TELEDYNE LECROY
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Z100q Loki

100Gbps Ethernet Traffic Generator with 2 QSFP28 ports

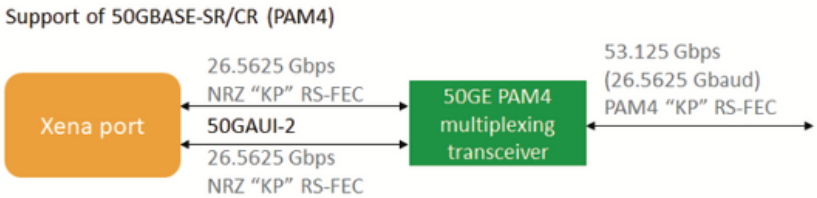
Key Features

- 2 x 100GE ports
- 5-speed flexibility: 100GE, 50GE, 40GE, 25GE and 10GE
- Dual media value
- Price / performance
- Ease of use

The Z100q Loki is a 2 port 100GE test module that can also test these Ethernet network speeds: 50GE, 40GE, 25GE and 10GE.

This flexibility is provided via two physical transceiver cages, both supporting QSFP28 and QSFP+ transceivers. Both cages can be active simultaneously.

The result is a versatile solution for performance and functional testing of network infrastructure and Ethernet equipment capable of supporting 100GE such as switches, routers, NICs, taps, packet-brokers, and backhaul platforms. This test module is available in the B2400 and the Compact chassis.



Find out more here:

PORT LEVEL FEATURES	
Interface category	• QSFP28 100GE, 50GE, 40GE*, 25GE, and 10GE* • QSFP+ 40GE and 10GE Ethernet ** Depending on transceiver capabilities*
Total number of test ports (software configurable)	2x100GE, 4x50GE, 2x50GE PAM4, 2x40GE, 8x25GE, and 8x10GE
Interface options	Each cage: 1 x 100GBASE-SR4/LR4/CR4, or 802.3bj ** 2 x 50GBASE-SR2/LR2/CR2, or Consortium 1 x 50GBASE-SR/CR (PAM4) or 802.3cd 1x40GBASE-SR4/LR4/CR4,or 802.3ba/Consortium** 4 x 25GBASE-SR/LR/CR, or 802.3by/Consortium 4x10GBASE-SR/LR/CR 802.3ae Actual interface options depend on the capabilities of the inserted transceiver. Both cages must run with the same base interface configuration (e.g. 2 x 100GE) *** As defined by Ethernet Technology Consortium*
Forward Error Correction (FEC)	RS-FEC (Reed Solomon) 528,514,t=7, IEEE 802.3 Clause 91 (100GE) RS-FEC (Reed Solomon) 544,514,t=15, IEEE 802.3 Clause 134 (50GE PAM4) RS-FEC (Reed Solomon) 528,514,t=7, IEEE 802.3 Clause 108 (25GE) RS-FEC (Reed Solomon) 528,514,t=7, 25/50G Ethernet Consortium (25/50GE) BASE-R FEC (Firecode) 2112,2080 IEEE 802.3 Clause 74 (25GE, 10GE)
Number of transceiver module cages	2xQSFP28/QSFP+
Port statistics	Link state, FCS errors, pause frames, ARP/PING, error injections, training packet All traffic: RX and TX Mbit/s, packets/s, packets, bytes Traffic w/o test payload: RX and TX Mbit/s, packets/s, packets, bytes
Adjustable Inter FrameGap (IFG)	Configurable from 16 to 56 bytes, default is 20B (12B IFG + 8B preamble)
Transmit line rate adjustment	Ability to adjust the effective line rate by forcing idle gaps equivalent to -1000 ppm (increments of 10 ppm)
Transmit line clock adjustment	From -400 to 400 ppm in steps of 0.001 ppm (shared across all ports)
ARP/PING	Supported (configurable IP and MAC address per port)
Field upgradeable	System is fully field upgradeable to product releases (FPGA images and Software)
Tx disable	Enable/disable of optical laser or copper link
IGMPv2 multicast join/leave	IGMPv2 continuous multicast join, with configurable repeat interval
Histogram statistics	Two real-time histograms per port. Each histogram can measure one of RX/TX packet length, IFG, or Latency distribution for all traffic, a specific stream, or a filter

Loopback modes	• L1RX2TX–RX-to-TX, transmit byte-by-byte copy of the incoming packet • L2RX2TX–RX-to-TX, swap source and destination MAC addresses (*only at 10G) • L3RX2TX–RX-to-TX, swap source and destination MAC addresses and IP addresses (*only at 10G) • TXON2RX–TX-to-RX, packet is also transmitted from the port • TXOFF2RX–TX-to-RX, port's transmitter is idle • Port-to-port–In line loop mode where all traffic is looped 100% transparent at L1
Oscillator characteristics	• Initial Accuracy is 3 ppm • Frequency drift over 1st year: +/- 3 ppm (over 15 years: +/- 15 ppm) • Temperature Stability: +/- 20 ppm (Total Stability is +/- 35 ppm)

100/50/40/25/10GE PCS/PMA LAYERS	
Payload Test pattern	PRBS-31
Error Injection	Manual single shot bit-errors or bursts
PCS virtual lane configuration	User-defined skew insertion per Tx virtual lane, and user defined virtual lane to SerDes mapping for testing of the Rx PCS virtual lane re-order function.
PCS virtual lane statistics	Relative virtual lane skew measurement (up to 2048 bits)
FEC Total Statistics	NRZ: Total corrected FEC symbols, Total uncorrected FEC symbols, Estimated Pre-FEC BER, Estimated Post-FEC BER, Pre-FEC Error Distribution Graph
Link Flap	Single short or repeatable link down events with ms precision
Error Injection (PMA Layer)	Repeatable error inject periods at PMA layer with ms precision

TRANSMIT ENGINES	
Number of transmit streams per port	256 (wire-speed). Each stream can generate millions of traffic flows through the use of field modifiers
Test payload insertion per stream	Wire-speed packet generation with timestamps, sequence numbers, and data integrity signature optionally inserted into each packet.
Stream statistics 1)	TX Mbit/s, packets/s, packets, bytes, FCS error
Bandwidth profiles	Burst size and density can be specified. Uniform and bursty bandwidth profile streams can be interleaved
Field modifiers	16-bit or 32-bit header field modifiers with inc, dec, or random mode. Each modifier has configurable bit-mask, repetition, min, max, and step parameters. 8 16-bit or 4 32-bit modifiers per stream
Packet length controls	Fixed, random, butterfly, and incrementing packet length distributions from 60 (in 10G: 56) to 12288 bytes
Packet payloads	Repeated user specified 1 to 18B pattern, an 8-bit incrementing pattern
Extended payload	Fixed full custom payloads can be generated for each stream with payload sizes up to 12288 bytes
Error generation	Undersize length (60 bytes min./ at 10G 56 bytes min.) and oversize length (12288 bytes max.) packet lengths, injection of sequence, misorder, payload integrity, and FCS errors
TX packet header support and RX autodecodes	Ethernet, Ethernet II, VLAN, ARP, IPv4, IPv6, UDP, TCP, LLC, SNAP, GTP, ICMP, RTP, RTCP, STP, MPLS, PBB, or fully specified by user. Responds to incoming pause and PFC (Priority-based Flow Control) frames.
Pause frames	Responds to incoming pause and PFC (Priority-based Flow Control) frames
Packet scheduling modes	• Normal (stream interleaved mode) – standard scheduling mode, precise rates, minor variation in packet inter-frame gap • Strict Uniform – new scheduling mode, with 100% uniform packet inter-frame gap, minor deviation from configured rates • Sequential packet scheduling (sequential stream scheduling). Streams are scheduled continuously in sequential order, with configurable number of packets per stream • Burst. Up to 10000 packets per stream are organized in bursts. Bursts from active streams form a burst group. The user specifies time from start of one burst group till start of next burst group

RECEIVE ENGINE	
Number of traceable Rx streams per port	2016 (wire-speed)
Automatic detection of testpayload for received packets	Real-time reporting of statistics and latency, loss, payload integrity, sequence error, and misorder error checking
Jitter measurement	Jitter (Packet Delay Variation) measurements compliant to MEF10 standard with 8 ns accuracy Jitter can be measured on up to 32 streams
Stream statistics (1)	• RX Mbit/s, packets/s, packets, bytes. • Loss, payload integrity errors, sequence errors, misorder errors • Min latency, max latency, average latency • Min jitter, max jitter, average jitter
Latency measurements accuracy	±16 ns
Latency measurement resolution	8 ns (Latency measurements can calibrate and remove latency from transceiver modules)
Number of filters:	• 6 x 64-bit user-definable match-term patterns with mask, and offset • 6 x frame length comparator terms (longer, shorter) • 6 x user-defined filters expressed from AND/OR'ing of the match and length terms
Filter statistics (1)	Per filter: RX Mbit/s, packets/s, packets, bytes.

CAPTURE	
Capture criteria	All traffic, stream, FCS errors, filter match, or traffic without test payloads
Capture start/stop triggers	Capture start and stop trigger: none, FCS error, filter match
Capture limit per packet	16 – 12288 bytes
Wire-speed capture buffer per port	• 256 kB for 100G • 128 kB for 40G
Low speed capture buffer per port (10Mbit/s speed)	4096 packets (any size)

ADVANCED PHY FEATURES	
Transmit Equalization Controls	• Tx Transmit Equalization Controls Pre-emphasis • TxAttenuation • Tx Post-emphasis Signal Integrity Analysis • Rx Optional Auto-Tune of PHY 50 & 25Gbps Rx SerDes

HW SPECIFICATIONS	
Max. Power	59W
Weight	1.0 lbs (0.455 kg)
Environmental	• Operating Temperature: 10 to 30°C • Storage Temperature: -40 to 70°C • Humidity: 8% to 90% non-condensing
Regulatory	FCC (US), CE (Europe)
Notes	This test module is available in the B2400 and the Compact chassis.

(1) Counter size: 64 bits

Ordering Information

Product Description	Product Code
• Z100qc Loki XenaCompact 1U chassis with 100GE 5-speed, 2 port test module QSFP28	C-Loki-100G-5S-2P
• Z100q Loki 100GE 5-speed, 2 port test module QSFP28	Loki-100G-5S-2P

Local sales offices are located throughout the world. Visit our website to find the most convenient location.

1-800-5-LeCroy • teledynelecroy.com

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