Ospirent pX3 400G 2-port Speed Test Module Owner's Manual

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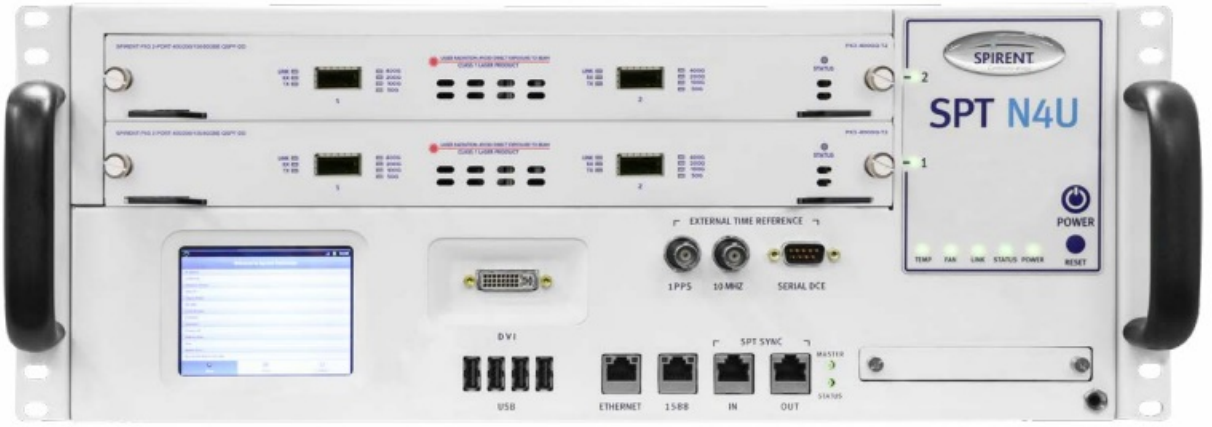
Ospirent pX3 400G 2-port Speed Test Module



Specifications

- **Module Part Number**: PX3-QSFP-DD-2-825A
- **Speed**: 400/200/100/50/40/25/10G
- **Maximum Ports per slot**: 2/4/8/16
- **Maximum Ports per SPT-N12U Chassis**: 24/48/96/192
- **Maximum Ports per SPT-N4U Chassis**: 4/8/16/32
- **MSA Interface:** QSFP-DD
- **Operational modes:**
  - Port CPU Stackable multi-core CPU
  - User reservation Per QSFP-DD port
  - Test Port speed config: 2 test port speed groups per blade
  - Line clocking and packet time-stamping
  - Inter-module and inter-chassis time synchronization
- **Module weight:** 3.219 kg, 5.45 lbs.
- **Module predicted MTBF**: 56,330 hours. Hours of continuous operation
- Operating temperature range
- **Max power draw per module**: Maximum of 450W per slot

Product Usage Instructions

Installation and Setup

1. Ensure the chassis and modules are powered off before installation.
2. Insert the pX3 400G 2-port Module into the designated slot on the chassis.
3. Power on the chassis and follow any setup instructions provided in the user manual.

Configuration

To configure the test ports, follow these steps:

1. Access the configuration menu on the module.
2. Select the desired test port speed groups.
3. Adjust any other settings as needed for your specific testing requirements.

Testing Procedures

When testing with the pX3 400G 2-port Module, consider the following:

- Connect your test equipment to the module using appropriate cables.
- Run your testing software or platform and initiate the tests on the configured ports.
- Monitor the test results and analyze the performance metrics provided by the module.

QSFP-DD Test Module
400/200/100/50/40/25/10G Network bandwidth needs continue to grow at a rapid pace.

Network equipment manufacturers are developing highly flexible multi-rate products to support the latest generation of HSE devices. Service Providers and Hyperscale data centers are deploying multi-rate networking infrastructure solutions to meet this growing market. With these multi-rate requirements, customers demand higher density test equipment. Flexibility is needed to validate the next generation of routers and data center fabrics. Spirent pX3 quad-speed module architecture was developed to meet these specific needs with its industry-leading 2 times density advantage for QSFP-DD. Spirent's QSFP-DD test modules can be configured to support seven speeds per port, 400/200/100/50/40/25/10G with both PAM4 and NRZ encoding. The QSFP-DD test module also supports Auto Negotiation and Link Training for all speeds including 8x50G. Trade-in programs are available for customers interested in upgrading existing test modules to support AN/LT and NRZ encoding. As an additional benefit, PX3-QSFP-DD-2 test modules provide a convenient way to upgrade to new hardware speed options through the purchase of related software licenses. These next-generation modules do not need to be returned to the factory in order to upgrade support for new speed options. For more information, see Ordering Information section.

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. A single N12U can support 24-400G ports, or 4-ports from a single N4U chassis. 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. Terabit Routers—Test 400G core routers with high-scale, multiprotocol topologies.

Features

- 2x 400G ports per pX3 module, delivers the highest density highspeed Ethernet solution per module, chassis or rack unit
- Each QSFP-DD port supports:
  - PAM4 – 1x400G, 2x200G, 4x100G, 8x50G
  - NRZ – 2x100G, 4x50G, 2x40G, 8x25G, 8x10G
  - 4x100G (QSFP28) accessory cable ACC-1067A and chassis license required
- Each port supports both PAM4 and NRZ encoding (requires chassis license)
- Support for Ethernet (FEC), and Auto Negotiation and Link Training (AN/LT) on all speeds including 8x50G mode
- Support for MACsec across all port speeds
- Protocol testing for L2/3 routing/ switching and data center test cases

Benefits

- Industry's highest density single slot test module: 2 times QSFP-DD advantage
- PAM4 and NRZ solution in one platform
- Provides large capacity testing for a variety of services

- Hardware speed option upgrades available via licensing

Productivity

- Intelligent Results™
- When creating test beds at the scale needed the amount of data that is produced is astronomical. An advanced, highly efficient distributed database processes billons of real-time results to validate tests and identify problems, giving engineers the immediate feedback they need to debug problems and accelerate development
- Delivers more results with tight correlation, and more information to find those obscure bugs. With more coverage and more information, Spirent 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. Using Spirent's iTest platform, your device under test results can easily be correlated and compared with Spirent's results.

Technical Specifications

pX3 400G 2-port Module				
Module Part Number	Speed	Maximum Ports per slot	Maximum Ports per SPT-N12U Chassis	Maximum Ports per SPT-N4U Chassis
PX3-QSFP-DD-2-825A	400/200/100/50/40/25/10G	2/4/8/16	24/48/96/192	4/8/16/32
PX3-QSFP-DD-2-750A	400/200/100/50G	2/4/8/16	24/48/96/192	4/8/16/32
PX3-QSFP-DD-2-400A	400G only	2	24	4

MSA Interface	QSFP-DD
Operational modes	PAM4 – 400/200/100/50G NRZ – 100/50/40/25/10G
Port CPU	Stackable multi-core CPU
User reservation	Per QSFP-DD port
Test Port speed config	2 test port speed groups per blade
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 2.5ns • 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
Inter-module and inter-chassis time synchronization	Modules in the same chassis are phased-locked to the timing source of the control module. For more modules in separate chassis: • Spirent-patented self-calibrating inter-chassis timing chain using dedicated port on chassis control module delivers precise synchronization ± 20ns • Synchronization via external GPS or CDMA network • Using IEEE 1588 or NTP packet-based approaches • With TIS/EIA-95B timing inputs
Module weight	3.219 kg, 5.45lbs.
Module predicted MTBF	56,330 hours. Hours of continuous operation
Operating temperature range	Supported for 41° to 95° F (5° to 35° C) ambient temperature. 2
Max power draw per module	Maximum of 450W per slot

Spirent TestCenter Layer 2-3 Generator and Analyzer	
Number of streams	• Stats/Streams @400/200/100/50/40/25/10G: Tx=32k, Rx=32k • Stream fields can be varied to create billions of flows
Number of Paths/Raw Streamblocks	1023; 255 when using list modifiers
Frame transmit modes	Port-based (rate per port), stream-based (rate per stream), burst, timed, step transmission, manual scheduler mode, random frame size with unique speed
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 • Out of sequence errors • FCS errors and rate • Min, Max and Average Latency • Real Time Dropped Frame count
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 • Out of sequence errors • PRBS errors • FCS errors and rate
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, TDP, UDP
Supported Tx signature capability	Fully compatible with Spirent hardware; contains sequence number and highly accurate timestamp
Capture buffer size	8MB per port
Capture buffer controls— Spirent 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 signature or all frames; store tx/rx control plane with data plane; real-time mode for control plane traffic; wrap or stop buffer at end. User defined pattern definitions can logically combine 8 filters of up to 32 total bytes. Patterns can be applied to start, filter (quality) or stop capture. In addition to user-patterns, filtering, starting and stopping capture contains the following pre-defined events: FCS, PRBS, IPv4 checksum, TCP/UDP/IGMP checksum, and sequence errors; undersize, oversize, jumbo, and user-defined frame length; IPv4, IPv6, TCP, UDP and IGMP 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	1M 4-byte entries for dynamic label or random IP/MAC address assignments
RIT or List VFD Entries per Stream	8 RIT insertions per stream and 6 VFD insertions per stream

Layer 1 Functionality	
QSFP Interconnects	SR, LR, FR, DR, PSM4 at multi-rate (400/200/100/50/40/25/10G)
Media support and FEC options	Support varies by module speed mode • 400G: 400GBASE-SR8, 400GBASE-DR4, 400GBASE-LR8, 400GBASE-FR8, 400GBASE-LR4, 4x100G QSFP-DD LR • 200G: 200GBASE-SR4, 200GBASE-PSM4,200GBASE-LR/FR4, plus additional MSA PMDs • 100G: 100GBASE-SR2, 100GBASE-LR2 plus additional MSA PMDs • RS-FEC (544) KP all speeds • Direct Attach Cable breakouts **NRZ** support varies by module speed mode and license • 100G: 100GBASE-SR4, 100GBASE-CR4, 100GBASE-LR4, 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 • QSFP28 to SFP28 breakout cable options • Auto-Negotiation and Link Training for 100G, 50G, 40G and 25G • Clause 74 BASE-R FEC, Clause 91 RS-FEC, and Clause 108 RS-FEC • 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)	Direct Attach Copper (DAC), AN/LT supported for all speeds including 8x50G mode
Layer-1 Debug Tools & Features	CR Tx Emphasis settings, Rx Eye view, FEC Counters, PRBS Gen/Check, Front-end L1 Summary Status, Xcvr MDIO access, PCS monitoring, PCS skew, FEC error injection, PCS random error injection

Ordering Information

Part Number	Description
Test Modules	
PX3-QSFP-DD-2-825A	Spirent pX3 400/200/100/50/40/25/10G QSFP-DD 2-Port
PX3-QSFP-DD-2-750A	Spirent pX3 400/200/100/50G QSFP-DD 2-Port
PX3-QSFP-DD-2-400A	Spirent pX3 400G QSFP-DD 2-Port
Additional Features	
UPG-NRZ-PX3-400G-T2**	FACTORY UPGRADE NRZ SPIRENT 400G QSFP-DD 2-Port
ACC-1067*	ACTIVE COPPER BREAKOUT QSFP-DD to 4XQSFP28 3M
Spirent Chassis	
SPT-N12U-110	Spirent N12U chassis and controller with 110VAC power supplies
SPT-N12U-220	Spirent N12U chassis and controller with 220VAC power supplies
SPT-N4U-110	Spirent N4U chassis and controller with 110VAC power supplies
SPT-N4U-220	Spirent N4U chassis and controller with 220VAC power supplies
Software Upgrades (available as add on after purchase of initial base package bundle)	
HWO-PX3-QSFP-DD-2-400G-XS	400G XStream Enhanced Scale Software
HWO-PX3-QSFP-DD-2-100G-XS	4x 100G XStream Enhanced Scale Software
SWO-PX3-QSFP-DD-2-MACSEC	MACSEC Software on PX3-QSFP-DD-2 Test Module

Requirements

- Spirent chassis and controller (see table)
- 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

1. High density 100G QSFP28, also requires BPK-1378 QSFP-DD to 4xQSFP28 chassis license
2. This feature requires 8x50G-AN/LT-compatible hardware. If hardware already supports 8x50G AN/LT, quote only UPG-NRZ-PX3-400G-T2.

If hardware does not support 8x50G AN/LT, then UPG-8x50G-ANLT-T2 needs to be added to quote (return to factory upgrade).

About Spirent Communications
Spirent Communications (LSE: SPT) is a global leader with deep expertise and decades of experience in testing, assurance, analytics and security, serving developers, service providers, and enterprise networks. We help bring clarity to increasingly complex technological and business challenges. Spirent's customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled.

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FAQ

Q: Can I upgrade my existing test modules to support new speed options?
A: Yes, trade-in programs are available for customers interested in upgrading existing test modules to support new speed options.

Q: What is the maximum power draw per module?
A: The maximum power draw per module is 450W per slot.

Documents / Resources

	Ospirent pX3 400G 2-port Speed Test Module [pdf] Owner's Manual pX3 400G 2-port Speed Test Module, pX3 400G 2-port, Speed Test Module, Test Module, Module

References

- User Manual