

# LPX500

Multi-channel 4K Waveform Monitor with  
Dual-independent displays  
for Hybrid IP/SDI workflows



 **LeaderPhabrix**

# Introducing the LPX500 Waveform Monitor



The LPX500 Hybrid IP/SDI waveform monitor is the first in a powerful new family of video analysis and generation instruments, encompassing next generation technology from the renowned Leader and PHABRIX Test and Measurement brands. The LPX500 offers a bank of four independent analyzers, enabling the simultaneous display of 4 x 12G-SDI and 2 x 100GE-IP inputs.



## Re-designed, compact form factor

Housed in a fully re-designed and compact form factor, the LPX500 offers an 8-inch touchscreen and short depth, ideal for locations with limited rack space, including OB trucks. An independent second compact 8-inch touchscreen display is also offered via a dedicated USB-C connection. Using its built-in noVNC, the LPX500 also offers fast access to both displays over a remote network.



## Quad 12G-SDI and dual 100GE-IP inputs

Supplying a bank of four independent analyzers, the LPX500 enables the simultaneous display of four 4K inputs, HDR and SDR inputs or even SDI and IP inputs. The instrument offers a 10G-IP toolset with dual SDI analyzer support as standard, and advanced Physical Layer Analysis (Eye and Jitter) offered as factory fitted options. The LPX500's comprehensive feature-set is designed to support SD/HD/3G/6G/12G-SDI, 10GE/25GE/100GE IP interfaces with SD/HD/UHD, SMPTE 2022-6, SMPTE ST 2110-10/20/30/31/40 with ST 2022-7, and AMWA NMOS.

Optional software licenses can also be added for SDI/IP AV Test Signal Generation, UHD/4K support, HDR, EUHD (47.95-60p RGB YCbCr 444 formats), 25GE and 100GE IP support.



# An interface that puts you in control

## Second, independent, touchscreen

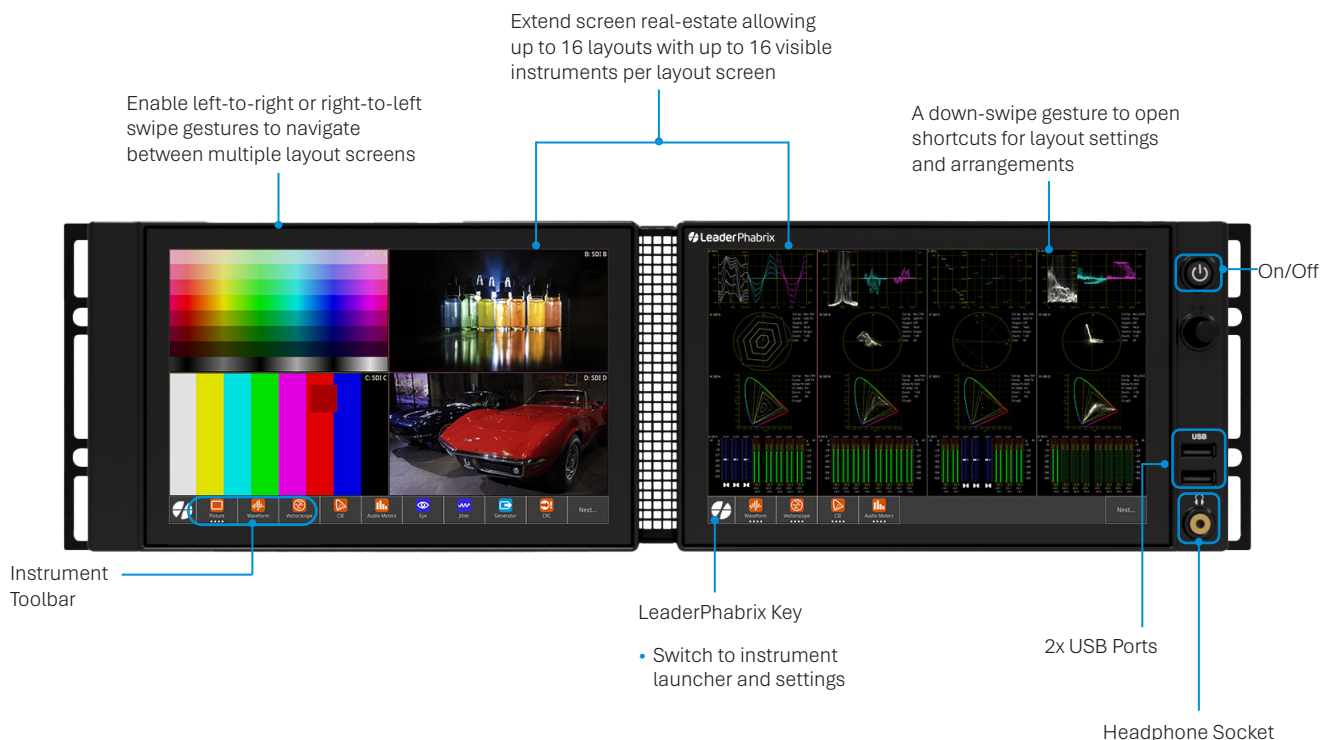
A second, compact screen unit can now optionally extend the unit's local display capabilities, allowing you to control the unit from either physical screen. The second screen is also touch-enabled and supports the same gestures as the primary screen on the main unit. Connection to the second display is over a dedicated USB-C connector.

Further remote screen output combinations are also available to output either screen, from either the DisplayPort or SDI Mon BNC display outputs. In addition, dual built-in VNC clients considerably improve the performance of the remote connection to either display over noVNC.

## Enhanced layouts and gestures

Following the innovative app style interface of PHABRIX instruments, the LPX500 hides the complexity of modern SDI and IP systems providing an uncluttered view of critical information.

The enhanced layouts designed for the LPX500 not only extend the available screen real estate but now feature swipe gestures to navigate left or right through configured layouts and precise tap, hold and slide for instrument placement. Multiple screen layouts provide a huge canvas of extended screen real estate enabling you to move smoothly between instrument layouts, optimizing the viewing and touch experience on the unit.



## Single or Multi Display Layout Modes

Layout capabilities are further extended in the LPX500 by Single or Multi display modes and analyzer link features. Switching between display modes enables you to switch the Analyzers to which your instruments are connected.

- **Single Mode:** All configured layout screens use the same Analyzer channel but you can switch between analyzer channels through the display mode shortcuts, context menu dropdown, toolbar softkeys, etc.
- **Multi Mode:** Allows instruments in the layout to connect to multiple analyzers.

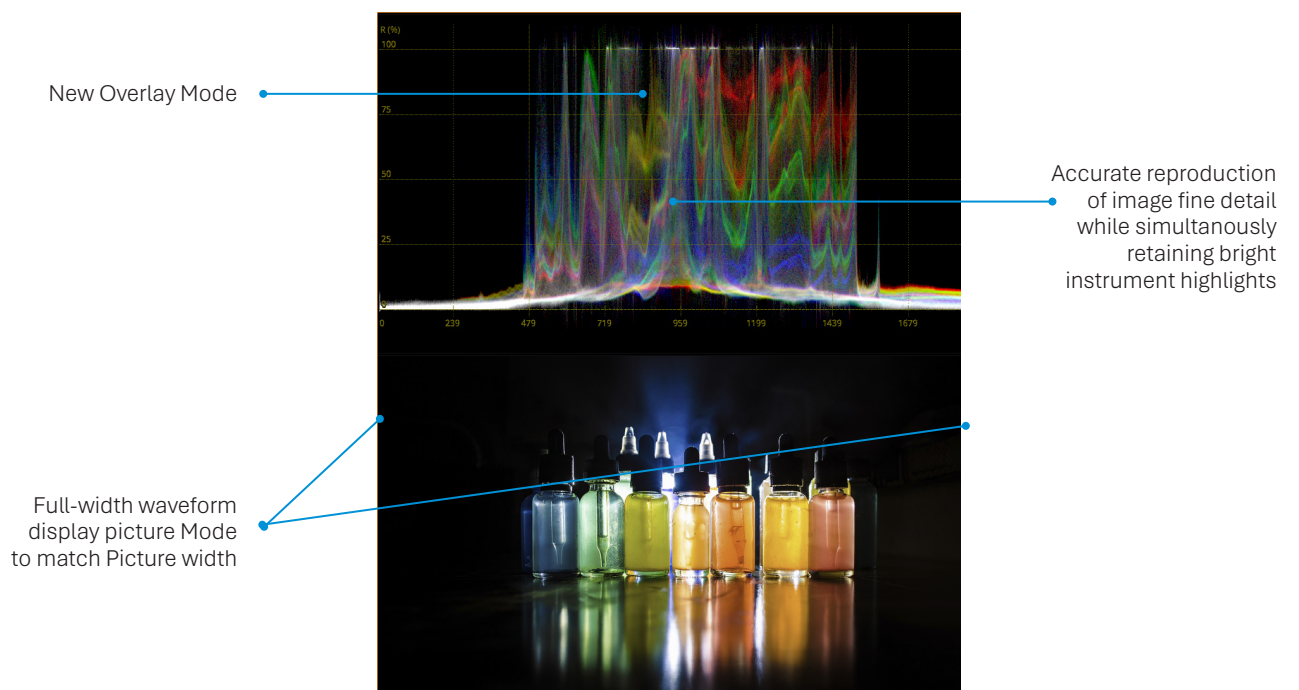


# Introducing our enhanced waveforms

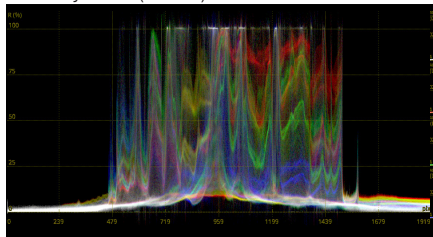
Utilizing a patented technique to efficiently deliver a high-resolution image processing pipeline with support for deep color sources up to 12-bits, our new waveform instrumentation delivers all the fine detail required for Camera Shading, Image Grading or critical QC of both SDR and HDR content.

A choice of Overlay, Stacked and Parade display modes are provided each with the option of multi-colored, highlighted, green or monochrome traces. The flexibility to display YCbCr, RGB, YRGB, YGRB and individual components is retained along with connected instrument cursor linked to Picture and Data view, and user markers linked to Vectorscope. Single Line Mode and H and V magnification are available for detailed inspection.

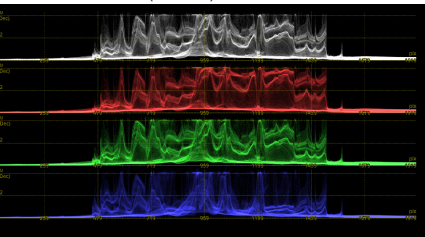
Luminance Nits scales and user-controlled Nits markers are provided for SDR, HLG, PQ, S-Log3, SR-live HDR formats. Both SMPTE-narrow and full-range operation are supported along with matrices for 709, 2020 and DCI P3 over a wide-range of YCbCr:422, RGB:444, SDI, 2110, HD/2K/UHD/4K/EUHD formats.



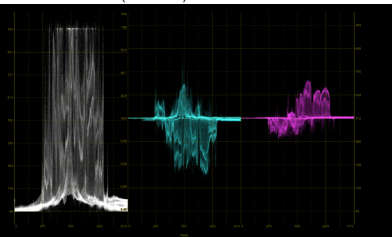
Overlay RGB (Color)



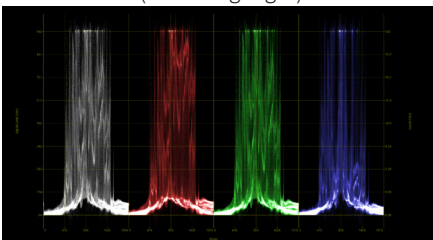
Stacked YRGB (Color)



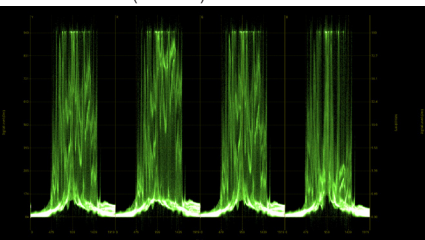
Parade YCbCr (Color)



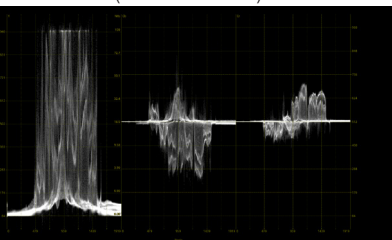
YRGB Parade (Color Highlight)



YRGB Parade (Green)



YCbCr Parade (Monochrome)



# Standard Toolset

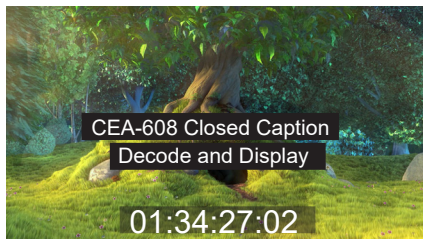


Picture view, waveform monitor, vectorscope, a new RGB vector tool, 32 channel audio metering, decoded audio channel status information, ANC status and payload, on screen display of OP47 and CEA-608 in 708 closed captions and Ancillary Time Code (ATC), Loudness monitoring, and advanced control and logging with human readable event logs and remote operator GUI access over noVNC are all provided as standard.



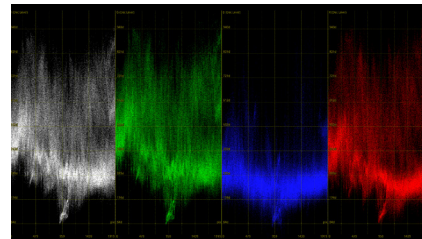
## Picture Display

- Cursors linked to Waveform and Data View
- Action, graphics and user-definable custom safe areas
- 1/16, 1/4 or full size display



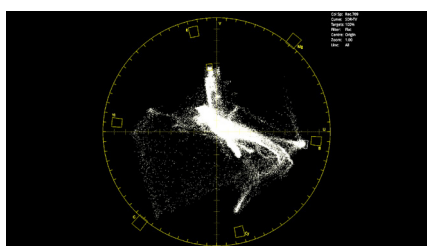
## Auxiliary Data Decode

- Closed Captions OP47, CEA-608 in 708
- Primary Closed Caption decode picture window
- ANC Timecode with OSD
- Date, V-chip, AFD and Input name
- SCTE 104 indication and logging



## Analyzer - Waveform

- YCbCr, YGBR and GBR display modes
- Cursor linked to Picture and Data View, Single line mode linked to Picture Cursor
- Configurable H and V Graticules
- User markers
- Overlay, Stacked, Parade, Single line, H & V Mag, Brightness, Persistence and Monochrome controls
- Horizontal or Vertical Measurement cursors



## Analyzer - Vectorscope

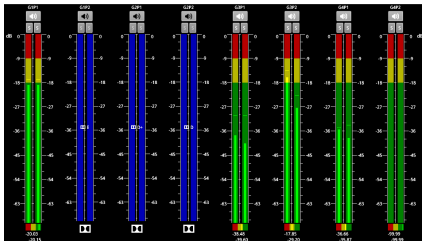
- 75% and 100% Targets for ITU-R Rec. 709, Rec. 2020 and HDR formats
- Custom 'user markers' linked to Waveform
- Center on target or custom user markers
- 0.5x to 4x Mag, center on chosen target
- Single line mode linked to Picture Cursor
- Tooltip display of Cb, Cr and Hue Angle

S353 MPEG Recoding	S305 SDTI	S348 HD-SDTI	S427 Link Encryption	S352 Payload ID
S2016-3 AFD	S2016-4 PAN	S2010 ANC/SCTE	S2031 DVB/SCTE	S2056 MPEG TS
S2068 3D Packing	S2064 Lip Sync	ITU-R BT.1685	OP47 Caption	OP47 VBI/WST
ARIB-TR-B29	ROD18 Metadata	RP214 KLV Metadata	RP223 LMD/VD	S2020 Audio
S2051 Two Frame	ROD8 WSS	RP215 Film Codes	S328-3 VITCde	EIA-708 Caption
EIA-608 Caption	RP207 Program	S334.1 Data	RP208 VBI Data	Mark Deleted
S299-2 3G Audio	S299-1 HD Audio	S272 3D Audio	S315 Camera Pos	RP165 EDH
S299-1 HD Audio				
Control Group 4 (EDH)	Present (Y-Pos)	Checksum	Parity	Data Block No
Audio Group 1 (E7M)	Present (C-Pos)	OK	OK	OK
Audio Group 2 (E8M)	Present (C-Pos)	OK	OK	OK
Audio Group 3 (E5M)	Present (C-Pos)	OK	OK	OK
Audio Group 4 (E6M)	Present (C-Pos)	OK	OK	OK
Control Group 1 (E3M)	Present (Y-Pos)	OK	OK	OK
Control Group 2 (E2M)	Present (Y-Pos)	OK	OK	OK
Control Group 3 (E1M)	Present (Y-Pos)	OK	OK	OK

## Analyzer - Ancillary Status

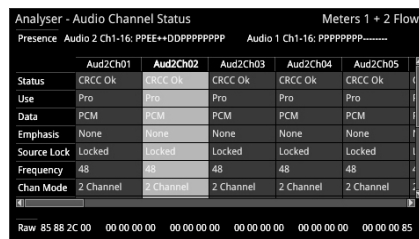
- SMPTE ST 291 VANC/HANC ancillary data presence/status window
- Grid View – clear visual overview, present/absent/fault indication
- List View–ANC present list with location & status information for Checksum, Parity, DBN
- Link to ANC Inspector
- Tooltip provides ST 291 ANC type overview, when operating via a mouse

# Standard Toolset



## Analyzer - Audio Meters

- In Single layout: 2x meter windows can be opened, each monitoring a block of up to 16 channels, for a total of up to 32 channels
- In Multi layout : 4x meter windows can be opened, each monitoring up to 16 channels , for a total of 64 channels
- 2110 audio group display across up to 4 flows
- Ballistics: PPM-I, PPM-II, Vu, Vu-Fr, Fast
- Scales: dBFS, dBu -18, dBu -20, BBC, DIN45406, NordicN9
- Adjustable peak hold times: Off, 0.1 s to Inf
- Audio pair correlation meters, numerical level
- Detection of Dolby E, ED2, DD, DD+, DE line pos
- Stereo/mono audio preview bus



## Audio Status

- 32 channel indication of audio type and presence, PCM, Dolby E, DD, DD+, ED2
- Decoded channel status information for up to 32 channels for SDI and 64 channels for IP
- Clear indication of useful audio parameters including CRC, PCM/data, sample frequency, word length
- Channel Status data view (Hex)

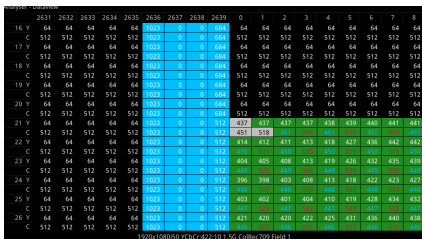


## Loudness Monitoring\*

- EBU R128 and ITU-R BS.1770
- Indicators for true peak, range, momentary, short term and integrated loudness
- User control of integrated, momentary and short term targets
- User-adjustable true peak alarm threshold
- Loudness logging stored automatically

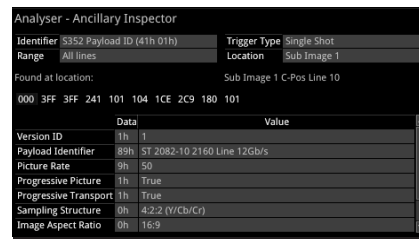
## Data View Analyzer with ANC Inspector

The engineering grade Data View Analyzer and ANC Inspector tools provide easy, accessible visualization of the data on an SDI interface and associated ANC packets. Deep SDI data inspection with full freedom to inspect Active Picture, VANC, HANC and API controls to read back Active Picture Data under automation control is included. Also featured is ANC packet decapsulation and error reporting for detailed analysis and debug of ANC payloads.



## Analyzer - Data View

- Allows analysis of complex faults
- Detailed view of data words in the SDI stream with tooltip hint
- Navigate function for rapid access to a required line, pixel or TRS word
- Color-coding to help identification
- Cursor linked to Picture and Waveform
- Available on Analyzer A input only



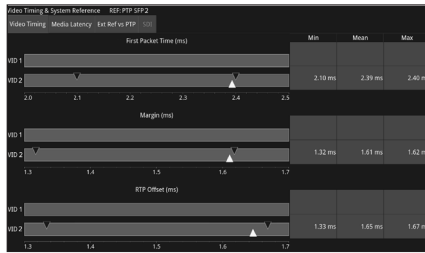
## ANC Inspector

- Ancillary data packet analyzer
- Link from ANC Status window
- User-defined DID/SDID windowed search
- Trigger on error, single shot, continuous
- ANC packet capture with Hex view
- ANC packet decode view

\*upcoming software release

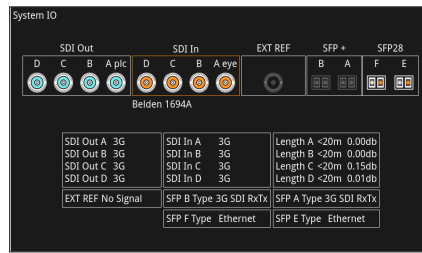
# Standard Toolset

## IP I/O and Reference Config



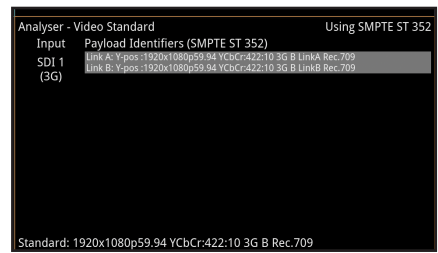
### Video Timing & System Reference (2022-6)

- Measurement of the timing of inputs against reference
- Indication of reference status and stability
- Graphical and numeric display



### System IO (IP)

- Shows the status of signal inputs & outputs, external reference, cable length, and connector details
- IP: Active IP SFP receive inputs and transmit outputs are indicated



### Analyzer - Video Standard (2022-6)

- Display of detected SMPTE ST 352 Payload ID for each SDI Link and Subframe
- Manual override of ST 352 ID
- Selection of SMPTE video format
- Indication of ST 352 errors

Analysers - CRC Analysis Analysis time: 2h 58m Last Failure Time: 11m 6s

Input Failures: 257

	Sub 1	Sub 2	Sub 3	Sub 4
C-CRC-Err	0	0	0	0
Y-CRC-Err	0	0	0	0
ANC-CS-Err	1	0	0	0
Rate (/s)	0.002	0.000	0.000	0.000
OK Time	9m 53s	11m 6s	11m 6s	11m 6s
Active Picture Changes	0	0	0	0
Active Picture CRC	EC9D CAC0	FE4F 7B21	EC9D CAC0	FE4F 7B21

### CRC Analysis (2022-6)

- Check for CRC errors on Y, C and ANC
- Reporting of the number of SDI input failures, the last failure time, total analysis time and error rates
- Detect active picture changes and view the active picture CRC to observe any changes in the expected active picture CRC value
- SDI switch line CRC masking control, for SMPTE RP168 compliance checking

Stats - IP Receive (SFP A) Clock Divisor: 1.001 3G Signal

Sub Image 1	
Counters Stable	true
Active Samples Per Line	4096 (B mux)
Active Lines Per Field	540
Total Samples Per Line	4400 (B mux)
Total Lines Frame/Field1	563
Total Lines Field2	562
Payload ID Y-Pos LinkA	8A 5A C0 D1
Payload ID C-Pos LinkA	unnecessary
Payload ID Y-Pos LinkB	8A 5A C0 41
Payload ID C-Pos LinkB	unnecessary

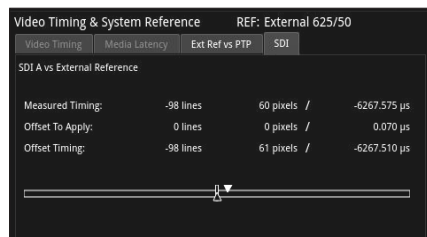
### Stats - IP Receive (2022-6)

- Indication of data rate and clock divisor
- Reporting of active and total pixel and line counts
- Y and C payload ID



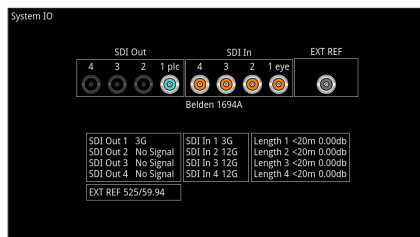
# Standard Toolset

## SDI I/O and Reference Config



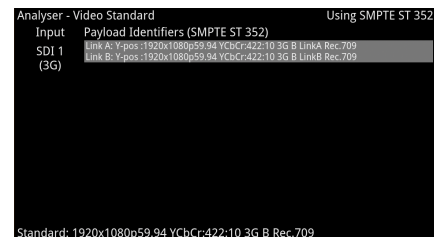
### Video Timing & System Reference (SDI)

- Measurement of the timing of inputs against reference
- Indication of reference status and stability
- Indication of the relative co-timing of input SDI channels
- Graphical and numeric display



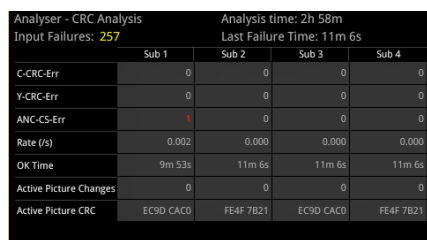
### System IO (SDI)

- Shows the status of signal inputs & outputs, external reference, cable length, and connector details
- Select BNC, cable type, loop through and generator copy outputs



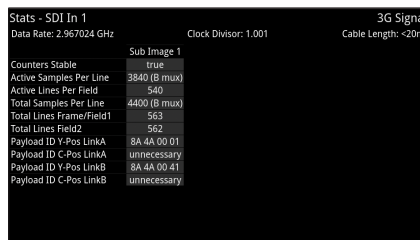
### Analyzer - Video Standard (SDI)

- Display of detected SMPTE ST 352 Payload ID for each SDI Link and Subframe
- Manual override of ST 352 ID
- Selection of SMPTE video format
- Indication of ST 352 errors



### CRC Analysis (SDI)

- Check for CRC errors on Y, C and ANC
- Reporting of the number of SDI input failures, the last failure time, total analysis time and error rates
- Detect active picture changes and view the active picture CRC to observe any changes in the expected active picture CRC value
- SDI switch line CRC masking control, for SMPTE RP168 compliance checking



### Stats - SDI In (SDI)

- Cable length indication
- Indication of data rate and clock divisor
- Reporting of active and total pixel and line counts
- Y and C payload ID

## ST 2110 and ST 2022-6 Monitoring



The core IP feature set, provided as standard in the LPX500, offers an operator all of the ST 2110 confidence status monitoring in an intuitive and accessible manner.

The toolset supports simultaneous decapsulation of one video, four audio and one ANC Data flows. Supported SMPTE protocols include ST 2059 (PTP) ST 2110-20 (Uncompressed Video), -30 (PCM Digital Audio), -31 (AES3 Transparent Transport) and -40 (ANC Data). ST 2022-7 Seamless Protection Switching with AMWA NMOS IS-04, IS-05 and PTP system resource, is provided over two media network interfaces using industry standard optical ethernet SFPs. Audio handling conforms to ST 2110-30 Class C with support for 48 kHz streams from 1 to 10 channels at packet times of 1 ms and 1 to 64 channels at packet times of 125  $\mu$ s.

Also provides an indication of the timing relationship of each of the eight ST 2022-7 flows to PTP with status information, as well as a ST 2022-7 status tool that reports the health and relative timing skew of each ST 2022-7 pair, all with hardware time stamping.

## SMPTE 2110 & 2022-6

SFP IP Network		IGMP: Max V3
	SFP 1	SFP 2
Carrier Signal	Present	Present
Interface	Up	Up
MAC Addr	00:1F:7F:01:55:F4	00:1F:7F:02:55:F4
IP Addressing Mode	Dynamic	Dynamic
IP Addr	192.168.10.14 / 24	192.168.20.17 / 24
Gateway	192.168.10.254	
DNS IP Addr	192.168.10.254	192.168.20.254
Total Tx pkts	1338371	1221414
Total Rx pkts	296456478757	136048482316
SFP 1		
SFP 2		

[illegible][illegible]

## SFP IP Network

- Reporting of presence of SFPs, SFP MAC and IP addresses (flow source IP address), and interface status
- Tx and Rx packet counters for indication of traffic activity
- User configuration of SFP IP Addresses, Masks, Gateway and DNS addresses

## SFP Information

- SFP status information for monitoring the physical network connection
- Indication of SFP vendor and laser characteristics
- RX and TX power for debug of fiber connectivity

## IP Receive Flows

- Reporting of the IP Flows available to the receiver and user selection of the required flows
- Indication of locked status, Protocol, Src and Dst IP and Port Numbers, SSRC, Packet Counts, Sequence, payload and CRC errors
- Configuration of Multicast Destination IP addresses and subsequent Multicast Join requests

## SMPTE 2110 & 2022-6

[illegible]

## ST 2022-7 Status

- Indication of the health of ST 2022-7 seamless protection
- Warning of ST 2022-7 flow-pair mismatch
- Warnings of errors on flows and errors on reconstructed output and error rates per second
- Class A, B, C, D markers

# SMPTE 2110

GM Info	Qx Status	Messaging
Domain	0	
Leader ID	08:00:11:FF:FE:22:B6:CE	
Priority 1	128	
Priority 2	128	
Clock Class	6	
Clock Accuracy	< 100 ns	
Variance	15652	
Clock Source	GPS	
PTP Time	2023-01-25 17:06:57 (TAI)	

## ST 2110 PTP Info

- Control of PTP domain and communication mode (multicast, hybrid w/o negotiation)
- Indication of lock status
- Grandmaster information including leader ID and time source
- Indication of estimated frequency and phase lock offsets
- Indication of one step or two step traffic

Video Timing & System Reference		REF: PTP 31P2		
Holo Timing - Media Latency		Ext Ref vs PTP		
First Packet Time (ms)		Min	Mean	Max
HD 1				
HD2		2.10 ms	2.39 ms	2.40 ms
Margin (ms)				
HD 1				
HD2		1.32 ms	1.61 ms	1.62 ms
RTP Offset (ms)				
HD 1				
HD2		1.33 ms	1.65 ms	1.67 ms

## IP Flow Latency

- Indication of media latency
- Indication of relative timing of audio and ANC flows wrt video
- Indication of relationship of underlying media to PTP
- External analog reference timing wrt PTP

## Standard Toolset

## AMWA NMOS

A suite of AMWA NMOS tools provides flexibility when integrating with an NMOS controller and associated 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. Configure Senders and Receivers independently as single or dual NMOS end points. NMOS troubleshooting is aided by the simultaneous views of the state of both the Sender and Receiver Master and RTP Enables, SDP, and the IS-05 parameters. The receiver auto-detected video format and audio packet time and channel count are compared with the received SDP information for diagnosis of the format information supplied by the SDP record.

NMOS Receivers - SDP - Active		NMOS Enabled: 192.168.10.254:8010			
		VID	AUD 1	AUD 2	ANC
SFP 1-2	Master Enable				
	RTP 1 Enabled				
	RTP 2 Enabled				
	SDP Present				

The screenshot shows the 'NMOS Receivers - SDP - Active' window. At the top, it indicates 'NMOS Enabled: 192.168.10.254:8010'. Below this is a row of six status indicators: 'SFP E+F' (green), 'VID' (green), 'AUD 1' (green), 'AUD 2' (green), 'AUD 3' (green), and 'AUD 4' (green). The main configuration area contains the following text:

```

ve=0
m=3865072999.3865072999 in IP4 192.168.10.20
s=sx.022044 SFP E+F VID
t=0
agroup=DUP PRIMARY SECONDARY
m=sdio:1778 RTP/AWP-96
c=IN IP4 239.9.2.0/32
a=t-reflex:ptp=IEEE1588-2008:traceable
a=medialack:direct=0
a=source-filter:in IP4 239.9.2.0/32 192.168.10.20
a=ttl:ttl=90000
a=mtu:16767;mtu=2048;hops=1080;excessrate=24000/1001;
sampling=YCbCr-4:2:2;depth=10;colorimetry=BT709;TCS=SDP;PM=2110GPM;
SSN=572110-20.2017;TP=2110TPM.

```

NMOS Receivers - IS05 - Active NMOS Enabled: 192.168.10.254:8070

SFP	E+F	VID	AUD 1	AUD 2	ANC
<div> <div>key</div> <div>value</div> </div> <ul style="list-style-type: none"> <li>activation           <ul style="list-style-type: none"> <li>activation_time 1642421872:378453365</li> <li>mode activate_immediate</li> <li>requested_time 1642421872:357383466</li> <li>master_enable true</li> <li>sender_ip 840C2Ba0-0952-5782-88f7-766a7880218a</li> <li>transport_file</li> <li>transport_params               <ul style="list-style-type: none"> <li>0</li> </ul> </li> <li>destination_port 5178</li> <li>interface_ip 192.168.10.147</li> <li>multicast_ip 239.9.20.1</li> <li>rtp_enabled true</li> <li>source_ip 192.168.10.125</li> </ul> </li> </ul>					

### NMOS Receiver Status

- At a glance overview of the state of the receiver Master Enable, RTP Enables and SDP records for each media interface
- Available in 1/16 view - toggles with the SDP view
- Display of the Master, RTP and SDP of all Receiver flows

[illegible]

```

MJD: Sunday, Sep. 2nd
MJD: Loading file:171.174.12.154-9010-emooc.registration.v0
SPFF  YES  AUC1  AUC2  AUC3  AUC4  AUC5  AUC6  AUC7  AUC8  AUC9  AUC10  AUC11  AUC12  AUC13  AUC14  AUC15  AUC16  AUC17  AUC18  AUC19  AUC20  AUC21  AUC22  AUC23  AUC24  AUC25  AUC26  AUC27  AUC28  AUC29  AUC30  AUC31  AUC32  AUC33  AUC34  AUC35  AUC36  AUC37  AUC38  AUC39  AUC40  AUC41  AUC42  AUC43  AUC44  AUC45  AUC46  AUC47  AUC48  AUC49  AUC50  AUC51  AUC52  AUC53  AUC54  AUC55  AUC56  AUC57  AUC58  AUC59  AUC60  AUC61  AUC62  AUC63  AUC64  AUC65  AUC66  AUC67  AUC68  AUC69  AUC70  AUC71  AUC72  AUC73  AUC74  AUC75  AUC76  AUC77  AUC78  AUC79  AUC80  AUC81  AUC82  AUC83  AUC84  AUC85  AUC86  AUC87  AUC88  AUC89  AUC90  AUC91  AUC92  AUC93  AUC94  AUC95  AUC96  AUC97  AUC98  AUC99  AUC100  AUC101  AUC102  AUC103  AUC104  AUC105  AUC106  AUC107  AUC108  AUC109  AUC110  AUC111  AUC112  AUC113  AUC114  AUC115  AUC116  AUC117  AUC118  AUC119  AUC120  AUC121  AUC122  AUC123  AUC124  AUC125  AUC126  AUC127  AUC128  AUC129  AUC130  AUC131  AUC132  AUC133  AUC134  AUC135  AUC136  AUC137  AUC138  AUC139  AUC140  AUC141  AUC142  AUC143  AUC144  AUC145  AUC146  AUC147  AUC148  AUC149  AUC150  AUC151  AUC152  AUC153  AUC154  AUC155  AUC156  AUC157  AUC158  AUC159  AUC160  AUC161  AUC162  AUC163  AUC164  AUC165  AUC166  AUC167  AUC168  AUC169  AUC170  AUC171  AUC172  AUC173  AUC174  AUC175  AUC176  AUC177  AUC178  AUC179  AUC180  AUC181  AUC182  AUC183  AUC184  AUC185  AUC186  AUC187  AUC188  AUC189  AUC190  AUC191  AUC192  AUC193  AUC194  AUC195  AUC196  AUC197  AUC198  AUC199  AUC200  AUC201  AUC202  AUC203  AUC204  AUC205  AUC206  AUC207  AUC208  AUC209  AUC210  AUC211  AUC212  AUC213  AUC214  AUC215  AUC216  AUC217  AUC218  AUC219  AUC220  AUC221  AUC222  AUC223  AUC224  AUC225  AUC226  AUC227  AUC228  AUC229  AUC230  AUC231  AUC232  AUC233  AUC234  AUC235  AUC236  AUC237  AUC238  AUC239  AUC240  AUC241  AUC242  AUC243  AUC244  AUC245  AUC246  AUC247  AUC248  AUC249  AUC250  AUC251  AUC252  AUC253  AUC254  AUC255  AUC256  AUC257  AUC258  AUC259  AUC260  AUC261  AUC262  AUC263  AUC264  AUC265  AUC266  AUC267  AUC268  AUC269  AUC270  AUC271  AUC272  AUC273  AUC274  AUC275  AUC276  AUC277  AUC278  AUC279  AUC280  AUC281  AUC282  AUC283  AUC284  AUC285  AUC286  AUC287  AUC288  AUC289  AUC290  AUC291  AUC292  AUC293  AUC294  AUC295  AUC296  AUC297  AUC298  AUC299  AUC300  AUC301  AUC302  AUC303  AUC304  AUC305  AUC306  AUC307  AUC308  AUC309  AUC310  AUC311  AUC312  AUC313  AUC314  AUC315  AUC316  AUC317  AUC318  AUC319  AUC320  AUC321  AUC322  AUC323  AUC324  AUC325  AUC326  AUC327  AUC328  AUC329  AUC330  AUC331  AUC332  AUC333  AUC334  AUC335  AUC336  AUC337  AUC338  AUC339  AUC340  AUC341  AUC342  AUC343  AUC344  AUC345  AUC346  AUC347  AUC348  AUC349  AUC350  AUC351  AUC352  AUC353  AUC354  AUC355  AUC356  AUC357  AUC358  AUC359  AUC360  AUC361  AUC362  AUC363  AUC364  AUC365  AUC366  AUC367  AUC368  AUC369  AUC370  AUC371  AUC372  AUC373  AUC374  AUC375  AUC376  AUC377  AUC378  AUC379  AUC380  AUC381  AUC382  AUC383  AUC384  AUC385  AUC386  AUC387  AUC388  AUC389  AUC390  AUC391  AUC392  AUC393  AUC394  AUC395  AUC396  AUC397  AUC398  AUC399  AUC400  AUC401  AUC402  AUC403  AUC404  AUC405  AUC406  AUC407  AUC408  AUC409  AUC410  AUC411  AUC412  AUC413  AUC414  AUC415  AUC416  AUC417  AUC418  AUC419  AUC420  AUC421  AUC422  AUC423  AUC424  AUC425  AUC426  AUC427  AUC428  AUC429  AUC430  AUC431  AUC432  AUC433  AUC434  AUC435  AUC436  AUC437  AUC438  AUC439  AUC440  AUC441  AUC442  AUC443  AUC444  AUC445  AUC446  AUC447  AUC448  AUC449  AUC450  AUC451  AUC452  AUC453  AUC454  AUC455  AUC456  AUC457  AUC458  AUC459  AUC460  AUC461  AUC462  AUC463  AUC464  AUC465  AUC466  AUC467  AUC468  AUC469  AUC470  AUC471  AUC472  AUC473  AUC474  AUC475  AUC476  AUC477  AUC478  AUC479  AUC480  AUC481  AUC482  AUC483  AUC484  AUC485  AUC486  AUC487  AUC488  AUC489  AUC490  AUC491  AUC492  AUC493  AUC494  AUC495  AUC496  AUC497  AUC498  AUC499  AUC500  AUC501  AUC502  AUC503  AUC504  AUC505  AUC506  AUC507  AUC508  AUC509  AUC510  AUC511  AUC512  AUC513  AUC514  AUC515  AUC516  AUC517  AUC518  AUC519  AUC520  AUC521  AUC522  AUC523  AUC524  AUC525  AUC526  AUC527  AUC528  AUC529  AUC530  AUC531  AUC532  AUC533  AUC534  AUC535  AUC536  AUC537  AUC538  AUC539  AUC540  AUC541  AUC542  AUC543  AUC544  AUC545  AUC546  AUC547  AUC548  AUC549  AUC550  AUC551  AUC552  AUC553  AUC554  AUC555  AUC556  AUC557  AUC558  AUC559  AUC560  AUC561  AUC562  AUC563  AUC564  AUC565  AUC566  AUC567  AUC568  AUC569  AUC570  AUC571  AUC572  AUC573  AUC574  AUC575  AUC576  AUC577  AUC578  AUC579  AUC580  AUC581  AUC582  AUC583  AUC584  AUC585  AUC586  AUC587  AUC588  AUC589  AUC590  AUC591  AUC592  AUC593  AUC594  AUC595  AUC596  AUC597  AUC598  AUC599  AUC600  AUC601  AUC602  AUC603  AUC604  AUC605  AUC606  AUC607  AUC608  AUC609  AUC610  AUC611  AUC612  AUC613  AUC614  AUC615  AUC616  AUC617  AUC618  AUC619  AUC620  AUC621  AUC622  AUC623  AUC624  AUC625  AUC626  AUC627  AUC628  AUC629  AUC630  AUC631  AUC632  AUC633  AUC634  AUC635  AUC636  AUC637  AUC638  AUC639  AUC640  AUC641  AUC642  AUC643  AUC644  AUC645  AUC646  AUC647  AUC648  AUC649  AUC650  AUC651  AUC652  AUC653  AUC654  AUC655  AUC656  AUC657  AUC658  AUC659  AUC660  AUC661  AUC662  AUC663  AUC664  AUC665  AUC666  AUC667  AUC668  AUC669  AUC670  AUC671  AUC672  AUC673  AUC674  AUC675  AUC676  AUC677  AUC678  AUC679  AUC680  AUC681  AUC682  AUC683  AUC684  AUC685  AUC686  AUC687  AUC68
```

The screenshot shows the 'NMOS Senders - IS05 - Active' window. At the top right, it says 'NMOS Enabled: 192.168.10.254:80'. Below this, there are two sections for SFP E and SFP F. Each section has a header row with 'SFP E' or 'SFP F', 'VID', 'AUD 1', 'AUD 2', 'AUD 3', 'AUD 4', 'ANC', and 'VIDMOI'. Below the header, there is a table with 'key' and 'value' columns. The 'activation' key is expanded, showing a list of keys and their values.

SFP E	VID	AUD 1	AUD 2	AUD 3	AUD 4	ANC	VIDMOI
key							value
activation							
activation_time							1641995897.254319371
mode							activate_immediate
requested_time							
master_enable							true

SFP F	VID	AUD 1	AUD 2	AUD 3	AUD 4	ANC	VIDMOI
key							value
activation							
activation_time							1641995897.355052629
mode							activate_immediate
requested_time							
master_enable							true

## NMOS Receiver SDP

- Display of the active receiver SDP record
- User-configurable color highlighting for improved readability
- Display adapts with NMOS Dual or Single receiver configuration (single shown)

## NMOS Receiver IS-05

- Display of the active receiver IS-05 parameters
- Individual tabs display IS-05 parameters for each receiver flow
- Human readable tree view of the IS-05 JSON with expand/collapse for rapid navigation
- Display adapts with NMOS Dual or Single receiver configuration (single shown)

## NMOS Sender Status

- At a glance overview of the state of the Sender Master Enable, RTP Enables and SDP records for each media interface
- Available in 1/16 view - toggles with the SDP view
- Display of the Master, RTP and SDP of all Generator flows
- Display of the Master, RTP and SDP status of all monitor GUI Interface flows

NMOS	
NMOS Node	Enabled
DNS Search Domain	nmos.tv
Operating mode	Registered
Registration Discovery	Manual
Registration URL	http://192.168.10.254:8010/x-nmos/registratio...
Receiver mode	Dual interface
Sender mode	Single interface
Configure with IS-09	Disabled

## NMOS Sender SDP

- Display of the active sender SDP record
- User-configurable color highlighting for improved readability
- Display adapts with NMOS Dual or Single receiver configuration (dual shown)

Analysér - 2110 Format Setup		Analysér Interface: SFP	
VID	AUD		
	Auto	SDB	Override
Picture Dimensions	1920x1080	1920x1080	1920x1080
Frame Packing	Interlaced	Interlaced	Interlaced
Frame Rate	25	25	25
Colour Format	YCbCr	YCbCr	YCbCr
Sampling	422	422	422
Bit Depth	10	10	10
Range		Full Protect	Narrow
Transfer Curve		SDR	SDR
Colourimetry		BT709	BT709
1080x1080 150 YCbCr 422 10 FR BT709 SDR		TRD Default: 783 322	

## NMOS Sender IS-05

- Display of the active sender IS-05 parameters
- Individual tabs for the display of the IS-05 parameters for each generator and GUI sender flows
- Human readable tree view of the IS-05 JSON with expand/collapse for rapid navigation
- Display adapts with NMOS Dual or Single sender configuration (dual shown)

## NMOS Setup

- Manual, mDNS or DNS-SD discovery of the Registry with DHCP
- Status reporting of registration and DNS domain
- Independent configuration of sender and receiver as single or dual NMOS endpoints
- NMOS node Enable/Disable
- IS-09 PTP Domain Enable/Disable
- Selectable NMOS endpoints

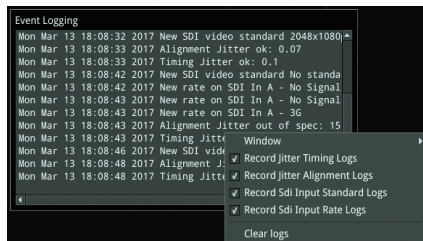
## 2110 Format Setup

- At a glance comparison of auto-detected, SDP and manual format settings
- User-configurable video format parameters for ST 2110-20 flows
- User-configurable audio format parameters for ST 2110-30/-31 flows includes packet time and channel count
- Automatic detection of audio format, channel count and packet time

# Remote Access



Various methods are provided to enable you to establish a remote connection with your LPX500, depending on your requirements.



LLDP Info	SFP1 Neighbour	SFP2 Neighbour	LLDP: Active
Sys Name	qx-022228	qx-022228	SIP-T48U
Sys Descr	PHABRIX LPX 1.0.0 2110	PHABRIX LPX 1.0.0 2110	108.85.179.10
Chassis ID	00:1F:7F:00:56:D4	00:1F:7F:00:56:D4	192.168.0.181
Port ID	00:1F:7F:02:56:d4	00:1F:7F:01:56:d4	80:5e:0c:58:88:3b
Port Descr	phabEth1	phabEth0	WAN PORT
Mgmt IP	192.168.0.103	192.168.0.103	
Primary VLAN	0	0	0

## noVNC

- Browser remote access using noVNC technology to deliver up to 16 simultaneous scalable instruments per display over a remote network

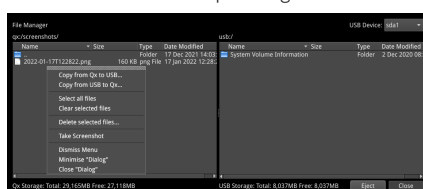
## Event Logger

- SDI Input standard/status
- SDI physical layer timing and alignment jitter
- IP-Tx, IP-Rx, Flow and SFP records
- Reference Locking
- Audio input presence
- SCTE and REST AP request logs

## LLDP

- Identify port and device to which the LPX500 IP interfaces are connected
- Restrict information communicated over LLDP for IT security purposes
- Available in both ST 2110 and ST 2022-6

Qx Network & Automation	
Interface	Up
MAC Address	00:1F:7F:00:56:78
IP Addressing Mode	Dynamic
IP Address	192.168.0.104
Gateway	192.168.0.1
Default Gateway	192.168.0.1
DNS Server	192.168.0.10
mDNS Server	qx-022136.local
REST API	Listening on port 8080
VNC Server	No Connections



## USB File Manager

- Copy presets, instrument logs, screenshots and user TIFF images to and from USB memory stick
- Delete selected files

## Mgmt Interface Config

- Manual or Dynamic Addressing modes
- mDNS and DNS
- Select Default Gateway from Media or Management interfaces

## Remote Connectivity



- File Transfer: FTP or Browser access to screenshots and PCAPs, User Test Patterns (TIFF), log files
- Remote Software Product Updates
- DisplayPort: UI video (1080p), UI audio (2-ch), local mouse
- SDI: UI video (1080p), UI audio (2-ch), local mouse
- noVNC: UI video (1080p high frame rate), remote mouse with screenshots
- KVM: HDMI or DVI (1080p compressed), remote mouse with screenshots
- ST 2110: UI (-20), Audio 2-ch (-30)
- Many KVM Options available - including Long Distance Connectivity, Cloud-based solutions, multiple access

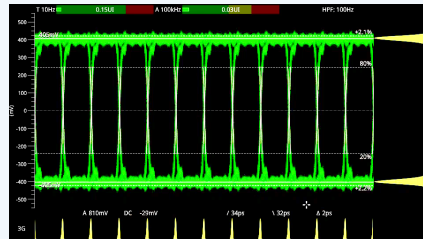
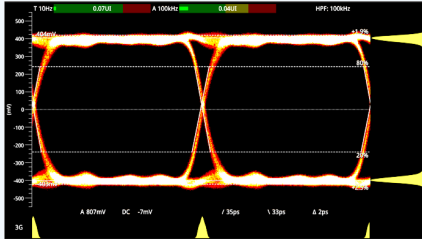


# Optional Toolsets



## Fast, automated 12G-SDI physical layer analysis [LPX500ISE]

The Physical Layer Toolset is a factory-fitted option for fast 12G/6G/3G/HD/SD-SDI physical layer commissioning, testing and development. Its RTE™ (Real-Time Eye) Technology instantly highlights any SMPTE compliance issues and its realtime SDI jitter window provides simultaneous monitoring across five specified frequency bands, jitter histogram and video trigger options. Built-in automation control allows testing to be performed faster, more reliably and at lower cost. Included in the option are a full range of SDI eye measurements including amplitude, DC offset, transition times, overshoot and health indication with both amplitude and time histograms, as well as choice of color, heat-map overlays and infinite persistence display.



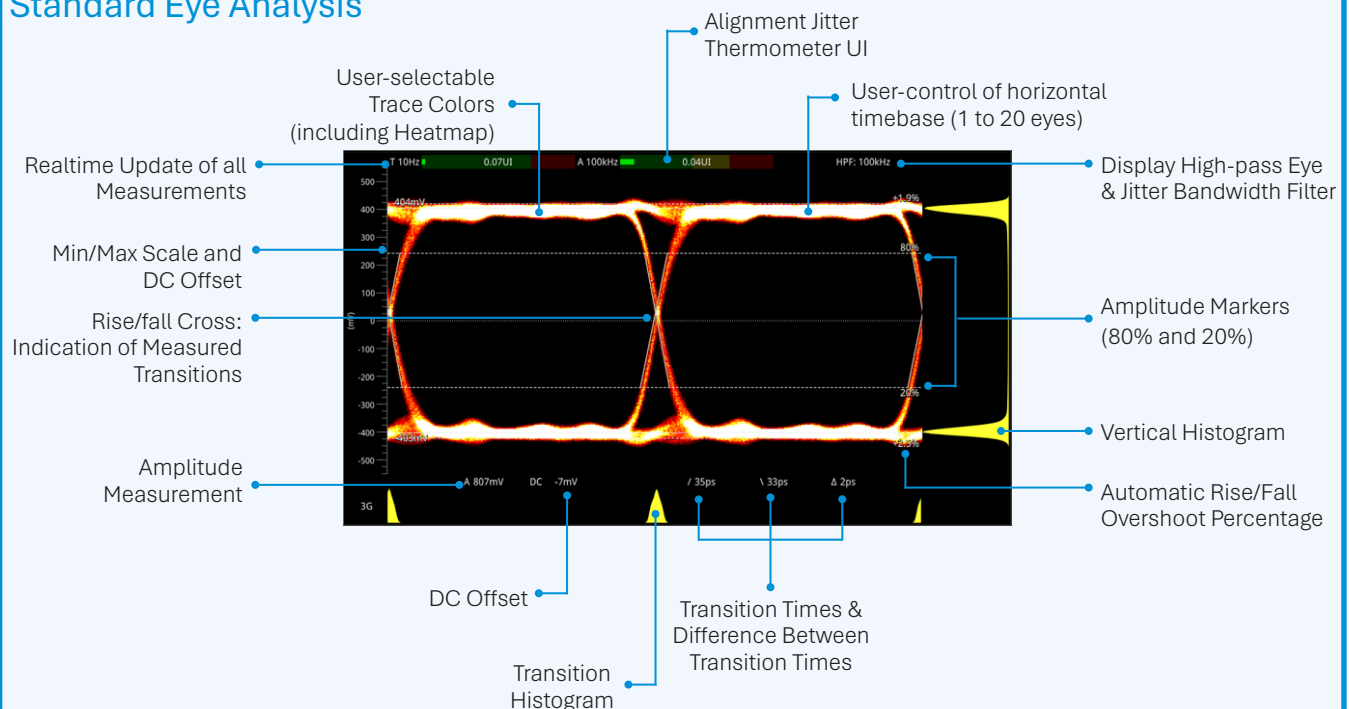
### SDI EYE Analysis

- RTE™ (Real-Time Eye) for testing SMPTE compliance with indication of DC offset
- Automatic measurements of: DC level, amplitude, rise and fall time, rise/fall overshoot, visual rise time indication
- Amplitude and time histograms
- Single or multiple eyes with choice of color, heat-map overlay and infinite persistence
- Timing and Alignment jitter thermometers
- User-definable time measurement cursors

### SDI Jitter Analysis

- Realtime SMPTE jitter measurements down to 10 Hz
- 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz filters
- H, 2H, F, V Trigger
- Persistence control none to infinite
- +/- 0.25 to +/- 64 UI vertical scale adjustment
- Jitter amplitude histogram

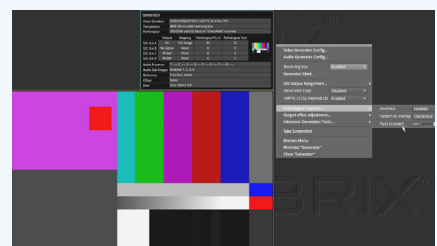
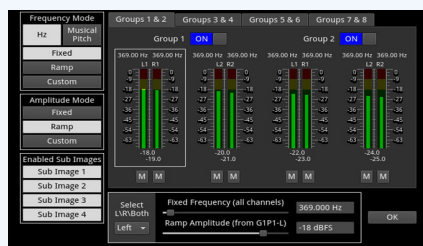
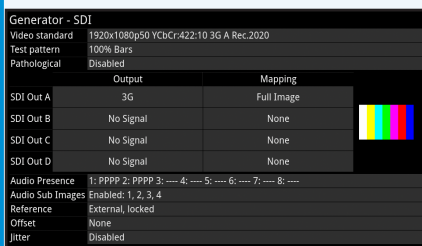
### Standard Eye Analysis



## Audio and Video Generation

[Requires LPX500-GEN]

Simultaneously generate and analyze a comprehensive set of SDI and IP formats with the audio and video generation option. Moving test patterns with up to 32 channels of embedded audio per link or sub-field (up to 64 channels on 12G interfaces) is included. The Generator toolset option provides not only the core full screen SDI Pathological stress patterns (Eq, PLL, Clk, CheckField), but uniquely also allows the user to define a percentage combination of the SDI pathological and conventional generator patterns up to full frame. Importing TIFF files for checking of HDR/WCG graphics or display and evaluation with user-created test images is also included. The LPX500 offers a ST 2110-20 2K/HD, 4K/UHD video flow generator, 2110-30/-31 64 channel audio generator and 2110-40 ANC flow generator. It can also generate both pattern and UI 2022-7 flow pairs. The GUI as a flow offers 1 x ST 2110-20 user interface video and 1 x 2110-30/-31 2.0 stereo monitoring bus audio with ST 2022-7. An IP Transmit configuration tool provides an at-a-glance view of transmitted flow status and selected formats.



### SDI Video Generation

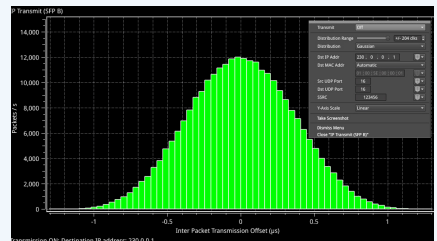
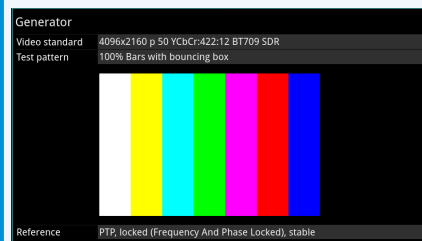
- Confirms generated Video Standard and Test Pattern details
- BNC output, SFP output and sub-image/full image mapping information
- Reporting of SDI-STRESS pathological insertion statistics
- Moving test patterns (bouncing box)
- Import/display TIFF images

### SDI Audio Generation

- Choice of fixed tones or chromatic scale – to assist channel identification
- Choice of fixed or ramp levels – to assist channel identification
- Custom config of number of active audio groups and channels
- Master gain control
- ST 2022-6: 32 channel audio generation can be replicated in all sub frames providing a total of up to 64 channels

### SDI Pathological Generation

- Conventional SDI pathological stress patterns, Eq, PLL and CheckField
- New proposed SMPTE combined pathological stress pattern: Eq + PLL + Color Bars + Clock
- Define a percentage combination of SMPTE or SDI pathological and conventional patterns up to full frame



### 2110 Video/ANC Gen

- 2110: Generate ST 2110/2022-7 Test Signals as a flow
- 2110: Monitor (GUI) as a flow
- 2110-20: 2K/HD, 4K/UHD video flow generator (422/444, YCbCr/RGB, 10/12-bit)
- 2110-40: 1 x ANC flow generator
- Timecode Generator ATC\_LTC, ATC\_VITC, locked to PTP or Local Time with Jam Sync and Drop Frame, VITC1/2 Reverse and signaling of SDI Line number and H Offset
- Import of TIFF images
- Bouncing Box pattern movement
- ST 2110-20 EUHD 47.95-60p RGB YCbCr 444 formats [requires LPX500-EUHD]

### 2110 Audio Generation

- 2110: Generate up to four ST 2110/2022-7 audio flows
- 2110-30/-31: Up to:
  - 64 audio channels 2110-30 at 125 µs
  - 60 audio channels 2110-31 at 125 µs
  - 8 audio channels 2110-30 at 1 ms
  - 6 audio channels 2110-31 at 1 ms

### IP Transmit (ST 2022-6)

- Evaluate the ability of a receiver to handle a ST 2022-6 flow with jitter
- Configuration of Transmission flow addresses, port numbers and SSRC
- Inter-packet jitter onto outgoing flow
- Gaussian or uniform distribution
- Flow control on/off

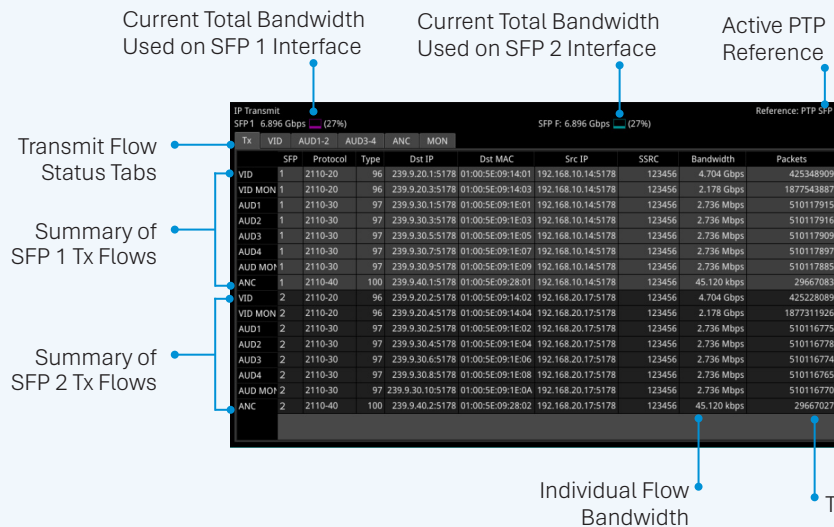
# Optional Toolsets

GEN

IP →

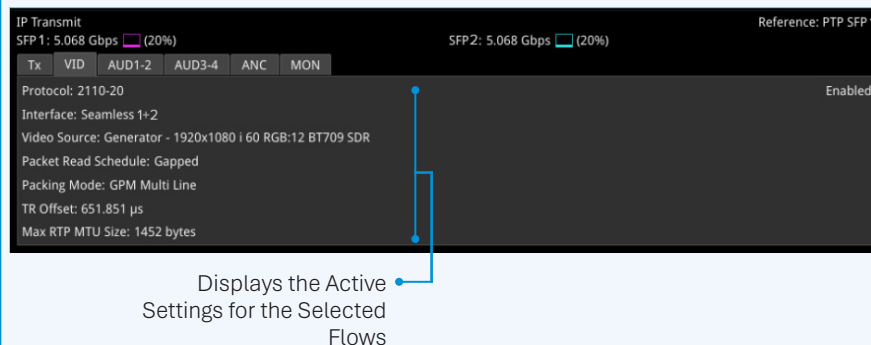
## Audio and Video Generation [LPX500-GEN]

### IP Transmit - Tx Status



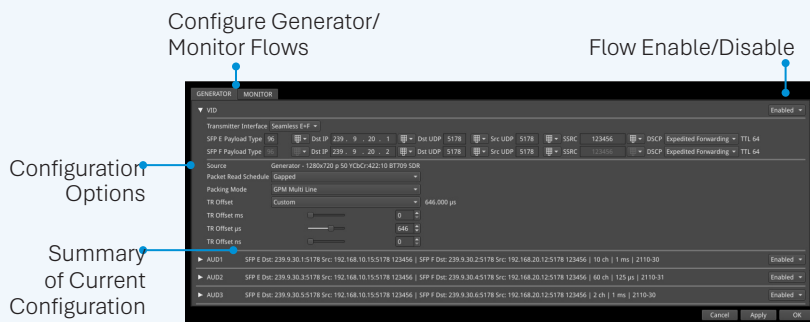
- At-a-glance status overview of all flows being encapsulated and transmitted
- Simultaneously transmit two different types of flow from the unit: Generator Flows and Monitor (GUI) Flows
- Displays a summary of the current status of all selected generator / monitor video, audio and ancillary flows being transmitted
- Use this tab as an overview of all flows actively being transmitted from the unit, together with the active PTP reference and an indication of bandwidth used by each stream and the total bandwidth used on each interface
- Displays the current information about the test pattern VID, AUD, ANC and monitor VID and AUD flows

### IP Transmit - VID, AUD1-2, AUD3-4, ANC, MON Status



- The VID tab displays the active settings for the Video Generator: Protocol, Interface, Video Source, Packet Read Schedule, Packing Mode, TR Offset
- The AUD1-2, AUD3-4 tabs shows the active settings for the transmitted audio flows: Protocol, Packet Time, Channels, Audio Source
- The ANC tab displays the active settings for the Video Generator flows: Protocol, Interface, Packet Packing, Keep Alive, Timecode, TR Offset
- The MON tab displays the active settings for transmission of the Monitor flows: Protocol, Interface, Video Source, Packet Read Schedule, Audio Source, Packet Time, Channels,

## Transmission Configuration



- List of available flows in an expandable list
- Each minimized flow provides a single line summary of the current settings for information
- Configure the VID, AUD1, AUD2, AUD3, AUD4 Generator Flows
- Configure the VID MON, AUD MON Monitor flows
- 2110-20: Gapped/Linear Packet Read Schedule, BPM/GPM Packing Mode
- SDI/Egress Time Stamp, user control of TR Offset
- 2110-40 ANC, Keep Alive and ATC-LTC or ATC-VITC Timecode locked to PTP or Local Time

# Optional Toolsets



## 4K/UHD ST 2110 Extended UHD Format Support

[LPX500-EUHD] (Also Requires LPX500-UHD)

Out of the box the LPX500 supports YCbCr 4:2:2 and YCbCr/RGB 444 formats in 2110-20 up to a max payload of approx 12 Gbps. If you are working with Extended Reality (xR), fixed installation LED walls and Graphics Card applications, then the LPX500-EUHD option provides support for Analysis and Generation of UHD/4K YCbCr/RGB 444 formats in the range 47.95P – 60P.

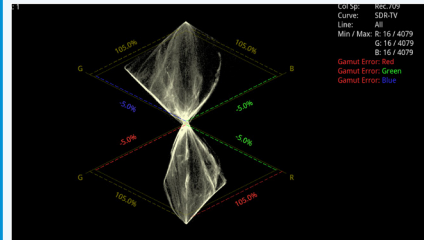


- Analysis of 2110-20 flows at UHD/4K 444 (RGB/YCbCr) 8/10/12 bit 47.95P-60P
- 4K60P RGB:12 Mean bandwidth approx. 20 Gbps (equivalent to a peak bandwidth of around 21 Gbps for a gapped flow)

## RGB Vector including Diamond Display

[LPX500-DIAM]

A brand new RGB Vector Display instrument provides a tool to monitor gamut violations in production environments.



- Monitor gamut violations
- Support for both RGB vector and split RGB vector views
- Switchable display modes between raw and interpolate. Raw displays the individual pixel dot values, interpolate joins adjacent pixels with a line
- Selectable EBU R103 low pass horizontal filtering
- Configurable alarms for gamut violations including alarms for exceeding 1% EBU
- R103, percentage of pixel area and lower / upper gamut threshold levels

## High Dynamic Range (HDR) Visualization & Analysis Toolset

[LPX500-HDR]

The LPX500's comprehensive HDR toolset includes a signal generator, CIE chart, Luma false color highlighting or heat map, waveform monitor and vectorscope. All the main live production SDR and HDR formats are supported: Standard Dynamic Range (SDR) BT.709, BT.2020 as well as HDR BT.2100 HLG, PQ, Sony S-Log3 and SR Live. The Waveform provides a Cd/m<sup>2</sup> (nits) graticule along with BT.2048 diffuse white markers. The flexible user controlled HDR heatmap offers 7 simultaneous programmable color overlay bands with presets for HDR and SDR ranges, plus a user custom preset. The CIE 1931 xy display provides overlays for BT.709, BT.2020 and ST.2086 gamut (P3) to enhance the visualization and analysis of your HDR / WCG content.

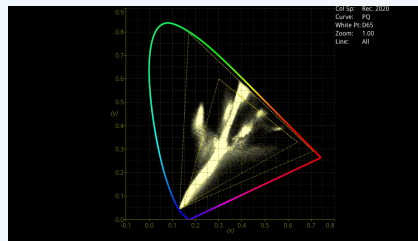
### HDR Generator

An extensive set of test patterns include BT.2111 HDR color bars for HLG, PQ, S-Log3 and SR Live as well as a full set of SDR 709 patterns mapped via display light to each of the four HDR formats for line checks, comparative monitor set-up and the evaluation of HDR to SDR converters.



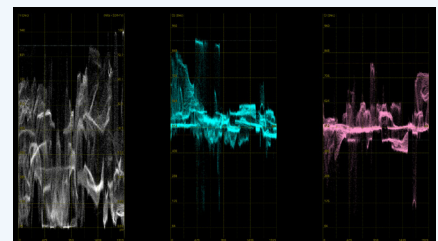
### False Color Highlighting

- Programmable Heat Map to highlight luminance zones providing quick identification of shadows, skin or mid-tones or specular highlights
- Seven simultaneous programmable color overlay bands
- Presets for HDR and SDR ranges plus user custom



### Analyzer - CIE Chart

- CIE 1931 xy display
- Single line mode linked to picture cursor
- Pan and zoom
- ITU-R BT. 709, BT. 2020 and ST 2086 gamut overlays
- Tooltip co-ordinate display
- Support for BT. 1886, BT. 2100 HLG and PQ, Sony S-Log3, SR Live



### HDR Waveform

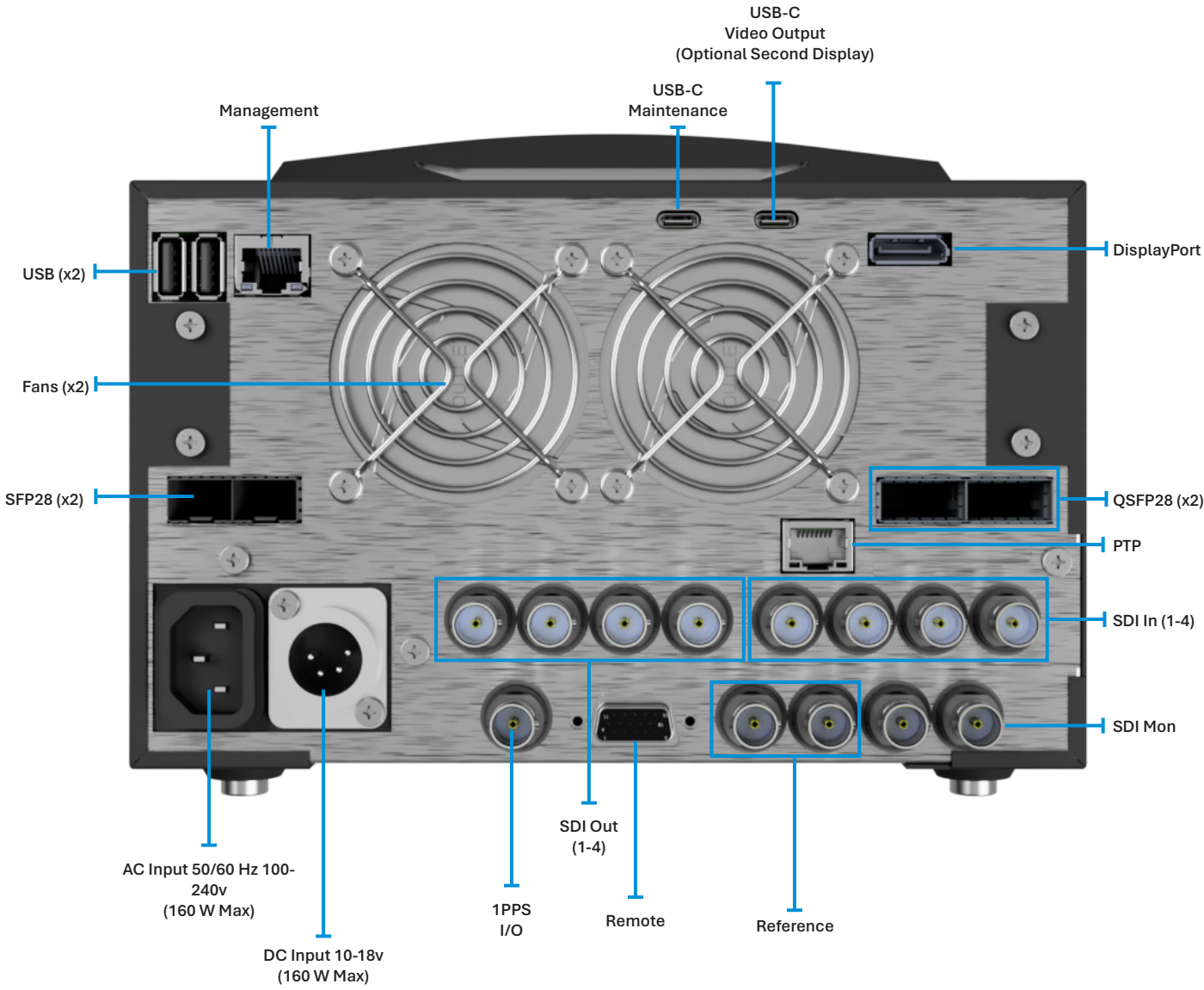
- Waveform HDR graticules with Nits (Cd/m<sup>2</sup>)
- BT. 2408 diffuse white markers
- Support for BT. 1886, BT. 2100 HLG and PQ, Sony S-Log3, SR Live



# Specifications

Formats supported (Generation, Analysis & Monitoring)		
ST 2110-20/-30/-31/-40 / 2022-7 / 2022-6 Analysis over 10G Ethernet		●
ST 2110-20/-30/-31/-40 / 2022-7 / 2022-6 Analysis over 25G Ethernet		○
ST 2110-20/-30/-31/-40 / 2022-7 / 2022-6 Analysis over 100G Ethernet		○
ST 2110-20/-30/-31/-40 / 2022-7 / 2022-6 Generation		○
SDI IO		Factory Option
270M / 1.5G / 3G-SDI HD / SD Analysis		Factory Option
1.5G / 3G-SDI HD Generation		○†
1.5G / 3G / 6G / 12G-SDI UHD Over SDI		○†
25G IP Link Rates Over SFP28		○
100G IP Link Rates Over QSFP28		○
Hardware and Software Options Supported		
Audio / Video Generator (SDI, ST 2022-6, ST 2110)		○ (SDI, 2022-6, 2110)
RTE™ Real-Time Eye input (12G/6G/3G/HD/SD-SDI) x 1 (SDI in 1) BNC		Factory Option
UHD / 4K Upgrade		○ (SDI, 2110)
Data View Analyzer, ANC Status and ANC Inspector		●
32 Channel Audio Metering and 5.1/2.0 Loudness Measurement		●
64 Channel Audio Metering and 5.1/2.0 Loudness Measurement		○ (Requires LPX500-QUAD)
HDR/WCG Support		○
ST 2022-6, ST 2110/20/30/31/40 Decap with Class C Audio, ST 2022-7, Single PTP		●
ST 2110 Network Traffic Measurement Toolset		○
ST 2110-20/30/31/40 Generator Toolset with Class C Audio, ST 2022-7		○
PCAP		○
EUHD Formats over 25G 2110-20		○
RGB Vector including Diamond display		○
SDI inputs / outputs		
4 x SDI inputs, SD / HD / 3G / 6G / 12G, 75 ohm terminated BNC		Factory Option
4 x SDI outputs, HD / 3G / 6G / 12G, 75 ohm BNC		Factory Option
Ethernet inputs / outputs (accepts MSA SFPs and QSFPs)		
2 x SFP28, supporting 10G (standard) and 25G cages (optional)		● (25G license optional)
2 x QSFP28 100G cages		● (100G license optional)
Audio inputs / outputs		
2 channel 48 kHz PCM audio on DisplayPort and SDI Instrument output		●
User interface		
Integrated 1920 x 1200 8 inch LCD multitouch touchscreen		●
USB-C DisplayPort Alt Mode for secondary 8-inch touchscreen		○
DisplayPort instrument output, 1920 x 1080, 4:4:4 RGB, Type A*		DisplayPort
SDI 3Gbit instrument out, 1920 x 1080, 4:2:2 YCbCr*		BNC
ST 2110-20, ST 2110-30 instrument out, 1920 x 1080, 4:2:2 YCbCr*		●
Remote Browser GUI access (noVNC)*		●
Reference		
1 x 75 ohm BNC reference input, tri-level or B&B with cross lock		●
Networking & control		
10/100/1000 BASE-T		●
Leader Remote Interface (15 pin high-density D-Type socket)		●
Monitoring		
Headphone Socket (3.5mm)		●
Form factor		
LPX500 Size (Width x Height x Depth - excluding projections)		210mm x 128mm x 125 mm
Weight		3.6Kg
LPX500 Extended Monitor Size (Width x Height x Depth - excluding projections)		210mm x 125mm x 45mm
LPX500 Extended Monitor Size (Width x Height x Depth - excluding projections)		1.4Kg
Electrical		
4 pin XLR DC power connector		11v - 18v, Typ. 85W, Max. 120W
Internal AC power supply with IEC connector		100-240 VAC, Typ. 85W, Max. 120W
Warranty		
Warranty (1 year)		●
Extended Warranty Package (3 - 5 years)		○

# Rear Panel - IO View



# Ordering LPX500

## LPX500 Chassis Options

LPX500I*	3U SD/HD/2K 10GbE IP Waveform Monitor/Analyser
LPX500IS	3U SD/HD/2K 10GbE IP/SDI Waveform Monitor/Analyser
LPX500ISE	3U SD/HD/2K 10GbE IP/SDI Waveform Monitor/Analyser, Eye/Jitter

## LPX500 Chassis Upgrades (Return to Factory)

LPX500M-IS	LPX500 SDI/IO Return to factory upgrade (requires LPX500I)
LPX500M-ISE	LPX500 SDI Eye/Jitter Return to factory upgrade (requires LPX500IS)

## Hardware Option

LPX500-EM	Extended Monitor providing a secondary screen
-----------	---

## Software Options for IP/SDI

LPX500-GEN	SDI/IP AV Test Signal Generator (SDI requires LPX500IS or LPX500ISE)
LPX500-UHD	2K Extended + UHD/4K IP/SDI (SDI requires LPX500IS or LPX500ISE)
LPX500-HDR	HDR/WCG, CIE1931, HDR Heat map (PQ, HLG, S-Log3, SR Live)
LPX500-QUAD	Display 4 inputs simultaneously
LPX500-DIAM*	RGB Vector including Diamond Display

## Software Options for IP

LPX500-IP-25G*	25GbE media network (requires 2x PHSFP-25GE-SR or 2x PHSFP-25GE-LR)
LPX500-IP-100G*	100GbE media network (requires 2x PHSFP-100GE-SR or 2x PHSFP-100GE-LR)
LPX500-IP-EUHD*	Add RGB, 12b, 444, 48-60Hz formats to ST2110 (requires LPX500-UHD)

## LPX500 Fitting Kits

LPX500-K1	3U 19 inch rackmount kit (1x LPX500 Chassis)
LPX500-K2	3U 19 inch rackmount kit (2x LPX500 Chassis)
LPX500-K3	LPX500 desktop kit (Carry case & Feet)*

## Cables

PHQXC-1	12G-SDI Eye measurement test cable 1m
---------	---------------------------------------

## SFP Accessories

PHSFP-10GE-SR*	SFP+ 10GBASE-SR Ethernet MM 850nm 300m
PHSFP-10GE-LR*	SFP+ 10GBASE-LR Ethernet SM 1310nm 10km
PHSFP-25GE-SR*	SFP28 25GBASE-SR Ethernet MM 850nm 100m
PHSFP-25GE-LR*	SFP28 25GBASE-LR Ethernet SM 1310nm 10km
PHSFP-100GE-SR*	QSFP28 100GBASE-SR4 Ethernet MM 850nm 100m
PHSFP-100GE-LR*	QSFP28 100GBASE-LR4 Ethernet SM 1310nm 10km

## LPX500 Extended Warranty

LPX500I-3YEAR	LPX500I Upgrade from 1 to 3 Year Warranty (excludes SFP)
LPX500I-5YEAR	LPX500I Upgrade from 1 to 5 Year Warranty (excludes SFP)
LPX500IS-3YEAR	LPX500IS Upgrade from 1 to 3 Year Warranty (excludes SFP)
LPX500IS-5YEAR	LPX500IS Upgrade from 1 to 5 Year Warranty (excludes SFP)
LPX500ISE-3YEAR	LPX500ISE Upgrade from 1 to 3 Year Warranty (excludes SFP)
LPX500ISE-5YEAR	LPX500ISE Upgrade from 1 to 5 Year Warranty (excludes SFP)

\* Upcoming Release

# Supported 2K/HD/SD SDI Formats

The following SDI formats are available on LPX500.

[LPX500IS / LPX500ISE]

SMPTE Stnds. Link (Content)	Interface	Resolution	Sampling Structure	Pixel Depth	Frame/Field Rate	HDR†	SDI‡	2022-6
ST 259 (ST 125)	SD (625i)	720 x 576	4:2:2 (YCbCr)	10	50i	-	OA	A
ST 259 (ST 125)	SD (525i)	720 x 485	4:2:2 (YCbCr)	10	59.94i	-	OA	A
ST 292 (ST 296)	HD	1280 x 720	4:2:2 (YCbCr)	10	60p, 59.94p, 50p, 30p, 29.97p, 25p,	○●	○●	●
ST 292 (ST 274)	HD	1920 x 1080	4:2:2 (YCbCr)	10	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	●
ST 292 (RP 211)	HD	1920 x 1080	4:2:2 (YCbCr)	10	30psF, 29.97PsF, 25psF, 24PsF, 23.98PsF	○●	○●	●
ST 292 (ST 2048-2)	HD	2048 x 1080	4:2:2 (YCbCr)	10	30p, 29.97p, 25p, 24p, 23.98p, 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	○●	○●	●
ST 372 (ST 274)	Dual Link HD	1920 x 1080	4:2:2 (YCbCr)	10	60p, 59.94p, 50p	○●	○●	-
ST 372 (ST 274)	Dual Link HD	1920 x 1080	4:4:4 (YCbCr/RGB) 4:4:4:4 (YCbCrA/RGBA)	10	60i, 59.94i, 50i, 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	-
ST 372 (ST 274)	Dual Link HD	1920 x 1080	4:4:4 (YCbCr/RGB)	12	60i, 59.94i, 50i 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	-
ST 372 (ST 274)	Dual Link HD	1920 x 1080	4:2:2 (YCbCr)	12	60i, 59.94i, 50i, 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	-
ST 372 (ST 2048-2)	Dual Link HD	2048 x 1080	4:2:2 (YCbCr)	10	60p, 59.94p, 50p, 48p, 47.95p	○●	○●	-
ST 372 (ST 2048-2)	Dual Link HD	2048 x 1080	4:4:4 (YCbCr/RGB) 4:4:4:4 (YCbCrA/RGBA)	10	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	-
ST 372 (ST 2048-2)	Dual Link HD	2048 x 1080	4:4:4 (YCbCr/RGB)	12	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	-
ST 372 (ST 2048-2)	Dual Link HD	2048 x 1080	4:2:2 (YCbCr) 4:2:2:4 (YCbCrA)	12	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	-
ST 425-1 (ST 274)	3G Level A (1)	1920 x 1080	4:2:2 (YCbCr)	10	60p, 59.94p, 50p	○●	○●	●
ST 425-1 (ST 2048-2)	3G Level A (1)	2048 x 1080	4:2:2 (YCbCr)	10	60p, 59.94p, 50p, 48p, 47.95p	○●	○●	●
ST 425-1 (ST 296)	3G Level A (2)	1280 x 720	4:4:4 (YCbCr/RGB) 4:4:4:4 (YCbCrA/RGBA)	10	60p, 59.94p, 50p, 30p, 29.97p	○●	○●	●
ST 425-1 (ST 274)	3G Level A (2)	1920 x 1080	4:4:4 (YCbCr/RGB) 4:4:4:4 (YCbCrA/RGBA)	10	60i, 59.94i, 50i, 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	●
ST 425-1 (ST 2048-2)	3G Level A (2)	2048 x 1080	4:4:4 (YCbCr/RGB) 4:4:4:4 (YCbCrA/RGBA)	10	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	●
ST 425-1 (ST 274)	3G Level A (3)	1920 x 1080	4:4:4 (YCbCr/RGB)	12	60i, 59.94i, 50i, 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	●
ST 425-1 (ST 2048-2)	3G Level A (3)	2048 x 1080	4:4:4 (YCbCr/RGB)	12	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	●
ST 425-1 (ST 274)	3G Level A (4)	1920 x 1080	4:2:2 (YCbCr)	12	60i, 59.94i, 50i, 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	●
ST 425-1 (ST 2048-2)	3G Level A (4)	2048 x 1080	4:2:2 (YCbCr) 4:2:2:4 (YCbCrA)	12	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	●
ST 425-1 (ST 274)	3G Level B-DL (I)	1920 x 1080	4:2:2 (YCbCr)	10	60p, 59.94p, 50p	○●	○●	●
ST 425-1 (ST 2048-2)	3G Level B-DL (I)	2048 x 1080	4:2:2 (YCbCr)	10	60p, 59.94p, 50p, 48p, 47.95p	○●	○●	●
ST 425-1 (ST 274)	3G Level B-DL (II)	1920 x 1080	4:4:4 (YCbCr/RGB) 4:4:4:4 (YCbCrA/RGBA)	10	60i, 59.94i, 50i, 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	●
ST 425-1 (ST 2048-2)	3G Level B-DL (II)	2048 x 1080	4:4:4 (YCbCr/RGB) 4:4:4:4 (YCbCrA/RGBA)	10	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	●
ST 425-1 (ST 274)	3G Level B-DL (III)	1920 x 1080	4:4:4 (YCbCr/RGB)	12	60i, 59.94i, 50i, 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	●
ST 425-1 (ST 2048-2)	3G Level B-DL (III)	2048 x 1080	4:4:4 (YCbCr/RGB)	12	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	●
ST 425-1 (ST 274)	3G Level B-DL (IV)	1920 x 1080	4:2:2 (YCbCr)	12	60i, 59.94i, 50i, 30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	●
ST 425-1 (ST 2048-2)	3G Level B-DL (IV)	2048 x 1080	4:2:2 (YCbCr) 4:2:2:4 (YCbCrA)	12	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF 30p, 29.97p, 25p, 24p, 23.98p	○●	○●	●

## KEY

- - Generator with LPX500-GEN option and Analyzer
- - Optional
- - Optional Generator with LPX500-GEN option and Analyzer
- A - Analyzer Only
- '-' - Not Available

† Note: Optional HDR formats require LPX500-HDR

‡ Note: SDI formats require LPX500IS / LPX500ISE



# Supported 2K/HD/SD IP Formats

The following 2K/HD/SD ST 2110-20 formats are provided as standard.  
[LPX500I / LPX500IS / LPX500ISE]

Resolution	Sampling Structure	Pixel Depth	Frame/Field Rate	2110 HDR†	2110 SDR
720 x 576	4:2:2 (YCbCr)	10	50i	-	A
720 x 485	4:2:2 (YCbCr)	10	59.94i	-	A
1280 x 720	4:2:2 (YCbCr)	8	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	OA	A
1280 x 720	4:2:2 (YCbCr)	10	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	O●	●
1280 x 720	4:4:4(YCbCr/RGB)	8	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	OA	A
1280 x 720	4:4:4(YCbCr/RGB)	10	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	O●	●
1920 x 1080	4:2:2(YCbCr)	8	60I, 59.94I, 50I	OA	A
1920 x 1080	4:2:2 (YCbCr)	10	60i, 59.94i, 50i	O●	●
1920 x 1080	4:2:2(YCbCr)	12	60I, 59.94I, 50I	O●	●
1920 x 1080	4:4:4(YCbCr/RGB)	8	60I, 59.94I, 50I	OA	A
1920 x 1080	4:4:4(YCbCr/RGB)	10	60I, 59.94I, 50I	O●	●
1920 x 1080	4:4:4(YCbCr/RGB)	12	60I, 59.94I, 50I	O●	●
1920 x 1080	4:2:2 (YCbCr)	8	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	OA	A
1920 x 1080	4:2:2 (YCbCr)	10	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	O●	●
1920 x 1080	4:2:2 (YCbCr)	12	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	O●	●
1920 x 1080	4:4:4(YCbCr/RGB)	8	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	OA	A
1920 x 1080	4:4:4(YCbCr/RGB)	10	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	O●	●
1920 x 1080	4:4:4(YCbCr/RGB)	12	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	O●	●
1920 x 1080	4:2:2 (YCbCr)	8	30PsF, 29.97PsF, 25PsF, 24PsF, 23.97PsF	OA	A
1920 x 1080	4:2:2 (YCbCr)	10	30PsF, 29.97PsF, 25PsF, 24PsF, 23.98PsF	O●	●
1920 x 1080	4:2:2 (YCbCr)	12	30PsF, 29.97PsF, 25PsF, 24PsF, 23.97PsF	O●	●
1920 x 1080	4:4:4(YCbCr/RGB)	8	30PsF, 29.97PsF, 25PsF, 24psF, 23.97PsF	OA	A
1920 x 1080	4:4:4(YCbCr/RGB)	10	30psF, 29.97psF, 25psF, 24PsF, 23.97PsF	O●	●
1920 x 1080	4:4:4(YCbCr/RGB)	12	30PsF, 29.97PsF, 25PsF, 24PsF, 23.97PsF	O●	●
2048 x 1080	4:2:2 (YCbCr)	8	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	OA	A
2048 x 1080	4:2:2 (YCbCr)	10	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	O●	●
2048 x 1080	4:2:2 (YCbCr)	12	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	O●	●
2048 x 1080	4:4:4(YCbCr/RGB)	8	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	OA	A
2048 x 1080	4:4:4(YCbCr/RGB)	10	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	O●	●
2048 x 1080	4:4:4(YCbCr/RGB)	12	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	O●	●
2048 x 1080	4:2:2(YCbCr)	8	30PsF, 29.97PsF, 25PsF, 24PsF, 23.97PsF	OA	A
2048 x 1080	4:2:2(YCbCr)	10	30PsF, 29.97PsF, 25PsF, 24PsF, 23.97PsF	O●	●
2048 x 1080	4:2:2(YCbCr)	12	30PsF, 29.97PsF, 25PsF, 24PsF, 23.97PsF	O●	●
2048 x 1080	4:4:4(YCbCr/RGB)	8	30PsF, 29.97PsF, 25PsF, 24PsF, 23.97PsF	OA	A
2048 x 1080	4:4:4(YCbCr/RGB)	10	30PsF, 29.97PsF, 25PsF, 24PsF, 23.97PsF	O●	●
2048 x 1080	4:4:4(YCbCr/RGB)	12	30PsF, 29.97PsF, 25PsF, 24PsF, 23.97PsF	O●	●

## KEY

● - Generator with LPX500-GEN option and Analyzer

O - Optional

O● - Optional Generator with LPX500-GEN option and Analyzer

A - Analyzer Only

'-' - Not Available

† Note: Optional HDR formats require LPX500-HDR

# Supported 4K/UHD Formats

The following SDI formats are optional LPX500.

[LPX500-UHD + LPX500IS / LPX500ISE]

SMPTE Stnds. Link (Content)	Interface	Resolution	Sampling Structure	Pixel Depth	Frame/Field Rate	SDI HDR†	SDI SDR
ST 425-3 Annex B.1 (ST 2036-1)	Quad-link HD-SQ	3840 x 2160	4:2:2 (YCbCr)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-3 Annex B.1 (ST 2048-1)	Quad-link HD-SQ	4096 x 2160	4:2:2 (YCbCr)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-3 Annex B.2, (ST 2036-1)	Dual 3G-B-DS	3840 x 2160	4:2:2 (YCbCr)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-3 Annex B.2, (ST 2048-1)	Dual 3G-B-DS	4096 x 2160	4:2:2 (YCbCr)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2081-10 M1 (ST 2036-1)	6G-2SI	3840 x 2160	4:2:2 (YCbCr)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2081-10 M1 (ST 2048-1)	6G-2SI	4096 x 2160	4:2:2 (YCbCr)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-5 (ST 2036-1)	Quad-link 3G-A, B (1) 2SI	3840 x 2160	4:2:2 (YCbCr)	10	60p, 59.94p, 50p	○●	○●
ST 425-5 (ST 2048-1)	Quad-link 3G-A, B (1) 2SI	4096 x 2160	4:2:2 (YCbCr)	10	60p, 59.94p, 50p, 48p, 47.95p	○●	○●
ST 425-5 (ST 2036-1)	Quad-link 3G-A, B (2) 2SI	3840 x 2160	4:4:4 (YCbCr/RGB)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-5 (ST 2048-1)	Quad-link 3G-A, B (2) 2SI	4096 x 2160	4:4:4 (YCbCr/RGB) 4:4:4:4 (YCbCrA/RGBA)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-5 (ST 2036-1)	Quad-link 3G-A, B (3) 2SI	3840 x 2160	4:4:4 (YCbCr/RGB)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-5 (ST 2048-1)	Quad-link 3G-A, B (3) 2SI	4096 x 2160	4:4:4 (YCbCr/RGB)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-5 (ST 2036-1)	Quad-link 3G-A, B (4) 2SI	3840 x 2160	4:2:2 (YCbCr)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-5 (ST 2048-1)	Quad-link 3G-A, B (4) 2SI	4096 x 2160	4:2:2:4 (YCbCrA)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-5 Annex B (ST 2036-1)	Quad-link 3G-A, B (1) SQ	3840 x 2160	4:2:2 (YCbCr)	10	60p, 59.94p, 50p	○●	○●
ST 425-5 Annex B (ST 2048-1)	Quad-link 3G-A, B (1) SQ	4096 x 2160	4:2:2 (YCbCr)	10	60p, 59.94p, 50p, 48p, 47.95p	○●	○●
ST 425-5 Annex B (ST 2036-1)	Quad-link 3G-A, B (2) SQ	3840 x 2160	4:4:4 (YCbCr/RGB)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-5 Annex B, (ST 2048-1)	Quad-link 3G-A, B (2) SQ	4096 x 2160	4:4:4 (YCbCr/RGB) 4:4:4:4 (YCbCrA/RGBA)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-5 Annex B (ST 2036-1)	Quad-link 3G-A, B (3) SQ	3840 x 2160	4:4:4 (YCbCr/RGB)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-5 Annex B, (ST 2048-1)	Quad-link 3G-A, B (3) SQ	4096 x 2160	4:4:4 (YCbCr/RGB)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-5 Annex B (ST 2036-1)	Quad-link 3G-A, B (4) SQ	3840 x 2160	4:2:2 (YCbCr)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 425-5 Annex B (ST 2048-1)	Quad-link 3G-A, B (4) SQ	4096 x 2160	4:2:2 (YCbCr) 4:2:2:4 (YCbCrA)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2081-11 M1, ST 425-5 (ST 2036-1)	Dual-link 6G-2SI (I)	3840 x 2160	4:2:2 (YCbCr)	10	60p, 59.94p, 50p	○●	○●
ST 2081-11 M1, ST 425-5 (ST 2048-1)	Dual-link 6G-2SI (I)	4096 x 2160	4:2:2 (YCbCr)	10	60p, 59.94p, 50p, 48p, 47.95p	○●	○●
ST 2081-11 M1, ST 425-5 (ST 2036-1)	Dual-link 6G-2SI (II)	3840 x 2160	4:4:4 (YCbCr/RGB)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2081-11 M1, ST 425-5 (ST 2048-1)	Dual-link 6G-2SI (II)	4096 x 2160	4:4:4 (YCbCr/RGB) 4:4:4:4 (YCbCrA/RGBA)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2081-11 M1 ST 425-5 (ST 2036-1)	Dual-link 6G-2SI (III)	3840 x 2160	4:4:4 (YCbCr/RGB)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2081-11 M1, ST 425-5 (ST 2048-1)	Dual-link 6G-2SI (III)	4096 x 2160	4:4:4 (YCbCr/RGB)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2081-11 M1 ST 425-5 (ST 2036-1)	Dual-link 6G-2SI (IV)	3840 x 2160	4:2:2 (YCbCr/RGB)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2081-11 M1 ST 425-5 (ST 2048-1)	Dual-link 6G-2SI (IV)	4096 x 2160	4:2:2 (YCbCr) 4:2:2:4 (YCbCrA)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2082-10 M1, ST 425-5 (ST 2036-1)	12G-2SI (I)	3840 x 2160	4:2:2 (YCbCr)	10	60p, 59.94p, 50p	○●	○●
ST 2082-10 M1, ST 425-5 (ST 2048-1)	12G-2SI (I)	4096 x 2160	4:2:2 (YCbCr)	10	60p, 59.94p, 50p, 48p, 47.95p	○●	○●
ST 2082-10 M1 ST 425-5 (ST 2036-1)	12G-2SI (II)	3840 x 2160	4:4:4 (YCbCr/RGB) 4:4:4:4 (YCbCrA/RGBA)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2082-10 M1 ST 425-5 (ST 2048-1)	12G-2SI (II)	4096 x 2160	4:4:4 (YCbCr/RGB) 4:4:4:4 (YCbCrA/RGBA)	10	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2082-10 M1 ST 425-5 (ST 2036-1)	12G-2SI (III)	3840 x 2160	4:4:4 (YCbCr/RGB)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2082-10 M1 ST 425-5 (ST 2048-1)	12G-2SI (III)	4096 x 2160	4:4:4 (YCbCr/RGB)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2082-10 M1 ST 425-5 (ST 2036-1)	12G-2SI (IV)	3840 x 2160	4:2:2 (YCbCr) 4:2:2:4 (YCbCrA)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●
ST 2082-10 M1 ST 425-5 (ST 2048-1)	12G-2SI (IV)	4096 x 2160	4:2:2 (YCbCr) 4:2:2:4 (YCbCrA)	12	30p, 29.97p, 25p, 24p, 23.98p	○●	○●

KEY

○ - Optional

○● - Optional Generator with LPX500-GEN option and Analyzer

† Note: Optional HDR formats require LPX500-HDR

# Supported 4K/UHD IP Formats

The following 4K/UHD ST 2110-20 formats are optional with:  
LPX500-IP-25G and LPX500-UHD.

Resolution	Sampling Structure	Pixel Depth	Frame/Field Rate	2110 HDR†	2110 SDR
3840 x 2160	4:2:2 (YCbCr)	8	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	OA	A
3840 x 2160	4:2:2 (YCbCr)	10	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	O●	●
3840 x 2160	4:2:2 (YCbCr)	12	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	O●	●
3840 x 2160	4:4:4(YCbCr/RGB)	8	30p, 29.97p, 25p, 24p, 23.98p	OA	A
3840 x 2160	4:4:4(YCbCr/RGB)	10	30p, 29.97p, 25p, 24p, 23.98p	O●	●
3840 x 2160	4:4:4(YCbCr/RGB)	12	30p, 29.97p, 25p, 24p, 23.98p	O●	●
4096 x 2160	4:2:2(YCbCr)	8	60p, 59.94p, 50p, 48p, 47.97p, 30p, 29.97p, 25p, 24p, 23.98p	OA	A
4096 x 2160	4:2:2 (YCbCr)	10	60p, 59.94p, 50p, 48p, 47.95p , 30p, 29.97p, 25p, 24p, 23.98p	O●	●
4096 x 2160	4:2:2 (YCbCr)	12	60p, 59.94p, 50p, 48p, 47.95p , 30p, 29.97p, 25p, 24p, 23.98p	O●	●
4096 x 2160	4:4:4(YCbCr/RGB)	8	30p, 29.97p, 25p, 24p, 23.98p	OA	A
4096 x 2160	4:4:4(YCbCr/RGB)	10	30p, 29.97p, 25p, 24p, 23.98p	O●	●
4096 x 2160	4:4:4(YCbCr/RGB)	12	30p, 29.97p, 25p, 24p, 23.98p	O●	●

The following 4K/UHD ST 2110-20 extended formats are optional with:  
LPX500-IP-25G, LPX500-UHD and LPX500-EUHD.

Resolution	Sampling Structure	Pixel Depth	Frame/Field Rate	2110 HDR†	2110 SDR
3840 x 2160	RGB:444	8	60p, 59.94p, 50p, 48p, 47.97p	OA	OA
3840 x 2160	RGB:444	10	60p, 59.94p, 50p, 48p, 47.97p	O●	O●
3840 x 2160	RGB:444	12	60p, 59.94p, 50p, 48p, 47.97p	O●	O●
3840 x 2160	YCbCr:444	8	60p, 59.94p, 50p, 48p, 47.97p	OA	OA
3840 x 2160	YCbCr:444	10	60p, 59.94p, 50p, 48p, 47.97p	O●	O●
3840 x 2160	YCbCr:444	12	60p, 59.94p, 50p, 48p, 47.97p	O●	O●

## 4K Formats

4096 x 2160	RGB:444	8	60p, 59.94p, 50p, 48p, 47.97p	OA	OA
4096 x 2160	RGB:444	10	60p, 59.94p, 50p, 48p, 47.97p	O●	O●
4096 x 2160	RGB:444	12	60p, 59.94p, 50p, 48p, 47.97p	O●	O●
4096 x 2160	YCbCr:444	8	60p, 59.94p, 50p, 48p, 47.97p	OA	OA
4096 x 2160	YCbCr:444	10	60p, 59.94p, 50p, 48p, 47.97p	O●	O●
4096 x 2160	YCbCr:444	12	60p, 59.94p, 50p, 48p, 47.97p	O●	O●

## KEY

- - Generator with LPX500-GEN option and Analyzer
- O - Optional
- O● - Optional Generator with LPX500-GEN option and Analyzer
- A - Analyzer Only
- OA - Optional Analyzer

† Note: Optional HDR formats require LPX500-HDR



[www.leaderphabrix.com](http://www.leaderphabrix.com)



This brochure is to be used for informational use only and is subject to change without notice and should not be construed as commitment by Leader Electronics of Europe Limited. Leader Electronics of Europe Limited assumes no responsibility or liability for errors or inaccuracies that may appear in this brochure. This is a preliminary release document; the content, features and images are subject to change. Please visit [www.leaderphabrix.com](http://www.leaderphabrix.com) for latest product information.

March 2025