

# Keysight's Ixia UHD100T32 QSFP28 Ultra-High-Density 32-Port Test System

## Challenge: Testing 100GE at Scale

Even with link aggregation, 10 gigabit Ethernet (GE) and 40 GE technologies fall short of meeting the scalability and cost per bit needed to support today's bandwidth-hungry networks. This has led to the adoption of 100 GE across the entire networking eco-system. With mass deployment in modern data centers, 100 GE technologies have now come to maturity and market trends indicate steady growth for the next few years.

To address the need for higher scale at a manageable cost, merchant silicon is significantly driving down the cost per bit of switched data in the network. Cost-prohibitive test gear leads to compromise in testing cycles and even the use of home-grown, immature, and inadequate test systems and methodologies.

## Solution: Cost Effective, High Density Test System

Keysight now offers the Ixia **UHD100T32**, the industry's first test solution purpose-built to address the density challenges of validating 100 GE devices and networks in a more cost-effective way. In just a 1U form-factor, the fixed chassis provides 32 QSFP28 100 GE ports, ready for use cases ranging from white box production-line testing to data center pre- and post-deployment testing.

Supporting 100 / 50 / 40 / 25 / 10 GE speeds, the **UHD100T32** system comes with all fanouts enabled. It also includes Keysight's proven technology for

## Highlights

- Speed time to test with easy-to-deploy out-of-the-box solution
- Simplified web application to run end-to-end test
- Reduce Capex with new full-solution subscription model
- Use less rack space and power with compact, data-center-ready footprint
- Validate high-port-count devices for performance, scalability, and interoperability
- Pay as you grow with subscription option
- Deploy in lab or production environments
- Modernize automated testing with REST API



**UHD100T32 100GE  
QSFP28 UHD 32-port  
Test System**

Layer 2 / 3 traffic generation and analysis. Optional routing protocols are available that include OSPF, BGP, and ISIS and RFC 2544 benchmark test capabilities.

## Key Features

- Line-rate 3.2 tbps packet generation and analysis of received traffic to detect and debug data transmission errors for multiple speeds, including 32 x 100 GE, 64 x 50 GE, 32 x 40 GE, 128 x 25 GE, 128 x 10 GE
- UHD base software with IPv4/IPv6/Ethernet interface emulation, line-rate traffic and RFC 2544 benchmark test
- Line-rate, at all speeds with per-port and per-flow statistics
- Latency measurement with 1 ns resolution
- Reed-Solomon forward error correction (RS-FEC) and fire-code FEC (FC-FEC) support with FEC statistics
- Auto-negotiation and link training support
- Routing protocols (BGP, OSPF, ISIS) support up to 32 sessions (add-on option)
- Supports RFC benchmarking of networking devices and equipment using industry-standard RFC 2544 benchmark tests at line-rate 100 / 50 / 40 / 25 / 10 GE speeds
- Automate testing with REST API Browser and RESTpy support
- Measure throughput, latency, packets loss, and convergence times
- Faster time to test with no client application to install and inherent session sharing capability: Web-based UI enables user to point a web browser to the IP address of the box

## Specifications

Key Specifications	UHD100T32 Perpetual	UHD100T32 Base Subscription	UHD100T32 Standard Subscription
Part Number	944-1180	U100-BASE	U100-STANDARD
<b>Hardware Fixed Chassis System Specifications</b>			
RU / Number of Ports	1 RU 32-port fixed chassis systems		
Physical Interfaces	Native QSFP28 physical port		
Supported Port Speeds	<ul style="list-style-type: none"> <li>• 100 GE / port: 100 GE-capable fiber and passive copper cable media</li> <li>• 2 x 50 GE / port: 50 GE-capable passive copper (DAC) for point-point and fan-out cables, and multimode fiber point-to-point AOC media</li> <li>• 40 GE / port: 40 GE-capable passive copper (DAC) for point-point and fan-out cables, and multimode fiber point-to-point AOC media</li> <li>• 4 x 25 GE / port: 25 GE-capable fiber and passive copper point-point and fan-out cable media</li> <li>• 4 x 10 GE / port: 10 GE-capable fiber and passive copper point-point and fan-out cable media</li> </ul>		

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<b>CPU and Memory</b>	Multicore processor with 4 GB of CPU memory per resource group		
<b>IEEE Interface Protocols for 100GE</b>	<ul style="list-style-type: none"> <li>• IEEE 802.3 100GBASE-R LAN</li> <li>• IEEE P802.3bj</li> <li>• IEEE P802.3bm</li> <li>• IEEE P802.3by</li> <li>• IEEE 802.3ba</li> <li>• IEEE 802.3ae</li> </ul>		
<b>Layer 1 Support</b>	<p><b>100GE:</b></p> <ul style="list-style-type: none"> <li>• Auto-negotiation (AN), Clause 73 for passive copper DAC</li> <li>• Link training for 100GE copper cable media, Clause 73</li> <li>• Ethernet Forward Error Correction RS-FEC, Clause 91 <ul style="list-style-type: none"> <li>◦ FEC statistics: FEC Corrected and Uncorrected Codeword Counts</li> </ul> </li> <li>• Ability to independently turn ON or OFF AN with Link training or FEC, or to allow IEEE defaults to automatically manage the interoperability or FEC, or to allow IEEE defaults to automatically manage the interoperability</li> </ul> <p><b>50GE:</b></p> <ul style="list-style-type: none"> <li>• Ethernet Forward Error Correction: <ul style="list-style-type: none"> <li>◦ FC-FEC, Clause 74 for BASE-R PHYs</li> <li>◦ RS-FEC, Clause 91 for 50GBASE-R PHYs</li> </ul> </li> <li>• FEC statistics: <ul style="list-style-type: none"> <li>◦ FEC Corrected and Uncorrected Codeword Counts</li> </ul> </li> <li>• Independent fan-out ports with physical fan-out media for up to 2 × 50 GE per QSFP28 port</li> </ul> <p><b>40GE:</b></p> <ul style="list-style-type: none"> <li>• Auto-negotiation (AN), Clause 73 for passive copper DAC</li> <li>• Link training for copper cable media, Clause 73</li> </ul> <p><b>25GE:</b></p> <ul style="list-style-type: none"> <li>• Auto-negotiation (AN), Clause 73 for passive copper DAC</li> <li>• Link Training (LT) for 25GE copper DAC media (Clause 93, 110)</li> </ul> <p>Note: Clause 72 link training patterns are not supported</p> <ul style="list-style-type: none"> <li>• Ethernet Forward Error Correction: <ul style="list-style-type: none"> <li>◦ FC-FEC, Clause 74 for BASE-R PHYs</li> <li>◦ RS-FEC, Clause 108 for 25GBASE-R PHYs</li> </ul> </li> <li>• FEC statistics: <ul style="list-style-type: none"> <li>◦ FEC Corrected and Uncorrected Codeword Counts</li> </ul> </li> <li>• Ability to independently turn ON or OFF AN with Link training, or FEC, or to allow IEEE defaults to automatically manage the interoperability</li> </ul>		

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	<ul style="list-style-type: none"> <li>• Independent fan-out ports with physical fan-out media for up to 4 × 25 GE per QSFP28 port</li> </ul> <p><b>10GE:</b></p> <ul style="list-style-type: none"> <li>• Independent fan-out ports with physical fan-out media for up to 4 × 10 GE per port</li> </ul>		
<b>Transceiver Support</b>	<ul style="list-style-type: none"> <li>• 100 GBASE-SR4 and 4 × 25 GBASE-SR QSFP28 for multimode fiber <ul style="list-style-type: none"> <li>◦ Pluggable transceiver</li> <li>◦ 100 GE speed support requires a point-to-point cable</li> <li>◦ 40 GE speed support requires a point-to-point cable</li> <li>◦ 25 GE speed support requires a point-to-point cable or a fan-out cable</li> <li>◦ 10 GE speed support requires a point-to-point cable or a fan-out cable</li> </ul> </li> <li>• 100 GBASE-LR4 QSFP28 for single-mode fiber <ul style="list-style-type: none"> <li>◦ Pluggable transceiver</li> <li>◦ 40 GE speed not compatible with 100 GBASE-LR4 QSFP28. Must use 40 GBASE-LR4 QSFP transceiver for 40 GE speed</li> </ul> </li> <li>• 100 G PSM4 QSFP28 for single mode fiber <ul style="list-style-type: none"> <li>◦ Pluggable transceiver</li> <li>◦ 100 GE support requires a point-to-point cable</li> <li>◦ 25 GE support requires a point-to-point or a fan-out cable</li> </ul> </li> </ul>		
<b>Cable Media</b>	<ul style="list-style-type: none"> <li>• 100 GBASE-SR4 multimode fiber Active Optical Cable (AOC) and MT-MT 12-fiber point-to-point cables for QSFP28</li> <li>• 100 GBASE-CR4, passive, copper Direct Attached Cable (DAC) up to 5 meters in length. Note: Requires RS-FEC to be enabled</li> <li>• 50 GBASE-CR2 passive, copper Direct Attached Cable (DAC) QSFP28-to-2 x QSFP28 fan-out media, up to 3 meters in length. Note: Requires BASE-R FEC Clause 74 or RS-FEC Clause 91 to be enabled</li> <li>• 50 GBASE-SR2 multimode fiber Active Optical Cable (AOC) media, 850 nm, 3-meter length</li> <li>• 25 GBASE-SR multimode fiber Optical Cable (AOC) and MT-MT 12-fiber point-to-point cable for QSFP28, 3-meter length is available</li> <li>• 25 GBASE-SR multimode fiber MT-to-4 x LC fan-out cable for QSFP28, 3-meter and 5-meter lengths are available</li> <li>• 25 GBASE-LR single mode fiber MT-to-4 x LC fan-out cable for QSFP28, 3-meter length is available</li> <li>• 25 GBASE-CR passive, copper Direct Attached Cable (DAC) point-point, up to 5 meters in length. Note: Requires BASE-R FEC Clause 74 or RS-FEC Clause 91 to be enabled</li> </ul>		

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	<ul style="list-style-type: none"> <li>25 GBASE-CR passive, copper Direct Attached Cable (DAC) QSFP28-to-4 x SFP28 fan-out media, up to 5 meters in length. Note: Requires BASE-R FEC Clause 74 or RS-FEC Clause 91 to be enabled</li> </ul>		
<b>Fixed Chassis Dimensions</b>	509 x 440 x 44 mm (20.03 x 17.32 x 1.73)		
<b>Fixed Chassis System Weights</b>	<ul style="list-style-type: none"> <li>Hardware only: 20.05 lb (10.00 kg)</li> <li>Shipping: 25 lb (11.33 kg): Approximate (includes rackmount slides, power cords, sync cables, and packaging)</li> </ul>		
<b>Fixed Chassis System Electrical Power</b>	<ul style="list-style-type: none"> <li>2 redundant, load-sharing hot-swappable AC, 1100 W</li> <li>90 to 240 VAC at 50–60 Hz</li> </ul>		
<b>Fan</b>	Hot-swappable fans with N+1 redundancy		
<b>Temperature</b>	<ul style="list-style-type: none"> <li>Operating: 0 C to 40 C (32 F to 104 F)</li> <li>Storage: -40 C to 70 C (-40 F to 158 F)</li> </ul>		
<b>Humidity</b>	0 % to 95 % non-condensing		
<b>Regulatory Compliance Specifications</b>	IEC/EN/UL/CSA 60950-1, IEC/EN/UL/CSA 62368-1, CE (LVD, EMC, RoHS), EN/IEC 55032, EN/IEC 55024, CFR 47, FCC Part 15B, ICES-003, AS/NZ CISPR 32/24, KN32/35, Korea (KCC), Customs Union (EAC)		
<b>Transmit Feature Specifications</b>			
<b>Transmit Engine</b>	Wire-speed packet generation with timestamps, sequence numbers and packet group signatures		
<b>Max. Streams per Port and Speed</b>	100 GE: 16 50 GE: 8 40 GE: 16 25 GE: 4 10 GE: 4	100 GE: 1 50 GE: 1 40 GE: 1 25 GE: 1 10 GE: 1	100 GE: 16 50 GE: 8 40 GE: 16 25 GE: 4 10 GE: 4
<b>Stream Controls</b>	<ul style="list-style-type: none"> <li>Rate and frame size change on the fly</li> <li>Advanced stream scheduler support</li> </ul>		
<b>Minimum Frame Size</b>	200 bytes at full line rate	200 bytes at full line rate	200 bytes at full line rate

Key Specifications	UHD100T32 Perpetual	UHD100T32 Base Subscription	UHD100T32 Standard Subscription
	<ul style="list-style-type: none"> <li>64 bytes at full line rate on a subset of ports</li> </ul>		<ul style="list-style-type: none"> <li>64 bytes at full line rate on a subset of ports</li> </ul>
<b>Maximum Frame Size</b>	9,216 bytes		
<b>Frame Length Controls</b>	Fixed, IMIX, Custom IMIX	Fixed	Fixed, IMIX, Custom IMIX
<b>Value Lists (Max.) per port</b>	1024 / 100 GE port 512 / 50 GE port 1024 / 40 GE port 256 / 25 GE port 256 / 10 GE port	100 / 100 GE port 100 / 50 GE port 100 / 40 GE port 100 / 25 GE port 100 / 10 GE port	1024 / 100 GE port 512 / 50 GE port 1024 / 40 GE port 256 / 25 GE port 256 / 10 GE port
<b>Hardware Checksum Generation</b>	Checksum generation and verification for IPv4, TCP / UDP		
<b>Link Fault Signaling</b>	Reports, no fault, remote fault, and local fault port statistics		
<b>Latency Measurement Resolution</b>	1 nanosecond		
<b>Intrinsic Latency Compensation</b>	Removes inherent latency error from the 100 GE port electronics		
<b>Receive Feature Specifications</b>			
<b>Receive Engine</b>	Wire-speed real-time latency and sequence checking capability		
<b>Trackable Receive Flows per Port (Max.)</b>	100 GE: 1,024 50 GE: 512 40 GE: 1,024 25 GE: 256 10 GE: 256	100 GE: 16 50 GE: 8 40 GE: 16 25 GE: 8 10 GE: 8	100 GE: 256 50 GE: 128 40 GE: 256 25 GE: 64 10 GE: 64
<b>Minimum Frame Size</b>	<ul style="list-style-type: none"> <li>200 bytes at full line rate</li> <li>64 bytes at full line rate on a subset of ports</li> </ul>		
<b>Standard Statistics and Rates</b>	Link state, line speed, frames sent, valid frames received, bytes sent/received, fragments, undersize, oversize, CRC errors, sequence checking frames, sequence checking errors, ARP, and PING requests and replies		

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<b>FEC Statistics</b>	<p>The following FEC statistics are available as applicable to different speed modes:</p> <ul style="list-style-type: none"> <li>• RS-FEC Corrected Codeword Count</li> <li>• RS-FEC Uncorrected Codeword Count</li> <li>• FC-FEC Corrected Block Count</li> <li>• FC-FEC Uncorrected Block Count</li> <li>• Fire code FEC Sync</li> <li>• RS-FEC Corrected Codeword Count Rate</li> <li>• RS-FEC Uncorrected Codeword Count Rate</li> <li>• FC-FEC Corrected Block Count Rate</li> <li>• FC-FEC Uncorrected Block Count Rate</li> </ul>		
<b>Latency / Jitter Measurements</b>	Cut through		
<b>Layer 2-3 Protocol Support</b>			
<b>Routing, Switching</b>	IPv4 / IPv6, BGP4 / BGP4+, OSPFv2 / v3, ISISv4 / v6, LACP	IPv4 / IPv6	IPv4 / IPv6, BGP4 / BGP4+, OSPFv2 / v3, ISISv4 / v6, LACP

## Application Support

UHD100T32
<p>UHD Web Application: Line-rate traffic generation with service modeling that builds realistic, dynamically controllable data-plane traffic. Industry's best test solution for functional and performance testing by using comprehensive emulation for routing, switching end points</p>
<p>UHD Web Quick Test and Traffic Test Application: RFC 2544 based benchmark tests*</p> <p>*Not available in U100-BASE subscription</p>
<p>REST API / RESTpy: Comprehensive automation coverage through Keysight's cutting edge REST API and pythonic wrapper APIs RESTpy</p>

## UHD Application Software Part Numbers for Perpetual (944-1180)

### 930-2230

Keysight's Ixia Basic package for UHD100T32; includes RFC2544 QuickTest

### 930-2231

Keysight's Ixia Basic Routing bundle for UHD100T32, includes BGP4 / BGP4+, OSPFv2 / v3, ISISv4 / v6; requires 930-2230: Basic package for UHD100T32

Notes: 930-2230 is in the bill of materials for 944-1180 and is not required to be ordered separately. All subscription part number (U100\*) is inclusive of hardware and software.

Contact your Keysight sales representative for ordering information.

Learn more at: [www.keysight.com](http://www.keysight.com)

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: [www.keysight.com/find/contactus](http://www.keysight.com/find/contactus)

