A3 400G 4-port Appliance

High Performance QSFP-DD Test Platform 400/200/100/50/40/25/10G*

Network bandwidth and performance are growing rapidly to support emerging applications such as Machine Learning, Artificial Intelligence (AI), and 5G services. This is putting pressure on Cloud Service Providers and Hyperscale data centers to scale their networking infrastructure in order to support these new services.

With these multi-rate requirements, customers demand higher-scale emulation capabilities from test equipment. The need to support higher control and data planes on top of the 50G PAM4 architecture is paramount, as is the ability to test NRZ speeds to validate switches and routers for data center networking interconnects.

The A3 400G Appliance was developed to meet these specific needs. VIAVI's A3 QSFP-DD platform is a 2U rack-mountable appliance and can support 400/200/100/50G (PAM4)* and 200/100/50/40/25/10G (NRZ)* speed modes. The appliance also supports Auto-Negotiation and Link Training for all speed modes*.

The A3 Appliance supports licensed speeds, offering maximum value and flexibility for configuring systems to meet your specific needs. A high-density 100G mode option is available, allowing support for 4xQSFP28 from a single QSFP-DD port, achieving a maximum of 16* 100G ports from a single 2U platform.



Key Features

- 4-port 2U high appliance, delivers the highest performance 400G testing solution
- Each port supports:
  - PAM4: 1x400G, 2x200G, 4x100G, 8x50G*
  - NRZ*: 1x200G, 2x100G, 4x50G, 2x40G, 8x25G, 8x10G
- Support for Ethernet (FEC), Auto Negotiation (AN), and Link Training (LT) for all supported speeds and full breakouts*
- Protocol testing for L2/3 routing/ switching and data center test cases
- TestCenter MCP Server, part of VIAVI's NITRO® AI portfolio of solutions provides a natural language interface for test configuration, execution, and analysis.

Key Benefits

- Industry's highest scale and performance QSFP-DD test appliance
- PAM4 and NRZ* in one platform
- MACsec supported on all ports
- Provides massive capacity testing for a variety of services
- Offers the highest protocol performance
- Offers the most feature-rich stateless traffic generation
- Ideal for testing core/edge of carrier and cloud service provider class routers, application gateways, firewalls, and more

Applications

Cloud Computing/Streaming Services: Validate data plane QoS on thousands of flows at line rate and test complex routing, data center, and access protocols on switches and routers.

Data Center ToR and EoR Switches and Fabrics: Validate forwarding performance, latency, MAC capacity, and functional capabilities of ultra-high-scale, next generation enabled multi-terabit cloud data center fabrics. This platform enables synchronized timing of 255 systems with no requirement for external timing devices or specialized cabling.

Next-gen Routers and Switches: Test the latest generation of core routers and switches in high-scale, multiprotocol topologies, and high-bandwidth deployments.

Productivity and Analytics

- Create and execute tests using TestCenter+ Web-based UI, Windows UI, or a full suite of automation API frameworks
- Actionable Results:
  - User definable Health Indicator views provide real-time health monitoring and error isolation capability that allows engineers to accurately and quickly pinpoint errors, even in the most complex test configurations. Customizable Time Series charts, overlaid with Events, provide correlation between real-time metrics and system events, allowing rapid debugging of problems and accelerating development.
  - Port counts, rates, errors and protocol summaries offer a high-level view for quick drilldown to specific issues
  - Broadest set of per stream metrics with simultaneous control and data plane results allow most tests to be run in a single pass
  - Real-time traffic filters allow analysis down to specific fields. Multiple metrics can be simultaneously collected and instantly analyzed.
  - Dynamic views feature multi-metric extraction, sorting and operation in real-time or post-test
  - Full packet capture enables timing, sequencing and content analysis for individual packets
  - Powerful filters ensure the capture buffer is filled with relevant data
- TestCenter Model Context Protocol (MCP) Server - Part of VIAVI's NITRO® AI portfolio, this framework lets AI agents configure, execute, monitor, and analyze TestCenter tests via natural language greatly increasing user productivity.
- High performance database underneath a modern web UI processes billions of real-time results to validate tests, identify problems, and generate customizable reports
- Delivers comprehensive results and insights, accelerating problem identification and resolution. With more coverage and more information, VIAVI answers questions faster, and in a single test run, where multiple runs are necessary with other test tools.

- Interesting streams use real-time results data mining to dynamically filter through massive datasets and display the results that matter
- Powerful automation with Command Sequencer (Visual Programming) and GUI to Script empowers the test operator to:
  - Construct sophisticated, stressful, automated test cases without programming experience
  - Combine numerous individual test cases into a single run to save regression test time
  - Develop a catalog of broad automated test cases in a fraction of the time
  - Export automated test cases to run from a command line for headless test execution that can be integrated with any automated regression system
- Supports TestCenter's industry-leading Layer 2–3 feature set:
  - "Hardened" system proven for testing from a single to thousands of ports
  - Stress ASIC and backplane designs with live traffic changes. The number of emulated devices, the traffic they emanate and the rate at which they send it can all be changed "on the fly" making for more realistic tests and faster troubleshooting.
  - Best-in-industry for measuring ultra-low sub microsecond latencies with 2.5ns precision and resolution. Latency accuracy up to 10 times better than the competition.
  - 19 different scheduling algorithms available for finding the right traffic to emulate the real world or tax the device's ability to handle any traffic pattern— from microbursts to carefully timed sequences of "killer" frames.

Extensive, Flexible Reporting

Real-time statistics for critical variables across all protocols. The web-based TestCenter IQ provides actionable analytics and intuitive reporting to visualize dynamic behavior of systems under test.

Technical Specifications

Product Feature	Description
A3 400G 4 Port Appliance	
MSA Interface	QSFP-DD
Operational Modes	PAM4 400/200/100/50G; NRZ 200/100/50/40/25/10G*
Line Clocking and Packet Timestamping	Stratum-3 rated oscillator is the default time source. Transmit line clock is at the precise nominal Ethernet rate ± < 1 PPM on initial shipment. Accurate to ± 4.6 PPM 15 years of operation. • Frame time-stamp resolution of 2.5ns • GPS and CDMA-based external time sources are supported • IEEE 1588v2 and NTP packet-based external time sources are supported • TIA/EIA-95B-based external time sources are supported

Technical Specifications continued

Product Feature	Description
Appliance Time Synchronization	**Appliance Features** • VIAVI-patented self-calibrating inter-chassis timing chain using dedicated port on chassis control • Appliance delivers precise synchronization ± 20ns • Ability to daisy chain up to 255 appliances for large density testing • Synchronization via external GPS or CDMA network • Using IEEE 1588 or NTP packet-based approaches • With TIA/EIA-95B timing inputs
Operating Temperature Range	50° to 95° F (10° to 35° C) when using QSFP-DD transceivers rated up to 24W. When using QSFP-DD transceivers exceeding 24W, the maximum operating temperature is 84° F (29° C); 10% to 80% relative humidity (non-condensing). The minimum operating temperature is 41° F (5° C).
AC Input Range	100-240 VAC
Max Power Draw	2100W
Product Weight	Unit installed weight: 60 lb. (27.2 kg) Shipping weight: 89 lb. (40.4 kg)
Product Dimensions	17.1"W x 3.5"H x 30.0"L (43.4 cm x 8.9 cm x 76.2 cm)
TestCenter Layer 2-3 Generator and Analyzer	
Number of Paths/ Raw Streamblocks	**1024:** 400G PAM4/200G PAM4/100G PAM4/200G NRZ/100G NRZ/50G NRZ/40G NRZ* **512:** 50G PAM4/25G NRZ/10G NRZ*
Frame Transmit Modes	Port-based (rate per port), Stream-based (rate per stream), Burst, Timed, Step Transmission, and manual scheduler mode, random frame size with unique seed
Min/Max Frame Size (w/CRC)	60 to 16,383
Min/Max Tx Rates	1 packet per 1 second to 101% of line rate
Real-time Tx Stream Adjustments	Change rate and frame length settings without stopping the generator or analyzer for truly interactive, cause and effect analysis
Per-stream Statistics Analyzed in Real Time	**Tx and Rx frame counts and rates** • Tx and Rx Layer 1 byte counts and rates • FCS errors and rate • Min, Max and Average Latency • Real Time Dropped Frame count
Flow Control	Support Priority Flow Control

Technical Specifications continued

Product Feature	Description
Per-port Statistics Analyzed in Real Time	**Tx and Rx frame counts and rates** • Tx and Rx Layer 1 byte counts and rates • Total byte count/rate • Signature frame count • L1 byte and rate count • FCS error count and rate • PFC counts
Tx and Rx Frame Counts and Rates	2.5 ns Tx timestamp resolution with intra-chassis and inter-chassis synchronization
Supported Encapsulations	• Layer 2: Ethernet II, 802.1Q, 802.1ad, FCoE • Layer 3/4: IPv4, IPv6, TCP, UDP
Supported Tx Signature Capability	Fully compatible with VIAVI hardware; contains sequence number and highly accurate timestamp
Capture Buffer Size	8MB per port at all speeds
Capture Buffer Controls — TestCenter's unique capture capability allows maximum effectiveness when debugging hard to find hardware or protocol problems	Several modes of operation including filter by protocol fields, filter by byte offset and range; store slices or full-frames; store TX/RX control plane with data plane; real-time mode for control plane traffic; wrap or stop buffer at the end. User-defined pattern definitions can logically combine 8 filters of up to 32 total bytes. Patterns can be applied to start, filter (qualify), or stop capture. In addition to user patterns, filtering, and stopping capture contains the following pre-defined events: FCS; undersize, oversize, jumbo, and user-defined frame length; IPv4 and IPv6 packets; test signature present and test stream ID match. Each event can be independently set to ignore, include, or exclude. Support UDC (user defined counters), Capture byte offset mode, Capture pattern matching.
Latency Modes	Benchmark tests support LIFO, LILO, FIFO or FILO latency calculation methods
Route Insertion Table (RIT) Entries per Port	Entries for dynamic label or random IP/MAC address assignments 8M x 8 byte entries for all speeds
RIT or List VFD	8 RIT insertions per stream and 10 VFD insertions per stream
Layer 1 Functionality	
QSFP/QSFP-DD Interconnects	CR, SR, LR, FR, DR, PAM4, ZR, and ZR+ at multi-rate (400/200/100/50/40/25/10G)* Note: For transceivers that consume more than 20 watts of power, please consult the factory for additional information before using these optics in the system.

Technical Specifications continued

Product Feature	Description
Media Support and FEC Options	**PAM4 support varies by speed mode (RS-544 (KP4) FEC all speeds)** • 400G: 400GBASE-SR8, 400GBASE-DR4, 400GBASE-FR4/FR8, 400GBASE-LR4/LR8, 400GBASE-ZR and ZR+ plus additional MSA PMDs • 200G: 200GBASE-SR4, 200GBASE-DR4 200GBASE-FR4/LR4 • 100G: 100GBASE-CR2 (Active Electrical Copper Cable) • Direct Attached Copper and Active Optical Cable breakouts **NRZ support varies by module speed mode and license*** (Clause 74 BASE-R FEC, Clause 91 RS-FEC, and Clause 108 RS-FEC) • 200G: 200GBASE-SR8 • 100G: 100GBASE-SR4, 100GBASE-CR4, 100GBASE-LR4, 100GBASE-DR, 100GBASE-FR1, 100GBASE-LR1 plus additional MSA PMDs • 50G: 25/50G Consortium 50GBASE-CR2, • 40G: 40GBASE-SR4, 40GBASE-CR4, 40GBASE-LR4 • 25G: 802.3by 25GBASE-CR, 25GBASE-CRS, 25GBASE-SR • 10G: 10GBASE-SR, 10G Direct Attached Copper • Direct Attached Copper and Active Optical Cable breakouts 25/50G Consortium 50GBASE-R FEC CL74, 25/50G Consortium 50GBASE RS-FEC CL91 IEEE 25GBASE CR CL74, CL108, CR-S CL74, SR FEC CL108 25/50G Consortium 25GBASE-R FEC CL74, 25/50G Consortium 25GBASE RS-FEC CL91
AN/LT (Enable/Disable)	AN/LT supported for all speed modes*
Layer-1 Debug Tools & Features	Tx Emphasis settings, FEC Counters, Front-end L1 Summary Status, Transceiver management interface access, PCS monitoring, PCS skew, FEC error injection, PCS random error injection, L1 Transceiver Auto Tune Command

Ordering Information

Part Number	Description
Base Package Bundle Description	
A3-400-QD-4-350A*	A3 4-Port QSFP-DD 200G/100G/50G PAM4 Bundle
A3-400-QD-4-400A	A3 4-Port QSFP-DD 400G PAM4 Only
A3-400-QD-4-550A*	A3 4-Port QSFP-DD 400G/100G/50G PAM4 Bundle
A3-400-QD-4-700A	A3 4-Port QSFP-DD 400G/200G/100G PAM4 Bundle
A3-400-QD-4-750A*	A3 4-Port QSFP-DD 400G/200G/100G/50G PAM4 Bundle
A3-400-QD-4-825A*	A3 4-Port QSFP-DD 400G/200G/100G/50G/40G/25G/10G PAM4 & NRZ Bundle

Technical Specifications continued

Product Feature	Description
Hardware Upgrades (available as add on after purchase of initial base package bundle)	
HWO-A3-400-QD-4-50G*	50G PAM4 Hardware Speed Option for A3
HWO-A3-400-QD-4-100G	100G PAM4 Hardware Speed Option for A3
HWO-A3-400-QD-4-200G	200G PAM4 Hardware Speed Option for A3
HWO-A3-400-QD-4-400G	400G PAM4 Hardware Speed Option for A3
HWO-A3-400-QD-4-NRZ10G*	10G NRZ Hardware Speed Option for A3
HWO-A3-400-QD-4-NRZ25G*	25G NRZ Hardware Speed Option for A3
HWO-A3-400-QD-4-NRZ40G*	40G NRZ Hardware Speed Option for A3
HWO-A3-400-QD-4-NRZ50G*	50G NRZ Hardware Speed Option for A3
HWO-A3-400-QD-4-NRZ100G	100G NRZ Hardware Speed Option for A3
HWO-A3-400-QD-4-NRZ200G	200G NRZ Hardware Speed Option for A3
HWO-A3-400-QD-4-PORT	A3 QSFP-DD-8P Single Port Enablement
HWO-A3-QSFP-DD-4-4QSFP28	Hardware Option for A3-400-QD-4-T1S 400G PAM4 to 4x100G QSFP28 NRZ
SWO-A3-400-QD-4-MACSEC	MACSEC Software on A3-400-QD-4-T1S Appliance

Specifications

- Windows-based workstation with 10/100/1000 Mbps Ethernet NIC; mouse and color monitor required for GUI operation
- Linux or Windows-based workstation for scripting
- Mac, Linux, or Windows-based workstation for REST API support

* Ordering availability and support for AN/LT, 50G PAM4, and NRZ speeds will be available in upcoming software releases.

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