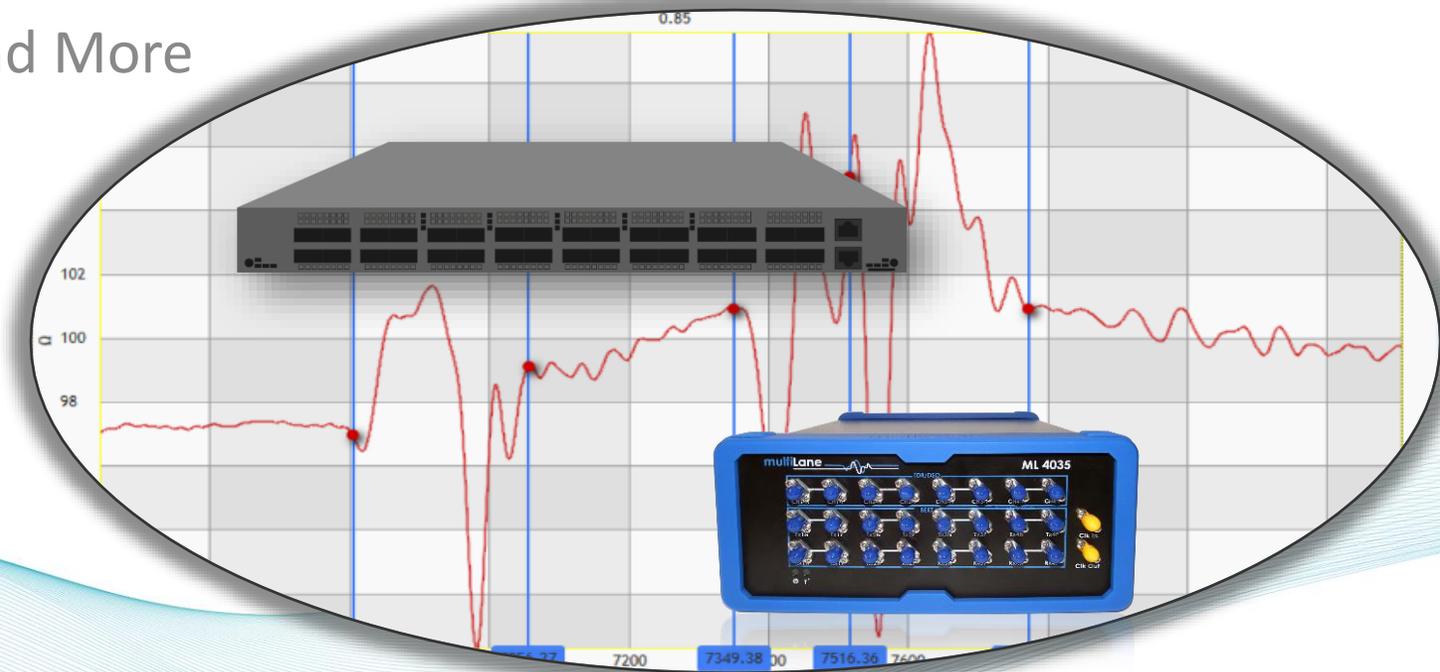


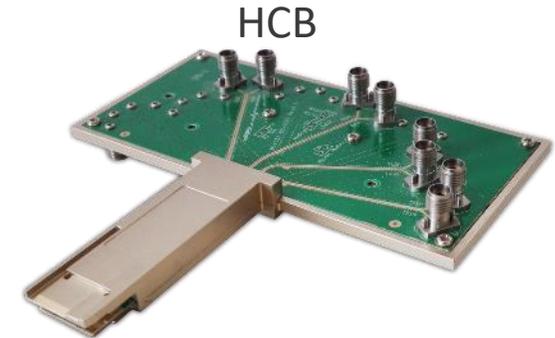
Port Characterization & Troubleshooting

Enhancing SI Visibility with TDR, BER and More

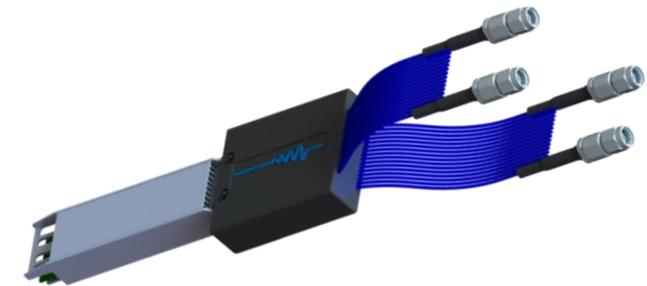


Outline

- Host Life Cycle
- ML4035 Overview
- Port Troubleshooting Flow
- TDR Overview
- Cabled HCB Introduction
- Roadmap
- Test Coverage Guide
- MultiLane Advantages

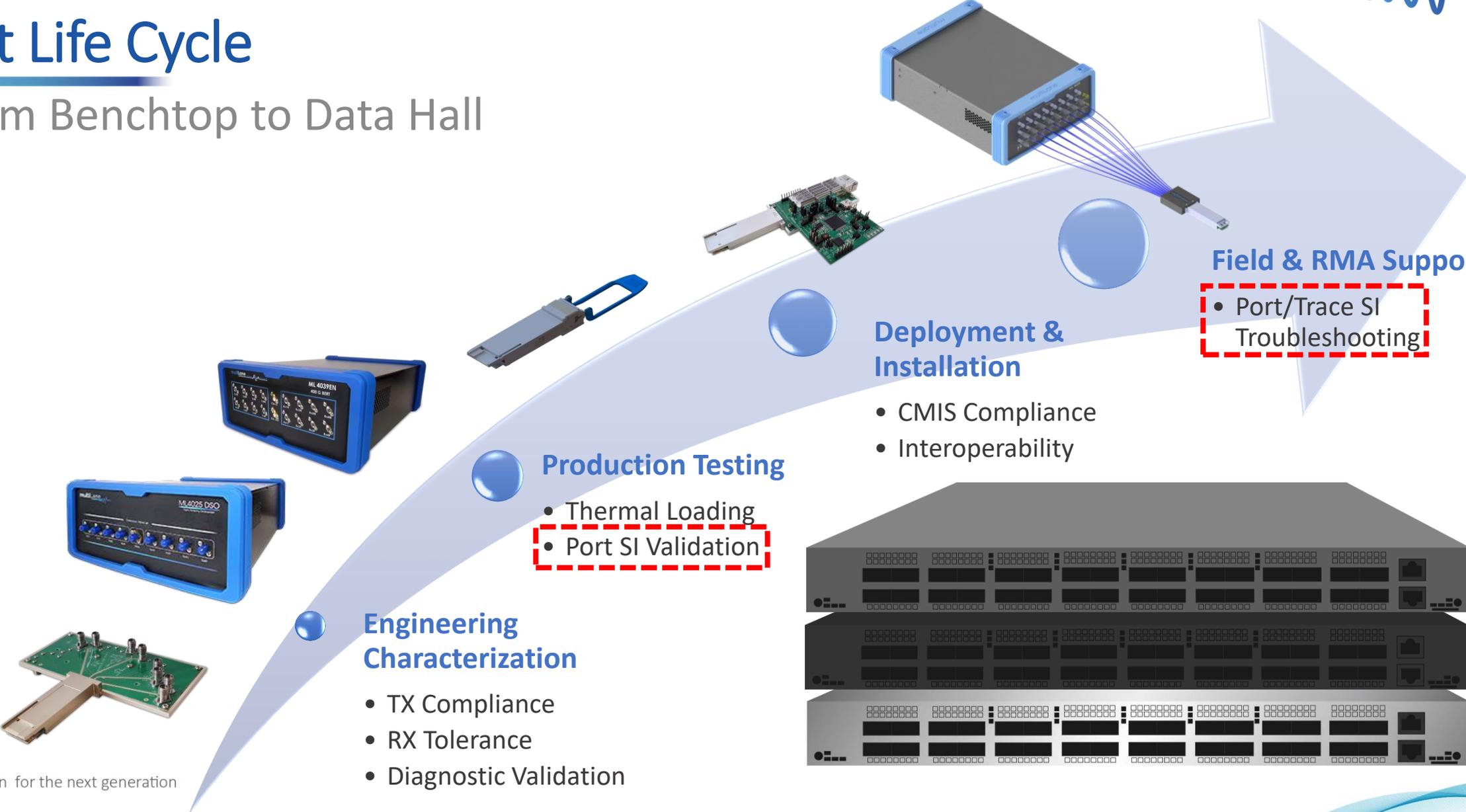


Cabled HCB



Host Life Cycle

From Benchtop to Data Hall



ML4035 Overview

400G BERT | 35GHz Scope | TDR

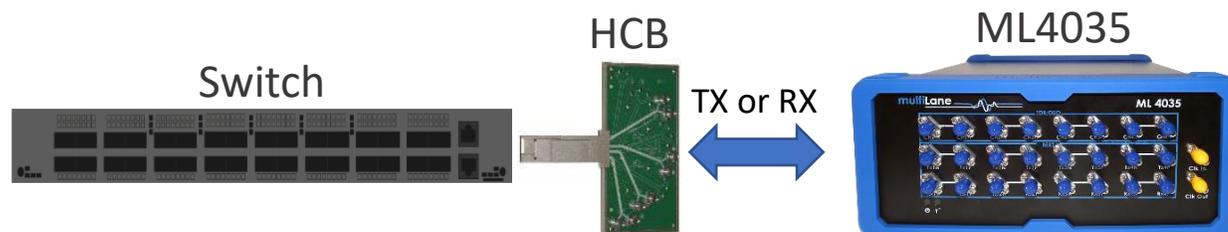
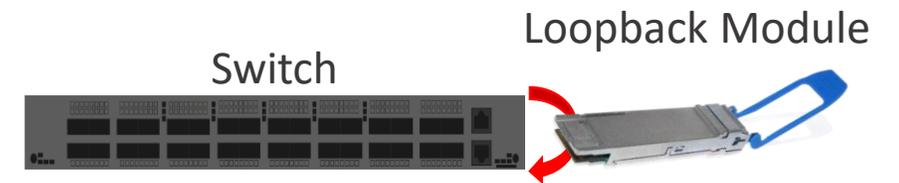
- 4-Lane 53 GBd PPG:
 - ❖ PAM4: 22-29.6 & 48-56 GBd
 - ❖ NRZ: 22-29 & 48-56 Gbps
 - ❖ DFE Pre-Coding & Gray Coding
 - ❖ Channel Emulation & Full FEC
- 400G Bit Error Ratio Tester:
 - ❖ Total DFE/FFE/CTLE equalization up to 13 dB
 - ❖ FEC measurements
 - ❖ Clock-data recovery
 - ❖ BER counters
- 4-Lane 35 GHz Sampling Scope:
 - ❖ High fidelity signal capture
 - ❖ Jitter decomposition & NRZ/PAM4 full Eye measurements
- 4-Lane True-Differential TDR | TDT:
 - ❖ High resolution TDR/TDT measurements
 - ❖ Impedance profile measurements
 - ❖ S-Parameters:
 - Crosstalk
 - Accurate multiport S-parameters
- Automation SW
- High throughput & affordable



Port Troubleshooting Flow

Beyond the Bit Error Rate

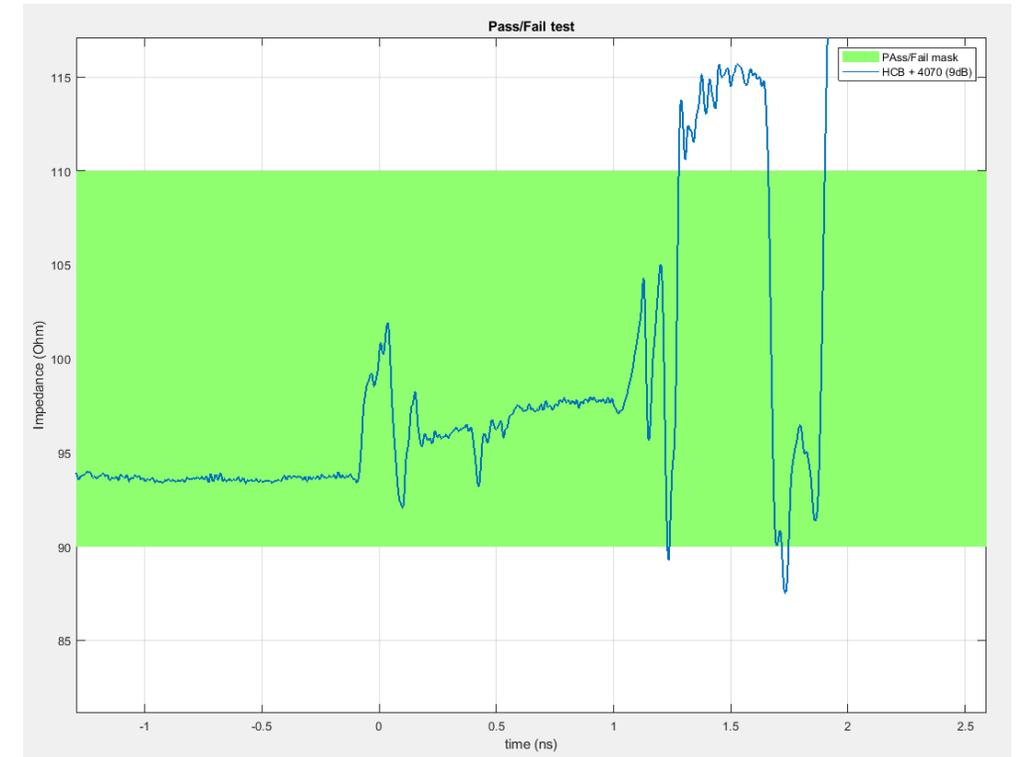
- Loopback module is first inserted for BER test
- If port BER is high, troubleshooting required
- TX path is tested using **ML4035** Scope with CDR via HCB
- Impedance measurements help identify source of issue
- The **ML4035** enables **TDR Testing** for port debug



TDR Overview

Time Domain Reflectometry with the ML4035

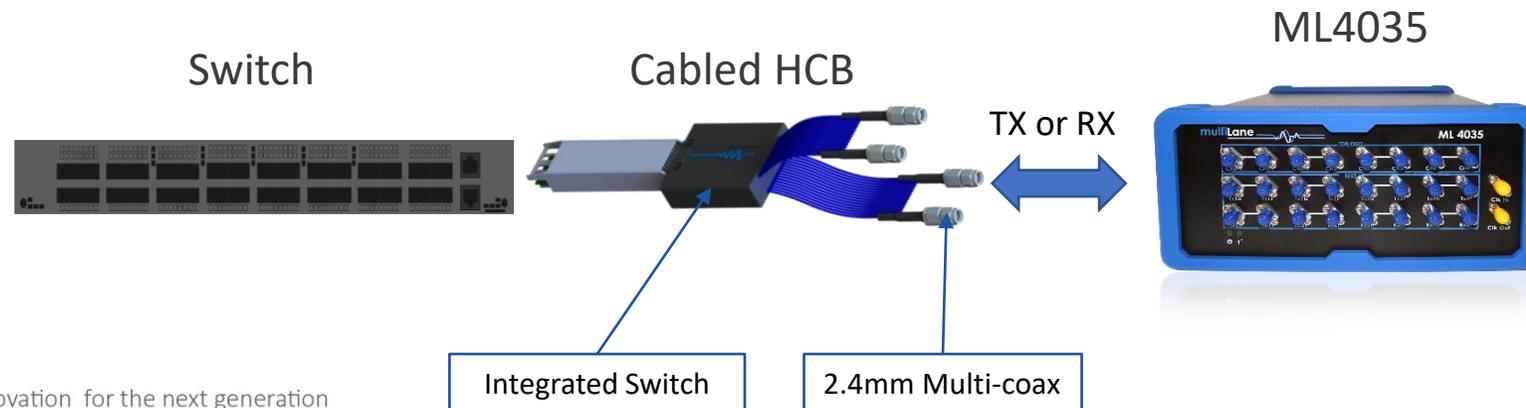
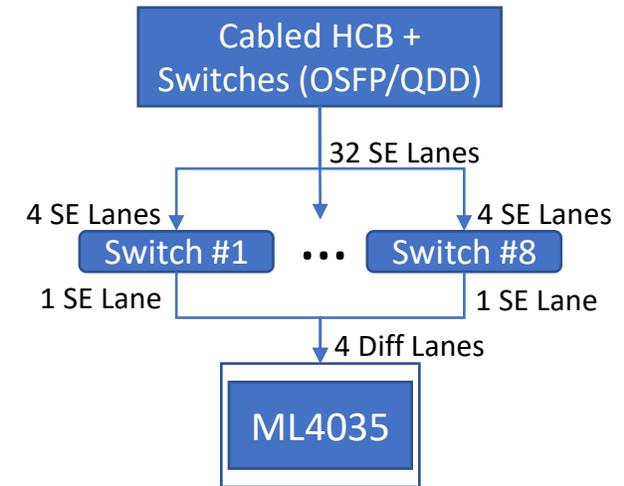
- Isolate impedance mismatches and discontinuities
- Pass/Fail verdict for each lane
- Standard & custom masks
- Gated TDR → hone-in on fault area (for instance, a bad connector or broken pin)
- Fast parallel measurements
- Sub ohm accuracy
- ~1 mm resolution



Efficient Characterization & Troubleshooting

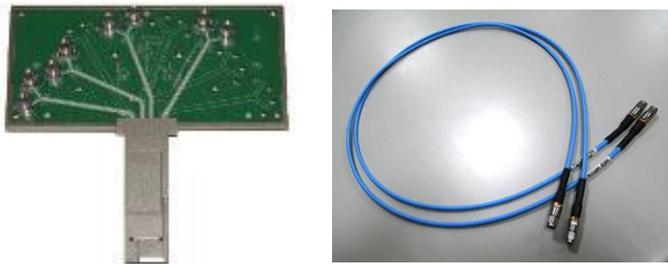
Cabled HCBs & Switches

- Cabled HCB: Transceiver-like connector with 2.4mm multi-coax cables (*available in Q3*)
 - ❖ RF cables and host plug integrated into one package
 - ❖ Plugs directly into switch
 - ❖ All major form factors (SFP, QSFP, QSFP-DD, & OSFP)
- Cabled HCB with integrated Switch (*available in Q4*)
 - ❖ Eight integrated 4:1 SE switches -> Test 16 differential lanes with a 4-lane tester
 - ❖ Unlocks full port coverage (TX+RX) with a single plug



Roadmap

Today

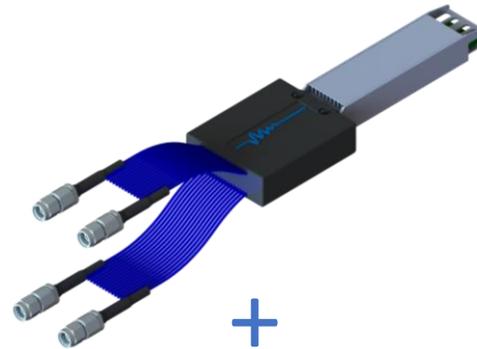


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ML4035 + HCB & Cables

Q3 2020

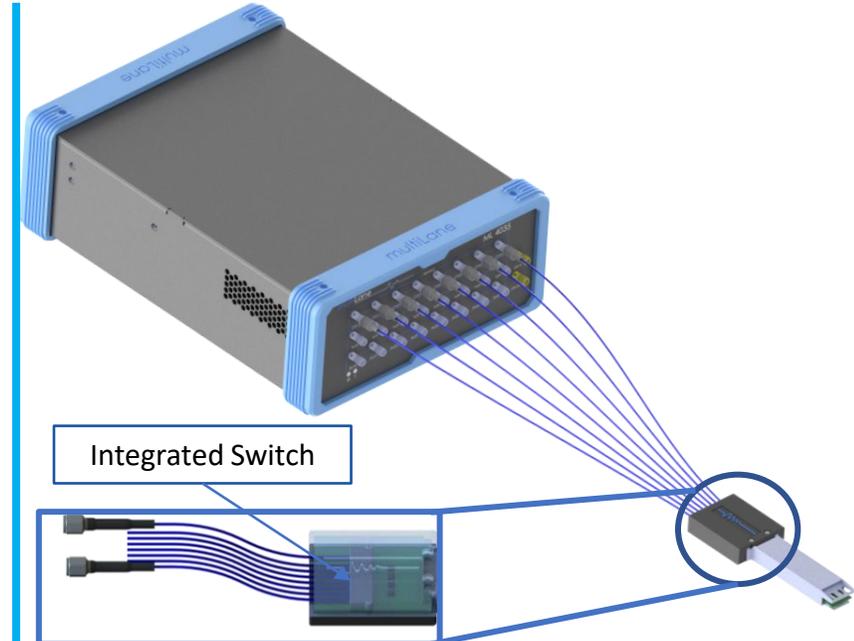


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ML4035 + Cabled HCB

Q4 2020



ML4035 + Cabled HCB with Integrated Switch (single plug)

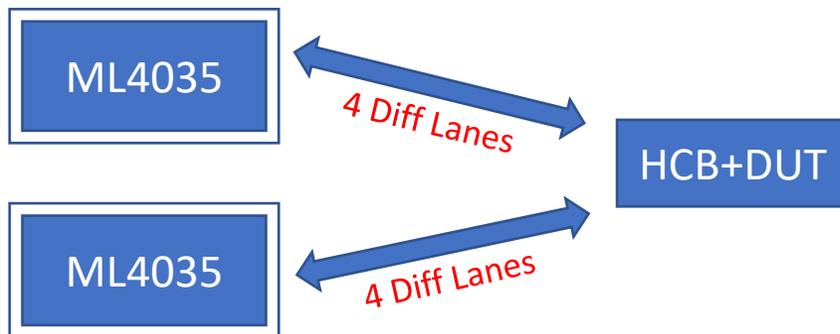
Test Coverage Guide

HCBS + Cables | Cabled HCB

Using 1 x ML4035:
Fully automated test for up to
4 Diff Lanes



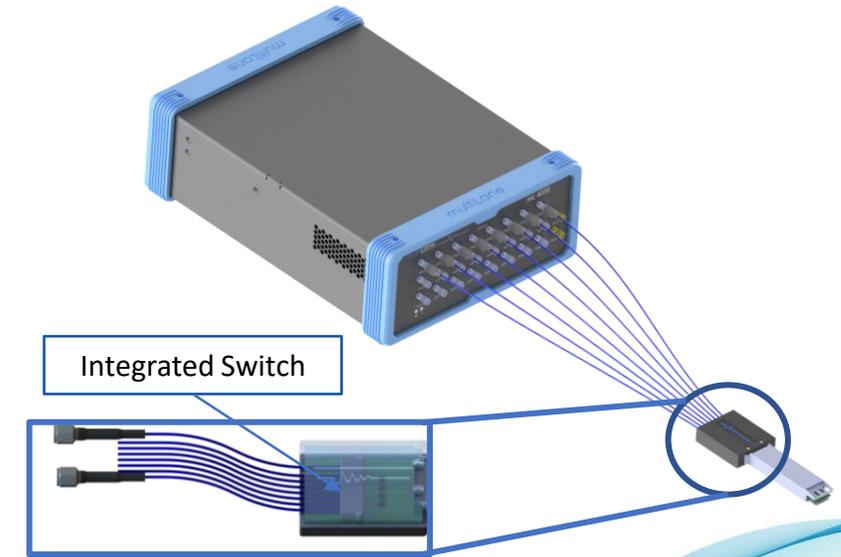
Using 2 x ML4035:
Fully Automated Test for up to
8 Diff Lanes



Cabled HCB with Switches

Single Plug 

Using 1 x ML4035:
Fully Automated Test for up to
16 Diff Lanes



MultiLane Advantage

Why choose MultiLane?

MultiLane

- High value solution that includes BERT, DSO, TDR, & TDT
- High throughput (4 Diff Ports & Switch)
- User friendly & automated
- Compact & integrated size
- Single plug

Alternatives

- Expensive (\$200k+)
- Low throughput (2-4 SE Ports)
- Test requires certified engineer
- Bulky, heavy instrument (ex. VNA)
- Multiple cable reconnections



THANK YOU

Innovation for the next generation

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