

# 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 multiterabit 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<sup>™</sup>
- 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**

Port Number Speed persist SPT-INZU Chassis SPT-INZU Chass	3 400G 2-port Module		Maximum Ports	Maximum Ports per	Maximum Ports per		
PX3-QSFP-DD-2-750A 400Conty 2 2 24  PX3-QSFP-DD-2-400A 400Conty 2 2 24  MAS Interface  QSFP-DD  Operational modes  PAM - 400/200/100/50G  NRZ - 1005/040/25/10G  PAM - 400/200/100/50G  PAM - 400/200/200/50G  PAM - 400/200/200/200/50G  PAM - 400/200/200/200/200/200/50G  PAM - 400/200/200/200/200/200	rt Number	Speed			SPT-N4U Chassis		
ASA Interface OSFP-DD Departational modes PAM4 - 400/200/100/50G NSZ - 100/50/40/25/10G PAM4 - 400/200/100/50G PAM4 - 400/200/200/100/50G PAM4 - 400/200/200/200/200/200/200/200/200/200/	3-QSFP-DD-2-825A	400/200/100/50/40/25/10G	2/4/8/16	24/48/96/192	4/8/16/32		
ASA Interface  Operational modes  PAMA - 400/200/100/50G NRZ - 100/50/40/25/10G Stackable multi-core CPU  Stackable multi-	3-QSFP-DD-2-750A	400/200/100/50G	2/4/8/16	24/48/96/192	4/8/16/32		
Page 100/50/40/25/G0 Part CPU Stackable multi-core CPU Page 27	3-QSFP-DD-2-400A	400G only	2	24	4		
Operational modes   NRZ - 100/50/A0/25/10C	A Interface	QSFP-DD					
Per QSFP-DD port  2 test port speed config  ine clocking and packet time-stamping  Statum-3 rared oscillator is the default time source. Transmit line clack is at the practice there is a 1 PPM on initial shipment. Accurate to 2 4.6 PPM 15 years of operation in the clocking and packet time-stamp resolution of 2,5 in   - From time-stamp resolution of 2,5 in  - From	erational modes						
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Stratum-3 rated accilitator is the default time source. Transmit line clock is at the practifibrement rate z < 1 PPM on initial shipment. Accurate to 2 4.6 PPM 15 years of operation in the strain of 2.5 s.  OPS and CDMA-based external time sources are supported items on the strain of 2.5 s.  OPS and CDMA-based external time sources are supported items on the strain of 2.5 s.  OPS and CDMA-based external time sources are supported items on the sources are supported on the strain of 2.5 s.  OPS and CDMA-based external time sources are supported items on the sources are supported inter-module and inter-chassis time.  Module and inter-chassis time which is a separate chassis or the timing source of the control me for more modules in the same chassis are phased-locked to the thiming source of the control me for more modules in the same chassis are phased-locked to the timing source of the control me for more modules in the same chassis are phased-locked to the timing source of the control me for more modules in the same chassis are phased-locked to the timing source of the control me control modules are phased-locked to the timing source of the control me for more modules and self-colibrating inter-chassis timing chain using dedicated port or control module delivers precise synchronization at 20 s.  Synchronization via external CPS or CDMA network  Using IEEE 1588 or NTP packet-based approaches  With ITMS/EIA-958 liming inputs  Module predicted MTBF  Separating temperature range  Supported for 41* to 95* F (5* to 35* C) ambient temperature. 2  Maximum of 450W per slot  Maximum of 45	er reservation	Per QSFP-DI	) port				
Ethernet rate z = 1 PPM on initial shipment. Accurate to ± 4.6 PPM 15 years of operation	t Port speed config	2 test port sp	2 test port speed groups per blade				
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For more modules in separate chassis:  - Spirent-partented self-calibrating inter-chassis timing chain using dedicated port or control module delivers pracise synchronization ± 20ns  - Synchronization via external GPS or CDMA network  - Using IEEE 1588 or NTP packet-based approaches  - With TIS/EIA-95B timing inputs  3.219 kg, 5.451bs.  Module predicted MTBF  56,330 hours. Hours of continuous operation  Departing temperature range  Supported for 41° to 95° F (5° to 35° C) ambient temperature. 2  Maximum of 450W per slot  Spirent Tes/Center Layer 2-3 Generator and Analyzer  Number of streams  - Stats/Streams (2400/200/100/50/40/25/10G: Tx=32k, Rx=32k)  - Stream fields can be varied to create billions of flows  Number of Paths/Raw Streamblocks  - Stream fields can be varied to create billions of flows  Number of Paths/Raw Streamblocks  Number of Paths/Raw Streamblocks  - Stream fields can be varied to create billions of flows  Number of Paths/Raw Streamblocks  - Stream fields can be varied to create billions of flows  Number of Paths/Raw Streamblocks  - Stream fields can be varied to create billions of flows  Number of Paths/Raw Streamblocks  - Stream fields can be varied to create billions of flows  Number of Paths/Raw Streamblocks  - Stream fields can be varied to create billions of flows  Number of Paths/Raw Streamblocks  - Stream fields can be varied to create billions of flows  - Number of Paths/Raw Streamblocks  - Stream fields can be varied to create billions of flows  - Number of Paths/Raw Streamblocks  - Stream fields can be varied to create billions of flows  - Stream fields can be varied to create billions of flows  - Stream fields can be varied to create billions of flows  - Stream fields can be varied to create billions of flows  - Stream fields can be varied to create billions of flows  - Stream fields can be varied to create billions of flows  - Stream fields can be varied to create billions of flows  - Stream fields can be varied to create billions of flows  - Stream fields can be varied to create	er-module and inter-ch		Modules in the same chassis are phased-locked to the timing source of the control module.				
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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 Tx rates  1 packet per 3.43 seconds to 101% of line rate  Change rate and frame length settings without stopping the generator or analyzer for trul cause and effect analysis  Per-stream statistics analyzed in real time  Per-stream statistics analyzed in and trates  1 x and Rx frame counts and rates  1 x and Rx Layer 1 byte counts and rates  1 x and Rx Layer 1 byte counts and rates  1 x and Rx Layer 1 byte counts and rates  2 whin, Max and Average Latency  3 Real Time Dropped Frame count  Support Priority Flow Control  Tx and Rx frame counts and rates  2 whin, Max and Average Latency  3 Real Time Dropped Frame count  Support Priority Flow Control  Tx and Rx frame counts and rates  2 whin, Max and Rx Layer 1 byte counts and rates  3 whin Ax Layer 1 byte counts and rates  4 whin Ax Layer 1 byte counts and rates  5 whin Ax Layer 1 byte counts and rates  6 whin Ax Layer 1 byte counts and rates  7 x and Rx Layer 1 byte counts and rates  7 x and Rx Layer 1 byte counts and rates  8 whin Ax Layer 1 byte counts and rates  9 whin Ax Layer 1 byte counts and rates  10 whin Ax Layer 1 byte counts and rates  10 whin Ax Layer 1 byte counts and rates  10 whin Ax Layer 1 byte counts and rates  10 whin Ax Layer 1 byte counts and rates  10 whin Ax Layer 1 byte counts and rates  10 whin Ax Layer 1 byte counts and rates  10 whin Ax Layer 1 byte counts and rates  10 whin Ax Layer 1 byte counts and rates  10 whin Ax Layer 1 byte counts and rates  10 whin Ax Layer 1 byte counts and rates  11 whin Ax Layer 1 byte counts and rates  12 whin Ax Layer 1 byte counts and rates  13 whin Ax Layer 1 byte counts and rates  14 whin Ax Layer 1 byte counts and rates  15 whin Ax Layer 1 byte counts and rates  16 whin Ax Layer 1 byte counts and rates  17 whin Ax Layer 1 byte counts and rates  18 whin Ax Layer 1 byte counts and rates  19 whin Ax Layer 1 byte counts and rates  10 whin Ax Layer 1				ns of flows			
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Cause and effect analysis  Tx and Rx Layer 1 byte 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  Support Priority Flow Control  Per-port statistics analyzed in real time  Flow Control  Per-port statistics analyzed in real time  Flow End time  Flow End time  From the time timestamp resolution  For the timestamp resolution  Supported encapsulations  For the timestamp resolution  Supported Tx signature capability  Capture buffer controls— Spirent  EsteCenter's unique capture capability  Capture buffer size  Capture buffer size  Capture buffer size  Capture buffer so unique capture capability  Callows maximum effectiveness when debugging hard to find hardware or protocol problems  For the timestamp resolution  For the timestamp resolution  For the timestamp resolution with intra-chassis and inter-chassis synchronization  Fully compatible with Spirent hardware; contains sequence number and highly accurate tip timest to signature or all frames; store tx/rx control plane with data plane mode for control plane traffic; wrap or stop buffer at end. User defined pattern definitions combine 8 filters of up to 32 total bytes. Patterns can be applied to start, filter (quality) or so in addition to user-patterns, filtering, starting and stopping capture contains the following events: FCS, PRBS, IPv4 checksum, TCP/UDP/IGMP checksum, and sequence errors; under jumbo, and user-defined frame length; IPv4, IPv6, TCP, UDP and IGMP packets; test signat test stream ID match. Each event can be independently set to ignore, include or exclude. So (user defined counters), Capture byte offset mode, Capture pattern matching.  Benchmark tests support LIFO, LILO, FIFO or FILO latency calculation methods				at stopping the generator or and	vzer for truly interactive.		
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  Support Priority Flow Control  Tx and Rx Layer 1 byte counts and rates  Tx and Rx frame counts and rates  Tx and Rx Layer 1 byte 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  Supported encapsulations  Fully compatible with Spirent hardware; contains sequence number and highly accurate till and plane februaging hard to find hardware or protocol problems  Ty and Rx Layer 1 byte counts and rates  Out of sequence errors  PRBS errors  FCS errors and rate  2.5 ns Tx timestamp resolution with intra-chassis and inter-chassis synchronization  Layer 2: Ethernet II, 802.1Q, 802.1ad, FCOE  Layer 3/4: IPv4, IPv6, TDP, UDP  Fully compatible with Spirent hardware; contains sequence number and highly accurate till some sequence of operation that include: Filter by protocol fields, filter by byte offset and rates are supported to start, filter of up to 32 total bytes. Patterns can be applied to start, filter (quality) or some signature or all frames; store signature or all frames; store styre control plane with data plane mode for control plane traffic; wrap or stop buffer at end. User defined pattern definitions combine 8 filters of up to 32 total bytes. Patterns can be applied to start, filter (quality) or some protocol problems  Filter Spirent Protocol from length; IPv4, IPv6, TCP, UDP and IGMP packets; test signative or all frames; store signature or all	ar mile ix officialli dajus			in dropping the generator or and	yzer for mary interactive,		
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per port IM 4-byte entiries for dynamic label of random 17/MAC address assignments	port	IIVI 4-byle ellif	<u> </u>				
RIT or List VFD Entries per Stream 8 RIT insertions per stream and 6 VFD insertions per stream	or List VFD Entries per	stream 8 RIT insertions	s per stream and 6 VFD insertior	ns 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		
	<ul> <li>400G: 400GBASE-SR8, 400GBASE-DR4, 400GBASE-LR8, 400GBASE-FR8,</li> </ul>		
	400GBASE-LR4, 4x100G QSFP-DD LR		
	<ul> <li>200G: 200GBASE-SR4, 200GBASE-PSM4, 200GBASE-LR/FR4, plus additional MSA PMDs</li> </ul>		
	<ul> <li>100G: 100GBASE-SR2, 100GBASE-LR2 plus additional MSA PMDs</li> </ul>		
	RS-FEC (544) KP all speeds		
	Direct Attach Cable breakouts		
	NRZ support varies by module speed mode and license		
	<ul> <li>100G: 100GBASE-SR4, 100GBASE-CR4, 100GBASE-LR4, plus additional MSA PMDs</li> </ul>		
	<ul> <li>50G: 25/50G Consortium 50GBASE-CR2,</li> </ul>		
	<ul> <li>40G: 40GBASE-SR4, 40GBASE-CR4, 40GBASE-LR4</li> </ul>		
	<ul> <li>25G: 802.3by 25GBASE-CR, 25GBASE-CRS, 25GBASE-SR</li> </ul>		
	10G: 10GBASE-SR, 10G Copper DAC		
	<ul> <li>QSFP28 to SFP28 breakout cable options</li> </ul>		
	<ul> <li>Auto-Negotiation and Link Training for 100G, 50G, 40G and 25G</li> </ul>		
	<ul> <li>Clause 74 BASE-R FEC, Clause 91 RS-FEC, and Clause 108 RS-FEC</li> </ul>		
	<ul> <li>25/50G Consortium 50GBase-R FEC CL74, 25/50G Consortium 50GBase RS-FEC CL91</li> </ul>		
	<ul> <li>IEEE 25GBASE CR CL74, CL108, CR-S CL74, SR FEC CL108</li> </ul>		
	<ul> <li>25/50G Consortium 25GBase-R FEC CL74, 25/50G Consortium 25GBase RS-FEC CL91</li> </ul>		
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.

For more information visit: www.spirent.com

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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, Modul e

#### References

User Manual

Manuals+, Privacy Policy

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