

VIAVI

800G FLEX DCO Module

Simplify and accelerate high speed network test in lab and production

The industry's first fully integrated test product for pluggable digital coherent module development, validation and integration of 400G CFP2-DCO and 400GE QSFP-DD transponders, including 400ZR.

The VIAVI 800G FLEX DCO Module provides a wide range of critical test and measurement capabilities that manufacturers need to design and validate pluggable digital coherent optical modules. Native support for both 400G class CFP2 (DCO) and QSFP-DD 400ZR modules is backed by a solid power and thermal cooling environment. Electrical adapters allow testing on prototype boards and ICs before module integration, accelerating product development.

The complementary VIAVI MAP-300 optical products provide photonic solutions for R&D, SVT, and production to deliver the industry's only complete photonics and protocol one-stop solution for R&D and production test for coherent modules.

The 800G FLEX DCO Module supports the following test interfaces:

- 1 x CFP2-DCO
- 1 x QSFP-DD
- 3 x QSFP56
- 4 x QSFP28

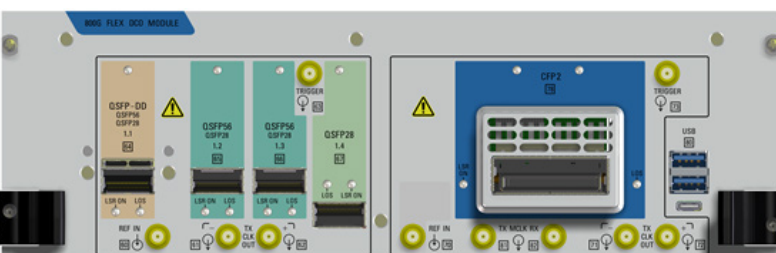


Figure 1. ONT 800G FLEX DCO Module with QSFP-DD, QSFP56, QSFP28 and CFP2-DCO test interfaces. Test module includes Reference Input Clock, TX Output Clock

Key Features

- Support for native 400G Pluggable Coherent Modules via CFP2-DCO and QSFP-DD 400ZR with substantial cooling margin up to 32 W
- QSFP-DD and QSFP56 Electrical Adapter
- Ethernet 400GE and 200GE
- 4 x 100GE Ethernet QSFP-DD breakout
- 4 x 50GE Ethernet QSFP56 breakout
- FlexO – FOIC1.2, FOIC2.4 and FOIC4.8 with OTUCn-PRBS and ODUflex-BULK
- Dynamic Skew
- Advanced Error Analysis
- FEC Stress Testing for PAM-4 signals, including RX FEC Symbol Error Statistics
- Multi-user support and independent test ports
- Test Automation

Benefits

- Ensures eco-system interoperability
- Enables reliable performance
- Accelerated test times and coverage to meet aggressive volume and cost expectations



Targeted Use Cases

- DSP IC development in Hardware and IP
- DSP vendor selection and firmware integration
- Module system hardware, firmware and C-CMIS integration
- Module firmware development and debugging
- CFP2-DCO and QSFP-DD 400ZR module production
- Module vendor selection
- Transponder hardware validation
- System Verification Testing (SVT)
- Field support for DCI and Metro systems

Long reach line side CFP2-DCO and Metro reach QSFP-DD 400ZR applications

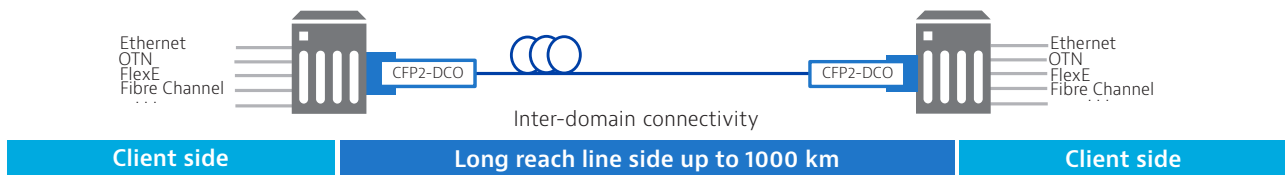


Figure 2. Long-Haul Multi-Services Transport with 400G CFP2-DCO

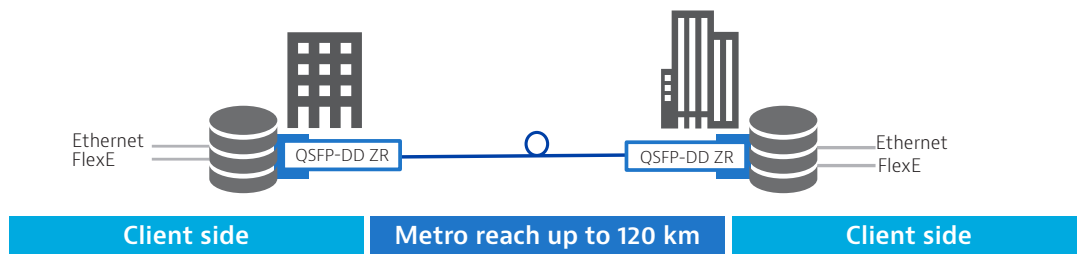


Figure 3. Data Center Interconnect (DCI) with QSFP-DD 400ZR

The 800G FLEX DCO Module covers a wide range of test applications in R&D, Design, SVT, and Manufacturing of high-speed Optical Transponders, Integrated Circuits, Line Cards, Sub-Systems and Network Elements.

The test applications provide deep testing insight and diagnostics of Layer 1-3 for multi-lane coherent 400G class products, from chips to systems. Key applications include:

Research and Development

- Transponder test and debugging to develop and validate pluggable coherent modules
- Skew injection and measurement – managing skew tolerances
- FEC Analysis and verification of FEC implementations and the related PCS alarms and errors
- IC development – comprehensive tools to check signal integrity, PCS layer, Ethernet and OTN traffic, using real-world signals rather than limited, unframed PRBS
- Validation and calibration of module parameters in conjunction with VIAVI MAP-300 product line

System Verification Testing (SVT) and Manufacturing

The 800G Module excels in typical SVT test applications like:

- System Interoperability and Reliability Test
- Performance Monitoring
- Functional Testing of Mappings, State Machines, and Error/Alarm handling on layers 1 ... 2
- Functional Testing throughout System Verification

Optical Modules Testing

Optical Modules have critical design parameters around:

- Service Disruption recovery
 - The recovery of the optical module from interruptions — especially short bursts in the range of [msec] — should be clean and stable. Worst case is when a module DSP “locks up” and reports a false status via Module Control Management.
 - In some cases the DSP output FIFO can become corrupted and send garbled data to the host interface. The Module Control Management interface may report correct status while the module is sending corrupt data to the host.
- Clock and phase stability
 - Ensures the VCOs, FIFOs and DSP all function correctly in conjunction with firmware
 - The DSP IC and corresponding firmware inside the optical module can be extremely sensitive to clock and phase variation.

ONT 800G FLEX DCO Module Transponder Test and Validation includes applications as listed in Table 1

Feature	Application
Unframed pattern generation	Correct electrical connectivity and signal integrity with full range of patterns including SSPRQ
Advanced error analysis including FEC	Detailed analysis to fingerprint error nature and accelerate BER test times, quickly identify system photonic and DSP issues
Framed traffic generation	Test complete signal path and DSP functionality – from PHY through framer and FEC
Timing variation	<p>Stress PHY, CDR and module clocking, avoids need for longer term soak testing</p> <p>The user can set the nominal desired ppm offset. Many modules support a large range of +/- 500 ppm but in most cases a step of ~10 ppm can cause issues with sensitive transponders.</p> <p>The ONT offers the option of a transition ramp. In this case the frequency changes to the new ppm offset in a controlled manner without any phase discontinuities or jumps.</p> <p>A 'good' module should not see any alarms or errors occurring with a small jump or transition in clock. A failed module may give a bit slip or error burst.</p>
Lane skew variation	<p>Stress PHY, CDR and module FIFO buffering</p> <p>Dynamic skew is where the phase relationship between the AUI lanes from the host can vary (often over several UI) due to factors such as temperature and voltage. The DSP in the module should 'absorb' the skew via FIFOs so that the output (optical signal) is not corrupted or interrupted. The IEEE lays out the maximum skew variation but not the rate of skew variation. Varying the rate of skew variation can drive various failure modes. If a failure does occur the module should correctly indicate the issue via the host Module Control Management interface.</p>

Table 1. Optical Module Test and Validation requirements

Ordering Information

Test Module for ONT-800

Part Number	Description
402-002.03	800G FLEX DCO Module

SW Options

Part Number	Description
402-108.61	400GE - ZR - 400GAUI8 - QSFPDD - Port 1
402-110.61	400GE - 802.3bs - 400GAUI8 - QSFPDD - Port 1
402-111.62	400GE - 802.3bs - 400GAUI8 - CFP2DCO - Port 2
402-115.61	200GE - PAM4 - QSFP56 - Port 1
402-180.61	4x100GE - 802.3cd - PAM4 - QSFPDD - Port 1
402-181.62	4x100GE - 802.3cd - PAM4 - CFP2DCO - Port 2
402-190.61	4x50GE - 802.3cd - PAM4 - QSFP56 - Port 1
402-205.61	FlexO 1xFOIC4.8-OTUCn-BULK - Port 1
402-205.62	FlexO 1xFOIC4.8-OTUCn-BULK - Port 2
402-207.61	FlexO 2xFOIC2.4-OTUCn-BULK - Port 1
402-207.62	FlexO 2xFOIC2.4-OTUCn-BULK - Port 2
402-209.61	FlexO 4xFOIC1.2-OTUCn-BULK - Port 1
402-209.62	FlexO 4xFOIC1.2-OTUCn-BULK - Port 2
402-225.61	FlexO 1xFOIC4.8-OTUCn-ODUflex-BULK - Port 1
402-225.62	FlexO 1xFOIC4.8-OTUCn-ODUflex-BULK - Port 2
402-229.61	FlexO 2xFOIC2.4-OTUCn-ODUflex-BULK - Port 1
402-229.62	FlexO 2xFOIC2.4-OTUCn-ODUflex-BULK - Port 2
402-234.61	FlexO 4xFOIC1.2-OTUCn-ODUflex-BULK - Port 1
402-234.62	FlexO 4xFOIC1.2-OTUCn-ODUflex-BULK - Port 2
402-805.60	Hardware Validation - Module Option
402-806.60	Dynamic Skew - Module Option
402-807.60	Module Stress Test - Module Option
402-810.60	Advanced Error Analysis - Module Option
402-813.60	200GE Autonegotiation and Link Training - Module Option
402-814.60	100GE Autonegotiation and Link Training - Module Option
402-815.60	50GE Autonegotiation and Link Training - Module Option
402-818.60	400G Ethernet FEC Validation - Module Option
402-819.60	200G Ethernet FEC Validation - Module Option
402-820.60	100G Ethernet FEC Validation - Module Option
402-822.60	50G Ethernet FEC Validation - Module Option
402-846.60	FlexO 400G FEC Validation - Module Option
402-847.60	FlexO 200G FEC Validation - Module Option
402-848.60	FlexO 100G FEC Validation - Module Option

Mainframes ONT-800

Part Number	Description
3078/04	ONT-804D Mainframe with Display
3078/05	ONT-804 Mainframe
3078/07	ONT-812 Mainframe
3078/08	ONT-812A Mainframe

Hardware Accessories for ONT-800

Part Number	Description
3078/92.01	ONT-800 High Accuracy GNSS Rb Clock
3078/92.05	Rack Mount Kit 19" and 21" for ONT-804



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