Qx Series

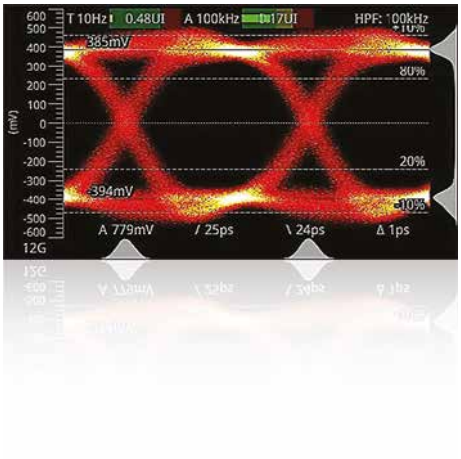
IP/12G-SDI, 4K/UHD, HDR/WCG GENERATION, ANALYSIS & MONITORING

PHABRIX®

Qx Series

IP/12G-SDI, 4K/UHD, HDR/WCG Generation, Analysis & Monitoring

The Qx range brings together all the advanced Test & Measurement tools required for transitioning to the next generation of video formats. The instrument set includes tools for rapid fault diagnosis, compliance monitoring and product development.



Fast, automated 12G physical layer analysis

Qx offers the fastest 12G-SDI physical layer testing, with its RTE™ (Real-Time Eye) technology instantly highlighting any SMPTE compliance issues, including eye under/overshoot.

Additional 12G/6G/3G/HD-SDI physical layer tools include Jitter analysis with monitoring across five specified frequency bands, as well as UHD/HD pathological test patterns. Built-in automation control allows testing to be performed faster, more reliably and at lower cost.

An advanced 12G-STRESS option is available for stress testing and evaluation of SDI interfaces up to 12Gbit/s.

Hybrid IP/SDI

The introduction of 4K/UHD, HDR/WCG and IP has led to a proliferation of new standards and formats. With the Qx platform you can operate in next generation Hybrid IP/SDI environments that require 4K/UHD (12G/6G/3G-SDI) and HD-SDI as well as SMPTE ST 2110 with 2022-7*, NMOS* and ST 2022-6 formats.

The high performance Qx 12G offers 4K/UHD-SDI generation, analysis and video/audio monitoring as standard. The IP Toolset provides tools for generation and analysis of IP video and audio traffic and IP Packet Interval Timing.

Advanced HDR visualization & analysis toolset

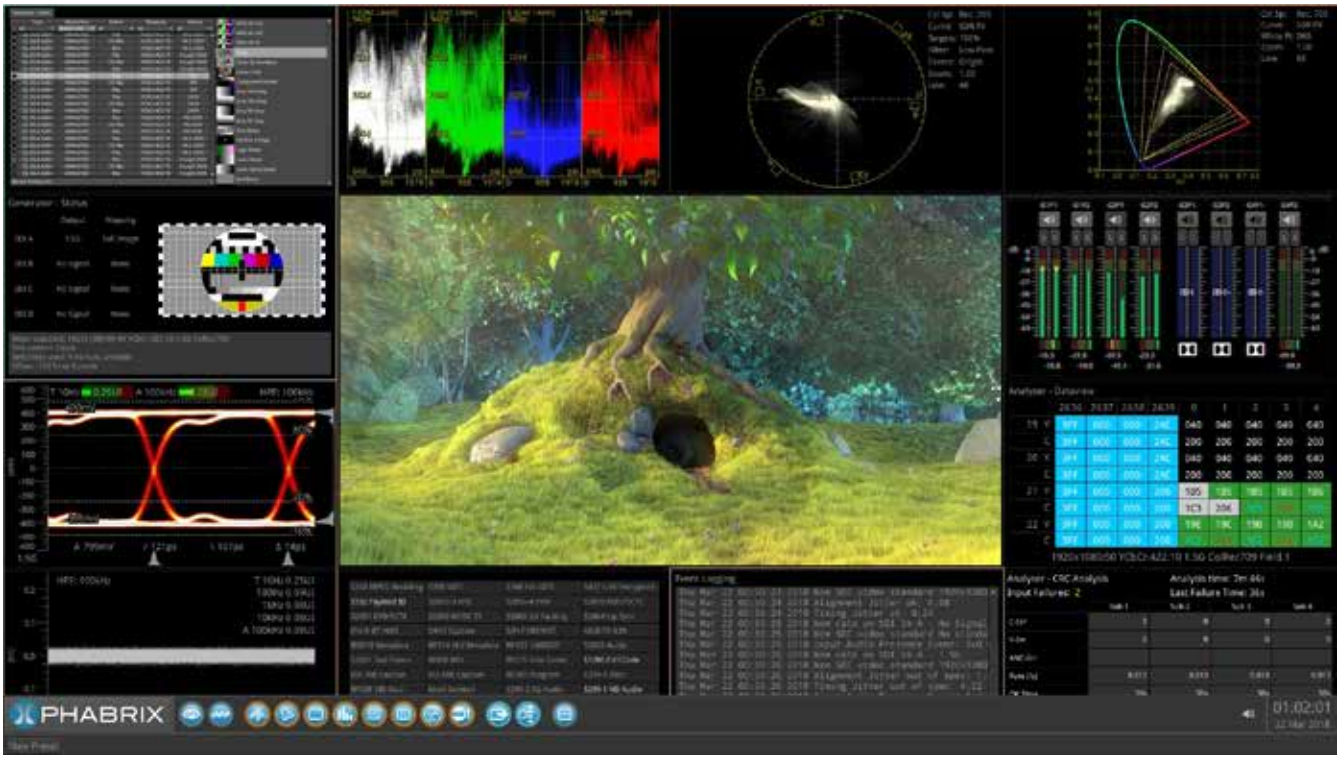
The Qx's comprehensive High Dynamic Range and Wide Color Gamut toolset offers new instruments to enhance the visualization and analysis of 4K/UHD and HD-SDI content to speed workflows.

The HDR/WCG tools include a signal generator, CIE chart, luminance heat-map, vectorscope and waveform, all supporting BT. 2100 HLG, PQ and Sony S-Log3 and SR Live.

*Upcoming software release

User-defined Instrument Display Layout

Optimized instrument display with scalable windows to suit individual operators



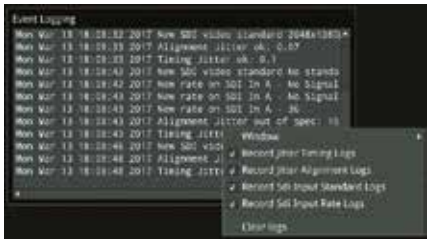
Control and Logging

REST API

- The Qx can be controlled remotely over a network via a REST API
- Integrated control, monitoring and automated manufacturer testing

VNC and Instrument Screenshots

- Interface employs VNC technology to deliver 16 simultaneous scalable instrument windows over a remote network
- SFTP and Browser network access to event logs, screenshots and user presets



Event Logger

Configurable event log file:

- SDI Input standard/status
- SDI physical layer timing and alignment jitter
- Rest API requests
- IP-Tx, IP-Rx, Flow and SFP records
- Reference Locking
- Audio input presence

Qx IP

IP, 3G-SDI + HDR Generation, Analysis & Monitoring

REAL-TIME EYE

The advanced Qx IP configuration offers hybrid IP/SDI generation, analysis and video/audio monitoring for SMPTE 2110 with NMOS* and 2022-6 plus 3G/HD-SDI environments. Designed for IP network traffic analysis and stress testing, the solution is also available with RTE™ (Real-Time Eye) 3G/HD-SDI physical layer testing. Qx IP can be upgraded with a comprehensive HDR/WCG analysis toolset, signal generator and even 12G/6G-SDI performance. An advanced SDI-STRESS option is available for stress testing and evaluation of SDI interfaces up to 12G.

Key Features

IP Generation & Analysis

- SMPTE ST 2110 and ST 2022-6 decapsulation / encapsulation
- Packet Interval Timing (PIT) analysis histogram for monitoring network traffic
- PIT Logging* offers effective longer-term network monitoring
- Packet Profile Generator for stress testing video networks
- Stream & network analysis tools
- NMOS IS-04*, IS-05*
- Network management multicast support (IGMP v2, v3)

3G-SDI Generation & Analysis

- Simultaneous 3G/HD-SDI generation and analysis
- Waveform monitor for YRGB/YUV monitoring
- Vectorscope for checking color bias / conformity
- Test pattern generation, including Pathological and moving patterns
- 32 channel audio signal generation and embedding
- Video and audio monitoring
- REF locking and timing analysis

HDR / WCG Generation & Analysis (option)

- Support for BT. 2100 HLG PQ and Sony S-Log3 and SR Live
- CIE chart (Rec. 709, Rec. 2020, ST 2086)
- HDR Heat-map highlights signals beyond SDR
- HDR test pattern generator
- Waveform with code value and Nits
- Vectorscope with Graticules / Targets for HDR, SDR and Wide Color Gamut
- Waveform ITU-R 2408 diffuse white markers

Physical Layer Testing (option)

- HD/3G/6G/12G-SDI RTE™ (Real-Time Eye) options for testing SMPTE compliance issues, including under/overshoot
- Jitter analysis in five specified frequency bands

12G-SDI STRESS (option)

- Advanced Generator tools with PRBS generation, control of SDI driver amplitude and jitter insertion
- Jitter FFT*
- PRBS Analyzer
- Pathological Detector

System Features

- Logging
- Configuration presets

Control

- Remote interface employing VNC technology providing up to 16 simultaneous instrument windows
- TCP/IP interface for remote control and automated testing

Form Factor

- Compact ½ 1 RU

*Upcoming software release

Qx 12G

IP, 4K/UHD (12G-SDI) + HDR Generation, Analysis & Monitoring

REAL-TIME EYE

The top of the range Qx 12G configuration is designed for next generation, hybrid IP/SDI environments using 4K/UHD (12G/6G/3G-SDI) and HD-SDI plus SMPTE 2110 with NMOS* and 2022-6. The high performance Qx 12G offers 4K/UHD-SDI generation, analysis and video/audio monitoring as standard. It's available with ultraresponsive, 12G/6G/3G/HD RTE™ (Real-Time Eye) physical layer testing, and can be upgraded to offer HDR instruments plus advanced IP traffic analysis and stress testing. An advanced SDI-STRESS option is available for stress testing and evaluation of SDI interfaces up to 12G.

Key Features

4K/UHD (12G/6G/3G/HD-SDI) Generation & Analysis

- Simultaneous generation and analysis
- 12-bit YRGB/YUV waveform monitor with H,V zoom
- Vectorscope for checking color bias / conformity
- Test pattern generation, including Pathological and moving patterns
- 32 channel audio signal generation and embedding
- Video and audio monitoring
- REF locking and timing analysis

IP Generation & Analysis (option)

- SMPTE ST 2110 and ST 2022-6 decapsulation / encapsulation
- Packet Interval Timing (PIT) analysis histogram for monitoring network traffic
- PIT Logging* offers effective longer-term network monitoring
- Packet Profile Generator for stress testing video networks
- Stream & network analysis tools
- NMOS IS-04*, IS-05*
- Network management multicast support (IGMP v2, v3)

HDR / WCG Generation & Analysis (option)

- Support for BT. 2100 HLG PQ and Sony S-Log3 and SR Live
- CIE chart (Rec. 709, Rec. 2020, ST 2086)
- HDR Heat-map highlights signals beyond SDR
- HDR test pattern generator
- Waveform with code value and Nits
- Vectorscope with Graticules / Targets for HDR, SDR and Wide Color Gamut
- Waveform ITU-R 2408 diffuse white markers

Physical Layer Testing (option)

- HD/3G/6G/12G-SDI RTE™ (Real-Time Eye) option for testing SMPTE compliance issues, including under/overshoot
- Jitter analysis in five specified frequency bands

12G-SDI STRESS (option)

- Advanced Generator tools with PRBS generation, control of SDI driver amplitude and jitter insertion
- Jitter FFT*
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System features

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Form factor

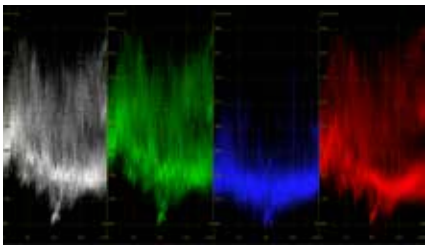
- Compact ½ 1 RU

*Upcoming software release

Core Toolset

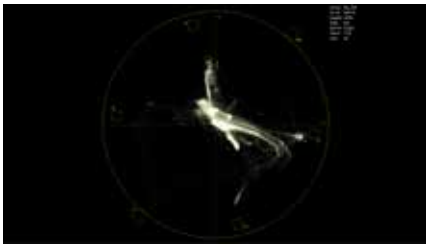
Analyzer - Picture

- Scaling from 1/16 to Full Screen
- Cursors linked to Waveform and Data View
- Tooltip display of pixel location in the image



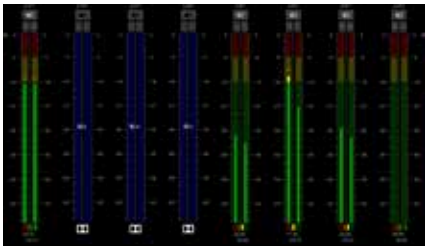
Analyzer - Waveform

- YCbCr, YGBR and GBR parade modes
- Cursor linked to Picture and Data View
- Single line mode linked to Picture Cursor
- Configurable H and V Graticules
- User markers NEW
- Parade, Single line, H & V Mag, Brightness, Persistence and Monochrome controls
- Mouse tooltip display of Waveform data



Analyzer - Vectorscope

- 12-bit processing
- 0.5x to 4x Magnification
- 75% and 100% Targets for ITU-R Rec. 709, Rec. 2020 and HDR formats
- User markers linked to Waveform NEW
- Single line mode linked to Picture Cursor
- Tooltip display of Cb, Cr and Hue Angle
- IQ axis on/off



Analyzer - Audio Meters

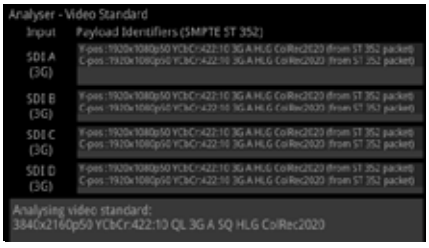
- 32 channel audio metering
- Metering Ballistics: PPM-I, PPM-II, Vu, Vu-Fr
- Scales: dBFS, dBu -18, dBu -20, BBC, DIN45406, NordicN9
- Adjustable peak hold times: Off, 0.1 s to Inf
- Audio pair phase meters
- Detection of Dolby DE, DD, DD+
- Tooltip display of numerical value, SDI group and pair, Dolby type

Analyzer - Data View

- Allows analysis of complex faults particularly in an R&D environment
- 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

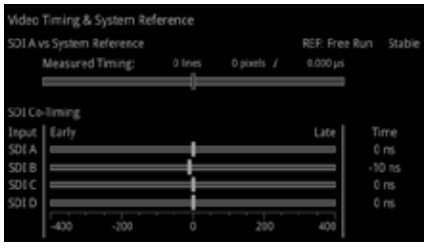
Analyzer - Ancillary Status

- 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 and status information NEW
- Link to ANC Inspector NEW
- Tool tip provides ST 291 ANC type overview



Analyzer - Video Standard

- Display of detected SMPTE S352 Payload ID for each SDI Link and Subframe
- Manual over-ride of S352 ID
- Selection of SMPTE video format
- Indication of S352 errors



Video Timing & System Reference

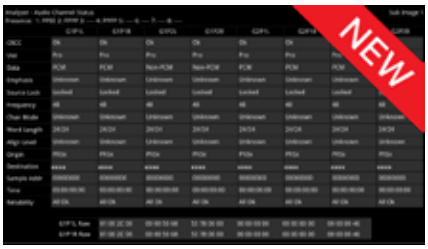
- Measurement of the timing of inputs against reference
- Indication of reference status and stability
- Indication of the relative co-timing of input SDI channels
- Graphical and numeric display
- Dolby line reporting

Network & Automation

- Reporting of Qx Management/Control Port information and Interface Status
- Reporting of IP and MAC Address and mDNS Hostname
- Reporting of REST API and VNC Server Status and user control enable/disable
- Configuration of Static IP address/Mask, Gateway and DNS Server

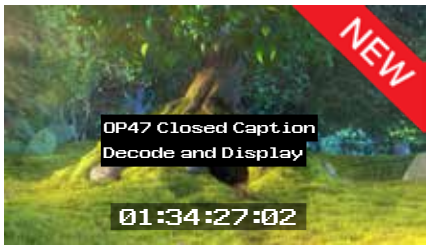
ANC Inspector

- Ancillary data packet analyser
- 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
- Cursor link to Data View window



Audio Status

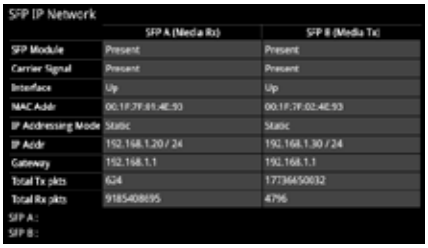
- Channel indication of audio type and presence with detection of Dolby DE, DD, DD+
- Decoded channel status information for up to 128 channels
- Clear indication of useful audio parameters including CRCC, PCM/data, sample frequency, word length
- Channel Status data view (Hex)



Ancillary Data-Decode

- ANC Timecode*
- Closed Captions OP47, CEA-708-B*
- 2 simultaneous Closed Caption decode windows*
- Paint, Pop and Scroll Display Modes*
- Italic and underlined character sets

IP Toolset

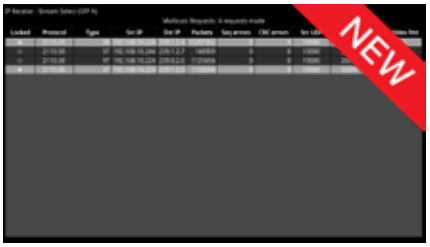


SFP IP Network

- 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 and Gateway Addresses

SFP Information

- SFP Status information for monitoring the physical network connection
- Indication of SFP Vendor part and laser characteristics
- Rx and Tx power for debug of fibre connectivity
- Optical link length indicator

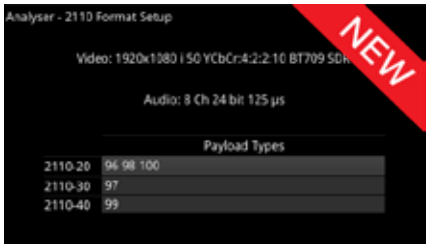


IP Receive Multi Flows

- Reporting of the IP Flows available to the receiver and user selection of the required flows
- Indication of Qx 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

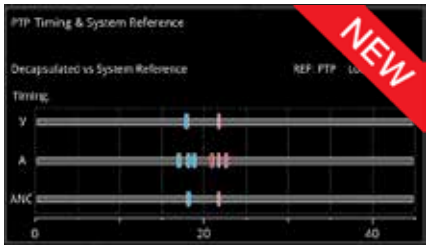
PTP Info

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



2110 Format Setup

- User-configurable allocation of ST 2110 packet IDs
- User-configurable video format parameters for ST 2110-20 flows
- User-configurable audio format parameters for ST 2110-30 flows includes packet time and channel count

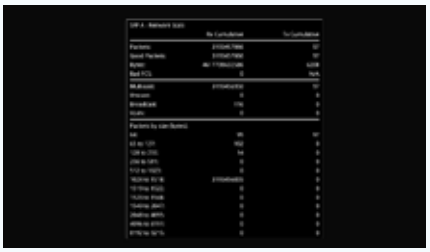


IP Video Flow Timing and System Reference

- Measurement of the timing relationship of selected flows against PTP
- Indication of PTP lock status and stability
- Indication of the relative co-timing of the selected flows

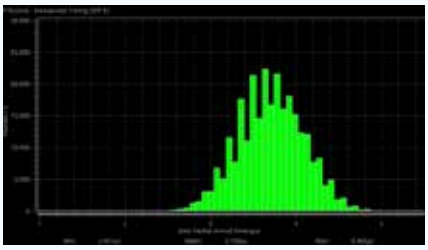
Optional Toolsets

Network Traffic Analysis [PHQXO-IP-NAT]



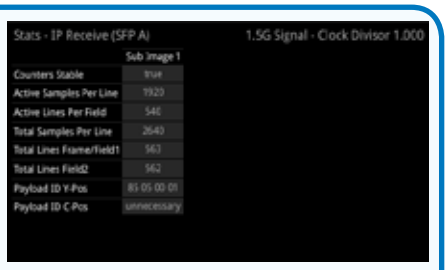
SFP A Network Statistics

- Reporting of SFP cumulative receive traffic
- Indication of packet types : multicast, unicast, broadcast, VLAN
- Indication of packet sizes and cumulative number of packets for each size



Inter-packet Timing

- Stream health reporting using histogram to visualise the distribution of inter-packet arrival times
- Packet counts (log or linear scales) mapped against arrival times (us)
- Easy diagnosis of congestion with max, mean and min inter-packet arrival times



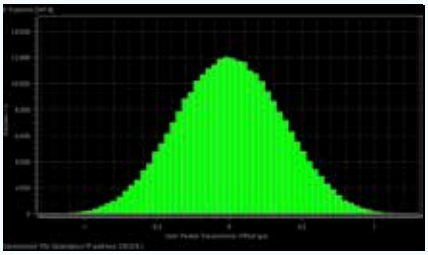
IP Receive Statistics

- Reporting of receiver flow video statistics and stability
- Total and active samples per line and lines per frame
- Indication of SMPTE ST 352 Payload ID
- CMAX, VRX, Buffer Min, Max and Mean values

Network Traffic Generation [PHQXO-IP-NGT] (Requires PHQXO-GEN)

SFP B Network Statistics

- Reporting of SFP cumulative transmit traffic
- Indication of Packet types : multicast, unicast, broadcast, VLAN
- Indication of packet sizes and cumulative number of packets for each size



IP Transmit

- Configuration of transmission flow unicast or multicast destination addresses, port numbers and SSRC
- Automatic calculation of multicast destination MAC address from destination IP Address
- Flow control on/off

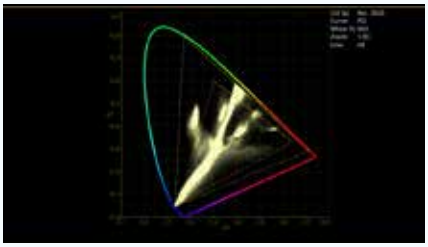
Packet Profile Generator

- Injection of inter-packet jitter onto outgoing flow
- Gaussian or uniform distribution
- Log or linear scales

HDR Toolset [PHQXO-HDR]

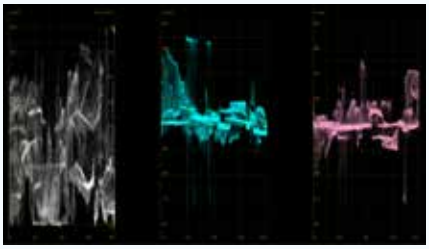
False Color Highlighting

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



Analyzer - CIE Chart

- CIE 1931 x,y 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 NEW



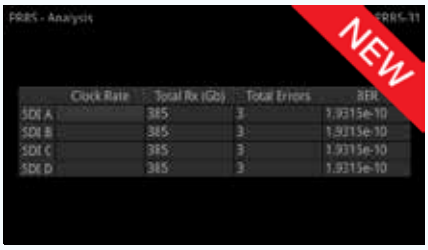
HDR Waveform and Gen.

- Waveform HDR graticules with Nits/Cd/m²
- BT. 2408 diffuse white markers NEW
- SDR patterns mapped to HDR Rec. BT. 2020 containers – useful for like for like set-up of HDR and SDR monitors and line checks
- Full Rec. 2020 patterns
- Support for BT. 1886, BT. 2100 HLG and PQ, Sony S-Log3, SR Live NEW

SDI Stress Toolset [PHQXO-STRESS] NEW

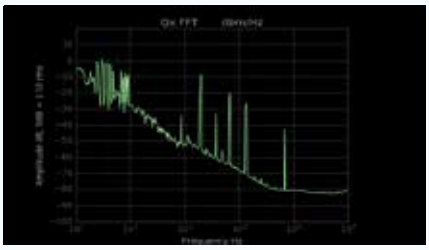
Adv. Generator Tools

- Generation of PRBS-7, 9, 15, 23, 31
- SDI scrambler and sync bit Insertion on/off
- Control of SDI driver amplitude +/-10%
- Control of jitter insertion frequency, amplitude and type
- Control of pre-emphasis



PRBS Analyzer

- Indication of PRBS cumulative received data and PRBS type
- Reported cumulative errors
- Calculated Bit Error Rate (BER)



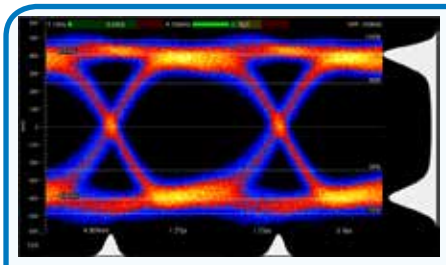
Jitter FFT*

- Spectral analysis of SDI jitter
- Easy identification of jitter harmonic components

Pathological Detector

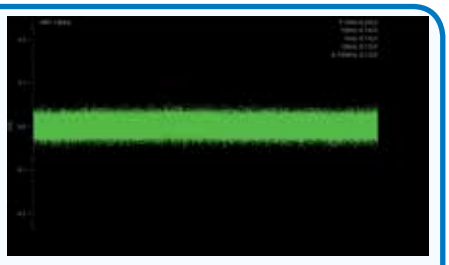
- Generator status indication of rate at which the video pattern generator is creating SDI pathological conditions
- Indication of PLL and EQ pathological rates/second
- Detection on each active SDI link
- Realtime GPI outputs of pathological detect for external equipment triggering

Physical Layer Toolset [PHQX01E]



SDI EYE Analysis

- Real-Time Eye (RTE) for testing SMPTE compliance
- DC coupled and automatic measurements of: amplitude, rise and fall time, jitter and under/overshoot
- Amplitude and time histograms
- Single or multiple eyes with choice of color and heat-map overlay and infinite persistance



SDI Jitter Analysis

- Realtime SMPTE jitter measurements down to 10Hz
- 10Hz, 100Hz, 1kHz, 10kHz, 100kHz filters
- H, 2H, F, 2F, V Trigger
- Infinite persistence modes
- +/- 0.25 to +/- 8 UI vertical scale adjustment

Generator Toolset [PHQXO-GEN]

Video Generation

- 12G/6G/3G/1.5G 4K/UHD and 2K/HD SDI signal generation
- Support for Single, Dual and Quad links with single, square and 2SI sub-images, Level A and B
- Moving test patterns
- 422, 444, 4224 and 4444, YCbCr and RGB Formats
- Import and display of TIFF images NEW

Audio Generation

- 32 channel audio generation, 128 channel embedder
- Choice of fixed tones or chromatc scale – to help with channel identification
- Choice of fixed or ramp levels – to help with channel identification
- Custom config of number of active audio groups and channels
- Master gain control

Pathological Generation

- SDI pathological - SDI Stress patterns, Eq, PLL and CheckField
- User-definable combination of SDI stress and conventional patterns up to full frame

*Upcoming software release

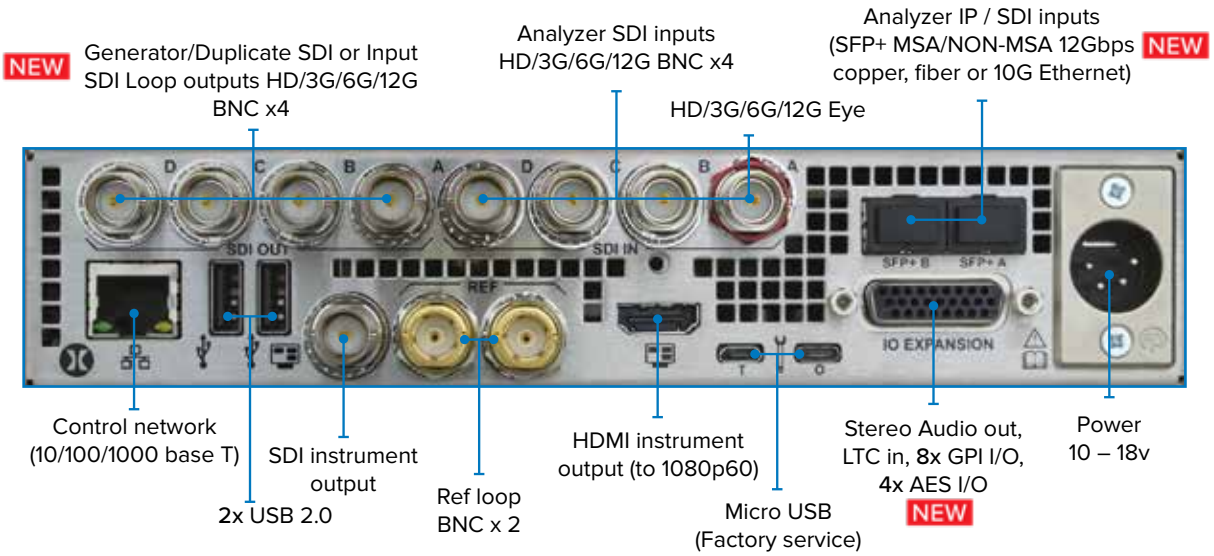
Specifications

	Qx IP	Qx I2G
Formats supported (generation, analysis & monitoring)		
IP SMPTE 2110	●	○
IP SMPTE 2022-6	●	○
3G/HD-SDI	●	●
12G/6G-SDI	○	●
Video inputs / outputs		
4 x SDI inputs, HD/3G, 75 Ohm terminated BNC	●	N/A
4 x SDI inputs, HD/3G/6G/12G, 75 Ohm terminated BNC	○	●
4 x SDI outputs, HD/3G, 75 Ohm BNC	●	N/A
4 x SDI outputs, HD/3G/6G/12G, 75 Ohm BNC	○	●
RTE Real-Time Eye input (12G/6G/3G/HD-SDI) x 1 (SDI input A) BNC	○	○
SFP+ MSA/NON-MSA 12 Gbps copper or fibre SDI, 10 G Ethernet	○	○
Audio inputs / outputs		
4 x 75 Ohm AES selectable I/O (26 pin high density 'D' Type socket)	●	●
1 x Stereo analog audio output (26 pin high density 'D' Type socket)	●	●
8 channel 48kHz PCM audio on HDMI and SDI Instrument output	●	●
User interface		
HDMI 1.4 instrument output, 1920 x 1080, 4:4:4 RGB, Type A	●	●
Reference		
2 x 75 Ohm BNC high impedance looping reference input, tri-level or B&B with cross lock	●	●
Networking & control		
10/100/1000 BASE-T	●	●
8 x bi-directional GPI (26 pin high density 'D' Type socket)	●	●
Monitoring		
Internal Beeper	●	●
Form factor		
Size (Width x Height x Depth - excluding projections)	253 x 44 x 211 mm	253 x 44 x 211 mm
Weight	1.9 kg	1.9 kg
Electrical		
Power consumption	50W typical, 70W max	50W typical, 70W max
4 Pin XLR power connector	12V nominal (10V-18V)	12V nominal (10V-18V)
AC Power adapter	90-264VAC, 120W	90-264VAC, 120W
Warranty		
Warranty (1 year)	●	●
Extended Warranty Package (3 - 5 years)	○	○

● Standard
○ Optional

**Upcoming software release*

Rear panel



Ordering

Qx IP

PHQX01-IP	Qx IP hybrid IP/SDI analyzer for ST 2110, ST 2022-6 and 3G/HD-SDI (1RU, ½ rack)
PHQX01E-IP	Qx IP hybrid IP/SDI analyzer for ST 2110, 2022-6 and 3G/HD-SDI with Eye / Jitter toolset (1RU, ½ rack)

10G Ethernet SPFs must be ordered separately for Encap and Decap, see PHSFP-10GE-SR

Options

PHQXO-IP-ENC	IP license for ST 2022-6 Encap+
PHQXO-IP-NAT	IP network traffic analysis toolset
PHQXO-IP-NGT	IP network traffic generation toolset (Packet Profile Generator) – requires Video signal generator (PHQXO-GEN)
PHSFP-10GE-SR	10G Ethernet SFP+, short range up to 300m (Qx IP supports 2 x SFP+)
PHQXO-HDR	HDR/WCG toolset with CIE 1931 chart, HDR Heat-map
PHQXO-GEN	Video signal generator for IP and SDI
PHQXO-UHD	UHD (12G/6G-SDI) support
PHQXM-01E	Eye / Jitter toolset upgrade for PHQX01-IP (return to factory upgrade)
PHQXO-12G-STRESS	Advanced 12G-SDI Stress Toolset [requires PHQXO-GEN, PHQXO-UHD and PHQXM-01E]
PHQXK1	19” rack mount kit for 1x Qx IP
PHQXK2	19” rack mount kit for 2x Qx IP
PHQXK3	9.5” rack mount kit for 1x Qx IP
PHQXK4	10.5” rack mount kit for 1x Qx IP

Extended Warranty

PHQX-3YEAR	3 Year Warranty for Qx IP*
PHQX-5YEAR	5 Year Warranty for Qx IP*

Qx 12G

PHQX01	Qx 12G UHD/HD-SDI analyzer / generator (1RU, ½ rack)
PHQX01E	Qx 12G UHD/HD-SDI analyzer / generator with Eye / Jitter toolset (1RU, ½ rack)

Options

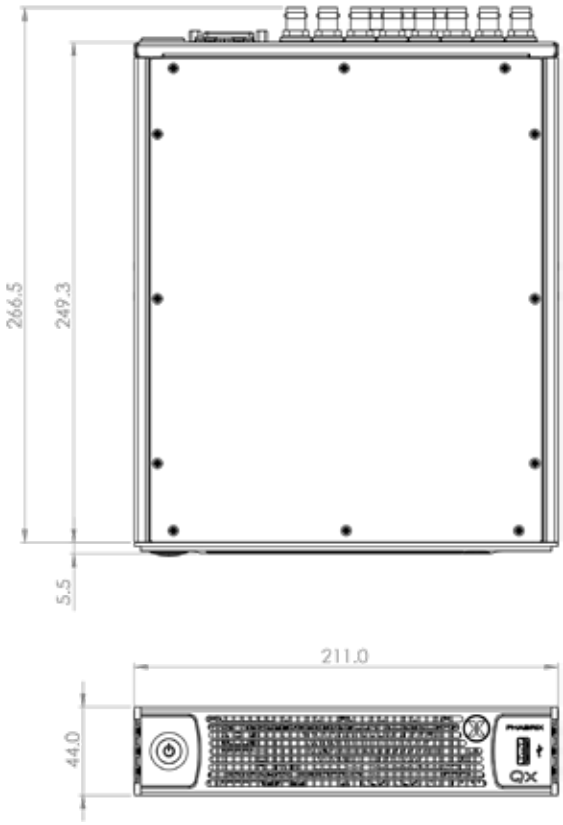
PHQXO-IP-DEC	IP license for ST 2110/2022-6 Decap+
PHQXO-IP-ENC	IP license for ST 2022-6 Encap+
PHQXO-IP-NAT	IP network traffic analysis toolset
PHQXO-IP-NGT	IP network traffic generation toolset (Packet Profile Generator)
PHSFP-10GE-SR	10G Ethernet SFP+, short range up to 300m (Qx 12G supports 2 x SFP+)
PHQXO-HDR	HDR/WCG toolset with CIE 1931 chart, HDR Heat-map
PHQXM-01E	Eye / Jitter toolset upgrade for PHQX01 (return to factory upgrade)
PHQXO-12G-STRESS	Advanced 12G-SDI Stress Toolset [requires PHQXM-01E]
PHQXC-1	12G-SDI Test Cable, 1m
PHQXK1	19” rack mount kit for 1x Qx 12G
PHQXK2	19” rack mount kit for 2x Qx 12G
PHQXK3	9.5” rack mount kit for 1x Qx 12G
PHQXK4	10.5” rack mount kit for 1x Qx 12G

Extended Warranty

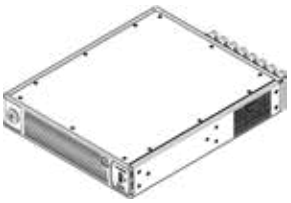
PHQX-3YEAR	3 Year Warranty for Qx 12G*
PHQX-5YEAR	5 Year Warranty for Qx 12G*

* One year warranty included as standard
\+ Requires 10G Ethernet SFP+ module (PHSFP-10GE-SR)

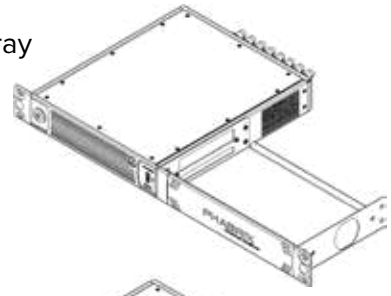
Dimensions & Installation



Desktop



Single Rack mount tray
with cover
PHQXK1



Dual Rack mount
PHQXK2

PHABRIX®

For more information about IP,
4K/UHD and HDR contact:

www.phabrix.com

SMPTE AIMS Member iabm SR Live for HDR

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Version b1