

Innovation for the next generation

# AT4079B

8-Channel 28GBd PAM4 & NRZ |  
400G BERT

8 x 28GBd Differential Error Detectors with CDR |  
8 Differential Pulse Pattern Generators | PRBS31Q,  
SSPRQ & Custom Pattern | Adaptive FFE on receivers  
| Pre- and Post-Emphasis on TX



## Summary

The AT line of products is highly integrated for the Advantest V93000 system and fits right underneath the load board, in the cavity of the test head extender. Due to this, the signal path to the DUT is kept extremely short.

The AT line of instruments is made to work for packaged silicon systems as well as for wafer probing and is meant to enable at-speed testing of SerDes, transceivers, amplifiers and other active and passive high-speed digital components. The AT family consists of pattern generators, error detectors and sampling oscilloscopes.

# AT4079B

## Introduction

The AT4079B is a fully featured 400G BERT. It covers a wide range of bitrates between 1.12 and 28.12 GBaud, while supporting both NRZ and PAM-4 coding schemes.

The GUI allows you to individually control each TX level, equalization, eye balance, pattern and Gray coding. The user may also inject error sequences into the stream. The receiver features CTLE and FFE equalization that, in combination with TX FFE, compensate for up to 30 dB of loss at Nyquist; it also allows advanced troubleshooting capabilities by showing separate LSB and MSB BER, offering targeted error-insertion and allowing real-time monitoring of the received signal levels histogram, SNR and receiver equalizer tap values.

## Key Features

- Low cost, instrument-grade BERT optimized for high speed data analysis of 100G/200G/400G transceivers.
- The wide range of bitrate coverage allows PHY testing for Ethernet, HDMI 2, USB 3.1, PCIe, Fiber-Channel and others.
- Ability to tune the bit rate in very fine steps to facilitate finding the locking margin.
- FEC support.
- Supports PRBS13Q/15Q/31Q and user-defined patterns.
- API library, sample code and Python wrapper.

## Target Applications

- Production testing of transceivers
- Benchtop testing for functional and SI functionality
- On-the-go testing of transceivers in the field
- Transceiver functional tester, for simple validation

## Mechanical Dimensions

The AT4079B is customized to fit and seamlessly function inside an Advantest HSIO test head extender. One cassette can host one 8-channel AT4079B; you can fit a total of 4 such cassettes in a V93K tester.

Dimensions: 265.6 x 33.2 x 58 mm<sup>3</sup>

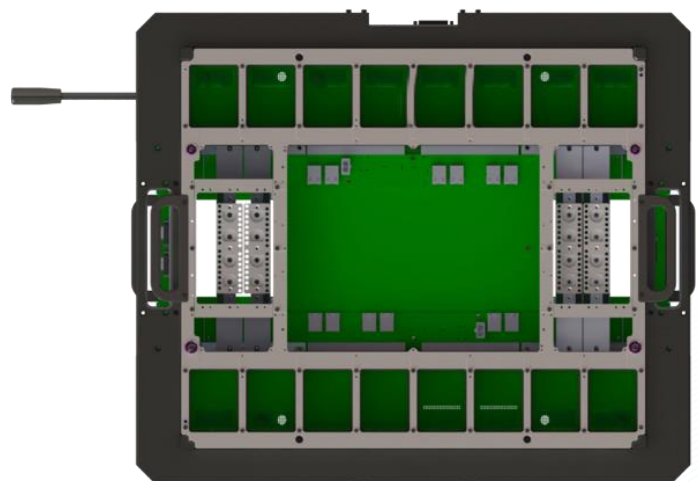
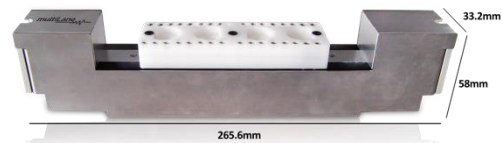
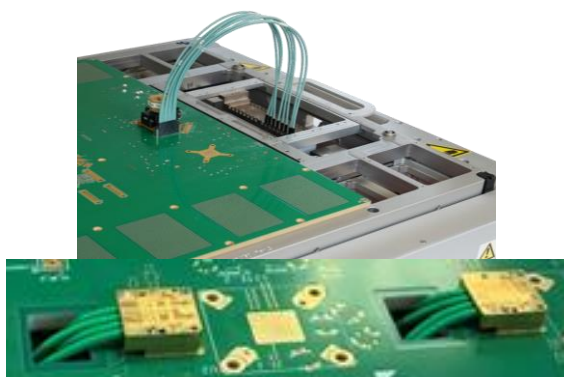


Figure 1: Four ML cassettes mounted in an Advantest V93K HSIO test head extender frame

## Cables

In order to connect the instrument through the stiffener to the load board, two cables set can be used:

- Vertical or right angle 1x8 coreHC to SMPM cable: allowing direct connection between instrument and load board



- 1x8 coreHC to 1.85mm cable combined with a 1.85mm to SMPM cable (bought from MultiLane), allowing connection between instrument and load board or external source



Figure 2: MultiLane SMPM-BM to 1.85mm cable

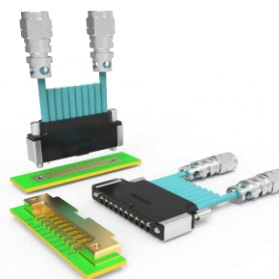


Figure 3: 8 channel coreHC to 1.85mm cable

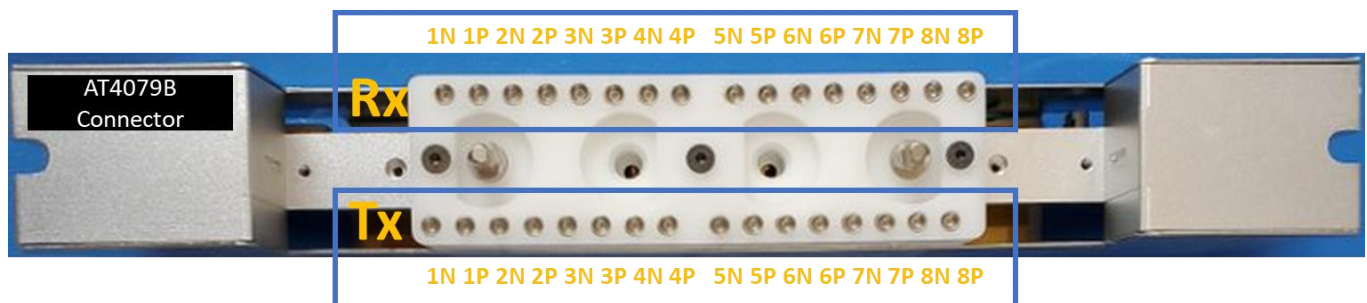
## Electrical Specifications

Parameter	Specifications
Bit Rates NRZ	1.12 – 1.56 Gbps 3.22 – 28.125 Gbps
Bit Rates PAM4	2.24 – 3.12 Gbps 6.44 – 56.25 Gbps
TX Amplitude Differential	0 - 800 mVpp
Patterns	PRBS 7/9/11/13/15/16/23/31 /58 PRBS13Q/31Q and SSPRQ Square wave
TX Amplitude Adjustment	Steps of 2 mV
Pre-Emphasis Resolution	±1000 steps
Equalizing Filter Spacing	1UI
Random Jitter RMS	300 fs
Rise / Fall Time (20–80%)	15 / 15 ps
Error Detector sensitivity	30 mVpp
Input Equalizer Dynamic Range	Up to 30 dB
TX/RX connectors	SMPM
Reference clock Output	Bitrate / 32, 64, 128, 256 or bitrate/170 LVPECL
Clock out amplitude (SE/Diff)	0.9/1.6 Vpp
Eye histogram resolution	8 bits horizontal across 2UI / 9 bits vertical
Clock Input Range	Rate dependent
Clock Input Amplitude (SE/Diff)	1/2 Vpp
Clock Input Impedance	50 Ω

Parameter	Specifications
Instrument Automatic Shutoff	70 °C
Normal Operating Temperature	0 - 60 °C
Air Supply Flow	0.6 – 3 CFM
Air Temperature	0 - 40 °C
Power Rating	12V, 1.4A

## AT4079B Pinout

Channels are numerated as shown in the below picture, taking as reference the backplane connector, beginning by RX row with RX1-N, RX1-P to RX8-N, RX8-P, and then faced by TX row with TX1-N, TX1-P to TX8-N, TX8-P. Below picture shows 1 AT4079B installed into a cassette.



## Ordering Information

Option	Description
<b>AT4079B</b>	400G BERT (1.12 – 28.12 GBd NRZ/PAM4)
<b>1YW</b>	1-year standard warranty
<b>3YW</b>	3-year warranty
<b>CAL</b>	Single calibration
<b>3YWC</b>	3-year warranty + 3 annual calibrations

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