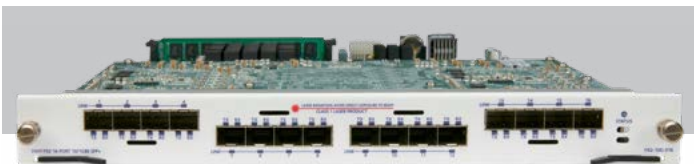# VIAVI fX2

10/100/1000Mbs Ethernet Test Module

The VIAVI fX2 10/100/1000Mbs Ethernet multi-speed test module delivers the highest density and lowest total cost of ownership in its class. VIAVI's Layer 2–3 traffic generation and analysis is combined with powerful network emulation and application traffic to deliver the perfect blend of realism, scalability and performance required to test today's networks.

The VIAVI fX2 10/100/1000Mbs Ethernet multi-speed test module combines VIAVI's industry-leading Layer 2–3 traffic generation and analysis with powerful network emulation and application layer protocols for emulating a wide range of device types, users and protocols. This module delivers the highest performance per dollar for Layer 2-3 testing. Reduced power consumption and the ability to use a single module throughout the test lifecycle results in lower CAPEX and OPEX. This module is ideal for functional, conformance and performance testing of data center and service provider network infrastructure and evolving SDN and NFV technologies.

VIAVI fX2

Applications

- **SDN and Data Center:** Validate forwarding performance and functional capabilities of Software Defined Networks (SDN) with high scale ultra-low latency and flexible port density. Supports key technologies like VXLAN, EVPN, OpenFlow, PCE, Segment Routing and BGP-LS

- **Device Benchmarking:** Test using IETF RFC 2544, RFC 2889 and RFC 3918 and other methodologies with easy test setup using dynamically bound traffic and automated wizards

- **Edge and Campus Routers and Switches:** Verify scale, reliability, and performance of Layer 2 & 3 services including data, multicast and video delivered via unicast routing, multicast routing, switching, Multicast VPN, EVPN and MPLS VPN technologies

- **Carrier Ethernet:** Benchmark scale, reliability, performance of Ethernet services delivered via Ethernet OAM (CFM IEEE 802.1ag and Y.1731), MPLS-TP, VPLS, PWE3 Pseudowires, bridged Ethernet, packet transport protocols or combinations of these technologies

- **Subscriber Emulation:** Verify setup and teardown of thousands of access subscribers using different services (including DHCPv4, DHCPv6-PD, PPPoX and L2TP) over various tunneling technologies (such as VLAN, L2GRE, MPLS, VPNs, and VPLS) under normal or exceptional traffic conditions

- **Functional, Conformance and Performance Testing:** Validate features, conformance to standards and measure system performance.

Features and Benefits

- SFP connector form-factor supports optical and BASE-T connectivity

- Low total cost of ownership compared to other test modules in its class

  — Excellent price-performance ratio that delivers faster time-to-market by combining leading-edge technical innovation with VIAVI's extensive testing experience

  — Intelligent power control to shut down unused test modules and allows faster boot time to bring capacity back on-line quickly

  — More total throughput than the competition for a given power footprint

  — Enhanced chassis software license value — Two to four times the device or end-user emulation per chassis with no increase in software costs

  — Topology emulation lowers Capex by eliminating the need for multiple DUTs in multiprotocol tests

  — Intelligent results gets answers in a fraction of the test time required by competitive products

  — Faster boot and firmware upgrade times mean less downtime in continuous running 24x7 regression test beds

- TestCenter's industry-leading Layer 2–3 feature set

  — "Hardened" system already proven for testing from a single port up to 2,100 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 submicrosecond latencies with 10ns precision and resolution

  — 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 micro-bursts to carefully timed sequences of "killer" frames

- fX2 module supports TestCenter's deep analysis system

  — Port counts, rates, errors and protocol summaries provide a high-level view for quick drilldown to specific issues

  — Broadest set of per stream metrics with simultaneous control and data plane results allows 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

Technical Specifications

Product Feature	Description
fX2 Module Specifications	
Port density	16 ports
Media Support See accessory table below for part numbers.	1000MBASE-SX, 1000MBASE-LX, 10/100/1000MBASE-T (full-duplex only)
Line clocking and packet time stamping – module gets its transmit line clocking and time-stamping from the control modules on the SPT-N12U and SPT-N4U.	• 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 over 15 years of operation • Frame time stamp resolution of 10ns • 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
Inter-Module and Inter-chassis Time Synchronization	Ports in the same chassis are phase-locked to the internal timing source. For separate systems: • Timing chain synchronization with +/- 20ns • Synchronized via GPS or CDMA network • Using NTP or PTP packet-based approaches (requires supporting controller version)
User Reservation	Per-port reservation
Transmit / Receive Streams per Port	32k/64k
VFDs	6 VFDs available for each of 1024 stream templates
Scheduler Mode Support	• Port Based – traffic scheduling handled at the port level • Rate Based – key parameters determined at the port level with division among the individual stream blocks • Priority Based – scheduling determined at the stream block level using user-assigned priorities. Precise scheduling of CBR and bursty traffic for QoS testing • Manual Mode – manual control of stream sequence
Frame Length Range and Controls	100% line rate for 1GE frames of 58-16383 bytes controlled by fixed, increment, decrement, random and IMIX modes. 10/100 max frame length of 16350 when not using PPM adjust. 10BASE-T max frame length of 13000 when using PPM adjust

Technical Specifications continued

Product Feature	Description
Statistics	• Nearly 50 transmit stats per port reported in real time. Includes L1–4 counters and rates and checksum and CRC errors • Over 40 real-time measurements per stream including advanced sequencing, latency, jitter and data integrity
Capture	16 MB per port with sophisticated trigger and filtering controls
Histograms	Port-level histogram modes for latency, jitter, interarrival time, frame length, sequence run length and sequence difference check
Operating Temperature	15°C - 35°C, 20% - 80% RH (non-condensing)

TestCenter Protocol Emulation

TestCenter protocols available as separately licensed packages. Below is a sample list of sup-ported protocols. Contact VIAVI for a full list of capabilities and packages.

Enterprise and Data Center Switch Protocol Support	• OpenFlow 1.3 / 1.0: OpenFlow switch and controller emulation • Routing, multicast and bridging: All major IPv4 and IPv6 unicast and multicast routing protocols, IGMPv1/v2/v3, MLDv1/v2, LACP, STP, RSTP and MSTP • Data center: VXLAN, EVPN, DCBX, FCoE, FIP
Service Provider Protocol Support	• WAN SDN: PCE-P, BGP-LS (Link State), BGP Flow Spec and Segment Routing for ISIS, OSPF and BGP • NFV: Validate performance and scale of NFVI and VNFs including vSwitch, BGP vRouterReflector, vBNG, vCPE, and vRouter • Routing and MPLS: All major IPv4 and IPv6 unicast and multicast routing protocols, RSVP-TE, LDP, LDPv6, MLDP, VPLS-LDP, VPLSBGP, BGP/MPLS-VPN, EVPN (RFC 7432), PBB EVPN, mVPN, NG MVPN, GTM, BFD, MPLS BFD, LSP Ping, TWAMP and PWE3 (RFC 4447) • Access: ANCP, PPPoE, DHCP, L2TP, L2TPv3, IGMPv1/v2/v3, MLDv1/v2, DHCP-PD and PPPoEv6 • Carrier Ethernet and bridging: LACP, STP, RSTP, MSTP, 802.1ag CFM, Y.1731, PBB, PBB-TE, Link OAM • Mobile Backhaul: MPLS-TP, 1588v2 and Synchronous Ethernet

Ordering Information

Part Number	Base Package Description[1]
fX2-1G-S16	VIAVI fX2 10/100/1000ME SFP 16-PORTS
Accessories	
ACC-6025A	1000Base-SX GigE SFP Transceiver, MM 850nm, LC Connector
ACC-6026A	1000Base-LX GigE SFP Transceiver, SM 1310nm, LC Connector
ACC-6092A	Copper transceiver, SFP, 1000BASE-T[1] RJ-45
ACC-6099A	Optical transceiver, SFP, 1300NM, 100BASE-FX MMF

1. Full-duplex operation only

VIAVI

fx2-10-100-1000mbs-ds-hse-nse-ae
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