Qx IP | Qx 12G
IP, 4K/UHD + HDR generation, analysis & monitoring
The Qx range brings together all the advanced, hybrid IP/SDI test & measurement tools required for transitioning to the next generation of video formats, including instruments for rapid fault diagnosis, compliance monitoring and product development.

**IP tools for analysing congestion & stress testing**

With the Qx range, you can quickly analyse SMPTE 2110* and 2022-6 IP video network traffic to determine the cause of typical problems like packet congestion, packet loss and jitter.

A high performance IP toolset includes a decapsulator with Packet Interval Timing (PIT) analysis for network traffic monitoring. There’s also a unique signal generator with IP encapsulator and Packet Profile Generator for stress testing video networks.

**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.

**Advanced HDR visualization & analysis toolset**

The Qx’s comprehensive High Dynamic Range and Wide Colour 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 Dolby PQ, HLG* and SLOG3* standards.

*Upcoming software release
The Qx’s instrument display can be quickly optimised for IP, UHD and HDR to suit individual operators.
The advanced Qx IP offers hybrid IP/SDI generation, analysis and video/audio monitoring for SMPTE 2110* and 2022-6 plus 3G/HD-SDI environments. Designed for IP network traffic analysis and stress testing, the solution is also available with RTETM (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.

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
- Network management multicast support (IGMP2,3)

3G-SDI generation & analysis
- Simultaneous 3G/HD-SDI generation and analysis
- Waveform monitor for YRGB/YUV monitoring
- Vectorscope for checking colour 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)
- Dolby PQ HDR supported (HLG and SLOG3 standards included with future upgrade)
- CIE chart (Rec.709, Rec.2020, P3)
- HDR Heat-map highlights signals beyond SDR
- HDR test pattern generator
- Waveform (log scale to 10,000 NIT) with Wide Colour Gamut support
- Vectorscope with Graticules / Targets for HDR & SDR

Physical layer testing (option)
- HD/3G/6G/12G-SDI RTETM (Real-time Eye) options for testing SMPTE compliance issues, including under/overshoot
- Jitter analysis in five specified frequency bands

System features
- Logging
- Configuration presets

Control
- TCP/IP interface for remote control and automated testing

Form factor
- Compact ½ RU
- Air filter option for live production

*Upcoming software release
Qx 12G
IP, 4K/UHD (12G-SDI) + HDR generation, analysis & monitoring

The top of the range Qx 12G is designed for next generation, hybrid IP/SDI environments using 4K/UHD (12G/6G/3G-SDI) and HD-SDI plus SMPTE 2110* and 2022-6. The high performance Qx 12G offers 4K/UHD-SDI generation, analysis and video/audio monitoring as standard. It’s available with ultra-responsive, 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.

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 colour 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
- Network management multicast support (IGMP2,3)

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

HDR / WCG generation & analysis (option)
- Dolby PQ HDR supported (HLG and SLOG3 standards included with future upgrade)
- CIE chart (Rec.709, Rec.2020, P3)
- HDR Heat-map highlights signals beyond SDR
- HDR test pattern generator
- Waveform (log scale to 10,000 NIT) with Wide Colour Gamut support
- Vectorscope with Graticules / Targets for HDR & SDR

System features
- Logging
- Configuration presets

Control
- TCP/IP interface for remote control and automated testing

Form factor
- Compact ½ RU
- Air filter option for live production
**IP toolset**

SMPTE 2110* & 2022-6 network analysis

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**Packet Profile Generator**
- Unique Packet Profile Generator for stress testing video networks
- Create different packet interval timing distribution profiles to simulate IP network congestion conditions

**Packet Interval Timing (PIT) analysis**
- Stream health reporting using histogram to visualise distribution of packet arrival times
- Packet counts mapped against arrival time (µS)
- Easy diagnosis of congestion with max, mean and min Inter Packet Arrival Time

**PIT Logging**
- Versatile PIT Logging tool offers effective longer-term network monitoring
- Tool can present accumulated max/min Packet Interval Timing (PIT) for all packets plotted against time

**Network stream analysis**
- Table identifies streams within an IP signal
- Presents protocol, bitrate, CRC status, source and destination addresses

**IP network analysis**
- Transmission and receive traffic analysis
- Monitoring packet types and sizes

**SFP status monitoring**
- SFP status for monitoring physical network connection
High Dynamic Range & WCG tools
Dolby PQ, HLG* & SLOG3*

CIE 1931 X Y chart
- BT.709, BT.2020, DCI-P3 colour gamut overlays
- X, Y labelled axis
- Tooltips co-ordinate display
- Supports SDR and HDR

Waveform monitor
- Graticules for SDR & HDR
- YCbCr/YRGB & single trace modes
- Tooltips co-ordinate display
- 12-bit resolution
- H/V pan and zoom
- Picture linked cursor*

Vectorscope
- Graticules / Targets for SDR and HDR*
- Tooltips co-ordinate display
- 12-bit resolution
- Zoom to targets
- User definable targets*
- Picture linked cursor*

HDR Heat-map
- Programmable HDR Heat-map to highlight luminance zones - ideal for adjusting brightness of picture
- 7 simultaneous & programmable colour overlay bands
- Individual upper & lower overlay threshold controls
- User presets for SDR & HDR
- Selectable background grey / colour
- Identify shadows, mid-tones or specular highlights

Generator
- BT.709, BT.2020 colour space HDR patterns
- SDR patterns in HDR containers
- Pathological overlay
- Full range of HD to UHD standards

PQ, HLG and SLOG3
- HDR tools support Dolby PQ standard
- HLG and SLOG3 HDR tools will be included with future upgrade

*Upcoming software release
12G/6G/3G/HD-SDI
Physical layer and signal analysis tools

Real-time Eye
- Instant, Real-time Eye (RTE) for testing SMPTE compliance issues, including under / overshoot
- Rise time and fall time
- Amplitude histograms
- Single or multiple eyes
- Traffic lights instantly provide compliance indication

Jitter analysis
- Real-time jitter measurements
  - 10, 100, 1k, 10k, 100k filters
  - Infinite Persistence mode
  - H, 2H, V Trigger

Waveform
- Up to 4 waveform traces at full 12-bit resolution
- Configurable H and V graticules
- Single line, H-mag, V-mag, brightness, colour and monochrome controls

Vectorscope
- 12-bit processing
- Magnification (0.5x to 4x)
- 75% and 100% targets
- 5% +/-5 degrees boxes
- IQ axis on/off, perimeter rose, brightness, gamma, raw, persistence, low pass and interpolate trace modes

Signal generation
- 12G/6G/3G/HD-SDI signal generation, including pathological test patterns for stress testing
- Selection of moving test patterns
- Audio signal generation and embedding

Input standards selection
- Easy SMPTE standards selection
- Payload indicators simplify the use of 4K/UHD with more than one carrier signal (4 x 3G or 2 x 6G)
Picture display
- Scaling from 1/16 to full screen
- Cursors linked to waveform and data view

Pixel pan and zoom
- Picture magnification, zooming and pixel panning
- Ideal for checking 4K/UHD quadrant intersections
- Grid display offers 1x, 2x, 4x, 8x and 16x pixel sizes

Timing & system reference
- Measure timing of SDI input against reference
- Relative timing tools for 4K/UHD based on 4 x 3G signals
- Graphic and numeric values

Audio monitoring
- 32 channel audio monitoring
- Input selection of audio groups, and sub-image audio for 12G
- Metering Ballistics options include PPM Type I, PPM Type II, Vu and VuFr
- Audio pair phase meters
- Stereo pair & mono monitoring

ANC detect and ancillary status
- Colour coded signal conditions for present, lost, and error
- Toolset to edit DID and SDID values

SDI data view
- Presents the raw data in the signal as hex, decimal or binary
- Pixel value shown by frame and line value
- Presents entire frame with active video, TRS words & blanking data

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## Specifications

### Formats supported (generation, analysis & monitoring)

<table>
<thead>
<tr>
<th></th>
<th>Qx IP</th>
<th>Qx 12G</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP SMPTE 2022-6</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>IP SMPTE 2110*</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3G/HD-SDI</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>12G/6G-SDI</td>
<td>○</td>
<td>●</td>
</tr>
</tbody>
</table>

### Video inputs / outputs

<table>
<thead>
<tr>
<th></th>
<th>Qx IP</th>
<th>Qx 12G</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 x SDI for HD, 3G, 6G, 12G 75 Ohm terminated BNC Inputs</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>4 x SDI for HD, 3G, 6G, 12G 75 Ohm terminated BNC Outputs</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>RTE Real-time Eye input (12G/6G/3G/HD-SDI) x 1 (SDI input A) BNC</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>SFP+ MSA/NON-MSA 12 Gbps copper or fibre SDI, 10 G Ethernet</td>
<td>○</td>
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</tr>
</tbody>
</table>

### Audio inputs / outputs

<table>
<thead>
<tr>
<th></th>
<th>Qx IP</th>
<th>Qx 12G</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 x 75 Ohm AES selectable I/O (26 pin high density ‘D’ Type socket)</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>1 x Stereo analogue audio output (26 pin high density ‘D’ Type socket)</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>8 channel 48kHz PCM audio on HDMI and SDI Instrument output</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

### User interface

<table>
<thead>
<tr>
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<th>Qx IP</th>
<th>Qx 12G</th>
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</thead>
<tbody>
<tr>
<td>HDMI 1.4 instrument output, 1920 x 1080, 4:4:4 RGB, Type A</td>
<td>●</td>
<td>●</td>
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</table>

### Reference

<table>
<thead>
<tr>
<th></th>
<th>Qx IP</th>
<th>Qx 12G</th>
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</thead>
<tbody>
<tr>
<td>2 x 75 Ohm BNC high impedance looping reference input, tri-level or B&amp;B with cross lock</td>
<td>●</td>
<td>●</td>
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</table>

### Networking & control

<table>
<thead>
<tr>
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<th>Qx 12G</th>
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</thead>
<tbody>
<tr>
<td>10/100/1000 BASE-T</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>8 x bi-directional GPI (26 pin high density ‘D’ Type socket)</td>
<td>●</td>
<td>●</td>
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</table>

### Monitoring

<table>
<thead>
<tr>
<th></th>
<th>Qx IP</th>
<th>Qx 12G</th>
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<tbody>
<tr>
<td>Internal loudspeaker Beeper</td>
<td>●</td>
<td>●</td>
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### Form factor

<table>
<thead>
<tr>
<th></th>
<th>Qx IP</th>
<th>Qx 12G</th>
</tr>
</thead>
<tbody>
<tr>
<td>253 x 44 x 211 mm (width x height x depth) excluding projections</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>1.9 kg weight</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

### Electrical

<table>
<thead>
<tr>
<th></th>
<th>Qx IP</th>
<th>Qx 12G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power consumption 50W typical, 70W max</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>4 Pin XLR power connector, 12V nominal (10V-18V)</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>AC Power adapter (included), 90-264VAC, 120W</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

### Warranty

<table>
<thead>
<tr>
<th></th>
<th>Qx IP</th>
<th>Qx 12G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warranty (1 year standard increased to 3 - 5 years with Extended Warranty package)</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

*Upcoming software release*
Rear panel

Generator SDI outputs
HD/3G/6G/12G BNC x4

Analyser SDI inputs
HD/3G/6G/12G BNC x4

Analyser IP / SDI inputs
(SFP+ MSA/NON-MSA 12Gbps
copper, fibre or 10G Ethernet)

HD/3G/6G/12G Eye

Control network
(10/100/1000 base T)

SDI instrument output

Ref loop BNC x 2

HDMI instrument output (to 1080p60)

Micro USB
(Factory service)

Stereo Audio out,
LTC in, 8x GPIO I/O,
4x AES I/O

Power
10 – 18v

Ordering

Qx IP

PHQX01-IP
Qx 1U ½ rack 3G IP/SDI analyser
(SMPTE 2022-6)

PHQX01E-IP
Qx 1U ½ rack 3G IP/SDI analyser
(SMPTE 2022-6) + Eye / Jitter physical layer analysis

Options
PHQXO-IP-NET
IP network traffic analysis tools

PHSFP-10GE-SR
10GBASE-SR Ethernet short range SFP+

PHQXO-GEN
Generator plus IP encapsulation license

PHQXO-UHD
UHD 12G/6G-SDI standards

PHQXO-HDR
HDR/WCG standards

PHQX-3YEAR
3 Year Warranty*

PHQX-5YEAR
5 Year Warranty*

*One year warranty included as standard

Qx 12G

PHQX01
Qx 1U ½ rack 12G/6G/3G/HD-SDI
analyser/generator

PHQX01E
Qx 1U ½ rack 12G/6G/3G/HD-SDI
analyser/generator + Eye / Jitter physical layer analysis

Options
PHQXO-IP-LIC
IP decapsulation / encapsulation license
(SMPTE 2022-6)

PHQXO-IP-NET
IP network traffic analysis tools

PHSFP-10GE-SR
10GBASE-SR Ethernet short range SFP+

PHQXO-HDR
HDR/WCG standards

PHQX-3YEAR
3 Year Warranty*

PHQX-5YEAR
5 Year Warranty*
For more information about IP, 4K/UHD and HDR contact:

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