UX400-1G Module
Ethernet and Fibre Channel

VePAL UX400
Universal Test Platform

Next Generation Modular Platform for Transport, Carrier Ethernet, Mobile Backhaul, and Legacy Testing

VeEX® UX400 is the industry's most flexible, compact, and future-proof test solution for OTN, SDH, SONET, PDH, T-Carrier, Carrier Ethernet, Mobile Backhaul, Core, and Storage Area Networks[1].

Dual Ethernet/Fibre Channel Module

General

- Dual 10/100/1000Base-T RJ45 ports, Dual 100Base-FX/1000Base-X SFP ports
- Throughput, latency, jitter, frame loss, and back-to-back measurements per industry-standard RFC2544
- V-SAM test suite compliant with ITU-T Y.1564 standard
- IPv4 and IPv6 traffic generation
- Q-in-Q (VLAN stacking) and multiple MPLS tag support
- MAC flooding and VLAN flooding
- BER testing at Layer 2, Layer 3 and Layer 4, with or without VLAN and MPLS tags
- Multiple stream traffic generation and analysis for end-to-end QoS verification of multiple services
- Intelligent device discovery mode; discover other VeEX Ethernet testers or loopback devices on the network for quick and easy loopback control configuration
- Peer-to-peer symmetrical or asymmetrical test to a remote VePal test set with measurements at each end

Module Highlights

- Smart Loop mode for Layer 1, Layer 2, Layer 3, and Layer 4 with all key measurements on received traffic provided on the loopback port
- VLAN Scan
- Line rate packet capture with Wireshark™ decode

Packet Network Synchronization

- Supports IEEE 1588v2/PTP Master Clock and Slave clock emulation
- IEEE 1588v2/PTP protocol monitoring and decoding
- IEEE 1588v2/PTP PDV analysis
- ESMC SSM generation, monitoring, and decoding

Fibre Channel

- 1G/2G/4G Fibre Channel support for Storage Area Networks
- Terminate and Loopback operations mode
- FC-1 and FC-2 Layer testing
- RFC2544 compliance testing

[1] *Test interfaces, data rates, mappings, transmission protocols, and features depend on the availability of individual test modules*

Ethernet

Electrical Interfaces

Dual 10/100/1000Base-T
Port: RJ45 connector
Ethernet Classification: Per IEEE 802.3

Optical Interfaces*

Dual 1000Base-X/100Base-FX
SFP Port: LC connector
ROHS compliant and Lead Free per Directive 2002/95/EC
Eye Safety: Class 1, per FDA/CDRH, EN (IEC) 60825

**Specific data rates, performance and supported transmission protocols for the SFPs supplied by VeEX Inc. are listed in the ordering section.*

Ethernet Features

Auto Negotiation
Full and Half Duplex
Flow Control

Operating Modes

Terminate
Monitor
Loopback
Dual port operation: Independent traffic generation and test capabilities on any two ports selected

Traffic Generation

Layer 2, Layer 3 or Layer 4
Test Frame Header

- IEEE 802.3 and Ethernet II (DIX) frames
- Configurable Source and Destination MAC and Ethernet Type
- VLAN stacking up to 3 VLAN tags w/configurable priority & type
- Fully configurable IPv4 or IPv6 header
- MPLS up to 3 labels with configurable Label/S/CoS and TTL fields (optional)
- UDP/TCP header with configurable Source & Destination ports
- Frame size 64 to 1518 bytes and jumbo frame up to 10000 bytes
- Traffic Pattern (Throughput Test and BERT only): Constant, Ramp, Multi Bursts, Single Burst
- Error Injection (Throughput Test and BERT only): Bit, CRC, IP Checksum, TCP/UDP checksum, Pause
- MAC flooding feature generates test frames with up to 4096 incremental Source and/or Destination MAC addresses (optional)
- VLAN flooding feature generates test frames with up to 4096 incremental VLAN IDs (optional)

Key Measurements

Error Measurements: Bit/BER (BERT and single stream Throughput Test), CRC, symbol, IP checksum, TCP/UDP checksum, jabber frames, runt frames, Frame loss (count and %), OSS
Alarm Detection: LOS, pattern loss, service disruption
Frame/Packet Statistics: Multicast, broadcast, unicast, pause frames, frame size distribution
Rates (min, max, average and current): frame rate, bandwidth utilization, frame rate, line rate, data rate
Delay (min, max, average and current): round trip delay, inter frame gap, jitter

ITU-T Y.1564 V-SAM Test

V-SAM test suite compliant with ITU-T Y.1564 standard
Support for Multi-stream traffic generation, Service Configuration and Service Performance tests
Independently configurable for each stream: Bandwidth profile parameters (CIR, EIR, Traffic Policing) and Service Acceptance criteria (FLR, FTD, IFDV, AVAIL)
Simple summary Pass/Fail results tables and drill down capability with detailed measurements (Frame Loss, Frame Transfer Delay, Frame Delay Variation, Availability) for each service

RFC2544 Compliance Testing

Automated tests compliant with RFC2544 with configurable threshold values and maximum transmit bandwidth settings
Throughput, latency, jitter, frame loss, and back-to-back (burst) tests
Frame sizes: 64, 128, 256, 512, 1024, 1280, and 1518 bytes including 2 user configurable frames
Test can be done to a remote loopback or to a remote test set with remote control of traffic generation and measurements at each end (requires asymmetric test option)

RFC2544 Advanced SLA Mode

RFC2544 compliant test on primary test stream with up to 7 independent background traffic streams
Each background stream can be set with independent frame size, bandwidth, traffic profile, and QoS levels
Test can be done to a remote loopback or to a remote test set with remote control of traffic generation and measurements at each end (requires asymmetric test option)

Bit Error Rate Testing

Single Stream test with test pattern: PRBS 2E31 -1, PRBS 2E23 -1, PRBS 2E15 -1, PRBS 2E11 -1, Normal and inverted patterns, All 0s, All 1s and User Defined

Multiple Streams Throughput Testing

Up to 8 independent traffic streams generation and analysis, with configurable filters
Each stream can be set with independent frame size, bandwidth, traffic profile, and QoS levels

VeEX Tester Discovery Function & Remote Control

Discovery function to all VeEX VePal devices within subnet or manual control of VeEX VePal devices in routed network
Remote Control of Loopback capability
Remote Control of Asymmetric test capability for end-to-end test (optional)

Loopback Mode

Layer 1: loops back all incoming traffic
Layer 2: all incoming traffic is looped back with MAC source and destination addresses swapped
Layer 3: all incoming traffic is looped back with MAC and IP source and destination addresses swapped
Layer 4: all incoming traffic is looped back with MAC, IP, and UDP/TCP ports swapped
Loopback traffic filters with all MAC/VLAN/IP/UDP parameters configurable
All key measurements on received traffic provided on the loopback port

VLAN Scan and Monitor

Scan incoming traffic and discovers all VLAN flows including Q-in-Q tagging
Key statistics on traffic rates, alarms and errors are reported for monitored streams (up to 8)

IPv6

IPv6 compliant test traffic generation and analysis for all test applications (Y.1564 V-SAM, RFC2544, BERT and Multi-stream Throughput)
IPv6 Loopback capability
IPv6 Static or Stateless Auto Configuration and Ping function

IP Test Suite

IP Configuration and validation (IPv4, IPv6, Static, DHCP, PPPoE)
MAC address (configurable or default)
Ping and trace-route tests (IP address or URL)
Network discovery/ARP wizard (optional)

Packet Capture

Packet capture at line rate
Configurable capture filters
Capture file export in PCAP format
Integrated Wireshark™ packet decode

Packet Network Synchronization

IEEE 1588v2/PTP Master Clock Emulation

Unicast and multicast master emulation
IPv4 and IPv6 support
2-step clock
Configurable announce, Sync and Delay_req rates and domain number

Slave Clock Emulation

Unicast or multicast slave emulation
IPv4 and IPv6 support
1-step or 2-step clock
Configurable announce, Sync and Delay_req rates and domain number

Measurements

Message counters (Sync, Follow up, Delay Request/Response, Pdelay Request/Response, signaling, management) and statistics (Loss, CRC error, duplicate, out of order)
PTP messages display and decode
PDV measurements and graph display (Sync PDV, Delay_Req PDV)
Round trip delay measurements and graph display
IPG measurements and graph display

ESMC SSM

ESMC SSM generation: configurable message type and rate
ESMC SSM messages counters
ESMC SSM messages display and decode

Fibre Channel

Fibre Channel Rates

1GFC (1.0625 Gbps)
2GFC (2.125 Gbps)
4GFC (4.25 Gbps)

Operating Modes

Terminate
Loopback

Fibre Channel Topology

Point-to-Point

Primitive Sequence Protocols

Link Protocols: Link initialization, link rest, link failure

Flow Control

Buffer-to-Buffer Credit Configuration: 1-65535
Buffer-to-buffer credit

Traffic Generation Capabilities

FC-1 (with SOF and EOF frame delimiters) and FC-2 Frames
Class 3 Service Frames
Configurable Header fields
Configurable EOF, SOF
Traffic Shaping: constant, ramp, burst
Frame Length Configuration: 2148 bytes maximum

Key Measurements

Error Measurements: Bit, BER, CRC, symbol, Oversize, Undersize, Frame loss (count and %)
Alarm Detection: LOS, pattern loss, service disruption
Traffic Statistics: Bandwidth utilization, data rate, frame count, byte count, frame size distribution, buffer-to-buffer credit count, RR_RDY count, frame loss count and round trip delay
Rates (min, max, average and current): frame rate, bandwidth utilization, frame rate, line rate, data rate
Delay (min, max, average and current): round trip delay, inter frame gap

RFC2544 Compliance Testing

Automated tests compliant with RFC2544 with configurable threshold values and maximum transmit bandwidth settings
Throughput, Latency, Frame Loss, and Back-to-Back (burst) tests
Frame sizes: 64, 128, 256, 512, 1024, 1280, and 2000 bytes including 2 user configurable frames

Bit Error Rate Testing

NCITS-TR-25-1999 Patterns (FC-1): CRPAT, CSPAT, CJPAT
PRBS Patterns (FC-2): 2^{31} -1, 2^{23} -1, 2^{15} -1, 2^{11} -1, normal and inverted selections
User defined patterns
Error Injection: Bit and CRC

Loopback Mode

FC-1
FC-2 (Layer 2): swaps the destination and source IDs (D_ID and S_ID)

Ordering Information

Z22-00-001P	UX400 1GE Module, Dual 10/100/1000Base-T and Dual 100/1000Base-X (SFPs sold separately)

Software Options

Ethernet Options

499-05-014	MPLS Tags
499-05-015	Jitter Measurements
499-05-058	MAC Flooding
499-05-059	Asymmetric Testing
499-05-093	VLAN Flooding
499-05-129	1GE Packet Capture with Wireshark™ Decode

IP Options

499-05-091	1GE IP Connectivity (Ping, ARP and Trace Route

Packet Network Synchronization Options

499-05-179	IEEE1588v2 IPv4 Slave Clock Emulation
499-05-180	IEEE1588v2 IPv4 Master Clock Emulation
499-05-182	IEEE1588v2 IPv6
499-05-183	IEEE1588v2 Protocol Decode
499-05-203	SyncE ESMC/SSM Message Support

Fibre Channel Options

499-05-228	Fibre Channel 1G/2G/4G Test Suite
499-05-229	Fibre Channel 1G/2G Test Suite

Optical SFP Options

301-01-001G	850 nm SX (550m) SFP - 1GE, 1G/2G FC
301-01-002G	1310 nm LX (10km) SFP - 1GE, 1G/2G FC
301-01-003G	1550 nm ZX (90km) SFP - 1GE, 1G/2G FC
301-01-010G	850 nm SX (550m) SFP - 1GE, 1G/2G/4G FC
301-01-011G	1310 nm LX (4km) SFP - 1GE, 1G/2G/4G FC
301-01-012G	1310 nm LX (10km) SFP - 1GE, 1G/2G/4G FC
301-01-013G	1310 nm 100FX MM (2km) SFP - 100Mbps
301-01-014G	1310 nm 100FX SM (15km) SFP - 100Mbps

General

Power Consumption	12 watts (max)
Environmental	
Operating temperature	0 to 40°C (32 to 104°F)
Storage temperature	-20 to 70°C (-4 to 158°F)
Humidity	5% to 90% non-condensing

ROHS compliant and Lead Free per Directive 2002/95/EC
CE Compliant

The Verification Experts

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