# VIAVI
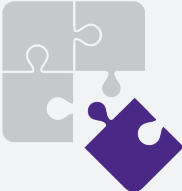## ONT-600 / 800 N-PORT Test Module

From design to production, the N-PORT Module helps launch new 100G-class products faster.

VIAVI Solutions

The VIAVI ONT N-PORT Module addresses test and measurement needs for more quickly launching 100G-class products to market. The N-PORT Module supports native 4 x QSFP28 / 4 x SFP28 and is an element of the VIAVI ONT portfolio. With its advanced test applications and comprehensive Transport technology coverage including Ethernet, OTN, and Fiber Channel it helps components and module vendors, NEMs, and service providers to enable existing and emerging technologies.
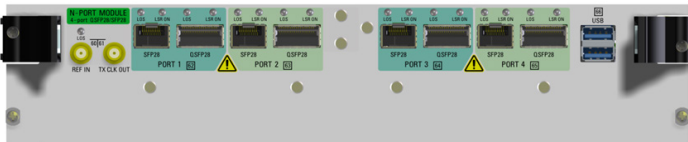
N-PORT Module (ONT-600 variant)

Reliable	Advanced	Complete
Trusted industry reference	Enabling emerging technologies	Comprehensive Transport technology coverage

The VIAVI ONT portfolio is designed to enable the latest technologies in design and production.

Key Features
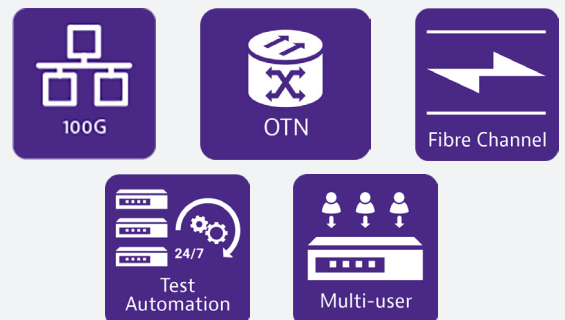
- Native support for 4 x SFP28 / 4 x QSFP28
- Ethernet including 10GE, 25GE, 40GE and 100GE
- OTN including OTU-4 and OTU-3
- Fiber Channel
- Multi-user support and completely independent ports
- Test Automation

Benefits

- Ensures ecosystem interoperability
- Enables reliable performance
- Accelerates product validation

Use Cases

- System development
- Transponder test
- FEC compliance validation
- IC development and validation test
- System Verification Testing
- Manufacturing test

Test Applications

N-PORT is the ideal selection for many use cases. The N-PORT Module provides four independently configurable and multi-user test ports for typical test scenarios like:
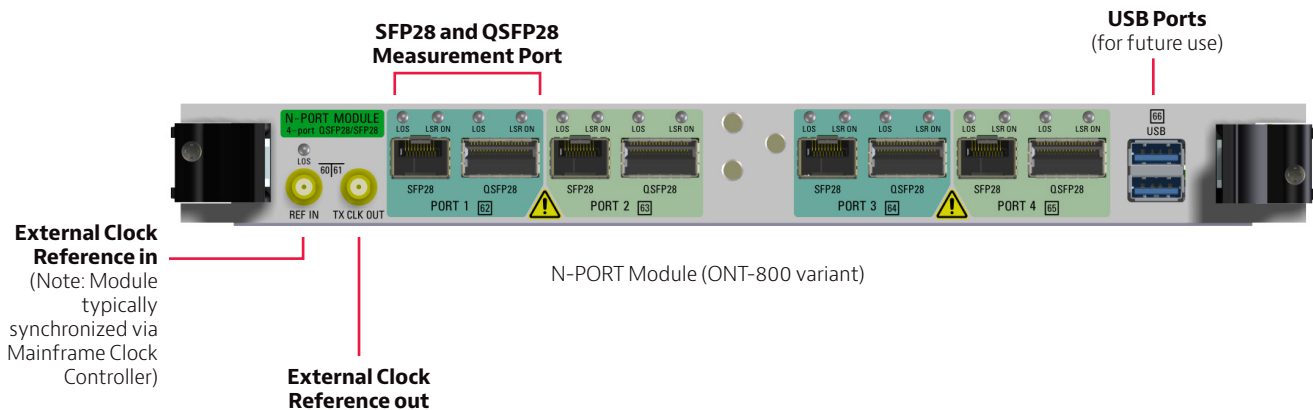
• Performance testing with full port loading

• Functionality testing of new features and release

• Continuous testing on stability and interoperability

SFP28 and QSFP28 Measurement Port

USB Ports (for future use)

External Clock Reference in (Note: Module typically synchronized via Mainframe Clock Controller)

External Clock Reference out

N-PORT Module (ONT-800 variant)

The N-PORT Module covers test requirements throughout R&D, System Verification Testing, Production and Deployment lifecycle of ICs, transponders, linecards and sub-systems and Network Elements for 100G-class products.

R&D and System Design

The N-PORT provides deep testing insight and diagnostic of Layer 1-3 from chips to system for multi-lane 100G-class products. Key applications include:

• Transponder test with I^{2}C debugging to develop and validate pluggables

• Skew insertion – managing skew tolerances

• FEC Alignment – overcoming inter-symbol interference challenges that dispersion causes in fiber from lower-cost optics

• IC development – comprehensive troubleshooting tools for signal integrity, PCS, Ethernet and OTN traffic using real-world traffic rather than limited, unframed PRBS signals to validate performance

System Verification Testing (SVT)

The N-PORT excels in typical SVT test applications and needs like:

• System Interoperability and Reliability using in-depth R&D test metrics for Performance Monitoring and Functional Testing of Mappings throughout System Verification Testing

• Verify automated protection switching (APS) with ONT Service Disruption Test

• Efficient, fully automated SVT and Production testing

Physical Layer Testing

The N-PORT provides physical-layer applications that quickly identify the root cause of errors. It covers the full range, from signal integrity through to CDR issues, timing and pattern sensitivity. It tests and validates QSFP28 pluggables, and optical media like SR4, PSM4, CWDM4, SWDM4 and LR4.

Physical Layer Test	What It Tests	Why It is Needed
Hardware Validation	I²C peek/poke, clock frequency variation, CPPI control – CTLE and DFE equalizer mode, Analog Settings TX pre-emphasis, Equalizer and RX Slicer, Lambda Mapping	Transponder validation. Find transponder control interface errors early.
Optical Power	TX/RX Optical Power, aggregated and per lane	Identify connector issues like dirty interfaces. Root cause analysis in case of LOS
BER Estimation	Target BER and Confidence level (probability that the actual BER is less or equal to the estimated BER) per lane. Positive / Neutral / Negative outlook and minimum residual measurement time to achieve target BER.	Provides visibility on BER performance based on actual error events and expected recovery time to achieve targeted BER.
PHY Errors & Alarms	Interface Alarm like LOS	Identify connector issues like dirty interfaces
TX Frequency Variation	Adjust TX frequency within limits	Check if receiver works within specified limits; test the margins

Ethernet Layer Testing

The N-PORT Ethernet provides deep insight and diagnostic of Layer 1-3 from chips to systems for multi-lane 100GE products. It supports independent Ethernet generation and analysis capabilities on four ports configurable for 10GE, 25GE, 40GE and 100GE (including CAUI-4 KR4 FEC or 100 GAUI-4 KP4 FEC) for simultaneous port tests in System Verification Test (SVT) or manufacturing applications.
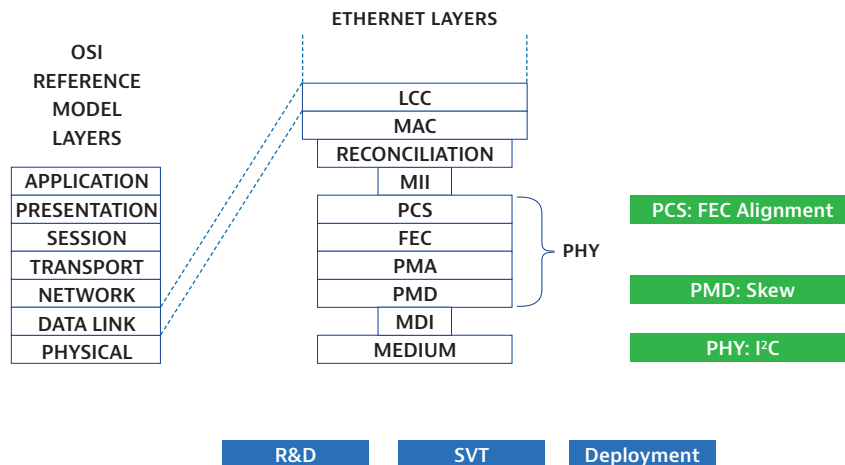
N-PORT: deep insight and diagnostics of Layers 1-3 of 10GE ... 100G products

PCS (incl. FEC) Layer Test

The N-PORT Module ensures thorough performance validation of standard and RS-FEC-based implementations. It sets pre-FEC error rate in perspective to post-FEC error rate and includes:

Ethernet PCS/FEC Test	What It Tests	Why It is Needed
BER Estimation	Target BER and Confidence level (probability that the actual BER is less or equal to the estimated BER) per lane. Positive / Neutral / Negative outlook and minimum residual measurement time to achieve target BER.	Provides visibility on BER performance based on actual error events and expected time to achieve targeted BER
RX FEC Error Statistics (for 25GE)	Number of corrupted symbols per codeword for error distribution classification.	Insight into pre-FEC link error rate allows better link margin calculations instead of just differentiating between correctable and uncorrectable Errors
PCS Errors & Alarms	PCS Lane Errors/Alarms, 64B/66B Errors & Alarms, Reconciliation Errors & Alarms.	Test integrity of PCS layer. Correlate pre-FEC and post-FEC error rate

MAC/IP Layer Test

Ethernet MAC/IP Layer Test	What It Tests	Why It is Needed
Flow Control	Generation and emulation of Pause frames and analysis	Test for Pause Frame count and Pause Quanta time
IPv4/IPv6 Multistream	Up to 256 streams	Test different flow speed and types
Configurable Frame structure	VLAN, QinQ, MPLS	Test policing, speed and types
Service Disruption	Flow disruption test: port disruption, QoS Transfer Delay, LPAC (Loss of Performance Assessment Capability), Frame Evaluation	Important test for APS (Automated Protection Switching) performance
Packet Jitter	Instantaneous Jitter is defined as the difference between packet spacing of the transmitter compared to packet spacing of the receiver. Instantaneous jitter is a measure of jitter dynamics.	Packet jitter is usually caused by queuing and routing across or buffering in switched-transport networks. The final effect of high packet jitter is the number of rejected packets.
MAC/IP Error	MAC Frame Errors (Runt, Oversized, FCS, Errored), Preamble / SFD (Invalid Preamble, Invalid SFD)	Validate MAC layer performance
Statistics	Total Frame Count, MAC Flow, MAC Bandwidth, Payload Bandwidth, MAC Frame Size Distribution, Frame Size	Test for Total Bandwidth and Utilization
Auto Test	Throughput Test, Preamble Transparency Check	Test end-to-end preamble integrity
RFC 2544	Throughput, round-trip delay, Frame Loss Rate, back-to-back (burstability) tests	RFC 2544 addresses the need for service providers to perform QoS measurements in Ethernet and IP networks. Vendors are mandated to qualify the correct behavior of their IP/Ethernet equipment.
Capture	Capture MAC / IP frames to file	Post analysis with e.g. Wireshark

OTN Layer Testing

The N-PORT Module provides sophisticated OTL, OTN and ODU-layer testing with skew measurements, support of lambda group, and real-time analysis per logical lane.

OTL Testing

OTL Test	What It Tests	Why It is Needed
TX Lane Mapping	Lane Rotator. Allows Virtual Lane assignment to lambda group	Correlate virtual lanes with physical lanes
TX/RX Alarms & Errors	OTL Lane Alarms per lambda group and Event List	Correlate errors to physical layer
Lane Skew	Current Skew per Virtual Lane	Validate if lane skew is within limits

OTN Testing

OTN Test	What It Tests	Why It is Needed
TX/RX Alarms & Errors	OTN Alarms & Errors, Event List, Graphical View	Test OTUk / ODUk / OPUk
Performance Analysis	Section and Path Monitoring, Signal Quality Supervision (G.798)	Verify performance monitoring implantation
Service Disruption	Number of Disruptions, Duration, Statistics, Event List	Important test for APS (Automated Protection Switching) performance
Overhead	Displays complete overhead; Section Monitoring, Path Monitoring, Fault Type and Fault Location Channel, Payload Structure Identifier, APS/PCC access, Overhead Byte Sequence	Overhead Evaluation (frame alignment / OTUk / ODUk / OPUk)
Stuffing	Adjust the asynchronous client offset	Allow manipulation of the stuffing rate of the client
TCM	TCM Alarms & Errors, Trail Trace Identifier Generation and Analysis	TCM References
Delay / Slip	PM Delay, TCM1-6 Delay	G.709 Overhead Delay Measurement
Control Plane	Capture fields GCCO, GCC1, GCC2, GCC1+2	General Communication Channel Capture

OTN Stacks

Stack	What It Tests
OTU4 BULK	Bulk PRBS payload into OTU-4
OTU3 BULK	Bulk PRBS payload into OTU-3
OTU4 with 100GE Client	100GE payload into OTU-4

Fiber Channel Testing

N-PORT Modules support Fiber Channel test at 16G and 32G rates. Test applications include:

• RFC 2544 adapted for Fiber Channel

• Line rate traffic generation with buffer-to-buffer credit flow control

• Bit Error Rate, frame loss and latency testing

Module Hardware Configurations

The dual-slot N-PORT Module (ONT-600 variant) can be operated in the ONT-600 and ONT-800 Mainframes. The 1-slot ONT-800 variant ca be operated in ONT-800 mainframes only.

ONT-804D Mainframe and N-PORT GUI

Ordering Information

N-PORT Module Hardware

401-001.02	N-PORT Module for ONT-600, 2 slots 4 ports
401-002.02	N-PORT Ethernet Module for ONT-600 platform, 2 slots, 4 ports
401-001.01	N-PORT Module for ONT-800 platform, 1 slot, 4 ports
401-002.01	N-PORT Ethernet Module for ONT-800 platform, 1 slot, 4 ports

Included Test Applications:

• Unframed BERT for supported line rates

• Hardware Validation

    – I^2C peek/poke

    – Clock frequency variation

    – CPPI control (100G Parallel Phy) – CTLE and DFE equalizer mode

    – Analog Settings TX pre-emphasis and RX Equalizer / Slicer

    – Lambda mapping

Available Software Options

Port SW Options can be assigned to either all 4 ports (401-xxx.50) or 2 ports, 1 and 3, (401-xxx.51). The table shows 4-port options only to enhance readability.

Licenses managed through StrataSync can be assigned to any port.

Port SW Options

Category	Part Number (Quad Port)	Option Name	Description
Ethernet			
	401-120.50	100GE incl. Clause 91 FEC - quad port	100G Ethernet with or without KR4 FEC
	401-121.50	100GE - 802.3cd - 100GAUI4 - NRZ - quad port	100G Ethernet with or without KP4 FEC
	401-150.50	25GE incl. RS/Base-R FEC - quad port	25G Ethernet with or without RS or Base-R FEC
	401-140.50	40GE - quad port	40G Ethernet
	401-160.50	10GE - quad port	10G Ethernet
	401-820.60	Ethernet FEC Validation (all available ports)	Adds in-depth FEC Validation to available Ethernet FEC rates (25GE, 100GE). Includes AM Sequence, FEC Stress Test, FEC Debug, TX Codeword Shift, TX lane mapping, TX/RX Lane Skew
OTN Bulk			
	401-240.50	OTL4-OTU4-BULK - quad port	OTU-4 with bulk PRBS
	401-243.50	OTL4-OTU4-ODUflex 1-80 - BULK - quad port	OTU-4 with single stage 1 ... 80 ODUflex TS, bulk-filled. Includes OTU-4 Bulk
	401-244.50	OTL4-OTU4-Multiplexed-BULK - quad port	OTU-4 with single (ODUk) and multistage (ODU3, ODU2, ODU1) muxed (ODU2, ODU1, ODU0, ODUFlex (1...8)) PRBS payload. Includes OTU-4 Bulk. No single-stage ODUFlex supported
	401-250.50	OTL3-OTU3-BULK - quad port	OTU-3 with bulk PRBS
	401-251.50	OTL3-OTU3-ODUflex 1-32 - BULK - quad port	OTU-3 with 1 ... 32 ODUflex TS, bulk-filled. Includes OTU-3 Bulk
	401-253.50	OTL3-OTU3-Multiplexed-BULK - quad port	OTU-3 with single (ODUk) and multistage (ODU2, ODU1) muxed (ODU1, ODU0, ODUFlex (1...8)) PRBS payload. Includes OTU-3 Bulk. No single-stage ODUFlex supported
	401-245.61	OTL4-OTU4-Multi-Channel 80TS - single - on port 1 - 4 combo	Up to 80 ODU timeslots. Runs on port 1 and needs resources of ports 1... 4

Port SW Options continued

Category	Part Number (Quad Port)	Option Name	Description
OTN with Ethernet Clients			
	401-330.50	OTL4-OTU4-Multiplexed-Client 40GE - quad port	OTU-4 with 40GE client. Includes OTU-4 and OTU4-ODU3 Bulk
	401-320.50	OTL4-OTU4-Client 100GE - quad port	OTU-4 with 100GE client. Includes OTU-4 Bulk
	401-360.50	OTL3-OTU3-Client 40GE - quad port	OTU-3 with 100GE client. Includes OTU-3 Bulk
	401-332.50	OTL4-OTU4-Multiplexed 10GE - 1GE - quad port	OTU-4 with single (ODUk) and multistage (ODU3, ODU2, ODU1) muxed (ODU2, ODU2e, ODU0, ODUFlex (1...8)) up to 10GE payload (via GFP-F) or 1 GE payload (via GFP-T in ODU0). Includes G.709 §17.4.1 mapping for 10GE. Includes OTU-4 Bulk and muxed PRBS instead of Ethernet. No single-stage ODUflex supported mapping.
	401-363.50	OTL3-OTU3-Multiplexed 10GE - 1GE - quad port	OTU-3 with single (ODUk) and multistage (ODU2 ODU2e) muxed (ODU0, ODUFlex (1...8)) up to 10GE payload (via GFP-F) or 1 GE payload (via GFP-T in ODU0). Includes G.709 §17.4.1 mapping for 10GE. Includes OTU-3 Bulk and muxed PRBS instead of Ethernet. No single-stage ODUflex supported mapping.
	401-321.61	OTL4-OTU4-GFP-F Client 100GE - Port 1	Option cannot run on ports 2 or 4
	401-321.63	OTL4-OTU4-GFP-F Client 100GE - Port 3	Option cannot run on ports 2 or 4
	401-322.61	OTL4-OTU4-ODUflex-GFP-F Client up to 100GE - Port 1	
	401-322.63	OTL4-OTU4-ODUflex-GFP-F Client up to 100GE - Port 3	
	401-840.60	OTN Enhanced OH Manipulation (all available ports)	Adds in-depth Overhead Manipulation features to enabled OTN rates
OTN with SDH clients			
	401-423.50	OTL4-OTU4-Multiplexed-Client 10G/2.5G/622M/155M SDH/SONET - quad port	Also includes PRBS bulk client instead of SDH/SONET. No ODUflex
	401-431.50	OTL3-OTU3-Multiplexed-Client 10G/2.5G/622M/155M SDH/SONET - quad port	Also includes PRBS bulk client instead of SDH/SONET. No ODUflex
Fiber Channel			
	401-553.50	Fibre Channel 32G - quad port	32G Fibre Channel
	401-552.50	Fibre Channel 16G - quad port	16G Fibre Channel

Module SW Options (can be used on any port)

Category	Part Number	Description	Supported Stack(s)	Included Functionality
Ethernet				
	401-820.60	Ethernet FEC Validation – Module Option	KR4-FEC- 100GigE L2 L3 Traffic 25GE RS-FEC and Base-R FEC	In-depth FEC evaluation. Debug, FEC Stress Test, FEC User Defined and Burst, RX AM Sequence, 256B/257B Errors, Codeword Shift
eCPRI				
	401-830.60	eCPRI over 10GE and 25GE (all available ports)	10GE, 25GE	Adds eCPRI functionality to all available 10GE/25GE ports
	401-832.60	eCPRI over 40GE and 100GE (all available ports)	40GE, 100GE, 100GAUI4	Adds eCPRI functionality to all available 40GE/100GE ports
OTN				
	401-840.60	OTN Enhanced OH Manipulation – Module Option	All available OTN stacks	Enables ability to manipulate and overwrite the internally generated or passed-through TX OTU/OPU/ODU overhead of the OTN Layer.

N-PORT Packages

Package number	Description
401-001.21	N-PORT OTU4/100GE - quad-port Standard Package
Parts and part numbers included:	
401-001.02	N-PORT Module 4-ports, 2 slots
401-120.50	SW: 100GigE incl. Clause 91 FEC - Multistream/IP - quad port
401-320.50	SW: OTL4-OTU4-Client 100GigE - quad port

Package number	Description
401-001.20	N-PORT 100GE - quad port Standard Package
Parts and part numbers included:	
401-001.02	N-PORT Module, 4-ports, 2 slots
401-120.50	SW: 100GigE incl. Clause 91 FEC - Multistream/IP - quad port

Flexible Software Options and Licenses

The N-PORT Module supports flexible and customizable software optioning and licensing. The N-PORT is StrataSync-enabled, allowing a fast and efficient test application upgrades and instant test readiness.

Software option keys are directly loaded to a specific module and port.

Example for OTL4-OTU4-Client 100GigE:

Part number	Software option key to enable quad or dual port
401-120.50	OTL4-OTU4-Client 100GigE - quad port
401-120.51	OTL4-OTU4-Client 100GigE - dual port 1/3

StrataSync software licenses are available and can be used to upgrade any existing N-PORT module when needed, either permanently or for a limited time. Upgrade to any N-PORT Module and any port when needed. Licenses can be assigned to a specific N-PORT Module and port through StrataSync at any time.

StrataSync™

Example for OTL4-OTU4-Client 100GigE:

Part number	StrataSync software license for a single port
401-120.73	OTL4-OTU4-Client 100GigE - 1 port Standard License (StrataSync)
401-120.77	OTL4-OTU4-Client 100GigE - 1 port 30 days Timed License (StrataSync)

VIAVI Care Support Plans

Increase your productivity for up to 5 years with optional VIAVI Care Support Plans:

- Maximize your time with on-demand training, priority technical application support and rapid service.
- Maintain your equipment for peak performance at a low, predictable cost.

For more Information: go to viavisolutions.com/viavicareplan

Features

*5-year plans only

Plan	Objective	Technical Assistance	Factory Repair	Priority Service	Self-paced Training	5 Year Battery and Bag Coverage	Factory Calibration
BronzeCare	Technician Efficiency	Premium	✓	✓	✓		
SilverCare	Maintenance & Measurement Accuracy	Premium	✓	✓	✓	✓*	✓