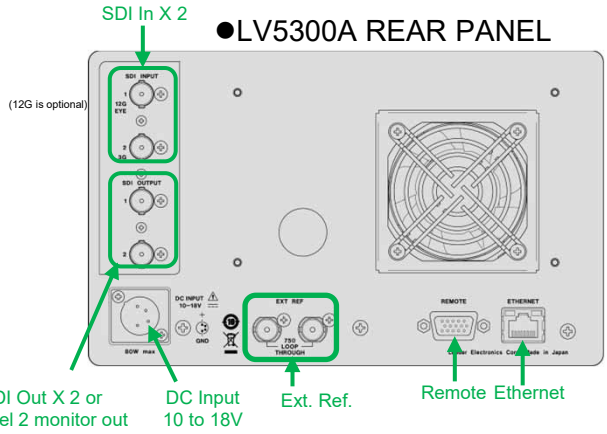
●LV5600 REAR PANEL



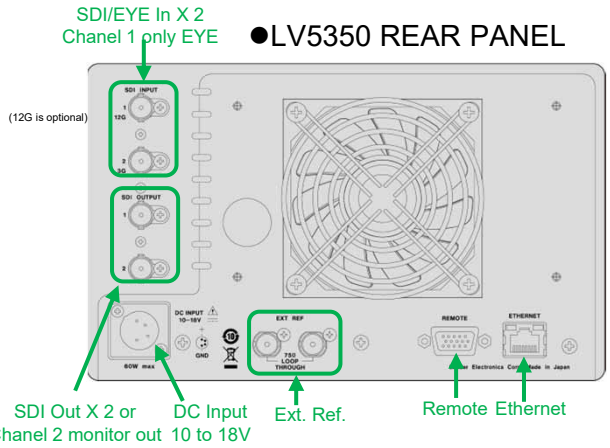
●LV7600 REAR PANEL



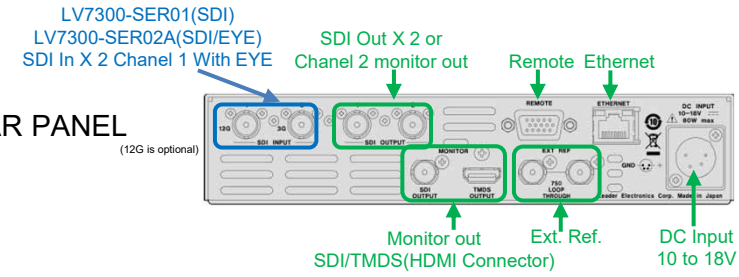
●LV5300A REAR PANEL



●LV5350 REAR PANEL



●LV7300 REAR PANEL



Option

Standard

LV5900

8K | 4K | 12GSDI | 3GSDI | HDSDI | SDSDI | EYE | MADI

8K Multi Waveform Monitor
Compatible with 8K Video

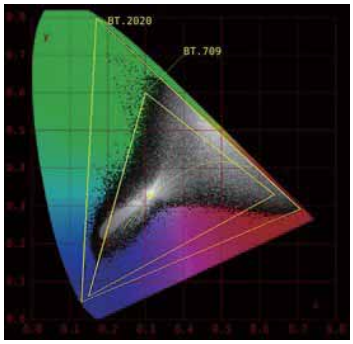
The LV5900 waveform monitor supports SMPTE ST 2082-12, which is used to receive 7680 (8192)×4320/59.94P YCBCR 10-bit 8K video via 12G-SDI QUAD LINK. As it supports not only 8K but also a 4K input and four simultaneous HD inputs, you can use it as a high-end 8K system and switch between other systems as needed. The waveform, vector, picture, and eye pattern displays allow for the measurement and quality control of various video signals. The status display allows you to view various error statuses and check on system stability by viewing event logs and long-term charts.

Dimensions (WHD mm): 223 x 172 x 360 (4U size)

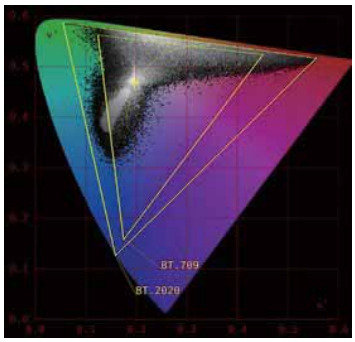
Technical Information

■CIE Chart (Applicable models：Zen series , LV5900)

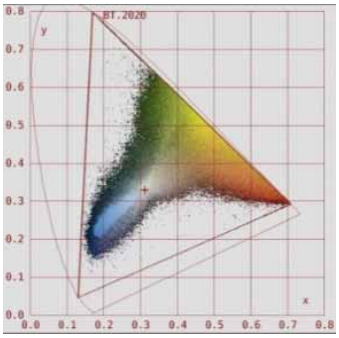
The CIE chart is a chromaticity diagram display which represents ITU-R BT.601, ITU-R BT.709, ITU-R BT.2020 color spaces. Both CIE 1931(xy) and CIE 1976(u'v') modes are supported. Multiple color spaces can be shown on the chromaticity chart, allowing content to be verified as BT.2020 or BT.709 color space. Colors are represented either as the full chromaticity coordinate space, or superimposed on the frame data shown on the color chart. Individual points may be directly measured with CineLite Advance. The chromaticity value is automatically indicated where the cursor is positioned on the chart display.



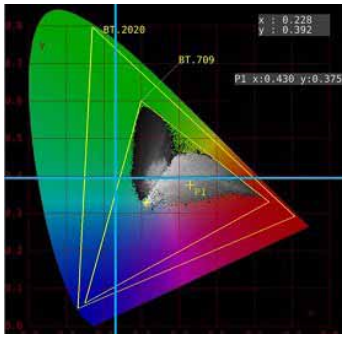
xy coordinate chart



u'v' coordinate chart



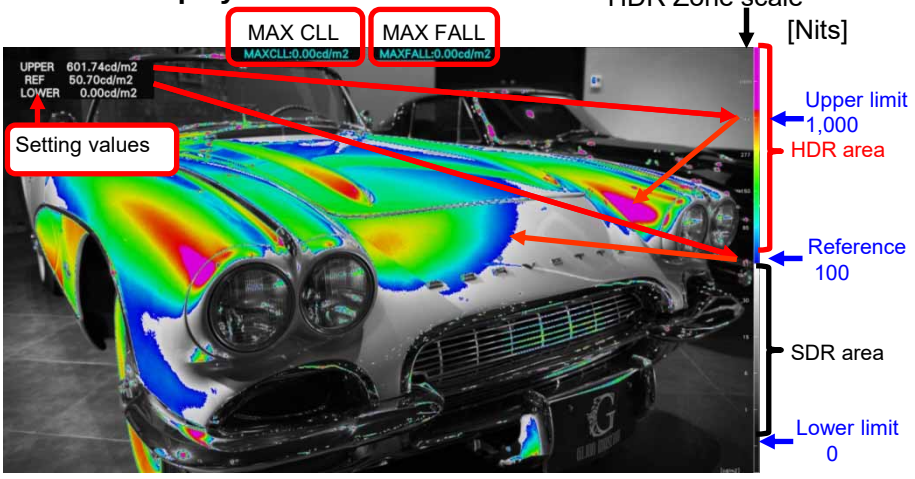
xy coordinate color chart

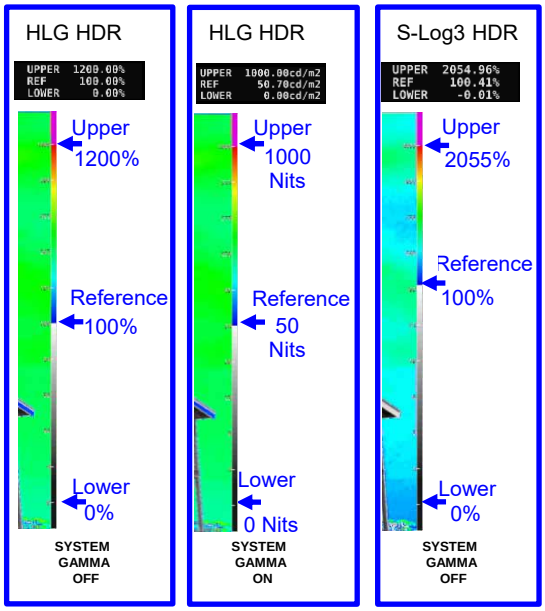


Cursor points shown in blue

■HDR (Applicable models：LV5900, Zen series)

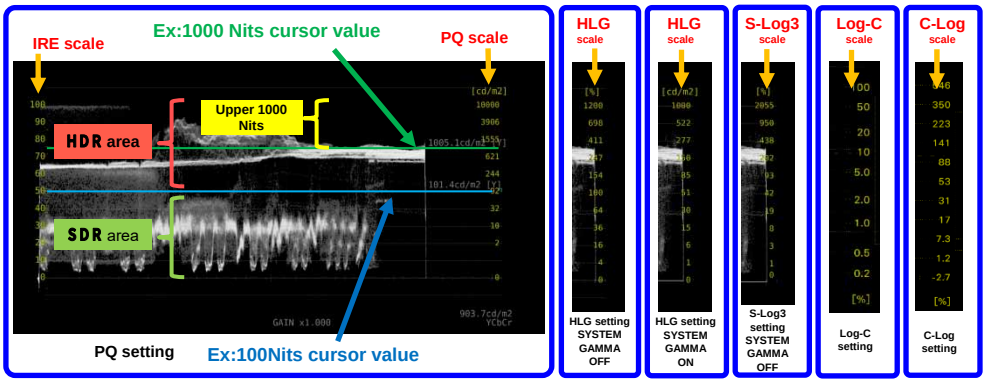
HDR Zone display



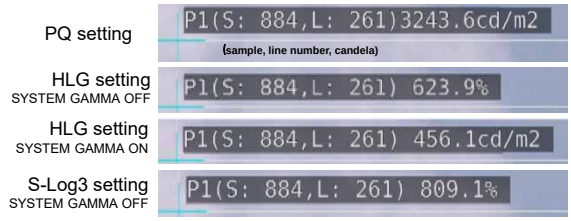


- SDR content is shown in monochrome, HDR in color, depending on brightness
- Content over the upper limit is colored magenta
- Setting values can be user defined for easy grading to a particular luminance

HDR waveform display



HDR point measurement



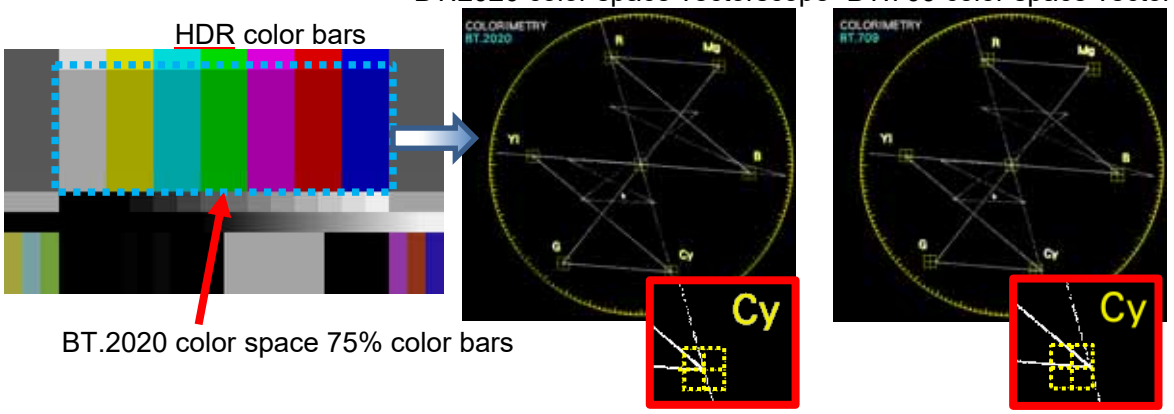
- Cursor can be easily positioned using a USB mouse
- Up to 3 points can be measured at the same time

■ BT.2020 Color Space Verification of HDR Color Bars (Applicable models: LV5900, all Zen series models)

BT.2020 color space vectorscope.BT.2020 and BT.709 values differ on vectorscope displays. If BT.2020 color bars are used, the result is centered in the targets, when using the vectorscope display and the BT.2020 setting.

BT.2020 color space vectorscope BT.709 color space vectorscope

HDR color bars

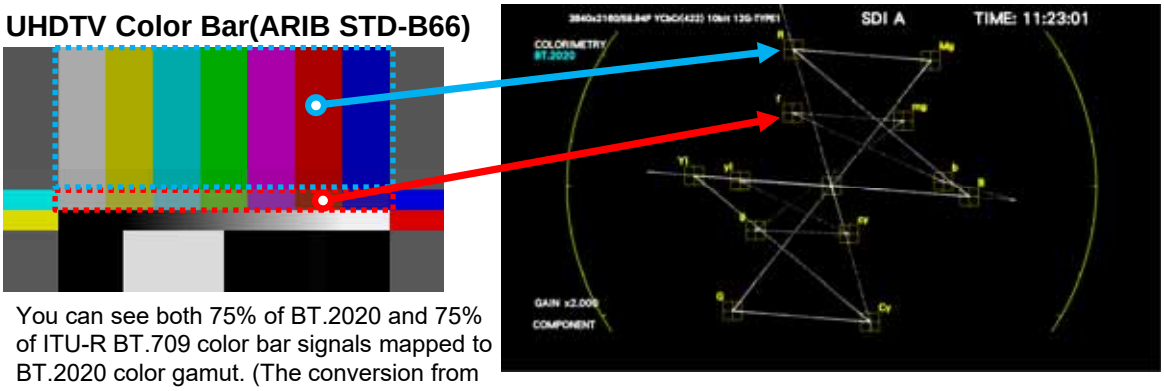


BT.2020 color space 75% color bars

■ UHDTV / HDR color bar compatible Vectorscope (Applicable models: LV5900, all Zen series models)

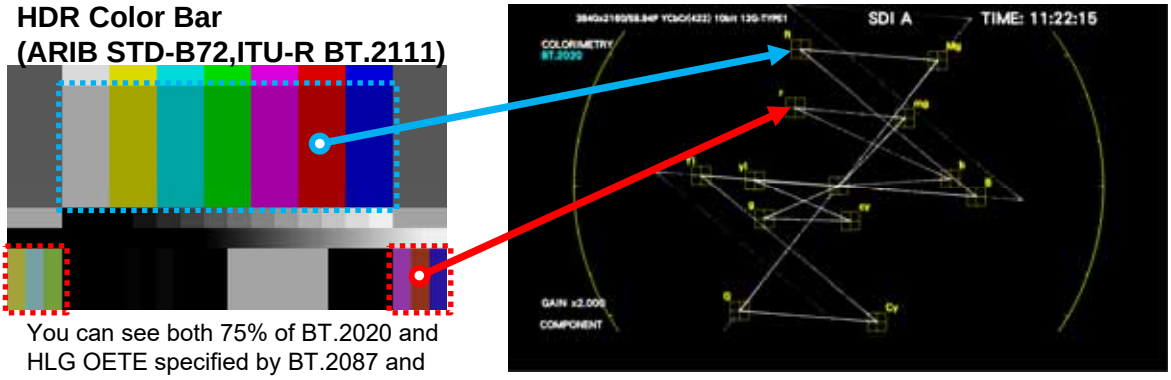
You can see both 75% of BT.2020 and 75% of ITU-R BT.709 color bar signals mapped to BT.2020 color gamut.
(The conversion from 709 to 2020 is ITU-R BT.2087)

UHDTV Color Bar(ARIB STD-B66)



You can see both 75% of BT.2020 and 75% of ITU-R BT.709 color bar signals mapped to BT.2020 color gamut. (The conversion from 709 to 2020 is ITU-R BT.2087)

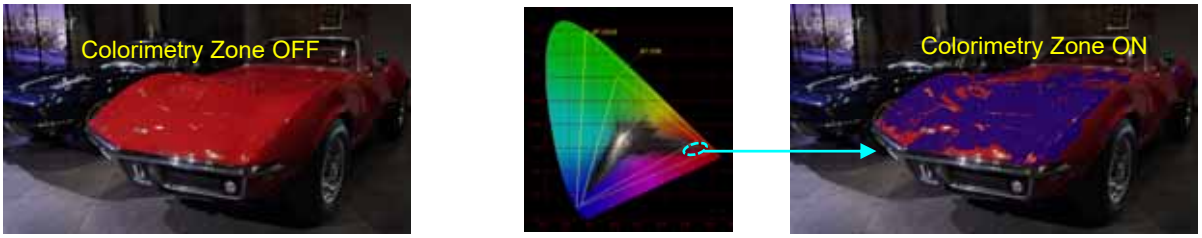
HDR Color Bar (ARIB STD-B72,ITU-R BT.2111)



You can see both 75% of BT.2020 and HLG OETE specified by BT.2087 and BT.709 color bar using linear matrix.

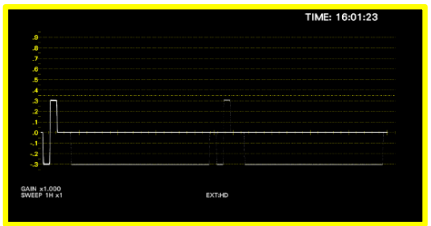
■ Colorimetry Zone Display (Applicable models: LV5600, LV7600)

When converting from a wide color gamut to a narrow color gamut, such as when creating content for simulcast, it is easier to check if the color has been replaced with a color different from the image.



■ External Sync Signal Input and Waveform Display (Applicable models: LV5600, LV7600 and LV5900)

The phase difference and synchronization states of SDI or IP video signals can be shown graphically based on an external reference sync signal (black burst, tri-level sync).
Further more, the waveform of the applied external reference sync signal can be displayed, allowing for the early discovery of problems related to the sync signal.



Tri-Level Sync

BB Sync

■Loudness Display (Applicable models: LV5600, LV7600 and LV5900)

- Variety of triggers including panel, remote, time code, and mute
- Chart function to display loudness over time
- Both absolute and relative values are reported
- Loudness measurement of ARIB / EBU / ATSC / ITU-R BS.1770
- Logging of integrated loudness values

Selectable measurement time
2min/10min/30min/1h/2h

Momentary / Short Term loudness

Long Term loudness

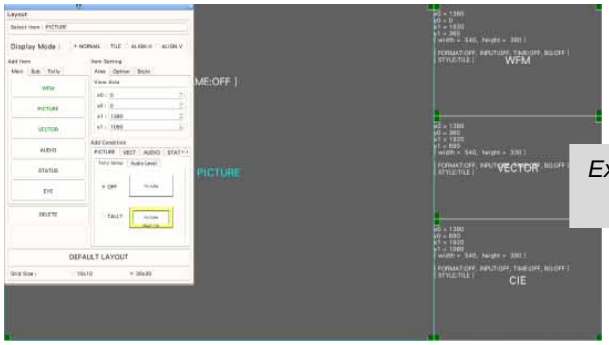
Absolute level

Relative level

Loudness display

■Custom Layout (Applicable models：Zen series, LV5900)

Using the touch screen or mouse input, multiple measurement displays can be sized and located on the screen to meet the specific needs of the user.



Ex: Waveform, Vector and CIE display added

■Customized Layout (Applicable models：LV5600 , LV7600 and LV5900)

Up to 4 channels can be displayed at the same time in the simultaneous mode, allowing for the monitoring of multiple feeds.

Enhanced layout configuration

Ex: 4 channels display and Waveform, Vector Of main channel.

Resulting layout display of 4 SDI feeds

■SR Live Metadata Display (Applicable models: all Zen series models)

This feature decodes and displays “SR Live Metadata” packets, advocated by Sony Imaging Products & Solutions Inc.

1920x1080/59.94P YCbCr(422) 10bit 3G-A SDI A TIME: 09:34:54

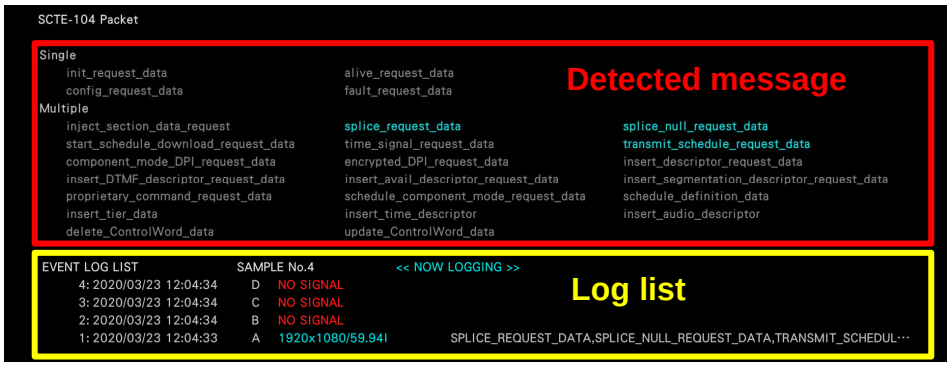
SR Live Packet

INTERFACE LINE No. 14

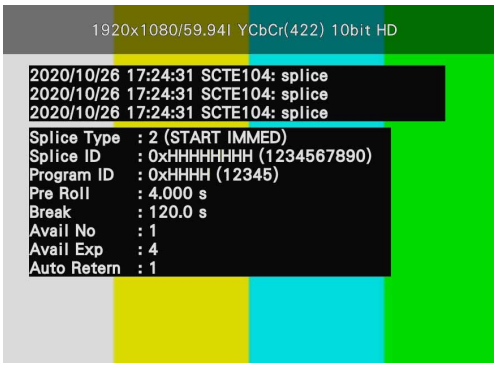
No.	ITEM	VALUE	CTRL[Abs]	No.	ITEM	VALUE	CTRL[Abs]
1	Table Version	V 1.00	++	14	Knee	OFF	OFF
2	OETF	HLG	++	15	Knee Point	96%	[-15]
3	Trasfer Matrix	BT.2020	++	16	Knee Slope	0.19	[+37]
4	Color Gamut	WIDE-BC	++	17	Knee Saturation	OFF	OFF
5	Conversion Mode	SR AIR ON	++	18	Knee Saturation Level	0.50	[+0]
6	HDR Look	Live	Live	19	Soft Knee	--	--
7	HDR Black Compression	ON	ON	20	Knee Radius	--	--
8	SDR Gain	-5.2dB	[-5.2dB]	21	SDR White Clip	ON	ON
9	Master Black	1.03%	[+4.7]	22	SDR White Clip Level	109%	[-94]
10	HDR Black Offset	Δ-0.99%	[-4.5]	23	HDR Knee	OFF	OFF
11	Gamma Table	STD 5	STD 5	24	HDR Knee Point	349%	[+0]
12	Gamma Step	0.45	0.45	25	HDR Knee Slope	0.65	[+0]
13	Gamma Level	0.95	[-12]				

SR Live Metadata display example

■ SCTE-104 analysis display (Applicable models: all Zen series models)



SCTE-104 detection screen (TEXT display)



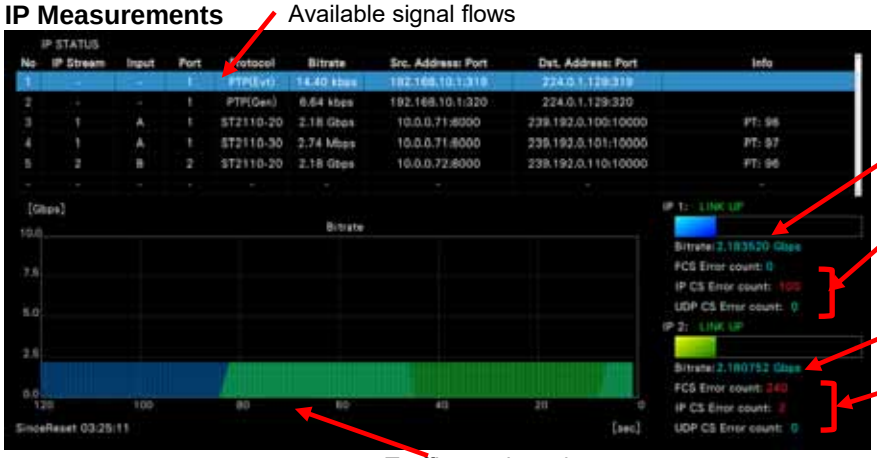
SCTE-104 message is displayed on the picture screen.

■IP Display (Applicable models：LV5600, LV7600)

Both SMPTE ST2022-6 and SMPTE 2110-20 based real-time IP transports at up to 2K image formats can be monitored. Transmission problems such as packet loss, checksum errors, as well as jitter can be monitored. Available media flows can also be identified by protocol and address. Both IP and SDI feeds can be simultaneously displayed in standard views such as waveform or picture to ensure SDI and IP operations in hybrid facilities.

IP measurement screen

IP Measurements Available signal flows



Traffic graph vs time

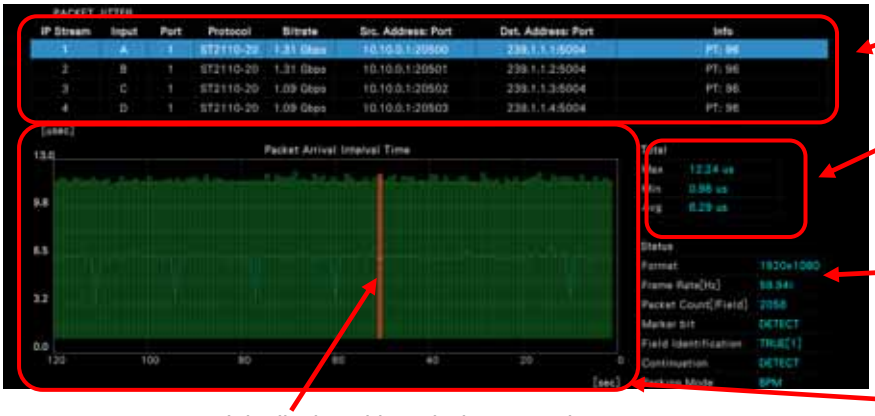
Bit rate (IP1 input)

Checksum error (IP1 input)
FCS：Frame checksum
IP CS：IP checksum
UDP CS：UDP checksum

Bit rate (IP2 input)

Checksum error (IP2 input)
FCS：Frame checksum
IP CS：IP checksum
UDP CS：UDP checksum

PACKET JITTER



Displays information about each decoded stream

Displays the maximum, minimum, and average packet arrival intervals per second

The format is displayed when ST2110 is used.

Displays the maximum, minimum, and average packet arrival intervals per second on a time graph

It is displayed in red when a packet error occurs.

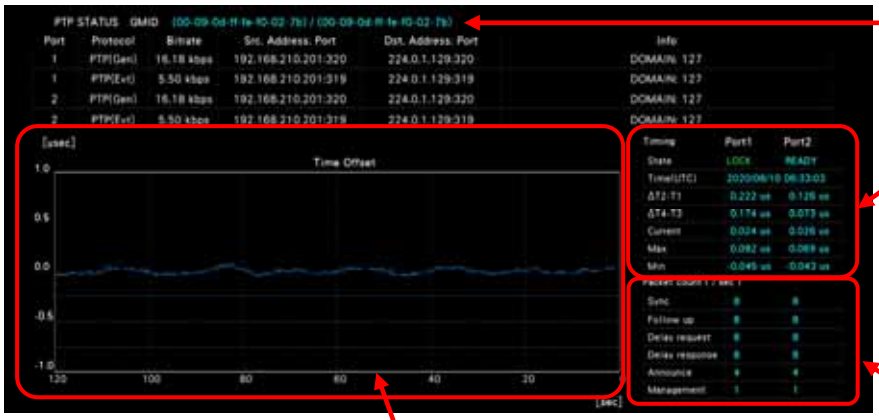
PACKET JITTER (4 streams simultaneous inputs)

You'll know immediately if there's a problem.

IP A,B and D input packet are fine.

IP C input has packet failure.

PTP STATUS



The GMID of the PTP master is displayed

Displays the PTP lock state, time information (UTC), and the maximum, minimum, and measured time difference values per second

Displays the number of PTP messages per second

Displays the time difference per second on a time-lapse graph

PTP and RTP timing measurements

Video timing relative to PTP

Audio timing relative to PTP

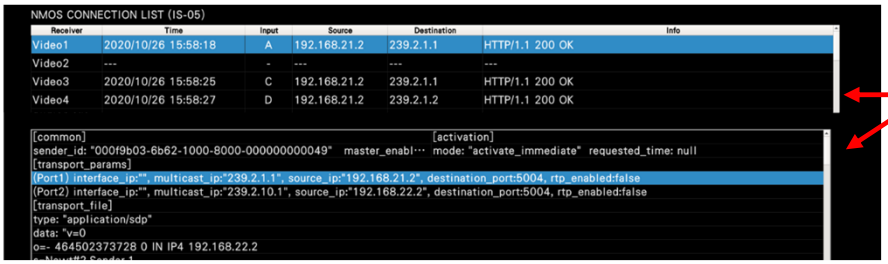
Ancillary timing relative to PTP

Graph display of PTP and each phase

PTP time information and timestamps can be compared to verify whether video, audio, and ANC signals are synchronized to PTP.

Displaying the NMOS Screen

NMOS CONNECTION LIST (IS-04) screen



The lower half of the screen is displayed the requests received by the receiver selected on the upper half of the screen.

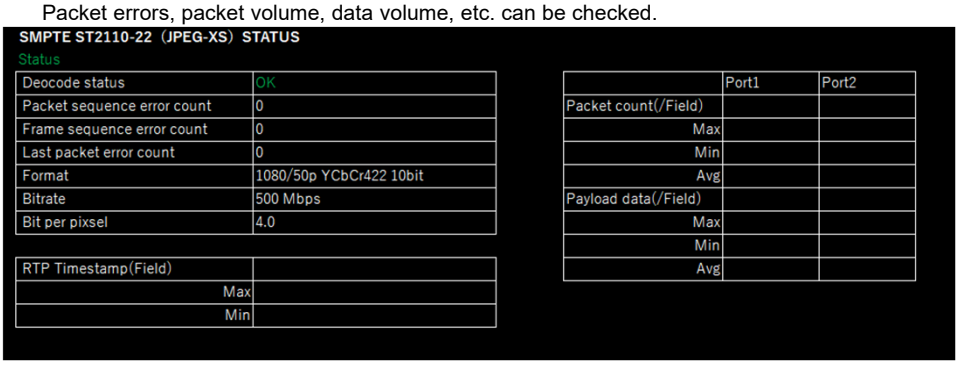
NMOS REGISTRATION LIST (IS-04) screen

The RDS server information

Displayed the progress up to RDS detection

JPEG-XS status display

You can check the decoding status of data received by JPEG-XS.
Packet errors, packet volume, data volume, etc. can be checked.



Deocode status	OK
Packet sequence error count	0
Frame sequence error count	0
Last packet error count	0
Format	1080/50p YCbCr422 10bit
Bitrate	500 Mbps
Bit per pixsel	4.0

RTP Timestamp(Field)	
Max	
Min	

	Port1	Port2
Packet count(/Field)		
Max		
Min		
Avg		
Payload data(/Field)		
Max		
Min		
Avg		

JPEG-XS Packet Analysis Function

Analyzes the header of JPEG-XS packets and displays the contents of the VideoSupportBox and ColourSpecificationBox.

SMPTE ST2110-22 (JPEG-XS) PACKET HEADER ANALYSIS

Payload Header

Transmission mode (T):	Sequential
Packetization mode (K):	Codestream packetization
Last packet (L):	TRUE
Interlaced (I):	Progressive (0)
Frame counter:	25
Slice counter:	0
Packet counter:	0
First packet of frame (helper):	TRUE

Video Support Box

Box length (LBox):	42
Box type (TBox):	jpvs

Video Information Box

Box length (LBox):	22
Box type (TBox):	jpvi
Bit Rate (brat):	995
Frame Rate (frat):	0x01000032
Framerate_Numerator	
Decoded frame Rate (fps):	50

Specified product specifications are subject to change without notice.

JPEG-XS Format Comparison Display

Displays a comparison of the format information sent in SDP, ST2110-40 (Payload ID), and ST2110-22 (JPEG-XS) respectively.
Items that are different in comparison are highlighted.

VIDEO FORMAT COMPARISON

	auto	SDP	ST2110-40	ST2110-22 (JPEG-XS)
Image :	1920 x 1080	1920 x 1080	1920 x 1080	1920 x 1080
Frame Rate :	59.94	59.94	59.94	59.94
i/p/PsF	interlace	interlace	interlace	interlace
Sampling Structure :	—	4 : 2 : 2	4 : 2 : 2	4 : 2 : 2
Color :	—	YCbCr	YCbCr	YCbCr
Bit Depth :	—	10	10	10
HDR / SDR :	—	SDR	SDR	-
Colorimetry :	—	BT709	BT709	-

Specified product specifications are subject to change without notice.

LVB440 IP ANALYZER

Ultimate IP Analysis and Monitoring

Supports 4K uncompressed

8K 4K HD SD
ST2110 ST2022-6 IP-TSG
Dual 60G Dual 40G Single 80G

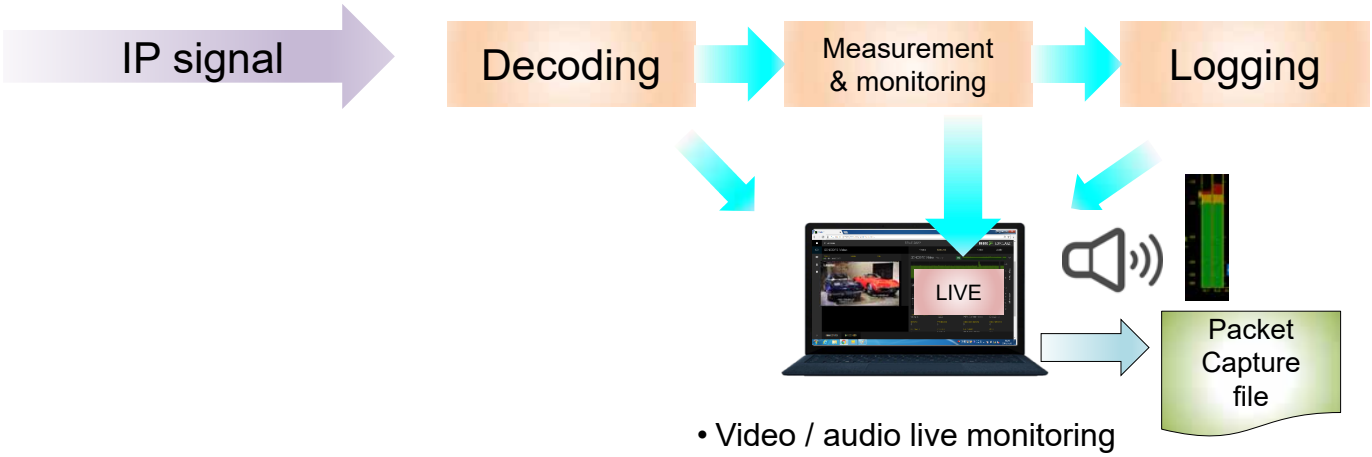
The LVB440 dual 40 gigabit Ethernet IP probe monitors high-bitrate IP broadcast media traffic from outside production studios, broadcasting networks, and master control centers, enabling quick troubleshooting and quality assurance. The LVB440 supports both ST2110-20 and ST2022-6 uncompressed and ST2110-22 JPEG-XS compression with dual 40 gigabit bit rate inputs, delivering a real-time analysis solution for broadcast stations and network operators handling large numbers of streams. Uncompressed video and audio packets can be analyzed with microsecond accuracy. Up to eight clients can simultaneously view analysis data on standard Web browsers or the optional aluminum kit.

- 10, 25, 40, 50 and 100 gigabit on dual interfaces.
- Simultaneous analysis of multiple 4K, 3G, HD, and SD IP streams.
- Supports uncompressed 4K/3G/HD/SD and compression(JPEG-XS) 4K/3G/HD.
- Continuously surveys all layers of media transport on an IP network and allows quick identification of potential problems.
- Maximizes Quality of Service (QoS).
- Provides remote monitoring via browser with support of up to eight simultaneous users.
- Outputs ST2110-20/30/40 compatible IP signals

Options

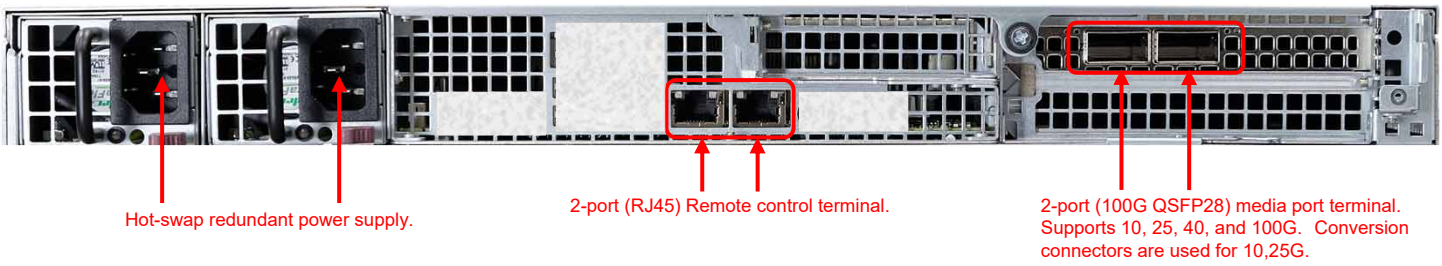
Model number	Product name	Function
LVB440-SER21	40Gbps-OPT	40Gbps can be added to support up to 60Gbps for dual and 80Gbps for single.
LVB440-SER22	JPEGXS-OPT	JPEG-XS decoding option. Can be evaluated using vector and image display.
LVB440-SER23	GEN5-OPT	Outputs ST2110-20/30/40 compatible IP signals. ST2110-20 compatible formats are 4K and HD.
LVB-SW3	Software Maintenance	3-year software maintenance and version upgrade support
LVB-SW5	Software Maintenance	5-year software maintenance and version upgrade support

■Basic operation



• Video / audio live monitoring
• IP measurement and long-term monitoring logging

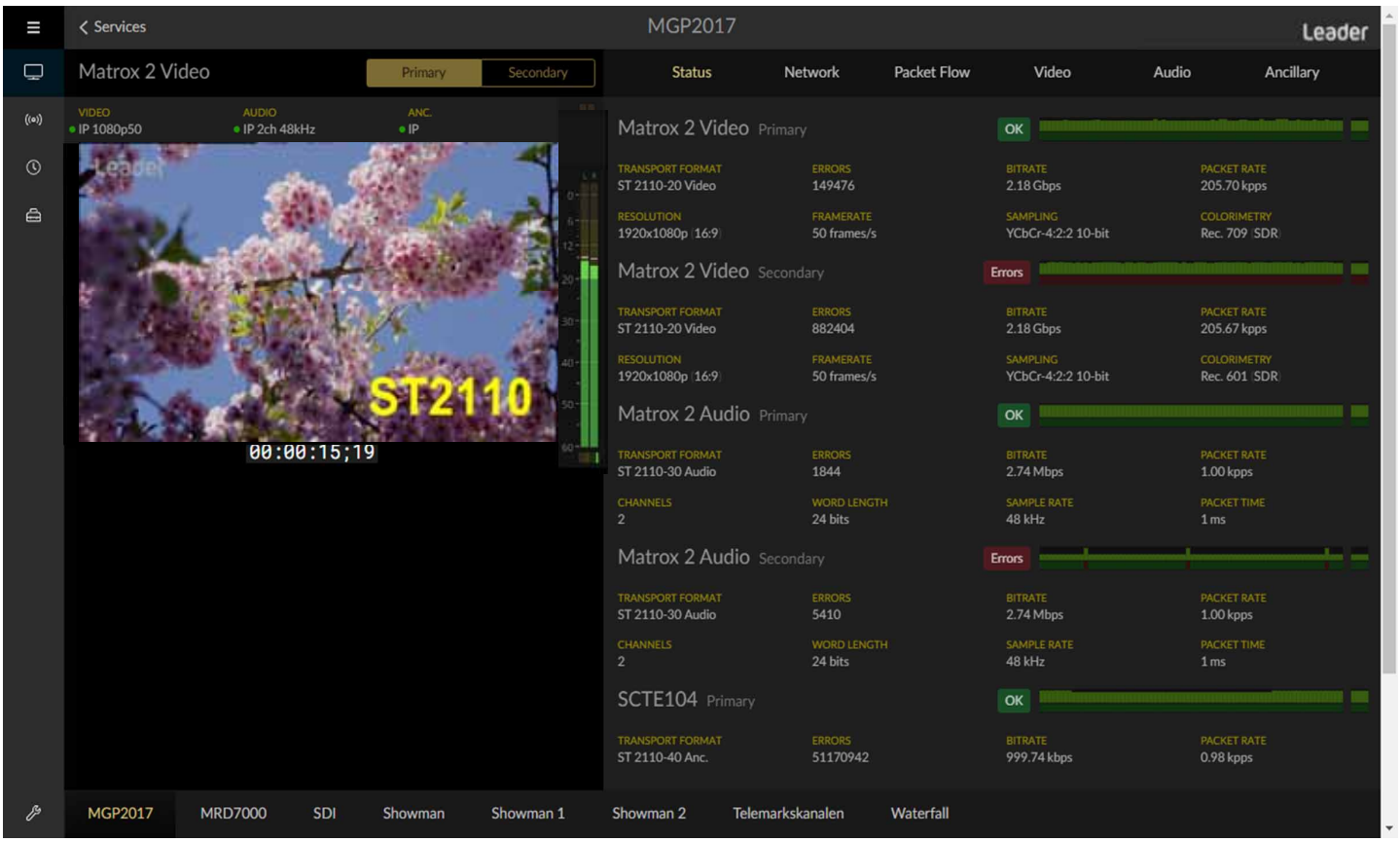
■ LVB440 REAR PANEL



Technical Information

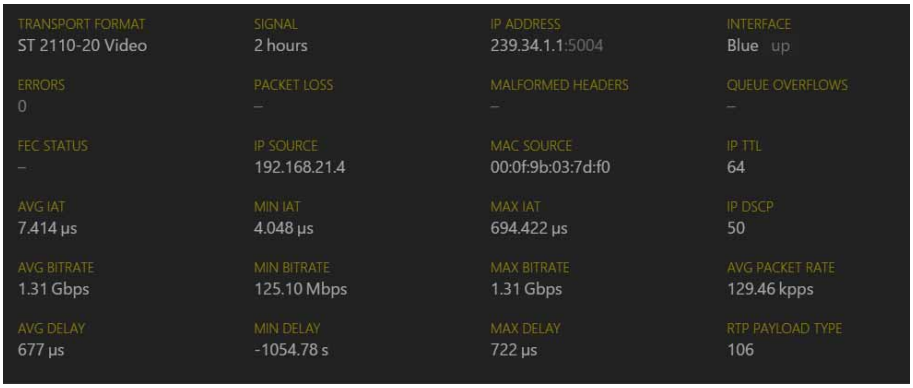
■Status confirmation screen

Video format, error count, bit rate, packet rate, angle of view, frame rate, color system support standard, audio bar, and time code can be checked.



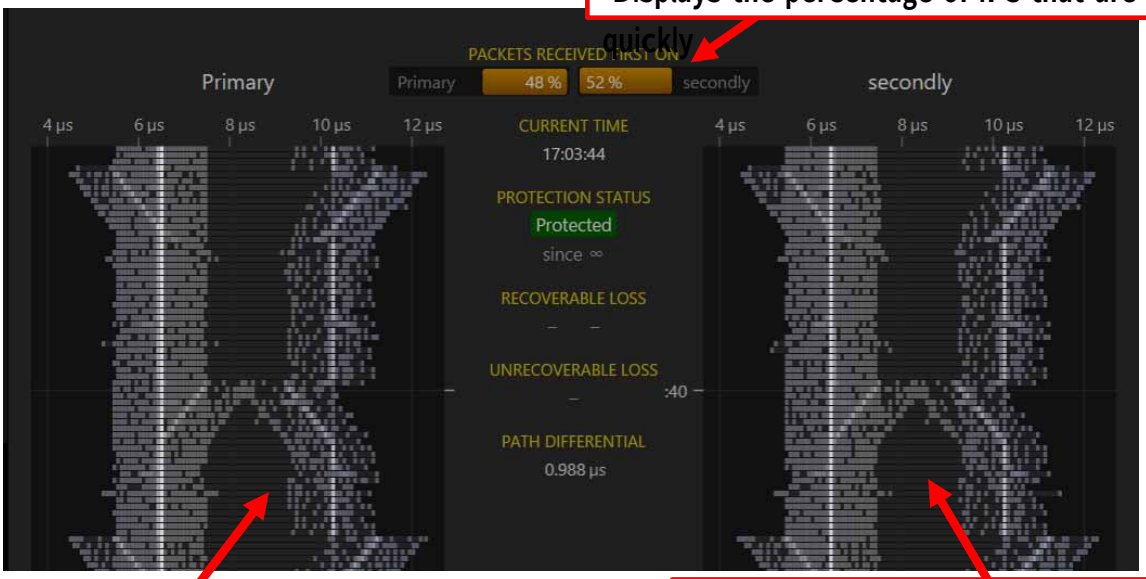
■Network Flows Screen

Network flows screen can see Transport format ,Signal availability time ,IP address ,Interface (Amber or Blue) ,Number of errors ,Packet loss count ,Malformed headers ,Queue overflows ,FEC status ,IP source address ,IP source MAC address ,IP TTL ,Average IAT ,Minimum IAT ,Maximum IAT ,IP DSCP ,Average bitrate ,Minimum bitrate ,Maximum bitrate ,Average packet rate ,Average delay ,Minimum delay ,Maximum delay and RTP payload type.



■PAI Measurement

Supports measurement of packet arrival interval time (PAI) of IP signals and ratio of redundant signals



Displays the percentage of IPs that are reached quickly

Display Packet arrival interval of Primary

Display Packet arrival interval of Secondary

■Timing measurement

By comparing the time information and timestamp of the PTP, video, audio, and ANC signals are synchronized with the PTP by comparing the time information and timestamps of the PTP. Timing measurement can check Path delay , RTP Align offset , RTP frequency offset , First packet time and FPT margin. Virtual Receive Buffer can check VRX , VRX underflow and VRX overflow. Network Burstiness can check C and C overflow.

■Maximum Streams

The number of measurement/monitoring streams can be input up to the maximum bandwidth. For example, the ST2110-20, 1920X1080 59.94I, has a transmission rate of 1.31Gbps per stream.With two SFP ports, the standard specification allows up to 30 streams per port; with the optional addition of two SFP ports, up to 45 streams per port; and with one SFP port, up to 61 streams can be measured and monitored simultaneously. Translated with www.DeepL.com/Translator (free version)

ST2110-20

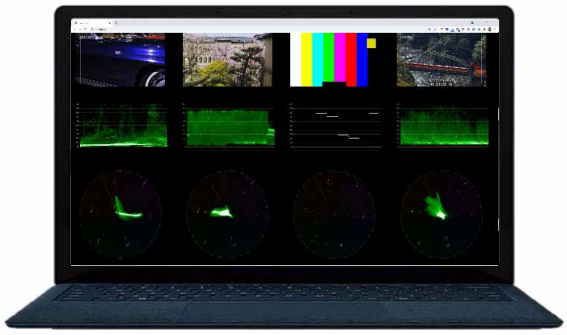
Format	Frame Rate	Stream Gbps	Standard 2 SFP (40GbpsX2)	+OP G40 2 SFP (60GbpsX2)	+OP 40G 1 SFP (80GbpsX1)
3840X2160	59.94P	10.4	3	5	7
3840X2160	50.00P	8.71	4	6	9
1920X1080	59.94P	2.61	15	22	30
1920X1080	50.00P	2.18	18	27	36
1920X1080	59.94I	1.31	30	45	61
1920X1080	50.00I	1.09	36	55	73
1280X720	59.94P	1.16	34	51	68
1280X720	50.00P	0.86	46	69	93

ST2022-6

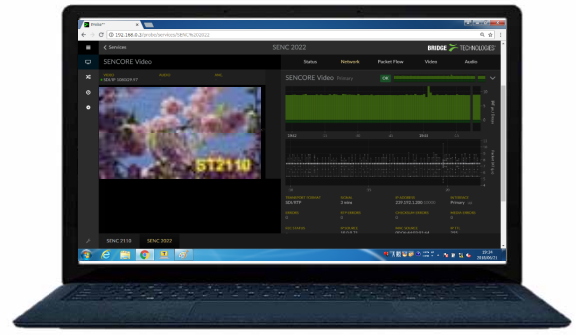
Format	Frame Rate	Stream Gbps	Standard 2 SFP (40GbpsX2)	+OP G40 2 SFP (60GbpsX2)	+OP 40G 1 SFP (80GbpsX1)
1920X1080	59.94I	1.55	25	38	51
1920X1080	50.00I	1.55	25	38	51
1920X1080	59.94P	3.1	12	19	25
1920X1080	50.00P	3.1	12	19	25

■Multi-display with Widglets function

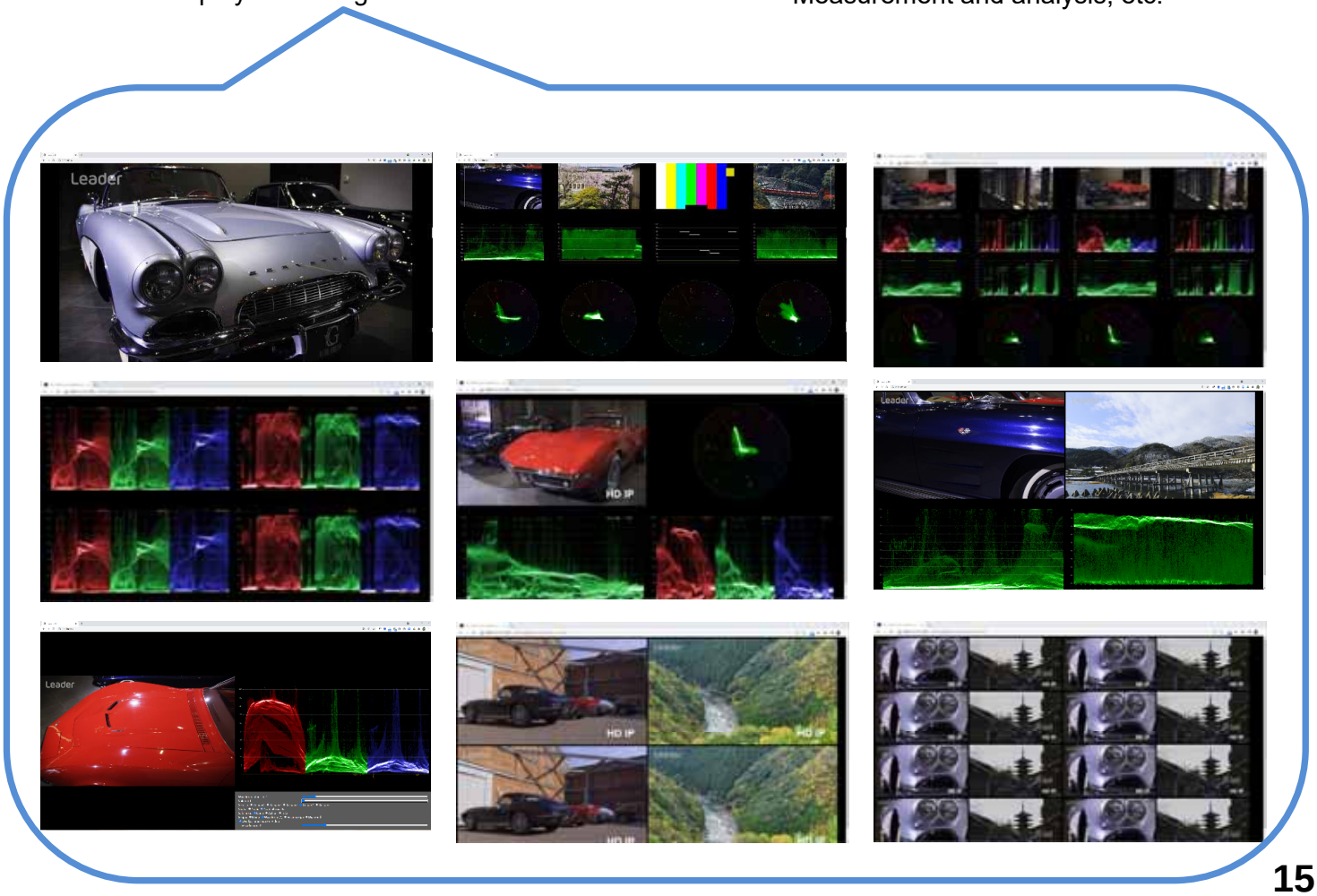
By creating HTML5, you can freely create screen layouts.



Multi-display with Widglets function.



Measurement and analysis, etc.



LT4610
Sync Generator

8K | 4K | 12GSDI | 3GSDI | HDSDI | SDSDI | BB | LTC | PTP | GPS

Multiple outputs, GPS, Timecode, Dual power supply

The LT4610 is a sync generator capable of generating triple-rate SDI (3G-SDI / HD-SDI / SD-SDI) signals. This generator features dual redundant power supplies for maximum reliability. Its SDI, 6 analog black sync, and audio word clock signal output can be synchronized. Furthermore, the genlock function has the STAY IN SYNC function that holds phase when an abnormality occurs in the input signal, making it possible to build a highly stable system.

Dimensions (WHD mm):
482x44x400 (1U size type)

■Option sold separately

Model number	Model name
LT4610SER01	GPS/TC
LT4610SER02	12G-SDI
LT4610SER03	PTP
LT4610SER04	GPS/BDS/TC
LT4610SER24	8K

*LT4610SER24 is a software option to add 12G-SDI 8K output to LT4610SER02.

LT4611
Sync Generator

8K | 4K | 12GSDI | 3GSDI | HDSDI | SDSDI | BB | LTC | PTP | GPS

Flexible Sync Generator, Dual power supply

LT4611 also offers a redundant power supply design for reliability. Standard features include the genlock function, 3 line analog black sync signal output, and audio word clock signal output. Other functions can be added to this sync generator as options, allowing the unit to have the flexibility to match the features of the LT4610 as needed.

Dimensions (WHD mm):
482x44x400 (1U size type)

■Option sold separately

Model number	Model name
LT4610SER01	GPS/TC
LT4610SER02	12G-SDI
LT4610SER03	PTP
LT4610SER04	GPS/BDS/TC
LT4611SER21	SYNC 3 OUT ADD
LT4611SER22	SDI OUTPUT
LT4611SER23	AUDIO OUTPUT
LT4611SER24	8K

*LT4610SER24 is a software option to add 12G-SDI 8K output to LT4610SER02.

LT4600A
Multi Format Video Generator

3GSDI | HDSDI | SDSDI | BB

Compact, 1U half rack size supports triple-rate SDI

The LT 4600A multi-format video generator is a compact, 1U half-rack size SDI video signal generator that supports the triple-rate SDI (3G-SDI/HD-SDI/SD-SDI) format. In addition to test pattern output including color bars and SDI check fields, the LT 4600A is equipped with numerous other features such as ID characters, QVGA logo marks, safety area markers, audio embedding, genlock for external reference input signals, and three analog black signal outputs.

LT4448
Changeover

3GSDI | HDSDI | SDSDI | BB | LTC

For LT4670 / LT4610 / LT4611 / LT4600A LTC capable

The LT4448 is equipped with 11 inputs / outputs, (PRIMARY, BACKUP, OUTPUT), plus LTC, and utilizes 2 input switching relays and 9 electronic switches. SDI, NTSC / PAL black burst, HD Tri-level Sync, AES / EBU digital audio, word clock, and LTC signals are supported. Faults are easily identified on the LED panel. The power supply is duplexed, with alarm notification of faults, and SNMP is also supported. Designed to be used in combination with LT4670, LT4610, LT4611 and LT4600A.

Dimensions (WHD mm): 426x44x400 (1U size type)

LT4670 NEW
Sync Generator

4K | 3GSDI | HDSDI | SDSDI | BB | LTC | PTP | GPS

Multiple outputs, GPS, Timecode, Hot Swap Dual power supply

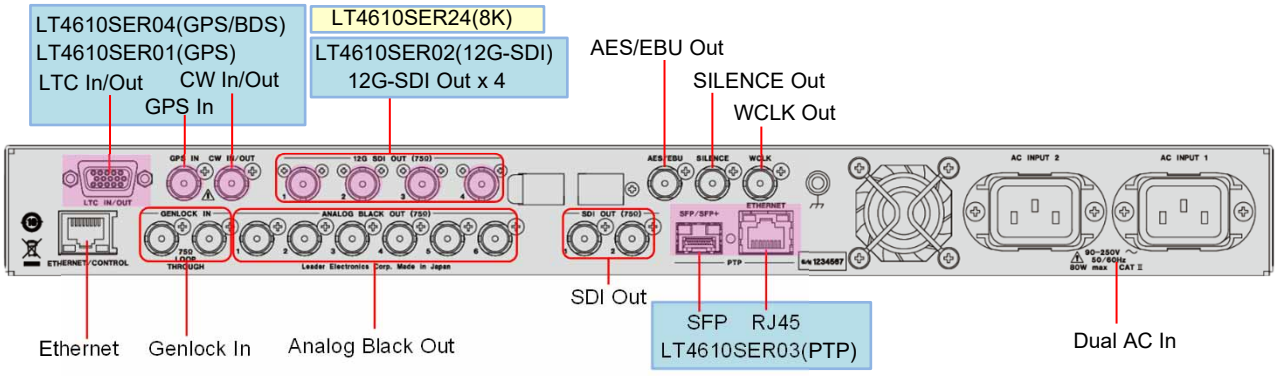
The LT4670 is a sync generator This generator features hot swap dual redundant power supplies for maximum reliability. Its 6 analog black sync, and audio word clock signal output can be synchronized. Furthermore, the genlock function has the STAY IN SYNC function that holds phase when an abnormality occurs in the input signal, making it possible to build a highly stable system. By option capable of generating SDI (4K / 3G-SDI / HD-SDI / SD-SDI) signals, GPS and PTP.

Combination of LT4610 and LT4448

Combination of LT4600A and LT4448

GENERATOR REAR PANEL

●LT4610 SYNC GENERATOR



Connectors are NOT mounted, in case of no options

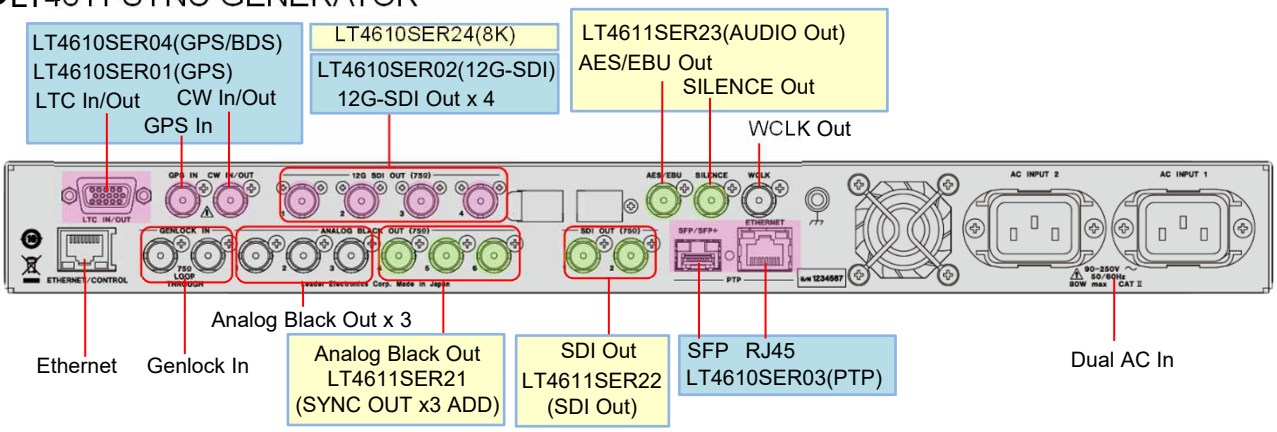
Common Options (Hardware)

- LT4610-SER01 GPS/TC
- LT4610-SER02 12G-SDI (4K)
- LT4610-SER03 PTP
- LT4610-SER04 GPS/BDS/TC

LT4610 Option (Software license)

- LT4610-SER24 12G-SDI (8K)

●LT4611 SYNC GENERATOR



Connectors are NOT mounted, in case of no options

BNC connectors are mounted, but no signal output in case of no options

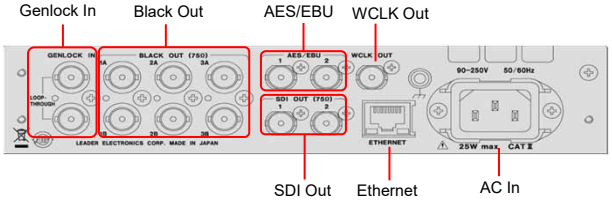
Common Options (Hardware)

- LT4610-SER01 GPS/TC
- LT4610-SER02 12G-SDI (4K)
- LT4610-SER03 PTP
- LT4610-SER04 GPS/BDS/TC

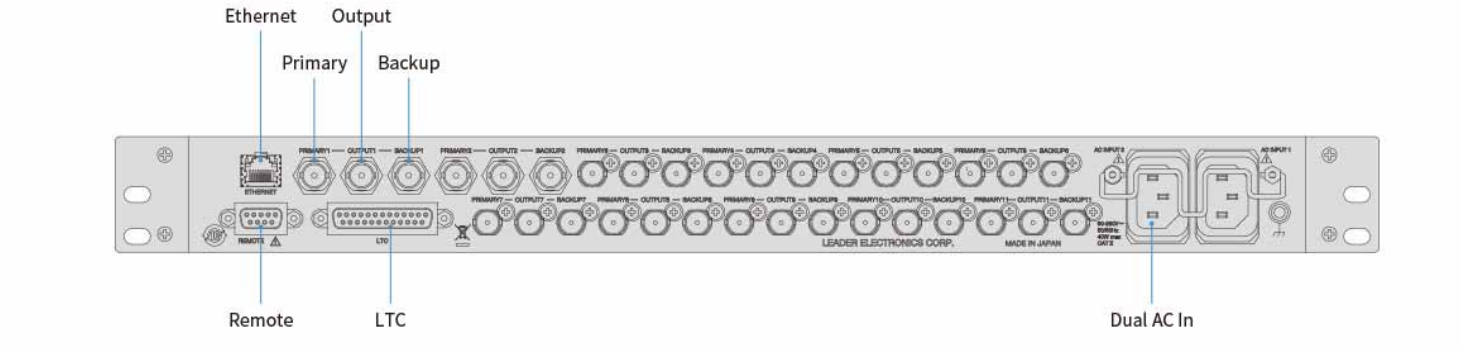
LT4611 Option (Software license)

- LT4611-SER21 SYNC 3 OUT ADD
- LT4611-SER22 SDI OUTPUTS
- LT4611-SER23 AUDIO OUTPUTS
- LT4611-SER24 12G-SDI (8K)

●LT4600A MULTI FORMAT VIDEO GENERATOR

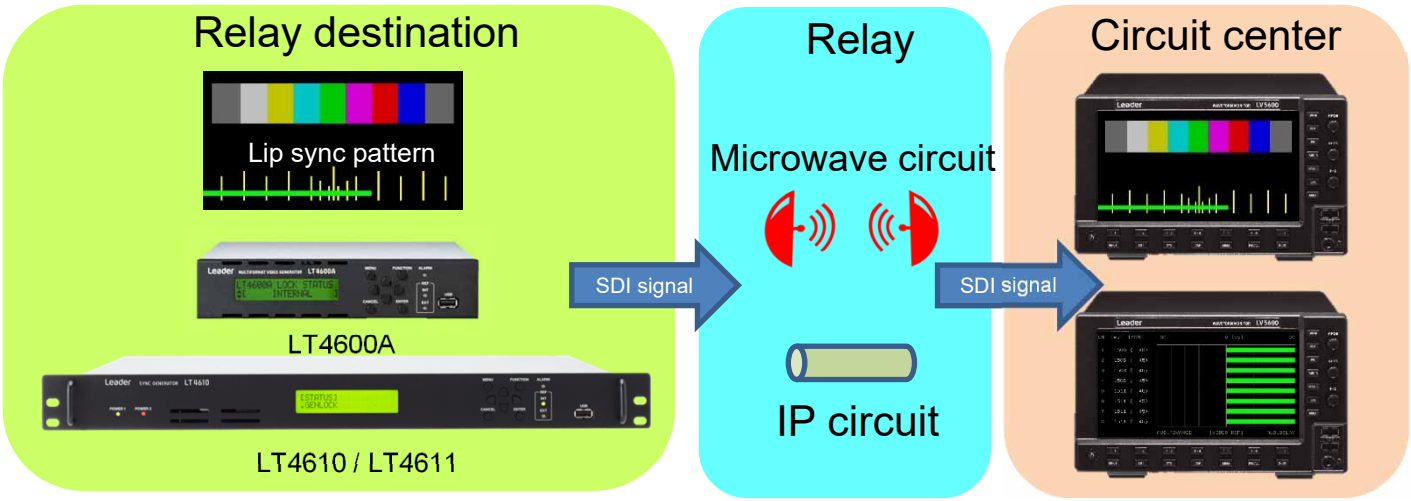


●LT4448 CHANGE OVER



Technical Information

■Lip Sync (Applicable models: LV5900, Zen series, LT4610, LT4611 and LT4600A)

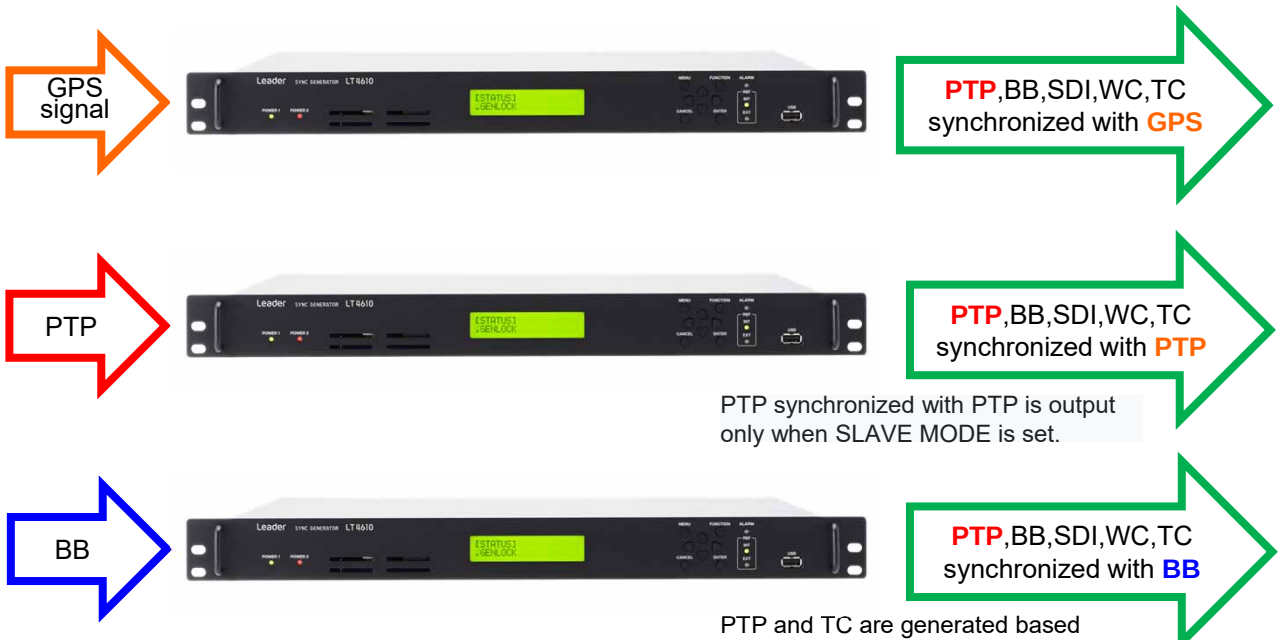


- Measures the time difference between audio and video signals.
- Can measure video and audio delays in microwave circuits and IP circuits during relay.
- Fluctuations in IP lines and the like are easy to identify.
- Measurement resolution: 1 ms
- Measurement system requirements

  Measurement system consisting of LV5600-SER03/LV7600-SER03 (DIGITAL/ANALOG AUDIO) installed in the LV5600/LV7600 or the LV5300-SER20/LV5350-SER20/LV7300-SER20 (AUDIO) installed in the LV5300A/LV5350/LV7300 and combined with the LT4610/LT4611 or LT4600A.

■PTP Function (Applicable models：LT4610, LT4611)

PTP is a time synchronization protocol as defined in IEEE1588. Messages are exchanged in time-stamped IP packets between master clocks, slaves, and other timed devices in order to accurately determine time throughout the network.



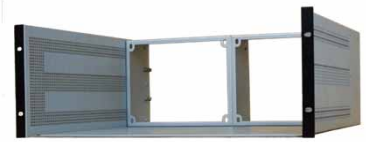
Accessories

LR2561 RACK-MOUNT ADAPTER
LR2561 is a rack mount adapter that allows two LV5600s to be mounted side by side or an LV5600 and LV5350 or LV5300A to be mounted side by side in an EIA 19-inch rack.
Applicable model: LV5600

LC2566 BLANK PANEL
The LC2566 is a blank panel for the LR2561 rack mount adapter.
Use it when installing a single LV5600 waveform monitor in the LR2561.
Applicable model : LV5600

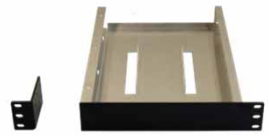
LR2530 RACK-MOUNT ADAPTER
Two waveform monitors can be mounted side by side on a 19-inch EIA standard rack.
Applicable model: LV5300A, LV5350

LC2535 BLANK PANEL
For use with a single waveform monitor and LR2530.
Applicable model: LV5300A, LV5350



LR2490 Rack Mount Adapter
The LR2490 is a dual rack mount adapter used to install LV5900 waveform monitors into a 19-inch EIA standard rack.
It allows two LV5900s to be installed side by side.
Applicable model: LV5900

LC2190 Blank Panel
The LC2190 is a blank panel for the LR2490 rack mount adapter. It can be used when installing a single LV5900 waveform monitor into the LR2490.
Applicable model: LV5900



LR2731 RACK-MOUNT ADAPTER
One rasterizer can be mounted on a 19-inch EIA standard rack with a blank panel on another side.
Applicable model: LV7300

LR2732 RACK-MOUNT ADAPTER
Two rasterizers can be mounted side by side on a 19-inch EIA standard rack.
Applicable model: LV7300

LR2478 Rack Mount Adapter
The LR2478 is a dual rack mount adapter used to install Leader's 1RU half-rack size products into a 19-inch EIA standard rack. It allows two units to be installed side by side.
Applicable model: LT4600A

LR2481 Rack Mount Adapter
The LR2481 is a rack mount adapter used to install a Leader 1RU half-rack size product into a 19-inch EIA standard rack. One side is a blank panel.
Applicable model: LT4600A

GST90A12 AC ADAPTER
AC adapter and AC cord for applicable models.
Sold separately except for LV7300.
Applicable model:
LV5300A/LV5350/LV7300

LC2141 SFP TRANSCEIVER RJ-45
1000BASE-T
Applicable model: LT4610-SER03

LC2148 SFP+ MULTI-MODE
850nm, 10GBASE-SR/SW
Maximum distance：300m
Applicable model: LV5600-SER05,SER06
LV7600-SER05,SER06
LT4610-SER03

LC2149 SFP+ SINGLE-MODE
Function: 1310nm, 10GBASE-LR/LW
Maximum distance：10,000m
Applicable model: LV5600-SER05,SER06
LV7600-SER05,SER06
LT4610-SER03

LC2151 SFP28 MULTI-MODE
Function: 850 nm, 25GBASE-SR
Long-distance: 70 m max. (OM3),
100 m max. (OM4)
Applicable model: LV5600-SER06
LV7600-SER06

LC2152 SFP28 SINGLE-MODE
Function: 1310 nm, 25GBASE-LR
Long-distance: 10, 000 m max.
Applicable model: LV5600-SER06
LV7600-SER06

LC2183 LTC CABLE
Conversion cable consists of 1 (one) 25 pin D-sub LTC connector and 2 (two) 15 pin D-sub LTC connector for PRIMARY/ BACKUP, and 3 (three) XLR connectors for LTC output (1.5m)
Applicable model: LT4448

AU-217 ANTENNA
Connector : TNC (F)
Frequency band : 1575～1606 MHz
Impedance : 50Ω
Applicable model : LT4610-SER01,SER04

Accessories List

PRODUCT NAME	MODEL	APPLICABLE MODEL	REMARKS
RACK-MOUNT ADAPTER	LR2490	LV5900	Two waveform monitors can be mounted side by side in a 4U space on a 19-inch EIA rack
RACK-MOUNT ADAPTER	LR2561	LV5600	Two units can be mounted side by side in a 3U space on a 19-inch EIA rack
RACK-MOUNT ADAPTER	LR2530	LV5300A / LV5350	Two units can be mounted side by side in a 3U space on a 19-inch EIA rack
RACK-MOUNT ADAPTER	LR2731	LV7300	One rasterizer can be mounted in a 1U space on a 19-inch EIA rack. Same rack used for Left or Right mount.
RACK-MOUNT ADAPTER	LR2732	LV7300	Two rasterizers can be mounted side by side in a 1U space on a 19-inch EIA rack
RACK-MOUNT ADAPTER	LR2478	LT4600A	Two units can be mounted side by side in a 1U space on a 19-inch EIA rack
RACK-MOUNT ADAPTER	LR2481	LT4600A	One units can be mounted in a 1U space on a 19-inch EIA rack. Same rack used for Left or Right mount.
BLANK PANEL	LC2190	LV5900	
BLANK PANEL	LC2566	LV5600	
BLANK PANEL	LC2535	LV5300A / LV5350	
SFP TRANSCEIVER RJ-45	LC2141	LT4610-SER03	1000BASE-T
SFP+ MULTI-MODE	LC2148	LV5600-SER05,SER06 / LV7600-SER05,SER06 / LT4610-SER03	10GE, 850nm, 10GBASE-SR/SW
SFP+ SINGLE-MODE	LC2149	LV5600-SER05,SER06 / LV7600-SER05,SER06 / LT4610-SER03	10GE, 1310nm, 10GBASE-LR/LW
SFP28 MULTI-MODE	LC2151	LV5600-SER06 / LV7600-SER06	25GE, 850nm, 25GBASE-SR
SFP28 SINGLE-MODE	LC2152	LV5600-SER06 / LV7600-SER06	25GE, 1310nm, 25GBASE-LR
AC ADAPTER	GST90A12	LV5300A / LV5350 / LV7300	Separately sold : LV5300A/LV5350, Included with LV7300
GPS/GNSS ANTENNA	AU-217	LT4610-SER01	High noise resistance and waterproof performance.
LTC CABLE	LC2183	LT4448	Conversion cable consists of 1(one) 25 pin D-sub LTC connector and 2 (two) 15 pin D-sub LTC connector for PRIMARY/BACKUP, and 3 (three) XLR connectors for LTC output (1.5m)

PHABRIX Qx Series

We launched the Qx, an industry-leading rasterizer for 4K/UHD, HDR/WCG and SDI/IP test and measurement workflows, offering our loyal 3G-SDI customers an important stepping stone into the wide plethora of standards available today. The rapid development of the Qx Series over the past few years now sees it offer advanced toolsets for hybrid IP/SDI support using 4K/UHD (12G/6G/3G-SDI) and HD-SDI plus SMPTE 2022-6 and 2110 plus 2022-7 analysis and monitoring, along with comprehensive HDR/WCG analysis and 12G-SDI physical layer analysis toolset. All three product ranges are in continued development cycles and going from strength to strength. All three product ranges can be found in almost every major broadcaster and video manufacturing and product development team worldwide.

QxP

PHABRIX 2K/4K/IP INPUT WAVEFORM MONITOR

25G-IP | 10G-IP | PTP | NMOS | IP-TSG | 4K
12GSDI | 6GSDI | 3GSDI | HDSDI | SDI-TSG | EYE | Stress

Display Size：7 inches
Dimensions（WHD mm）：
211x132x305
Weight : 4.1kg (Excl. Battery)

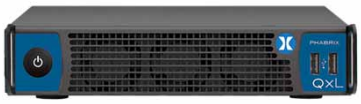
NEW

QxL

PHABRIX 2K/4K/IP INPUT RASTERIZER

25G-IP | 10G-IP | PTP | NMOS | IP-TSG | 4K
12GSDI | 6GSDI | 3GSDI | HDSDI | SDI-TSG | EYE | Stress

Dimensions（WHD mm）：253 x 44 x 211
（1/2U Rack size）
Power supply：DC10V～DC18V



Qx

PHABRIX 2K/4K/IP INPUT RASTERIZER

10G-IP | PTP | NMOS | IP-TSG | 4K
12GSDI | 6GSDI | 3GSDI | HDSDI | SDI-TSG | EYE | Stress

EYE Pattern
Display Size：7 inches
Dimensions (WHD mm) :253 x 44 x 211
（1/2U Rack size）
Power supply：DC10V～DC18V

Formats supported

- IP SMPTE 2110/2022-7 over 10G IP
- IP SMPTE 2022-6 over 10G IP
- IP SMPTE 2110/2022-7/2022-6 over 25G IP (QxL Only)
- 3G/1.5G-SDI
- 12G/6G/3G/1.5G-SDI UHD
- UHD over 25G IP (QxL Only)

ST2110 analysis

- ST 2110 analysis and debugging tools to support engineers
- Simultaneously measures the packet timing interval of up to four IPs
- Measures ST2110-21 network compatibility model (Cinst) and virtual receiver buffer model (VRX)
- Timing measurement of video, audio, ANC, and PTP

ST2110 and ST2022-6 monitoring

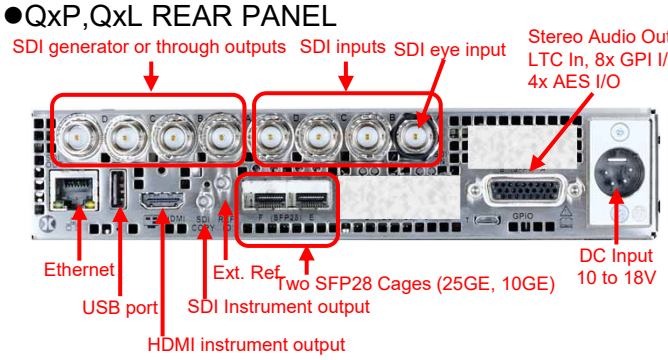
- Monitoring of redundancy, video, audio, and ancillary data
- SIPS and PTP status report
- ST2110-30 Class C (80 channel max. at 125 us)
- NMOS ready

SDI stress tool

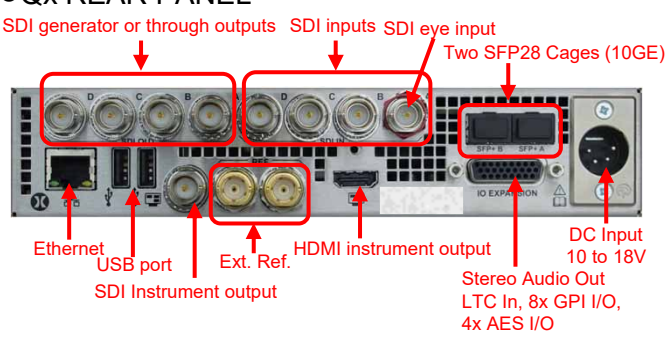
Unmatched ability to test the performance of equipment or designs, with the ability to customize test signals with

- Control of jitter insertion frequency and amplitude
- SDI scrambler and sync bit Insertion on/off
- SDI Bit Error (BER) insertion tool
- Control of SDI driver amplitude +/-15%
- Control of pre-emphasis, rise/fall time
- Generation of PRBS-7, 9, 15, 23, 31
- Reported cumulative errors
- Pathological signal detector

●QxP,QxL REAR PANEL



●Qx REAR PANEL



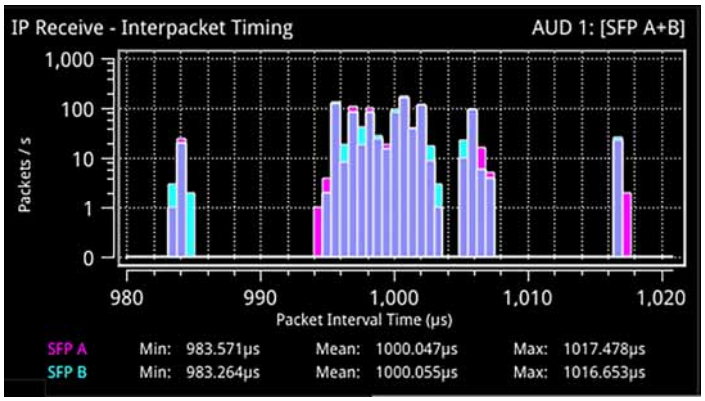
Base Units

Unit	Model #	Description
QxP Chassis V Mount	PHQXP-V	QxP 3U HD/2K 10G IP Waveform Monitor
	PHQXP01-3G-V	QxP 3U HD/2K 10G IP/SDI Waveform Monitor
	PHQXP01E-3G-V	QxP 3U HD/2K 10G IP/SDI Waveform Monitor with Eye & Jitter
QxP Chassis G Mount (QR Gold Mount)	PHQXP-G	QxP 3U HD/2K 10G IP Waveform Monitor
	PHQXP01-3G-G	QxP 3U HD/2K 10G IP/SDI Waveform Monitor
	PHQXP01E-3G-G	QxP 3U HD/2K 10G IP/SDI Waveform Monitor with Eye & Jitter
QxL Chassis	PHQXL	QxL 1U ½ rack HD/2K 10G IP Rasterizer
	PHQXL01-3G	QxL 1U ½ rack HD/2K 10G IP/SDI Rasterizer
	PHQXL01E-3G	QxL 1U ½ rack HD/2K 10G IP/SDI Rasterizer with Eye & Jitter
Qx Chassis	PHQX01-3G	Qx 1U ½ rack HD/2K SDI Rasterizer
	PHQX01E-3G	Qx 1U ½ rack HD/2K SDI Rasterizer with Eye & Jitter

Options / Accessories / Warranty

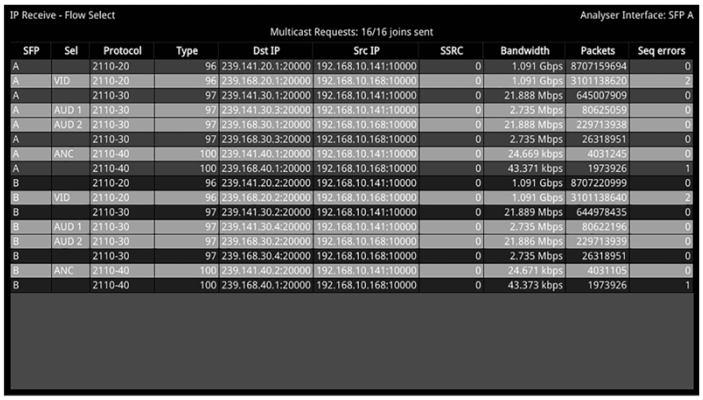
QxP	QxL	Qx	
Model #			Description
Subject: Hardware Option			
PHQXPM-01	PHQXLM-01		SDI I/O return to factory upgrade (requires PHQXP or PHQXL for each model)
PHQXPM-01E	PHQXLM-01E	PHQXM-01E	SDI I/O Eye/Jitter, return to factory upgrade (requires PHQXP01-3G or PHQXL01-3G or PHQX01-3G)
Subject : SDI Option			
		PHQXO-UHD	SDI 2K Extended + UHD/4K, 4xHD/6G/4x3G/2x6G/12G-SDI
PHQXPO-SDI-STRESS	PHQXLO-SDI-STRESS	PHQXO-SDI-STRESS	SDI Stress Test Tool Set (requires PHQX01E3G, PHQXO-UHD, PHQXO-GEN)
PHSFP-RT12-1310	PHSFP-RT12-1310	PHSFP-RT12-1310	SFP+ optical SDI Transceiver 12G/6G/3G/HD-SDI Single mode LC (10km), Non-MSA, Tx 1310nm, Rx 1260-1620nm
Subject : SDI/IP Software Option			
PHQXPO-DOLBY	PHQXLO-DOLBY	PHQXO-DOLBY	Dolby E Decode, Analyzer
PHQXPO-GEN	PHQXLO-GEN	PHQXO-GEN	SDI/IP AV Test Signal Generator (SDI, ST 2022-6, ST 2110) QxP:SDI requires PHQXP01-3G or PHQXP01E-3G. QxL:SDI requires PHQXL01-3G or PHQXL01E-3G, Qx : 2022-6 requires PHQXO-IP-STND)
PHQXPO-UHD	PHQXLO-UHD		2K Extended + UHD/4K IP/SDI, (SDI requires PHQXP01-3G/PHQXP01E-3G or PHQXL01-3G/PHQXL01E-3G)
PHQXPO-EUHD	PHQXLO-EUHD		Extended UHD: add RGB, 12b, 444, 48-60Hz formats to ST2110 IP, requires PHQXPO-UHD or PHQXLO-UHD
PHQXPO-HDR	PHQXLO-HDR	PHQXO-HDR	HDR/WCG, CIE 1931 Chart、HDR Heat map (PQ, HLG, S-Log3, SR Live)
Subject : IP Option			
		PHQXO-IP-STND	10G IP (ST 2022-6、ST 2110、PTP、NMOS IS-04/05)
PHQXPO-IP-25G	PHQXLO-IP-25G		25G IP (ST 2110) requires 2x PHSFP-25G-SR or 2x PHSFP-25G-LR)
PHQXPO-IP-MEAS	PHQXLO-IP-MEAS	PHQXO-IP-MEAS	IP Network Traffic Analysis : IP Measurement 2110-21, PIT histograms, timing
PHQXPO-IP-PCAP	PHQXLO-IP-PCAP	PHQXO-IP-PCAP	10G/25G Packet Capture Tool 4GB max.
PHQXPO-IP-NGT	PHQXLO-IP-NGT	PHQXO-IP-NGT	2022-6 IP Packet Interval Profile Generator requires PHQXPO-GEN
PHSFP-10GE-SR	PHSFP-10GE-SR	PHSFP-10GE-SR	SFP+ 10GBASE-SR Short Range Ethernet MM 850nm 300m Multi-mode Transceiver
PHSFP-10GE-LR	PHSFP-10GE-LR	PHSFP-10GE-LR	SFP+ 10GBASE-LR Long Range Ethernet SM 1310nm 10km Single-mode Transceiver
PHSFP-25GE-SR	PHSFP-25GE-SR		SFP28 25GBASE-SR Short Range Ethernet MM 850nm 100m Multi-mode Transceiver
PHSFP-25GE-LR	PHSFP-25GE-LR		SFP28 25GBASE-LR Long Range Ethernet SM 1310nm 10km Single-mode Transceiver
Subject : Test Cable			
PHQXC-1	PHQXC-1	PHQXC-1	12G-SDI Test Cable (BNC-BNC 1m)
Subject : Rack Mount			
PHQXK7			3U 19 inch rack mount kit (1x QxP Chassis)
PHQXK8			3U 19inch rack mount kit (2x QxP Chassis)
	PHQXK1	PHQXK1	19 inch rack mount kit (1x Qx/QxL Chassis)
	PHQXK2	PHQXK2	19 inch rack mount kit (2x Qx/QxL Chassis)
	PHQXK3	PHQXK3	9.5 inch rack mount kit (1x Qx/QxL chassis)
PHQXK9			QxP Desktop kit (adjustable feet plus handle)
Subject : Extended Warranty			
PHQXP-3YEAR	PHQXL-3YEAR		PHQXP Upgrade from 1 (standard) to 3 Year Warranty (excludes SFP)
PHQXP-5YEAR	PHQXL-5YEAR		PHQXP Upgrade from 1 (standard) to 5 Year Warranty (excludes SFP)
PHQXP01-3YEAR	PHQXL01-3YEAR	PHQX01-3YEAR	PHQXP01 Upgrade from 1 (standard)to 3 Year Warranty (excludes SFP)
PHQXP01-5YEAR	PHQXL01-5YEAR	PHQX01-5YEAR	PHQXP01 Upgrade from 1 (standard)to 5 Year Warranty (excludes SFP)
PHQXP01E-3YEAR	PHQXL01E-3YEAR	PHQX01E-3YEAR	PHQXP01E Upgrade from 1 (standard) to 3 Year Warranty (excludes SFP)
PHQXP01E-5YEAR	PHQXL01E-5YEAR	PHQX01E-5YEAR	PHQXP01E Upgrade from 1 (standard) to 5 Year Warranty (excludes SFP)

Technical Information



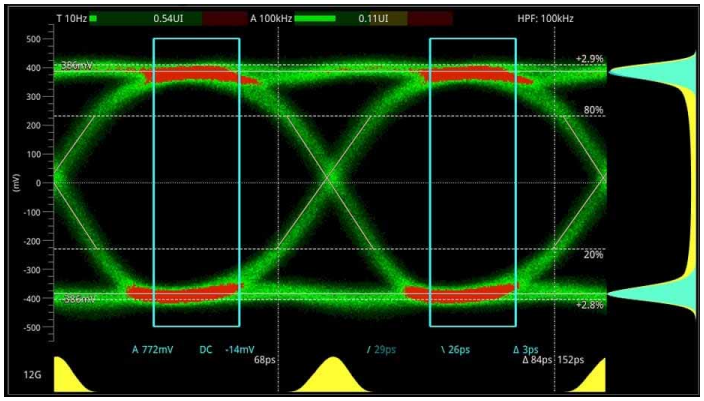
ST 2110 ANALYSIS FEATURE SET

Advanced Qx ST 2110 measurement tools include the provision of up to four simultaneous dual Packet Interval Timing measurement windows, detailed data reporting of flow packet, clock rates and PTP timing relationship, as well as IP Receive statistics that includes the measurements of the ST 2110-21 Network Compatibility model (Cinst) and Virtual Receiver Buffer Model (VRX).



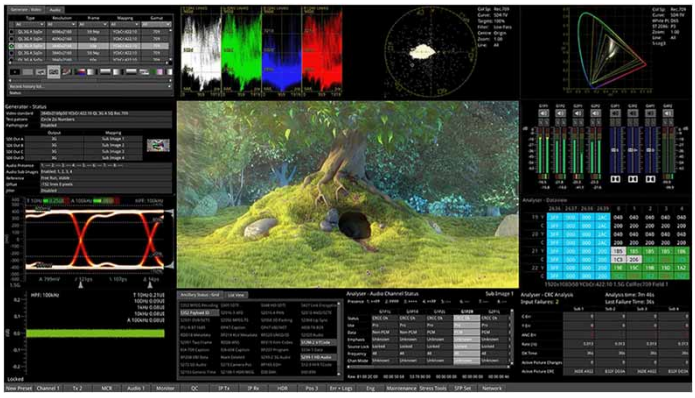
SUITE OF IP MONITORING TOOLS

The Qx's ST 2110 core IP toolset provides an operator with 2110 confidence status monitoring in an intuitive and accessible manner. The toolset supports simultaneous decap of 1 video, 2 audio and 1 ANC Data flow supported SMPTE protocols include ST 2059 (PTP), ST 2110-20, -30, -31 and -40. ST 2022-7 seamless protection (SIPS) is provided for all four flows over two media network interfaces using industry standard SFPs.



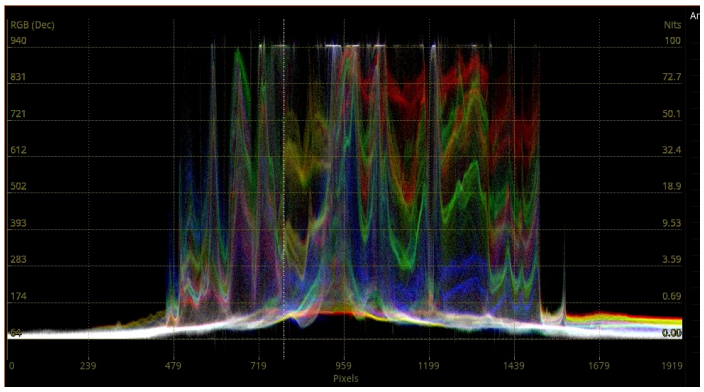
12G-SDI PHYSICAL LAYER & SDI-STRESS

The Qx offers a 12G/6G/3G/HD-SDI physical layer analysis option, including RTE™ (Real-Time Eye) technology to instantly highlight any SMPTE compliance issues including eye amplitude, transition times and overshoot. A suite of tools are available for users evaluating SDI interfaces.



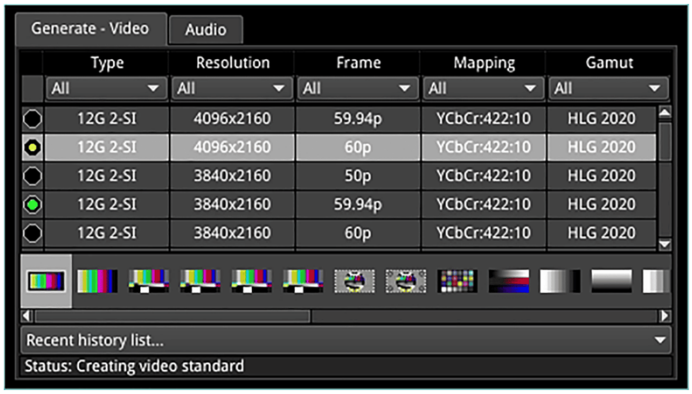
USER-DEFINED INSTRUMENT LAYOUT

Out of the box, the Qx offers media analysis for broadcast operator environments, with a flexible user-defined instrument layout displaying up to 16 simultaneous windows, and the ability to rapidly change between bespoke layouts for different operational tasks with user presets.



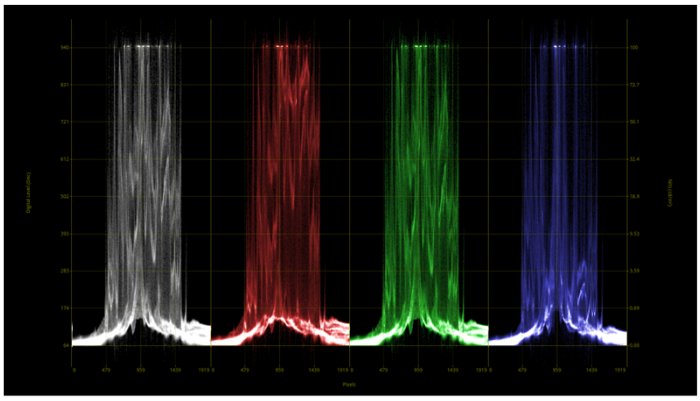
ADVANCED HDR ANALYSIS

The Qx's advanced HDR toolset includes a signal generator, CIE chart, Luma false color heat map/highlighting, waveform monitor and vectorscope. All the main live production SDR/HDR formats are supported: SDR BT.709, BT.2020, plus HDR BT.2100 HLG, PQ and Sony S-Log3 and SR Live. An extensive set of test patterns include BT.2111 HDR color bars for HLG, PQ and SR Live as well as SDR 709 patterns.



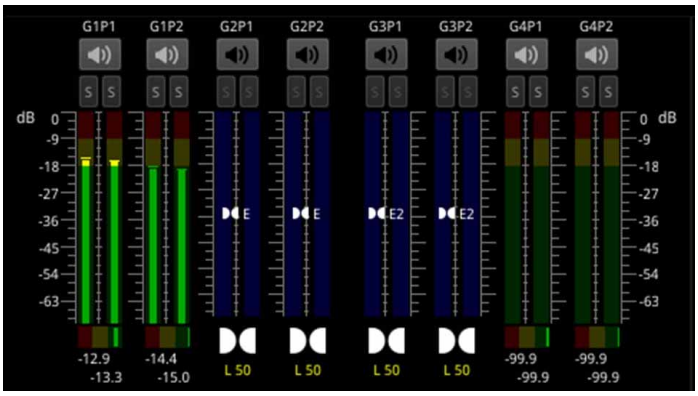
AUDIO AND VIDEO GENERATION

Generate and analyze a set of SDI/IP formats. Moving test patterns offer up to 32 channels of embedded audio per link or subfield (up to 128 channels on 12G interfaces). The toolset provides core full screen SDI Pathological SDI stress patterns as well as allowing the user to define a combination of SDI stress and conventional generator patterns up to full frame.



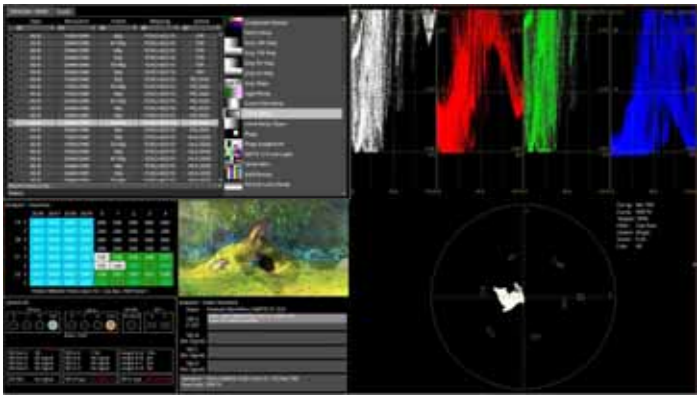
HD-SDI ANALYSIS AND MONITORING

Picture view, waveform, vectorscope, 32 channel audio metering, detection of Dolby formats, ANC status and payload, on screen display of OP47 and CEA-608 in 708 closed captions and Ancillary Time Code (ATC), and advanced control and logging are all provided as standard.



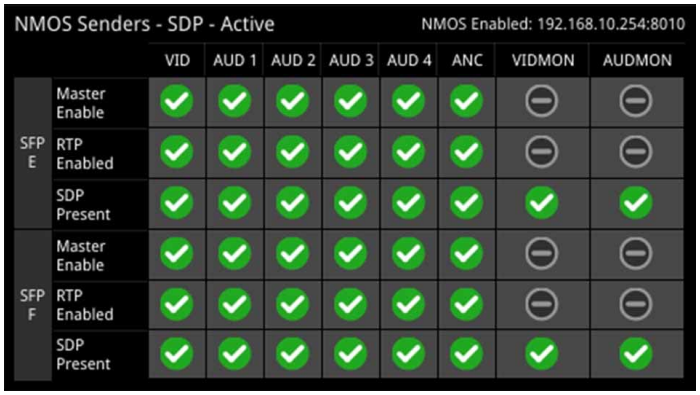
DOLBY® E DECODER & METADATA ANALYZER

The Dolby E Decoder and Metadata Analyzer option provides a clear and accessible view of the Dolby E metadata present in a selected Dolby E or ED2 audio stream. It also enables you to check the correct timing of Dolby E packets in the audio signal in an SDI or ST 2022-6 broadcast chain. You can check whether the Dolby E is created correctly and transferred transparently by network equipment such as routers, switchers, satellite links, etc.



PRESETS, VNC and GUI SCREENSHOTS

The Qx interface employs VNC technology to deliver 16 simultaneous instrument windows over a remote network . Multiple display layouts can be saved as presets. This allows users to save bespoke layouts for different operational tasks; useful for rapidly changing between different screen layouts eg. Audio, HDR or IP focus.



AMWA NMOS TOOLSET

A suite of AMWA NMOS tools that provide flexibility when integrating with an NMOS controller and associate network Topology. Supported protocols: IS-04 v1.0, 1.1, 1.2, 1.3 IS-05 1.02, 1.1 and IS-09 PTP domain. Provision of both in-band and out-of-band control topologies with manual, mDNS, DNS-SD and DHCP. Senders and Receivers can be independently configured as single or dual NMOS end points.(QxL,QxP)

3U instrument with integral 1920 x 1200, 7 inch LCD touch screen

The QxP's integrated 7 Inch multi-touch LCD display adds a new control layer to the Qx Series. Building on the Qx Series' innovative app based GUI, users are now able to configure and monitor all of their required instrumentation from the front display, up to 16 Instruments can be configured in various sizes. Plug in an external HDMI monitor and you have the same experience as if you were using the QxP as a conventional Rasterizer.

V-mount/G-mount Battery Plate for external battery and portable operation

The QxP is the world's first portable, 12G-SDI, 25G-ST 2110, combined waveform monitor, generator and analyzer, with support for mains, external DC power and comes with a V-mount or G-mount battery plate as standard, allowing for the unit to be powered by an external camera battery. This makes the QxP ideally suited for On-Set Production, Outside Broadcast, Commissioning, Engineering and R&D environments

PHABRIX Sx Series

Just like a Swiss army knife, a product conceived as a simple mix of technologies developed into three test instruments in one; an SDI signal generator, analyzer and monitor with an amazing array of tools. The Sx rapidly developed as a handheld video and audio testing device capable of supporting 3G-SDI, HD-SDI, SD-SDI video plus AES – a world's first for such a product. As engineers at PHABRIX, we designed the kind of product we'd like to use ourselves.

PHABRIX SxTAG

SDI/IP Portable Analyzer and Generator

IP | IP-TSG | 3G$_{SDI}$ | 3G$_{SDI}$ | SD$_{SDI}$

Weight/Size：900g, H:92mm, W:225mm, D:42mm

Integral battery supply : 1-2 hours lithium polymer

SFP is optional.

- Supports SFP optical HD-SDI input/output
- Supports IP ST 2022-6 and ST 2110
- Supports composite input/output (BB, tri-level)
- 3G-SDI, HD-SDI, SD-SDI video signal generator
- Supports balanced analog and digital audio input/outpu
- Equipped with picture monitor, waveform monitor, vectorscope, audio monitor, and signal data analysis functions

PHABRIX SxE

SDI/Eye Portable Analyzer and Generator

IP | IP-TSG | 3G$_{SDI}$ | 3G$_{SDI}$ | SD$_{SDI}$

Weight/Size：900g, H:92mm, W:225mm, D:42mm

Integral battery supply : 1-2 hours lithium polymer

- Eye pattern and jitter analyzer for 3G-SDI, HD-SDI, and SD-SDI signals
- 3G-SDI, HD-SDI, and SD-SDI video signal generator
- Equipped with picture monitor, waveform monitor, vectorscope, audio monitor, and signal data analysis functions
- Audio monitoring is possible using the AES/EBU digital audio signal generator, level monitor, and speaker.

PHABRIX SxD

SDI/Dual Link Portable Analyzer and Generator

IP | IP-TSG | 3G$_{SDI}$ | 3G$_{SDI}$ | SD$_{SDI}$

Weight/Size：900g, H:92mm, W:225mm, D:42mm

Integral battery supply : 1-2 hours lithium polymer

- 3G-SDI, HD-SDI, SD-SDI, Dual Link (SMPTE372M), and 3G-A/3G-B (SMPTE425M) video signal generator and analyzer
- Equipped with picture monitor, waveform monitor, vectorscope, audio monitor, and signal data analysis functions

* The SxD has two SDI input and SDI output connectors.
* The SxD does not have AES input or output connectors.

PHABRIX SxA

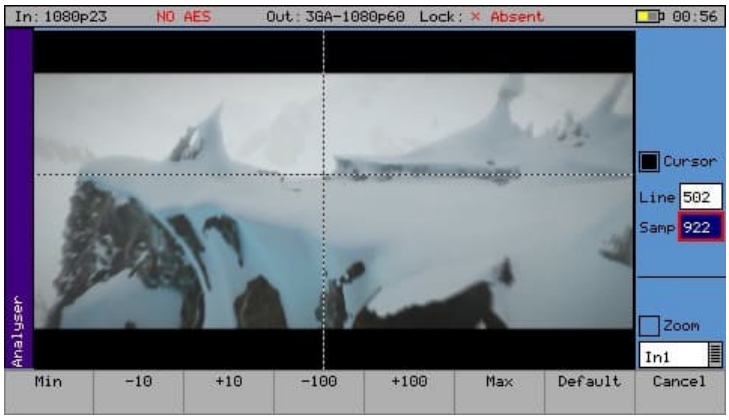
SDI Portable Analyzer and Generator

IP | IP-TSG | 3G$_{SDI}$ | 3G$_{SDI}$ | SD$_{SDI}$

Weight/Size：900g, H:92mm, W:225mm, D:42mm

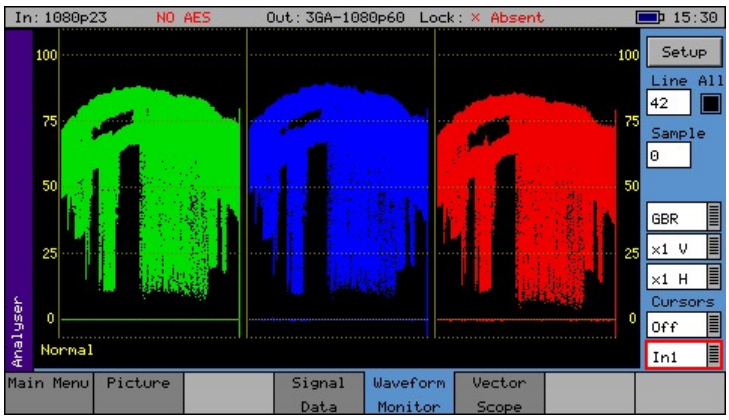
Integral battery supply : 1-2 hours lithium polymer

- 3G-SDI, HD-SDI, and SD-SDI video signal generator and analyzer
- Equipped with picture monitor, waveform monitor, vectorscope, audio monitor, and signal data analysis functions
- Audio monitoring is possible using the AES/EBU digital audio signal generator, level monitor, and speaker.



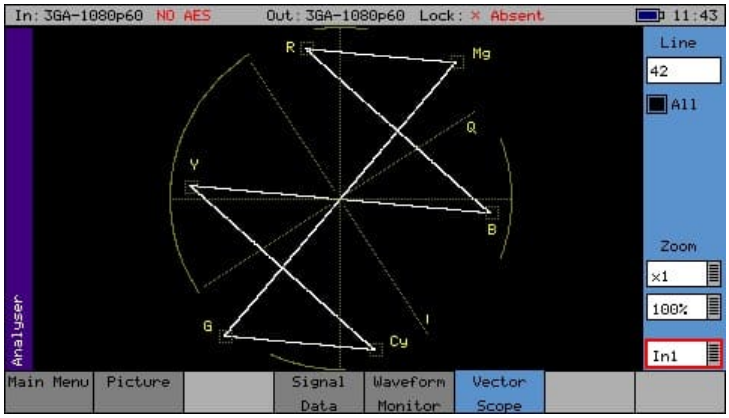
Picture Monitor

- The picture is displayed in a window as a down-converted display.
- A cursor may be turned ON over the area of the picture specified by the specified line and sample.
- Monitor device input or output.



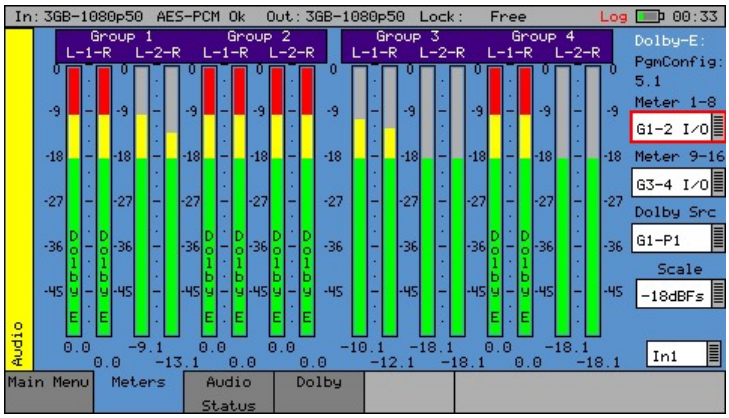
Waveform Full Frame

- Displays selected analyzer or generator source.
- Analog locking reference input view. (TAG only)
- YCbCr GBR, Y, Cb, Cr, R, G, B modes.
- Cursors may be displayed over the waveform to allow measurement of time or amplitude values.
- Vertical and horizontal magnifications.



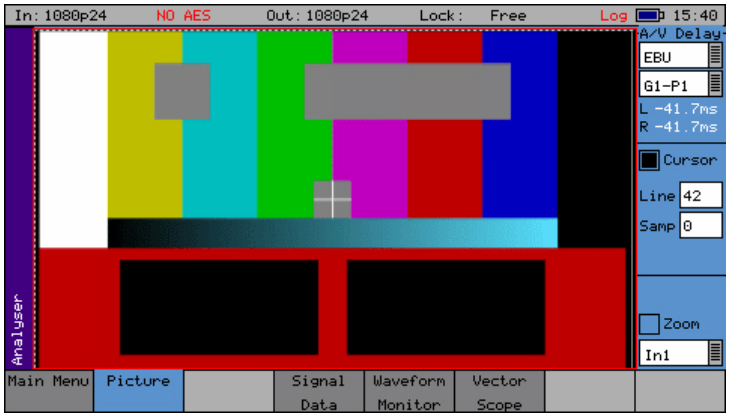
Vectorscope

- Choice of 100% or 75% graticules .
- Display the Composite(Sx TAG Only), SDI, SFP(Sx TAG Only) video input or the generator test pattern.
- Display a specific video line linked to picture cursor
- x1, x2, x5 or x10 magnifications with position to center , cyan, yellow, green, magenta, red, blue graticule locations



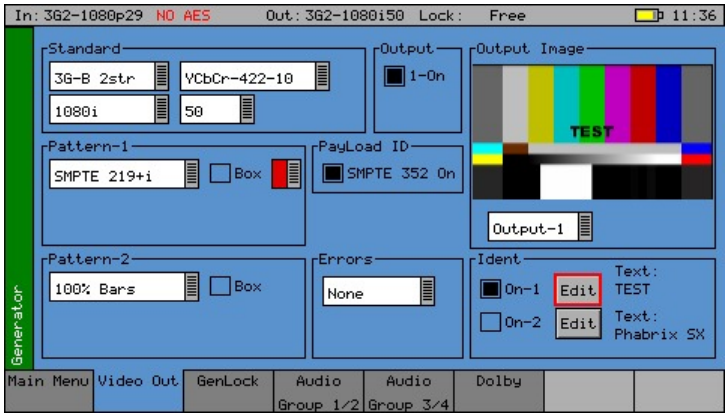
Dolby Metering

- Optional Software License.
- The detected Dolby Audio type is displayed in the audio meters.
- Dolby Audio is not decoded Dolby E metering is provided.



AV Delay Analysis

- Optional Software License.
- Support for adapted EBU Tech 3305 AV Sync and operation test pattern.
- Support for LAWO V_line AV Sync test pattern.
- Real time update of measured AV delay.
- +/- 400ms operating range.
- Select audio from SDI or AES input.



Video Generator

- The Sx can create video test signals for all supported SD and HD SDI output standards including the 3GHz standards at 1080p/50/59/60 Y, Cb, Cr.
- Advanced video formats include support for RGB, XYZ 12bit and 2K formats.
- A fully programmable Y Zone Plate

Base Units

Model #	Product Name	Description
PHSXTAGC	Sx TAG Analyzer/Generator	HD/SD-SDI, NTSC/PAL Composite, Analog/Digital Audio
PHSXTAGC-IP	Sx TAG-IP Analyzer/Generator	Sx TAGC + Option PHSXO-IP + SFP+ m option PHSFP-10SR-IP
PHSXE	SxE Handheld Instrument	SD/HD/3G, Eye&Jitter Handheld complete unit
PHSXDL	SxD Handheld Instrument	SD/HD/3G, Dual Link Handheld complete unit

Options / Accessories / Warranty

SxTAG	SxE	SxD	SxA	Model #	Product Name	Description
				Option list		
✓				PHSXO-3GADV	3G+2K Format	3G-SDI、422/444、YUV/RGB、10/12 bit、SMPTE 428-9 D-Cinema/SMPTE ST 2048-2:2011
✓	✓	✓	✓	PHSXOS	Command / Script + Report	Command Scripts + Reports – Repeat testing + create print report
✓	✓	✓	✓	PHSXOSD	SDI Data / Display + ANC analysis	SDI Data Dump display + VANC/ANC Inspector – Detailed SDI data display
✓	✓	✓	✓	PHSXOR	Enhanced Remote Control	Remote control of the main unit from an external PC via TCP/IP.
✓	✓	✓	✓	PHSXOZ	Programmable zone plate generator	Allows control of zone plate pattern parameters.
✓	✓	✓	✓	PHSX-DAG	Dolby E/D/D+ analysis + generator	Dolby streaming, metering, timing
✓	✓	✓	✓	PHSXO-ENGT	Engineering Package	PHSXO-3GADV、PHSXOS、PHSXOSD、PHSXOR、PHSXOZ、PHSXOBD-DAG with bundle discount price set
✓	✓	✓	✓	PHSXO-AVD	AV Delay Generator/Analyzer	AV delay (lip-sync) pattern signal generation and its measurement for SDI and IP.
	✓			PHSXOEA	Advanced Eye and Jitter	Advanced analysis functions
✓				PHSXO-IP	IP Encap/Decap license	Software license for 10GE IP ST 2022-6, ST 2110, NMOS IS-04/05/08 (requires PHSFP-10SR-IP)
				Accessary		
✓				PHSFP-10SR-IP	10GBASE-SR SFP	SFP+ Multi-mode Transceiver, ST2110,2022-6,NMOS
✓				PHSFP-RT30-HDBNC	SFP electrical transceiver 3G/HD/SD	Both input and output via BNC become possible.
✓				PHSXC-1	Audio Cable	Analog Audio D15 to AES XLR break out cable
				Extended Warranty		
✓	✓	✓	✓	PHSX-3YEAR	Extended Warranty for 3 years	Upgrade from 1 (standard) to 3 Year Warranty (excludes SFP modules)
✓	✓	✓	✓	PHSX-5YEAR	Extended Warranty for 5 years	Upgrade from 1 (standard) to 5 Year Warranty (excludes SFP modules)

ASACA VC4000

4K Multi Format Converter

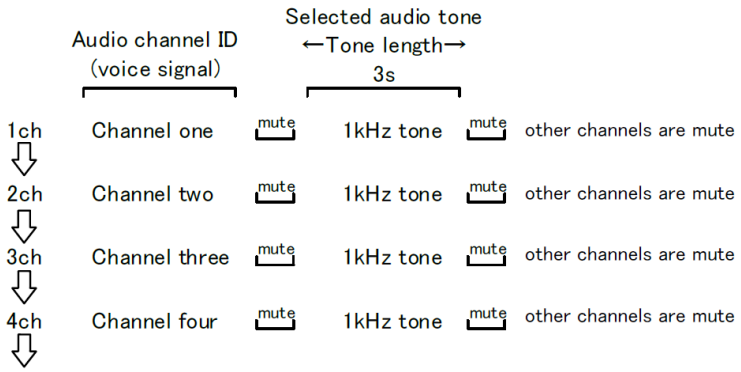
VC4000 is a television format converter that, converts 4K, HDTV and SDTV formats with different frame rates and minimizes jerkiness even with fast moving images. Supports up conversion, down conversion and cross conversion.

IN \ OUT		2160p		1080i	
		59.94	50	59.94	50
2160p	59.94	Standard equipment		Option 1 VC4000SYS	
	50				
1080i	59.94	Option 2 VC4000SYS		Option 3 VC4000SYS	
	50				
720p	59.94				
	50				
625i	50			Option 4	

ASACA DUX-214

Audio Channel ID SDI Signal Generator

Audio channel ID on voice signal can be output. (channel one to channel sixteen on voice)



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⚠ Safety Precautions

In order to use the product correctly and safely, carefully read the instruction manual prior to first use.

Specified product specifications are subject to change without notice. Mar. 2023

*** This Short Form catalog has been simplified. Please check additional product information on our website. URL：www.leader.co.jp/en**