A2 400G 8- and 16-port Appliance

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

Network bandwidth and performance are growing at a rapid pace to support emerging applications such as 5G, Internet of Things (IoT), Machine Learning, and Artificial Intelligence (AI). Since IEEE 802.3cd was released, Merchant Switch Chips Providers and Network equipment manufacturers have developed highly flexible multi-rate products. Service Providers and Hyperscale data centers are deploying multi-rate networking infrastructure solutions to answer the market demands.

With these multi-rate requirements, customers demand higher density and cost-performance efficiency test equipment. Flexibility to support 50G PAM4 and 25G/10G NRZ bandwidth also is needed to validate the switches and routers for data center networking interconnect.

VIAVI A2 400G Appliance was developed to meet these specific needs with its industry-leading 2x density and best cost-performance ratio advantages. VIAVI's QSFP-DD platform is a 2U rack-mountable appliance and can be configured to support 400/200/100/50G (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 A2 Appliance supports VIAVI's Smart Port Technology, a licensed feature that allows single port and speed upgrades for maximum value and flexibility. A high-density 100G mode option is available allowing support for 4xQSFP28 from a single QSFP-DD port achieving a maximum of 64x100G* ports from a single 2U platform.

Features

- 8 and 16 port variants for 2U high appliance, delivers the highest density high speed Ethernet solution
- Each port supports following:
  - PAM4: 1x400G, 2x200G, 4x100G, 8x50G
  - NRZ: 1x200G, 2x100G, 4x50G, 2x40G, 8x25G, 8x10G
  - Available single port upgrades
- High density 64xQSFP28 port option—requires external accessory and license
- Support for Ethernet (FEC), and 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*

Benefits

- Industry's highest density QSFP-DD test appliance
- PAM4 and NRZ in one platform
- MACsec supported
- Provides large capacity testing for a variety of services
- 8 to 16 port upgrade available via licensing
- Optimized to offer best value to performance

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 will allow 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 switch with high-scale, multiprotocol topologies and high bandwidth deployments.

Productivity

- Accurate Results – Purpose-built hardware delivers repeatable test execution and precise statistics
- 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
- High performance database underneath a modern web UI processes billions of real-time results to validate tests, identify problems, and provide customizable reports
- Delivers more results with tight correlation, and more information to find those obscure bugs. 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 uses real-time results data mining to dynamically filter through mountains of data 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

Extensive, Flexible Reporting

Real-time statistics for critical variables across all protocols.

Technical Specifications

Product Feature	Description
A2 400G 8- and 16-port Appliance	
MSA Interface	QSFP-DD
Operational Modes	PAM4 – 400/200/100/50G
	NRZ – 200/100/50/40/25/10G
Line Clocking and Packet Time-Stamping	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 2.5 ns • 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
Appliance Time Synchronization	Appliance Features • VIAVI-patented self-calibrating inter-chassis timing chain using dedicated port on chassis control • Appliance delivers precise synchronization ± 20 ns • 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 15 W. When using QSFP-DD transceivers exceeding 15 W, the maximum operating temperature is 86°F (30°C); 10% to 80% relative humidity (non-condensing). The minimum operating temperature is 41°F (5°C).
Ac Input Range	100 – 240 VAC (8-Port Appliance)
	208 - 240 VAC (16-Port Appliance)
Max Power Draw	1340 W (8-Port Appliance)
	2400 W (16-Port Appliance)
Product Weight	Unit installed weight: 62 lb (28.2 kg)
	Shipping weight: 86 lb (39.1 kg)
Product Dimensions	17.1 in W x 3.5 in H x 29.5 in L (43.4 cm x 8.9 cm x 74.9 cm)

Technical Specifications continued

Product Feature	Description
VIAVI TestCenter Layer 2-3 Generator and Analyzer	
Number Of Streams	• Stats/Streams — 400G: Tx=16 K, Rx=32 K — 200G: Tx=8 K, Rx=16 K — 100G: Tx=4 K, Rx=8 K — 50G: Tx=2 K, Rx=4 K — 40G: Tx=2 K, Rx=4 K — 25G: Tx=2 K, Rx=4 K — 10G: Tx=2 K, Rx=4 K (NOTE: TOP to TX = 64 K, RX = 128 K @400G and TX = 32 K, RX = 32 K @100G with VIAVI XStream license) • Stream fields can be varied to create billions of flows • Stats/Stream: Tx Count (frames), Rx Count (frames), Tx Rate (fps), Rx Rate (fps), Tx Rate (bps), Rx Rate (bps), Rx Sig Count (Frames), Avg Latency (µs), Min Latency (µs), Max Latency (µs)
Number Of Paths/ Raw Streamblocks	255 modifiers for 400/200/100G, and 127 modifiers for 50/40/25/10G (NOTE: 511 @400/100G with VIAVI XStream license)
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 16,004
Min/Max Tx Rates	1 packet per 3.43 seconds 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 • Advance Sequence Tracking (AST) stat on 400/200/100/50G speed modes
Flow Control	Support Priority Flow Control
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
Transmit Timestamp Resolution	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

Technical Specifications continued

Product Feature	Description
Supported Tx Signature Capability	Fully compatible with VIAVI hardware; contains sequence number and highly accurate timestamp
Capture Buffer Size	400G: 640 KB per port
	200/100G: 512 KB per port
	50/40/25/10G: 256 KB per port
Capture Buffer Controls—VIAVI TestCenter's unique capture capability allows maximum effectiveness when debugging hard to find hardware or protocol problems	Several modes of operation that include: 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 • 400/200G: 128 k • 100G: 64 k • 50/40/25/10G: 32 k
RIT or List VFD Entries Per Stream	8 RIT insertions per stream and 4 VFD insertions per stream
Layer 1 Functionality	
QSFP/QSFP-DD Interconnects	CR, SR, LR, FR, DR, PSM4, 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 Access 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 Copper DAC • Direct Access 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 and 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	
A2-400-QD-8-350A	A2 8-PORT QSFP-DD 200G/100G/50G PAM4 Bundle
A2-400-QD-8-400A	A2 8-PORT QSFP-DD 400G PAM4 Only
A2-400-QD-8-550A	A2 8-PORT QSFP-DD 400G/100G/50G PAM4 Bundle
A2-400-QD-8-700A	A2 8-PORT QSFP-DD 400G/200G/100G PAM4 Bundle
A2-400-QD-8-750A	A2 8-PORT QSFP-DD 400G/200G/100G/50G PAM4 Bundle
A2-400-QD-8-825A	A2 8-PORT QSFP-DD 400G/200G/100G/50G/40G/25G/10G PAM4 and NRZ Bundle
A2-400-QD-8-T1S	A2 8-PORT QSFP-DD 7-Speed T1 Appliance
A2-400-QD-16-350A	A2 16-PORT QSFP-DD 200G/100G/50G Bundle
A2-400-QD-16-400A	A2 16-PORT QSFP-DD 400G Only
A2-400-QD-16-550A	A2 16-PORT QSFP-DD 400G/100G/50G Bundle
A2-400-QD-16-700A	A2 16-PORT QSFP-DD 400G/200G/100G Bundle
A2-400-QD-16-750A	A2 16-PORT QSFP-DD 400G/200G/100G/50G Bundle
A2-400-QD-16-825A	A2 16-PORT QSFP-DD 400G/200G/100G/50G/40G/25G/10G Bundle
A2-400-QD-16-T1S	A2 16-PORT QSFP-DD 7-Speed T1 Appliance
Hardware Upgrades (available as add on after purchase of initial base package bundle)	
HWO-A2-400-QD-8-50G	50G PAM4 Hardware Speed Option for A2-400-QD-8-T1S
HWO-A2-400-QD-8-100G	100G PAM4 Hardware Speed Option for A2-400-QD-8-T1S
HWO-A2-400-QD-8-200G	200G PAM4 Hardware Speed Option for A2-400-QD-8-T1S
HWO-A2-400-QD-8-400G	400G PAM4 Hardware Speed Option for A2-400-QD-8-T1S
HWO-A2-400-QD-8-NRZ10G	10G NRZ Hardware Speed Option for A2-400-QD-8-T1S
HWO-A2-400-QD-8-NRZ25G	25G NRZ Hardware Speed Option for A2-400-QD-8-T1S
HWO-A2-400-QD-8-NRZ40G	40G NRZ Hardware Speed Option for A2-400-QD-8-T1S
HWO-A2-400-QD-8-NRZ50G	50G NRZ Hardware Speed Option for A2-400-QD-8-T1S
HWO-A2-400-QD-8-NRZ100G	100G NRZ Hardware Speed Option for A2-400-QD-8-T1S
HWO-A2-400-QD-8-NRZ200G	200G NRZ Hardware Speed Option for A2-400-QD-8-T1S
HWO-A2-400-QD-8-Port	A2 QSFP-DD-8P Single Port Enablement
HWO-A2-400-QD-16-50G	50G PAM4 Hardware Speed Option for A2-400-QD-16-T1S
HWO-A2-400-QD-16-100G	100G PAM4 Hardware Speed Option for A2-400-QD-16-T1S
HWO-A2-400-QD-16-200G	200G PAM4 Hardware Speed Option for A2-400-QD-16-T1S
HWO-A2-400-QD-16-400G	400G PAM4 Hardware Speed Option for A2-400-QD-16-T1S
HWO-A2-400-QD-16-NRZ10G	10G NRZ Hardware Speed Option for A2-400-QD-16-T1S
HWO-A2-400-QD-16-NRZ25G	25G NRZ Hardware Speed Option for A2-400-QD-16-T1S
HWO-A2-400-QD-16-NRZ40G	40G NRZ Hardware Speed Option for A2-400-QD-16-T1S
HWO-A2-400-QD-16-NRZ50G	50G NRZ Hardware Speed Option for A2-400-QD-16-T1S

Ordering Information continued

Part Number	Description
HWO-A2-400-QD-16-NRZ100G	100G NRZ Hardware Speed Option for A2-400-QD-16-T1S
HWO-A2-400-QD-16-NRZ200G	200G NRZ Hardware Speed Option for A2-400-QD-16-T1S
HWO-A2-400-QD-16-Port	A2 QSFP-DD-16P Single Port Enablement
HWO-A2-QSFP-DD-8-4QSFP28	Hardware Option for A2-400-QD-8-T1S 400G PAM4 to 4x100G QSFP28 NRZ
HWO-A2-QSFP-DD-16-4QSFP28	Hardware Option for A2-400-QD-16-T1S 400G PAM4 to 4X100G QSFP28 NRZ
Software Upgrades (available as add on after purchase of initial base package bundle)	
SWO-A2-400-QD-8-MACSEC	MACSEC Software on A2-400-QD-8-T1S Appliance
SWO-A2-400-QD-16-MACSEC	MACSEC Software on A2-400-QD-16-T1S Appliance
SWO-A2-400-QD-8-AST	Advanced Sequence Tracking 400/100G ON A2-400-QD-8-T1S
SWO-A2-400-QD-16-AST	Advanced Sequence Tracking 400/100G ON A2-400-QD-16-T1S

Requirements

- 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

*100G (QSFP28) high-density 64x100G license (requires HWO-A2-QSFP-DD-8-4QSFP28 or HWO-A2-QSFP-DD-16-4QSFP28).

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