

Zombie Components LLC
13177 Foothill Boulevard
Sylmar, CA 91342
United States (US)
TIN 934147673
www.zombiecomponents.com
+1.909.747.9984
ahall@zombiecomponents.com

CS100GE2Q28NGALL

Ixia CloudStorm 100GE 2-Port NG ALL

2-Port QSFP28 100 Gigabit Ethernet Application and Security Test Load Module · L2-7

Serial Number 100087

Part number 944-1233

Line Card Validation Report

Tested to ZC-TP-860-1422-11 rev C · issued 2026-11-12

OVERALL RESULT: PASS

Prepared for	Order reference
Stock inventory Zombie Components LLC	Invoice No: **n/a** Order No: **STOCK** Customer PO: **n/a** Document: **ZC-TR-STOCK-100087** Test procedure: **ZC-TP-860-1422-11 rev C** Service: **Test to stock** Chassis: Ixia XGS12 Chassis S/N: XGS12-J0701117 IxOS version: **9.24.3100.10** (chassis IxServer; version-matched client) Report date: 2026-11-12

This report certifies the health-validation testing performed on the Ixia CloudStorm 100GE 2-Port NG ALL, a 2-port QSFP28 100 Gigabit Ethernet application and security test load module identified herein. The module was exercised with live 64-byte traffic (512-byte on the 25GE and 10GE sets) at full line rate on the ports of each test set, 8 ports in all (a 2 h 44 min 100GE soak; line-rate runs without soak: 50GE 20 min 21 s, 40GE 20 min 24 s, 25GE 22 min 17 s, 10GE 30 min 01 s), each from a reset counter baseline, while identity, link state, line speed, every L1/L2 error and fault counter, and module temperatures were sampled continuously and assessed against the acceptance criteria. The complete per-port measurements and time-series charts follow.

Acceptance criteria. Each criterion is benchmarked to IEEE 802.3 or RFC 1242/2544 and set tighter. test procedure ZC-TP-860-1422-11 rev C, ten criteria, applied where the OEM gives no pass or fail limit, set out in full on the next page; each section states the criteria it verifies. **10 of 10 met.**

Methodology. All monitoring was performed read-only against a version-matched IxOS 9.24.3100.10 client; every error counter was verified zero at the start of each window and the module's traffic ran undisturbed. Verdicts reflect sustained behaviour, not single samples. **Limitations.** The validation uses the IxOS stream engine through IxExplorer; IxLoad and BreakingPoint application traffic are outside its scope and no application licence is exercised. The IxOS Tcl API does not expose fan speed, supply voltages or optical digital diagnostics. The chassis is a native IxOS (Linux) XGS12: the IxServer session log is taken from the chassis web console and read on the chassis clock.

Test Report Release Note

Issues of ZC-TR-STOCK-100087 from the report register. Issue 1 is the first release of this test record; each later issue re-issues the same test record without retesting, with the change stated. This copy is issue 2.

Issue	Date	Procedure	Change
1	2026-11-12	ZC-TP-860-1422-11 rev C	First release
2	2026-11-12	ZC-TP-860-1422-11 rev C	Issue 2: module number placed first on the cover, in a header row on every page and in the page footer; part number added to the cover. No retest; measurements and result unchanged.

Acceptance Criteria

Each criterion is benchmarked to IEEE 802.3 or RFC 1242/2544 and set tighter. Where the OEM gives no pass or fail limit for a load module, Zombie Components applies the acceptance criteria of its test procedure ZC-TP-860-1422-11 rev C to the module. The rule behind every limit: a module passed here must behave as a transparent instrument, adding no measurable error, loss or rate deviation to the production data its user collects. Where the industry sets no number (boot record, event log), nothing is tolerated. Each measurement section of this report opens with the criteria it verifies, the value measured and the result, and the Acceptance Criteria Summary before the sign-off lists all ten.

ID	Criterion and limit	Benchmark and basis
AC-1	Identity: enumerated model, port count and serial agree with the order, the unit label and the boot record	**Order, unit label, IxServer boot record.** The report certifies one physical unit. Identity must agree across all three sources, so the document stays valid after the card leaves the chassis.
AC-2	Boot: zero FAIL records in the as-tested IxServer boot record; card reaches Board Ready	**IxServer power-on sequence; no industry limit.** Zero FAIL records tolerated. A module that fails its own start-up checks is not accepted, however it performs afterward.
AC-3	Test conditions: IxOS client version-matched to the chassis; counters zeroed at window start; sampling interval 10 s or less; capture window at least the module soak time, the longest AC-8 window among the PHYs the module supports and never less than 2 h, applied to the 100GE test set; every other test set runs at least the AC-8 window of its own PHY at its own line rate	**Metrology practice: controlled, documented conditions.** A version-mismatched client returns empty or invalid data, and counters are zeroed so only this window is judged. The window is calculated, not chosen: it is the time at line rate needed to demonstrate AC-8 on the most demanding PHY the module supports, and never less than 2 h: the bit count proves the error ratio, but a short window does not bring the module to thermal equilibrium for AC-9. Where the test sets of a module differ in load, the soak is run on the set of highest load, and each other set runs the window that proves AC-8 for its own PHY.
AC-4	Link: up on every port in every sample; zero link-down transitions	**IEEE 802.3 link status.** Industry practice only requires that the link comes up. We require zero drops for the whole window, because one flap in service resets sessions and corrupts the measurement in progress.
AC-5	Line rate: negotiated speed equals the nominal port speed in every sample	**IEEE 802.3 PHY line rate.** Nominal speed in every sample, with no downshift or renegotiation at any point.
AC-6	Throughput: every port within ±100 ppm of the theoretical line-rate frame rate for the frame size under test, measured over the whole window (IEEE 802.3 clock tolerance); the measurement uncertainty is stated	**IEEE 802.3 ±100 ppm clock tolerance; RFC 2544 §26.1.** Tested at the minimum 64-byte frame, the highest frame rate and hardest case, on all ports at once. The measured rate must sit inside the tolerance of a compliant link.
AC-7	Frame delivery: zero frame loss on every port (RFC 2544 throughput definition). Tx and Rx totals agree within 10 frames, the frames in flight at the read instant	**RFC 1242 §3.17 / RFC 2544 §26.1: throughput is the highest rate with zero loss.** Zero loss at full line rate on every port simultaneously. The only allowance is frames in flight when the counters are read.
AC-8	Errors: zero increase on every frame-integrity, data-path, line-coding, fault, drop and flow-control counter. The demonstrated bit-error-ratio bound per port (95% confidence, zero errors) is at least 5× tighter than the IEEE 802.3 objective for the PHY. On copper, FCS errors are attributed to cabling and excluded	**IEEE 802.3 BER objective: 10^{-12} (1000BASE-X, 10G/40G/100G), 10^{-10} (1000BASE-T).** Zero errors, over enough bits to prove BER ≤ objective/5 at 95% confidence (3/N bits). A test instrument must be well inside the limit its users test against; 5:1 exceeds the 4:1 minimum test-uncertainty ratio of metrology practice (ANSI/NCSL Z540.3). A module we pass contributes at most one fifth of the objective, which can only matter for a device already within 20% of its limit.
AC-9	Thermal: no over-temperature alarm or shutdown during the window; every exposed sensor below 80 °C. Temperature change over the window is an indication only, not a pass or fail limit	**Ixia Platform Reference Guide: a card shuts itself down above its temperature threshold.** A shutdown interrupts a user's test, so that is what is judged; 80 °C is taken as the start of a runaway toward it. Temperature change depends on the room and the chassis as much as the card, so it is an indication only.

ID	Criterion and limit	Benchmark and basis
AC-10	Stability: zero card hardware events logged by IxServer during the capture window	**IxServer event log; no industry limit.** Any reset, re-initialisation or hardware event during a run would corrupt a customer's test in service, so none is tolerated during the window.

Standard and overrides. These criteria are the Zombie Components standard and are applied to every module we test. Because the modules are used equipment, sold with warranty terms that vary by unit, the President of Zombie Components may accept a specific unit against a relaxed limit when its application and warranty justify it. Any such override is stated in the report: the criterion, the standard limit, the limit applied, the reason, who authorized it and when. An overridden criterion is shown as OVERRIDE, never as PASS. **No override was applied to this unit.**

Demonstrated error bound for this unit: 100GE: zero errors over at least 9.81e+14 bits per port gives BER ≤ 3.1e-15 at 95% confidence, 327× tighter than the IEEE 802.3 cl.82/86 objective of 1e-12; 50GE: zero errors over at least 6.10e+13 bits per port gives BER ≤ 4.9e-14 at 95% confidence, 20× tighter than the IEEE 802.3 cl.133 objective of 1e-12; 40GE: zero errors over at least 4.90e+13 bits per port gives BER ≤ 6.1e-14 at 95% confidence, 16× tighter than the IEEE 802.3 cl.82/86 objective of 1e-12; 25GE: zero errors over at least 3.34e+13 bits per port gives BER ≤ 9.0e-14 at 95% confidence, 11× tighter than the IEEE 802.3 cl.107/110 objective of 1e-12; 10GE: zero errors over at least 1.80e+13 bits per port gives BER ≤ 1.7e-13 at 95% confidence, 6× tighter than the IEEE 802.3 cl.49/52 objective of 1e-12 (the criterion requires 5×).

Module Specifications & Intended Use

Acceptance criteria	Measured	Result: PASS
AC-1 Identity: enumerated model, port count and serial agree with the order, the unit label and the boot record	CS100GE2Q28ALLNG, 8 active of 8 enumerated ports, SN 100087 (label); EEPROM 100087; boot record SN 100087	**PASS**

CloudStorm is an application and security test load module with two native QSFP28 100GE interfaces. The family has two variants: fusion (IxLoad and BreakingPoint) and non-fusion (IxLoad only); the NG models are the fusion variant. The module has 128GB of memory, hardware encryption offload and FPGA offload, and includes a mission control center CPU (MCC) with dedicated memory and a solid-state drive. (Ixia Platform Reference Guide, Release 8.20 EA (Dec 2016), Chapter 36 IXIA CloudStorm Load Modules, printed pp.585-588)

The module is installed only in an XGS12-HSL chassis (up to 12 modules, 24 ports of 100GE) or an XGS2-HSL chassis (2 modules, 4 ports of 100GE) and is driven by IxOS, IxLoad, BreakingPoint (fusion only) and the Tcl API. It generates L4-7 application traffic with integrated L2/3 stateless traffic; the architecture combines multi-core network processors and inline FPGAs with 10 ns latency measurement resolution. The sources do not describe separate transmit and receive engines in the stream and packet-group terms used for L2-3 load modules. They state hardware checksum generation for IPv4, IPv6, UDP and TCP, hardware-based traffic capture of 2GB per 100GE interface for BreakingPoint, and IxLoad capture memory of the maximum between 2GB or 2 million packets per interface. (Ixia Platform Reference Guide, Release 8.20 EA (Dec 2016), Chapter 36 IXIA CloudStorm Load Modules, printed pp.586-589; Keysight data sheet 3120-1108.EN, CloudStorm 100GE Application and Security Test Load Module (published October 7, 2026), pp.2-4)

Stated performance specifications

Parameter	Specification
Model / part number	CS100GE2Q28NG, 944-1231 (Fusion); CS100GE2Q28NGALL, 944-1233 (Fusion, all speeds enabled). Non-fusion equivalents: CS100GE2Q28 944-1232, CS100GE2Q28ALL 944-1234.
Type	Application and security test load module; fusion variant runs IxLoad and BreakingPoint
Form factor	Load module dimensions 16.4 in (L) x 12.0 in (W) x 1.3 in (H), 417 x 305 x 33 mm; 12 cards per XGS12-HSL, 2 per XGS2-HSL. Slot width per card is not stated explicitly.
Ports / physical interface	2-port, 100GE QSFP28
Speeds	100GE native; capable of supporting 100/50/40/25/10GE on the same port with speed options
Speed options	25GE fan-out: 905-1014 factory installed, 905-1015 upgrade. 50GE fan-out: 905-1016 / 905-1017. 10/40GE fan-out: 905-1018 factory installed, 905-1019 upgrade. Options apply to 944-1231 and 944-1232. Fan-out lane counts are not stated; bundle 947-5101 includes MT-to-4x10GE LC fan-out cable 942-0067 for 10GE and 25GE fan-out.
Transceiver support	QSFP28 SR4 and LR4 pluggable transceivers: QSFP28-SR4-XCVR (100GBASE-SR4, MMF, 850 nm, 100 m reach), QSFP28-LR4-XCVR (100GBASE-LR4, SMF, 1310 nm, 10 km reach)
Cable support incl. passive copper DAC	942-0088 QSFP28 passive copper Direct Attach Cable (DAC), 3 m; 942-0092 QSFP28 Active Optical Cable, multimode, 850 nm, 3 m
Max ports per chassis	XGS12-HSL: 12 cards, 24 ports 100GE QSFP28. XGS2-HSL: 2 cards, 4 ports 100GE QSFP28.
Memory	128GB
Capture	Hardware-based traffic capture (BreakingPoint): 2GB per 100GE interface on CS100GE2Q28NG. Capture memory (IxLoad): maximum between 2GB or 2 million packets, per interface.
Hardware encryption offload / FPGA offload	Yes / Yes; hardware checksum generation for IPv4, IPv6, UDP, TCP
Latency resolution	10 ns resolution accuracy for latency measurements
UDFs (IxExplorer)	Ten UDFs (UDF 1 to 10); modes Counter, Value List, Nested Counter, Random; bit offset not supported
Application support	IxOS, IxLoad, BreakingPoint, TCL API (CS100GE2Q28NG)
Published throughput (single module, back-to-back)	BreakingPoint application throughput 200 Gbps per module; 2.4 Tbps for an XGS12 chassis with 12 blades
Operating temperature	41 F to 95 F (5 C to 35 C), ambient air

Specification rows are from the local Ixia Platform Reference Guide Release 8.20 EA (December 2016), the IxExplorer User Guide Release 9.24 and the Keysight data sheet of the family, each row cited with the printed page. Definition ZC-FD-cs100ge2q28ngall rev 3, approved 2026-11-12.

Module Family: CloudStorm 100GE

CloudStorm 100GE is the 2-port QSFP28 application and security test load module of the XGS-HSL chassis. The NG models are the fusion variant (IxLoad and BreakingPoint). Lower speeds are options on the card; the ALL model has every speed enabled.

Model	Part number	Description
CS100GE2Q28NG	944-1231	CloudStorm 100GE 2-port QSFP28 Fusion load module (IxLoad and BreakingPoint); 10/40GE speeds by option 905-1018 (factory installed) or 905-1019 (upgrade)
CS100GE2Q28NGALL (this unit)	944-1233	CloudStorm 100 GigE 2-port QSFP28 Fusion with all speeds enabled (100/50/40/25/10GE)

Platform Reference Guide v8.20 EA ch.36, Keysight data sheet 3120-1108.EN and the PCM list, as cited per member.

Device Under Test

Acceptance criteria	Measured	Result: PASS
AC-3 Test conditions: IxOS client version-matched to the chassis; counters zeroed at window start; sampling interval 10 s or less; capture window at least the module soak time, the longest AC-8 window among the PHYs the module supports and never less than 2 h, applied to the 100GE test set; every other test set runs at least the AC-8 window of its own PHY at its own line rate	100GE: interval 5.6 s, window 2 h 44 min of 2 h 00 min module soak time, counters zeroed yes; 50GE: interval 5.7 s, window 20 min 21 s of 20 min 00 s minimum window (no soak on this test set), counters zeroed yes; 40GE: interval 5.5 s, window 20 min 24 s of 20 min 00 s minimum window (no soak on this test set), counters zeroed yes; 25GE: interval 6.7 s, window 22 min 17 s of 20 min 00 s minimum window (no soak on this test set), counters zeroed yes; 10GE: interval 6.8 s, window 30 min 01 s of 25 min 00 s minimum window (no soak on this test set), counters zeroed yes; IxServer 9.24.3100.10, matched client (full card identity returned)	**PASS**
AC-9 Thermal: no over-temperature alarm or shutdown during the window; every exposed sensor below 80 °C. Temperature change over the window is an indication only, not a pass or fail limit	100GE: max 54 °C, no over-temperature alarm; change over the window -0.2 °C (indication only); 50GE: max 58 °C, no over-temperature alarm; change over the window +0.9 °C (indication only); 40GE: max 53 °C, no over-temperature alarm; change over the window +0.2 °C (indication only); 25GE: max 60 °C, no over-temperature alarm; change over the window +0.2 °C (indication only); 10GE: max 55 °C, no over-temperature alarm; change over the window +0.5 °C (indication only)	**PASS**

Slot	Serial	Assembly	Rev	HW	FPGA	Ports
4	100087	850-1422-03-07	A	1	1074332087	8

Serial number read from the unit's physical identification label and cross-referenced against the card's boot-record identity in the IxServer chassis log. Capture: 100GBASE-CR4, QSFP28 passive copper direct-attach cable (ports 1-2) 2026-11-12 04:11:03 to 06:54:38 local (2 h 44 min), 1,768 samples, longest gap 6 s; 50GBASE-CR2, 2 x 50GE per QSFP28 port over the QSFP28 passive copper direct-attach cable (ports 1-4) 2026-11-12 08:11:24 to 08:31:45 local (20 min 21 s), 216 samples, longest gap 6 s; 40GBASE-CR4, QSFP+ passive copper direct-attach cable (ports 1-2) 2026-11-12 07:04:21 to 07:24:45 local (20 min 24 s), 223 samples, longest gap 6 s; 25GBASE-CR, 4 x 25GE per QSFP28 port over the QSFP28 passive copper direct-attach cable (ports 1-8) 2026-11-12 08:35:18 to 08:57:35 local (22 min 17 s), 201 samples, longest gap 8 s; 10GBASE-R, 4 x 10GE per QSFP28 port over the QSFP28 passive copper direct-attach cable (ports 1-8) 2026-11-12 07:34:12 to 08:04:13 local (30 min 01 s), 264 samples, longest gap 8 s. All error counters verified zero at the start of each window.

Thermal profile (limit 80 °C, AC-9)

Sensor	100GE min / max / mean	50GE min / max / mean	40GE min / max / mean	25GE min / max / mean	10GE min / max / mean
Central (card)	46 / 48 / 47.0 °C	47 / 50 / 49.0 °C	46 / 47 / 47.0 °C	48 / 50 / 49.0 °C	47 / 48 / 47.2 °C
Port sensors	52 / 54 / 53.0 °C	52 / 58 / 56.1 °C	52 / 53 / 52.9 °C	55 / 60 / 59.1 °C	54 / 55 / 54.7 °C

Installed transceivers

Port	Vendor / Part	Serial	Port	Vendor / Part	Serial
1	Molex 1002971301	713621887	5	Molex 1002971301	713621887
2	Molex 1002971301	713621887	6	Molex 1002971301	713621887
3	Molex 1002971301	713621887	7	Molex 1002971301	713621887
4	Molex 1002971301	713621887	8	Molex 1002971301	713621887

8 of 8 ports identified in the as-tested boot record. Identity only; optic digital diagnostics were not collected.

Port Bring-Up & Aggregate Conformance Checklist

Acceptance criteria	Measured	Result: PASS
AC-4 Link: up on every port in every sample; zero link-down transitions	100GE: 3,536 of 3,536 port-samples up, 0 link-down transitions; 50GE: 864 of 864 port-samples up, 0 link-down transitions; 40GE: 446 of 446 port-samples up, 0 link-down transitions; 25GE: 1,608 of 1,608 port-samples up, 0 link-down transitions; 10GE: 2,112 of 2,112 port-samples up, 0 link-down transitions	**PASS**
AC-5 Line rate: negotiated speed equals the nominal port speed in every sample	100GE: 100,000 Mbps in 3,536 of 3,536 port-samples; 50GE: 50,000 Mbps in 864 of 864 port-samples; 40GE: 40,000 Mbps in 446 of 446 port-samples; 25GE: 25,000 Mbps in 1,608 of 1,608 port-samples; 10GE: 10,000 Mbps in 2,112 of 2,112 port-samples	**PASS**
AC-6 Throughput: every port within ±100 ppm of the theoretical line-rate frame rate for the frame size under test, measured over the whole window (IEEE 802.3 clock tolerance); the measurement uncertainty is stated	100GE: -15 to -15 ppm vs 148,809,524 fps (least-squares over all samples, 95% uncertainty ±2.2 ppm); 50GE: -76 to -54 ppm vs 74,404,762 fps (least-squares over all samples, 95% uncertainty ±65.5 ppm); 40GE: -85 to -79 ppm vs 59,523,810 fps (least-squares over all samples, 95% uncertainty ±62.7 ppm); 25GE: -69 to +43 ppm vs 5,874,060 fps (least-squares over all samples, 95% uncertainty ±183.0 ppm); 10GE: -64 to +9 ppm vs 2,349,624 fps (least-squares over all samples, 95% uncertainty ±132.3 ppm)	**PASS**

Each test was evaluated across the ports of each test set for every sample of each monitoring window (100GE 1,768, 50GE 216, 40GE 223, 25GE 201, 10GE 264); a test passes only if the criterion held continuously on every port.

#	Aggregate Port Test	Pass Criterion	100GE	50GE	40GE	25GE	10GE
1	Link establishment	Link up on every port of the test set, every sample	**PASS**	**PASS**	**PASS**	**PASS**	**PASS**
2	Line rate	Line speed = nominal port speed, every sample	**PASS**	**PASS**	**PASS**	**PASS**	**PASS**
3	Link stability (no flaps)	Zero link-down transitions over window	**PASS**	**PASS**	**PASS**	**PASS**	**PASS**

#	Aggregate Port Test	Pass Criterion	100GE	50GE	40GE	25GE	10GE
4	Frame integrity	FCS / alignment / undersize / oversize / fragments / dribble / symbol = 0	**PASS**	**PASS**	**PASS**	**PASS**	**PASS**
5	Data-path verification	Sequence errors = 0 and data-integrity errors = 0	**PASS**	**PASS**	**PASS**	**PASS**	**PASS**
6	Frame delivery	Dropped frames = 0, ingress and egress	**PASS**	**PASS**	**PASS**	**PASS**	**PASS**
7	Line coding	Code / disparity / invalid-EOF / error-character counters = 0	**PASS**	**PASS**	**PASS**	**PASS**	**PASS**
8	Fault signaling	Local / remote fault, link-fault state, PCS counters = 0	**PASS**	**PASS**	**PASS**	**PASS**	**PASS**
9	Flow control	Zero pause frames received	**PASS**	**PASS**	**PASS**	**PASS**	**PASS**
10	Line-rate throughput	Every port within ±100 ppm of the line-rate frame rate, least-squares over the window (AC-6)	**PASS**	**PASS**	**PASS**	**PASS**	**PASS**
11	Counter coherence	framesSent monotonic on every port (no resets)	**PASS**	**PASS**	**PASS**	**PASS**	**PASS**
12	Thermal	All sensors < 80 °C for the entire window	**PASS**	**PASS**	**PASS**	**PASS**	**PASS**

Measured per-port frame rate: 100GE: 148,811,457–148,811,457 fps against the 148,809,524 fps ceiling for 64-byte frames; 50GE: 74,399,120–74,400,751 fps (least-squares) against the 74,404,762 fps ceiling for 64-byte frames; 40GE: 59,518,776–59,519,103 fps (least-squares) against the 59,523,810 fps ceiling for 64-byte frames; 25GE: 5,873,657–5,874,314 fps (least-squares) against the 5,874,060 fps ceiling for 512-byte frames; 10GE: 2,349,474–2,349,645 fps (least-squares) against the 2,349,624 fps ceiling for 512-byte frames.

25GE frame size. The 25GE set is run at 512-byte frames, 5,874,060 fps per port, the full 25 Gbit/s line rate. In 25G mode each port of this module receives about 7 million frames a second at most, as in 10G mode: at 64-byte and 256-byte frames and 100 percent load the ports hold near 6 to 6.6 Mfps each and count pause frames with flow control off, where the 25GE line rate at 64 bytes is 37.2 Mfps. Measured on 2026-11-12 on SN 100087; it is a property of the four-port modes, and the 100GE, 50GE and 40GE sets run 64-byte frames at full line rate.

10GE frame size. The 10GE set is run at 512-byte frames, 2,349,624 fps per port, the full 10 Gbit/s line rate. In 10G mode each port of this module receives about 7 million frames a second at most: at 64-byte and 128-byte frames and 100 percent load the ports hold near 6.5 Mfps each and count pause frames with flow control off, where the 10GE line rate at 64 bytes is 14.88 Mfps. Measured on 2026-11-12 on two units of the family; it is a property of the 10G mode, and the 100GE and 40GE sets run 64-byte frames at full line rate.

IxServer Event Log: Card 4 Summary (S/N 100087)

Acceptance criteria	Measured	Result: PASS
AC-2 Boot: zero FAIL records in the as-tested IxServer boot record; card reaches Board Ready	0 FAIL records; 0 BIST/memory-test records; Board Ready logged	**PASS**
AC-10 Stability: zero card hardware events logged by IxServer during the capture window	100GE: 0 card hardware events; 50GE: 0 card hardware events; 40GE: 0 card hardware events; 25GE: 0 card hardware events; 10GE: 0 card hardware events	**PASS**

Summary of the IxServer chassis log in the IxServer Task-window schema (**Date/Time · Card · Port · Result · Event**, per the Ixia IxServer User Guide), retrieved read-only and scoped to Card 4 (serial 100087) plus chassis-level records.

Log summary by category. Every record for card 4 from the as-tested boot record onward (14,077 records) and the chassis-level records of the same session (34,321), grouped by what the chassis was doing; counts, time span and the values

that matter for each group.

Category	Records	Span (workstation time)	Result	Summary
Identity and assembly	6	02:08:42 to 02:10:19	ok	Native Board, Serial Number 100087, BOM Assembly Number 860-1422-11 Rev A, PCBA Date Code S11000042, Assembly Number 850-1422-03-07 Revision A LM type CS100GE2Q28ALL. Maximum current draw: 0.00 Amps at 3.3V, 0.00 Amps at 5V, 41.02 Amps at 12V. (492 Watts) MCC MFG Date Code S11000029 Assembly Number 850-1447-03-01 Revision D PHY Board MFG Date Code S11000997 Assembly Number 850-1440-03-02 Revision D LM Serial Number 100087 MFG Date Code S11000042 Assembly Number 850-1422-03-07 Revision A
Firmware and FPGA	42	02:08:55 to 08:33:31	ok	3 distinct FPGA version lines: FPGA versions: PHY 1.116 (0x4009_0074) PORT 1.864 (0x4009_0360); FPGA versions: PHY 1.288 (0x4009_0120) PORT 1.864 (0x4009_0360)
Processor boot	1	02:10:19 to 02:10:19	ok	none in scope
Optics (transceivers)	24	02:14:22 to 08:32:52	ok	Molex 1002971301: 8 ports (1, 2, 3, 4, 5, 6, 7, 8)
Port configuration and traffic control	474	02:10:18 to 08:57:48	ok	75 port configuration writes, 0 PFC control writes, 399 other control records (activation, transmit, ownership)
Client sessions	9812	02:10:19 to 08:58:03	ok	491 client connections (chassis-level records) from 127.0.0.1, 192.168.2.13; 61 disconnects; 9812 card reads and keep-alives
Faults and warnings	0	-	ok	none
Other card records	3718	02:08:36 to 08:57:48	ok	3718 boot and bring-up detail records (register values, link training, 26 link state changes before the capture window); none FAIL-tagged or Warning-tagged
Chassis context	34321	02:08:43 to 08:59:04	ok	------- Server Session Begin ------- IxOS 9.24.3100.10 Patch1 OS Name: Linux, Build Number: 0, Service Pack: 3.10.0-1160.42.2.el7.x86_64 Processor Type: 64bit, Number Of Processor Cores: 32 Backplane ID: 1306 Top Panel Assembly Part Number 840-0123-04 Revision D Top Panel Assembly Serial Number Top Panel Sub-Assembly Part Number 860-1342-01 Revision D Processor Card Assembly Part Number 942-0102-02 Revision N Processor Card Assembly Serial Number 721630 Processor Card Sub-Assembly Part Number 860-1331-10 Revision K Power Module Assembly Part Number 942-0032-08 Revision B Power Module Assembly Serial Number 721826 Power Module Sub-Assembly Part Number 870-0103-01 Revision C

Event timeline (aggregate).

Date / Time	Card	Port	Result	Event	Observations (aggregate)
11-12-2026 00:27:33	-	-	ok	IxServer start: chassis boot	IxServer 9.24.3100.10, chassis Ixia XGS12 S/N XGS12-J0701117. Chassis-side timestamps are mapped to workstation time by the clock offset measured between the workstation and the chassis.
11-12-2026 02:08:36	4	-	ok	Hot insertion: complete boot record of the unit as tested	Native Board, Serial Number 100087, BOM Assembly Number 860-1422-11 Rev A, PCBA Date Code S11000042, Assembly Number 850-1422-03-07 Revision A; LM type CS100GE2Q28ALL. Maximum current draw: 0.00 Amps at 3.3V, 0.00 Amps at 5V, 41.02 Amps at 12V. (492 Watts). 0 BIST / memory-test records, Board Ready logged. Complete, error-free enumeration: **zero FAIL records** in the boot sequence.
11-12-2026 02:08:36	4	1-8	ok	Transceiver enumeration	8 of 8 transceivers identified with vendor, part and serial.
11-12-2026 02:19:01	-	-	ok	Client sessions	63 client connections: IxExplorer (traffic control) and read-only Tcl connections (discovery, port info, statistics logging), all from the test workstation.
11-12-2026 09:00:16	4	1-8	ok	Statistics baselines	88 statistics-clear events; counters zeroed at the start of each capture window without stopping traffic.

Date / Time	Card	Port	Result	Event	Observations (aggregate)
04:11–06:54	4	1-2	ok	100GBASE-CR4, QSFP28 passive copper direct-attach cable soak (2 h 44 min)	0 card hardware events during the capture window (read-only statistics queries excluded). The card ran undisturbed at line rate.
08:11–08:31	4	1-4	ok	50GBASE-CR2, 2 x 50GE per QSFP28 port over the QSFP28 passive copper direct-attach cable run (20 min 21 s)	0 card hardware events during the capture window (read-only statistics queries excluded). The card ran undisturbed at line rate.
07:04–07:24	4	1-2	ok	40GBASE-CR4, QSFP+ passive copper direct-attach cable run (20 min 24 s)	0 card hardware events during the capture window (read-only statistics queries excluded). The card ran undisturbed at line rate.
08:35–08:57	4	1-8	ok	25GBASE-CR, 4 x 25GE per QSFP28 port over the QSFP28 passive copper direct-attach cable run (22 min 17 s)	0 card hardware events during the capture window (read-only statistics queries excluded). The card ran undisturbed at line rate.
07:34–08:04	4	1-8	ok	10GBASE-R, 4 x 10GE per QSFP28 port over the QSFP28 passive copper direct-attach cable run (30 min 01 s)	0 card hardware events during the capture window (read-only statistics queries excluded). The card ran undisturbed at line rate.
11-12-2026 09:01:58	-	-	ok	Session log accounting	Chassis log downloaded from the chassis web console. Scope: the as-tested insertion of card 4 through the end of the retrieved log, 120,356 event lines, all represented above. 0 FAIL-tagged records for card 4 in scope.

Statistics Log: Full Field Aggregate (every test set)

Acceptance criteria	Measured	Result: PASS
AC-7 Frame delivery: zero frame loss on every port (RFC 2544 throughput definition). Tx and Rx totals agree within 10 frames, the frames in flight at the read instant	100GE: max |Tx−Rx| 3 frames per port pair (ports 1 and 2 cabled to each other; totals of the pair); 50GE: max |Tx−Rx| 1 frame per port pair (ports 1 and 3, 2 and 4 cabled to each other; totals of the pair); 40GE: max |Tx−Rx| 1 frame per port pair (ports 1 and 2 cabled to each other; totals of the pair); 25GE: max |Tx−Rx| 1 frame per port pair (ports 1 and 5, 2 and 6, 3 and 7, 4 and 8 cabled to each other; totals of the pair); 10GE: max |Tx−Rx| 1 frame per port pair (ports 1 and 5, 2 and 6, 3 and 7, 4 and 8 cabled to each other; totals of the pair)	PASS
AC-8 Errors: zero increase on every frame-integrity, data-path, line-coding, fault, drop and flow-control counter. The demonstrated bit-error-ratio bound per port (95% confidence, zero errors) is at least 5× tighter than the IEEE 802.3 objective for the PHY. On copper, FCS errors are attributed to cabling and excluded	100GE: 0 errors / 31 counters; BER ≤ 3.1e-15 (target 2e-13, IEEE 802.3 cl.82/86); 50GE: 0 errors / 31 counters; BER ≤ 4.9e-14 (target 2e-13, IEEE 802.3 cl.133); 40GE: 0 errors / 31 counters; BER ≤ 6.1e-14 (target 2e-13, IEEE 802.3 cl.82/86); 25GE: 0 errors / 31 counters; BER ≤ 9.0e-14 (target 2e-13, IEEE 802.3 cl.107/110); 10GE: 0 errors / 31 counters; BER ≤ 1.7e-13 (target 2e-13, IEEE 802.3 cl.49/52)	PASS

Every one of the 48 logged fields with its measured value per medium, including every error counter that stayed at zero. Counters show the per-port increase over the window, state fields the value held across all samples, temperatures the range across ports.

Field	100GE (ports 1-2)	50GE (ports 1-4)	40GE (ports 1-2)	25GE (ports 1-8)	10GE (ports 1-8)
Port & link state (3 fields)					
link	1 (all ports, all 1,768 samples)	1 (all ports, all 216 samples)	1 (all ports, all 223 samples)	1 (all ports, all 201 samples)	1 (all ports, all 264 samples)
lineSpeed	100000 (all ports, all 1,768 samples)	50000 (all ports, all 216 samples)	40000 (all ports, all 223 samples)	25000 (all ports, all 201 samples)	10000 (all ports, all 264 samples)
linkFaultState	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
Traffic: transmit (4 fields)					

Field	100GE (ports 1-2)	50GE (ports 1-4)	40GE (ports 1-2)	25GE (ports 1-8)	10GE (ports 1-8)
framesSent	+1,460,517,338,377–1,460,517,338,378 per port · total 2,921,034,676,755	+90,776,010,028–90,776,010,031 per port · total 363,104,040,118	+72,889,678,626 per port	+7,856,419,261–7,859,769,227 per port · total 62,865,401,302	+4,231,063,012–4,233,562,180 per port · total 33,862,281,105
scheduledFramesSent	+1,460,517,338,377–1,460,517,338,378 per port · total 2,921,034,676,755	+90,776,010,028–90,776,010,031 per port · total 363,104,040,118	+72,889,678,626 per port	+7,856,419,261–7,859,769,227 per port · total 62,865,401,302	+4,231,063,012–4,233,562,180 per port · total 33,862,281,105
bytesSent	+93,473,109,656,128–93,473,109,656,192 per port · total 186,946,219,312,320	+5,809,664,641,776–5,809,664,641,968 per port · total 23,238,658,567,552	+4,664,939,432,032–4,664,939,432,064 per port · total 9,329,878,864,096	+4,022,486,661,792–4,024,201,844,352 per port · total 32,187,085,467,936	+2,166,304,262,368–2,167,583,836,224 per port · total 17,337,487,926,560
bitsSent	+747,784,877,249,024–747,784,877,249,536 per port · total 1,495,569,754,498,560	+46,477,317,134,208–46,477,317,135,744 per port · total 185,909,268,540,416	+37,319,515,456,256–37,319,515,456,512 per port · total 74,639,030,912,768	+32,179,893,294,336–32,193,614,754,816 per port · total 257,496,683,743,488	+17,330,434,098,944–17,340,670,689,792 per port · total 138,699,903,412,480
Traffic: receive (3 fields)					
framesReceived	+1,460,517,338,375–1,460,517,338,377 per port · total 2,921,034,676,752	+90,776,010,028–90,776,010,031 per port · total 363,104,040,117	+72,889,678,624–72,889,678,627 per port · total 145,779,357,251	+7,856,419,262–7,859,769,227 per port · total 62,865,401,306	+4,231,063,013–4,233,562,180 per port · total 33,862,281,107
bytesReceived	+93,473,109,656,032–93,473,109,656,128 per port · total 186,946,219,312,160	+5,809,664,641,776–5,809,664,642,000 per port · total 23,238,658,567,504	+4,664,939,431,984–4,664,939,432,128 per port · total 9,329,878,864,112	+4,022,486,661,760–4,024,201,844,336 per port · total 32,187,085,467,872	+2,166,304,262,344–2,167,583,836,200 per port · total 17,337,487,926,520
bitsReceived	+747,784,877,248,256–747,784,877,249,024 per port · total 1,495,569,754,497,280	+46,477,317,134,208–46,477,317,136,000 per port · total 185,909,268,540,032	+37,319,515,455,872–37,319,515,457,024 per port · total 74,639,030,912,896	+32,179,893,294,080–32,193,614,754,688 per port · total 257,496,683,742,976	+17,330,434,098,752–17,340,670,689,600 per port · total 138,699,903,412,160
Frame integrity (8 fields)					
fcsErrors	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
alignmentErrors	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
oversize	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
undersize	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
fragments	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
dribbleErrors	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
symbolErrors	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
symbolErrorFrames	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
Data-path verification (2 fields)					
sequenceErrors	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
dataIntegrityErrors	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
Media access (1 field)					
collisions	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
Frame delivery (drops) (2 fields)					
droppedFrames	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
egressDroppedFrames	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
Line coding (5 fields)					
codeError	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
codingErrorFramesReceived	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
eErrorCharacterFramesReceived	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)

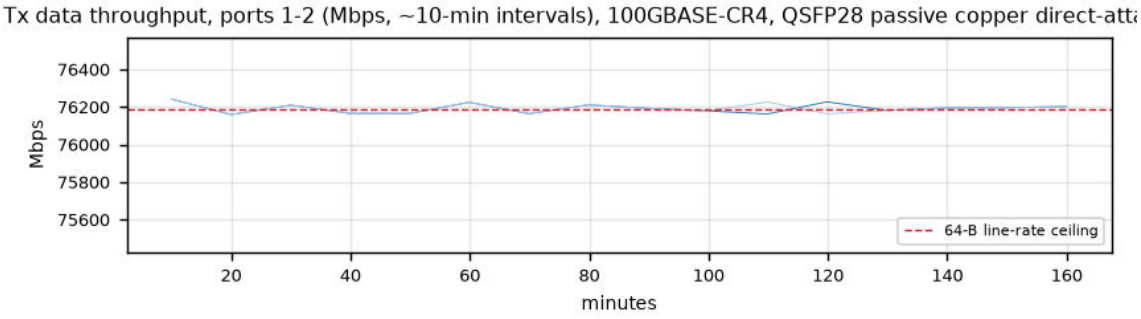
Field	100GE (ports 1-2)	50GE (ports 1-4)	40GE (ports 1-2)	25GE (ports 1-8)	10GE (ports 1-8)
invalidEOFCount	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
disparityErrors	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
Flow control & VLAN (2 fields)					
flowControlFrames	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
vlanTaggedFramesRx	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
Capture comparators (2 fields)					
captureTrigger	+154,342,976,321–154,655,776,586 per port · total 308,998,752,907	+16,070,630,901–16,127,609,782 per port · total 64,385,911,019	+19,233,336,864–19,256,898,587 per port · total 38,490,235,451	+7,856,419,261–7,859,769,227 per port · total 62,865,401,304	+4,231,063,012–4,233,562,181 per port · total 33,862,281,107
captureFilter	+154,342,976,321–154,655,776,586 per port · total 308,998,752,907	+16,070,630,901–16,127,609,782 per port · total 64,385,911,019	+19,233,336,864–19,256,898,587 per port · total 38,490,235,451	+7,856,419,261–7,859,769,227 per port · total 62,865,401,304	+4,231,063,012–4,233,562,181 per port · total 33,862,281,107
Timing (1 field)					
transmitDuration	raw duration register, advancing every sample	raw duration register, advancing every sample	raw duration register, advancing every sample	raw duration register, advancing every sample	raw duration register, advancing every sample
Fault signaling (sampled at every speed) (7 fields)					
localFaults	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
remoteFaults	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
pcsSyncErrorsReceived	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
pcsIllegalCodesReceived	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
pcsLocalFaultsReceived	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
pcsRemoteFaultsReceived	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
pcsIllegalIdleReceived	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
FEC (not used at this line rate; sampled regardless) (4 fields)					
fecCorrectedBitsCount	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
fecUncorrectableSubrowCount	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
rsFecCorrectedCodewordCount	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
rsfecUncorrectedCodewordCount	0 (all ports, all 1,768 samples)	0 (all ports, all 216 samples)	0 (all ports, all 223 samples)	0 (all ports, all 201 samples)	0 (all ports, all 264 samples)
Thermal sensors (3 fields)					
centralTemperature	46–48 °C across ports	47–50 °C across ports	46–47 °C across ports	48–50 °C across ports	47–48 °C across ports
portTemperature	52–54 °C across ports	52–58 °C across ports	52–53 °C across ports	55–60 °C across ports	54–55 °C across ports
trafficFpga1Temperature	reads 0 on every sample (sensor not exposed)	reads 0 on every sample (sensor not exposed)	reads 0 on every sample (sensor not exposed)	reads 0 on every sample (sensor not exposed)	reads 0 on every sample (sensor not exposed)
Other (1 field)					
tRead	min 1794485463.56 / max 1794495278.139	min 1794499885.217 / max 1794501105.354	min 1794495861.308 / max 1794497085.965	min 1794501318.388 / max 1794502656.927	min 1794497652.497 / max 1794499454.419

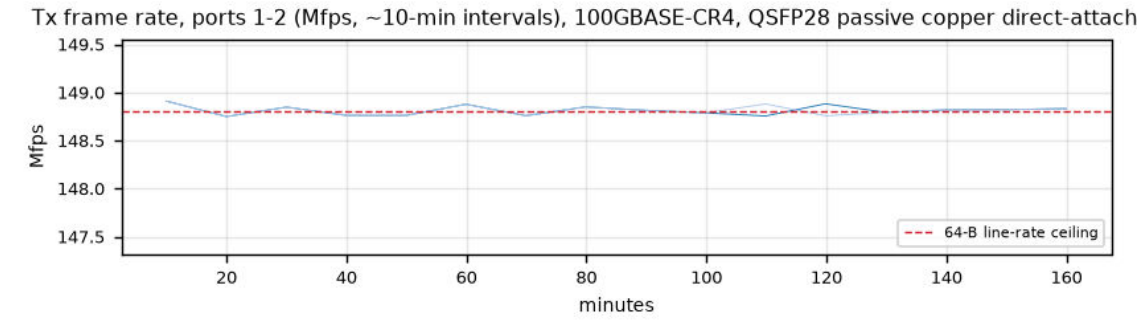
Zeros are measured values, sampled for the full window on every port.

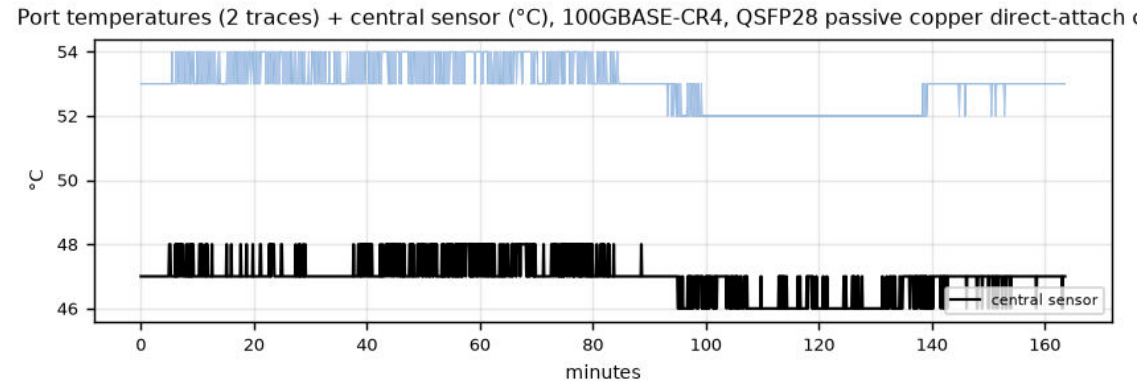
Statistics Log: Time-Series Graphs (100GBASE-CR4, QSFP28 passive copper direct-attach cable)

Acceptance criteria	Measured	Result: PASS
AC-6 Throughput: every port within ±100 ppm of the theoretical line-rate frame rate for the frame size under test, measured over the whole window (IEEE 802.3 clock tolerance); the measurement uncertainty is stated	100GE: -15 to -15 ppm vs 148,809,524 fps (least-squares over all samples, 95% uncertainty ±2.2 ppm)	**PASS**
AC-9 Thermal: no over-temperature alarm or shutdown during the window; every exposed sensor below 80 °C. Temperature change over the window is an indication only, not a pass or fail limit	100GE: max 54 °C, no over-temperature alarm; change over the window -0.2 °C (indication only)	**PASS**

Data throughput holds at ≈76,190 Mbps per port and the frame rate at the 148,809,524 fps ceiling for 64-byte frames (dashed line). Rates are exact counter deltas over ~10-minute intervals; 1-second timestamp resolution gives up to ±0.3% per interval, the scatter about the ceiling. Window totals are exact.



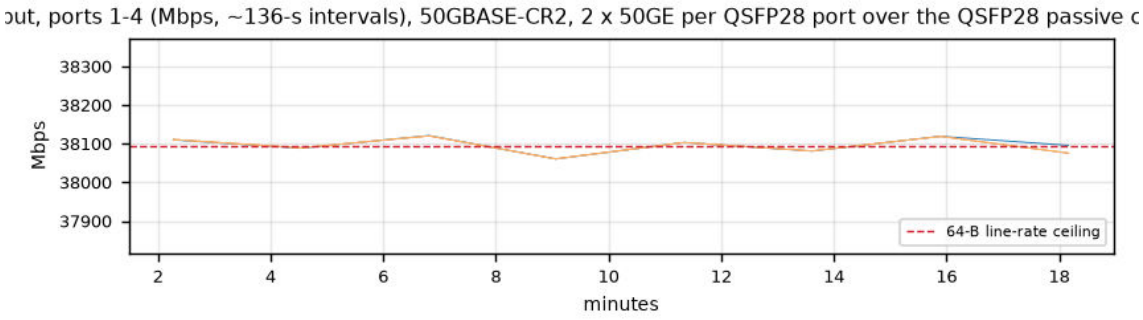


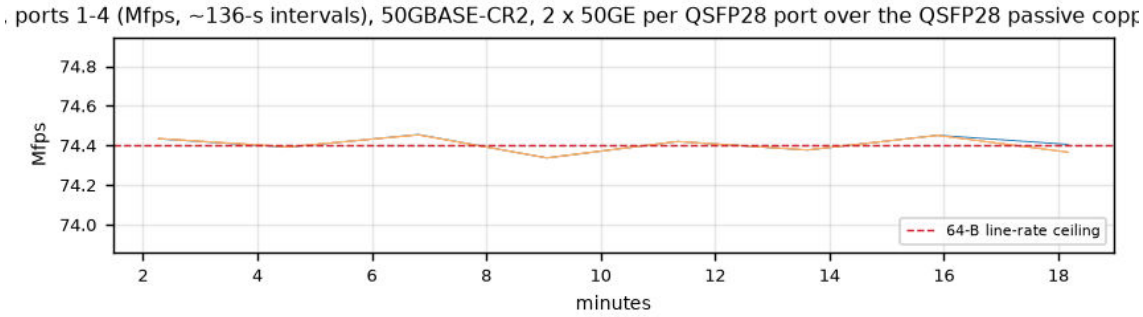


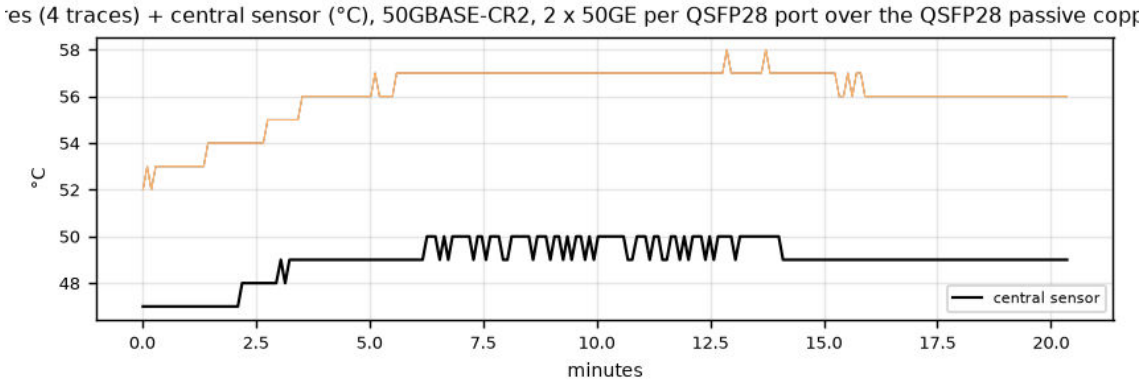
Statistics Log: Time-Series Graphs (50GBASE-CR2, 2 x 50GE per QSFP28 port over the QSFP28 passive copper direct-attach cable)

Acceptance criteria	Measured	Result: PASS
AC-6 Throughput: every port within ±100 ppm of the theoretical line-rate frame rate for the frame size under test, measured over the whole window (IEEE 802.3 clock tolerance); the measurement uncertainty is stated	50GE: -76 to -54 ppm vs 74,404,762 fps (least-squares over all samples, 95% uncertainty ±65.5 ppm)	**PASS**
AC-9 Thermal: no over-temperature alarm or shutdown during the window; every exposed sensor below 80 °C. Temperature change over the window is an indication only, not a pass or fail limit	50GE: max 58 °C, no over-temperature alarm; change over the window +0.9 °C (indication only)	**PASS**

Data throughput holds at ≈38,095 Mbps per port and the frame rate at the 74,404,762 fps ceiling for 64-byte frames (dashed line). Rates are exact counter deltas over ~136-second intervals, the window being too short for 10-minute ones; the read instant of a counter is known to about ±0.2 s, which gives up to ±0.3% per interval, the scatter about the ceiling. Window totals are exact.



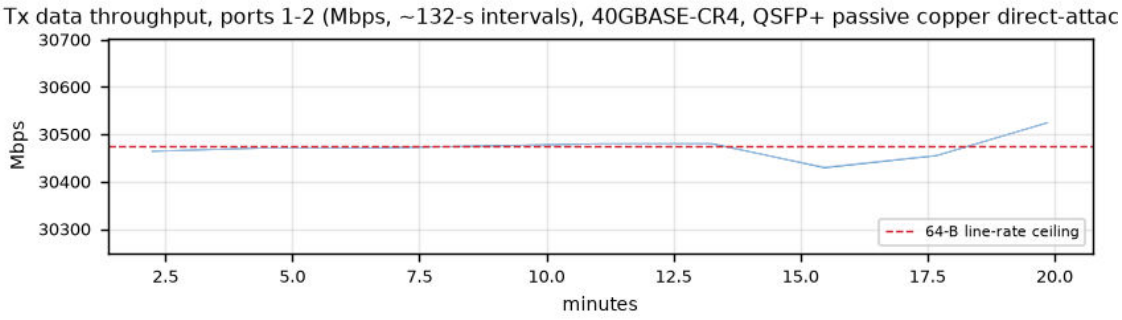


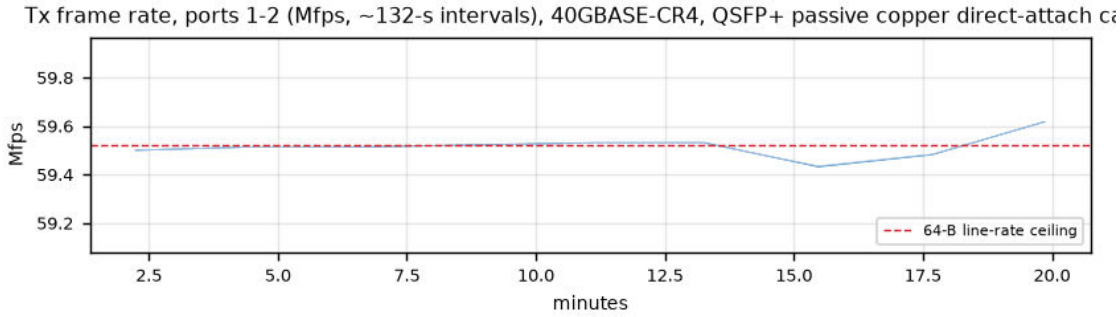


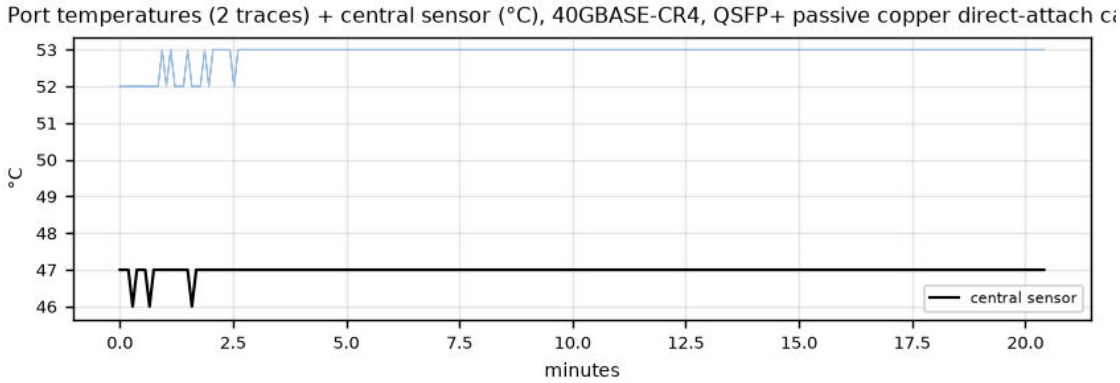
Statistics Log: Time-Series Graphs (40GBASE-CR4, QSFP+ passive copper direct-attach cable)

Acceptance criteria	Measured	Result: PASS
AC-6 Throughput: every port within ±100 ppm of the theoretical line-rate frame rate for the frame size under test, measured over the whole window (IEEE 802.3 clock tolerance); the measurement uncertainty is stated	40GE: -85 to -79 ppm vs 59,523,810 fps (least-squares over all samples, 95% uncertainty ±62.7 ppm)	**PASS**
AC-9 Thermal: no over-temperature alarm or shutdown during the window; every exposed sensor below 80 °C. Temperature change over the window is an indication only, not a pass or fail limit	40GE: max 53 °C, no over-temperature alarm; change over the window +0.2 °C (indication only)	**PASS**

Data throughput holds at ≈30,476 Mbps per port and the frame rate at the 59,523,810 fps ceiling for 64-byte frames (dashed line). Rates are exact counter deltas over ~132-second intervals, the window being too short for 10-minute ones; the read instant of a counter is known to about ±0.2 s, which gives up to ±0.3% per interval, the scatter about the ceiling. Window totals are exact.



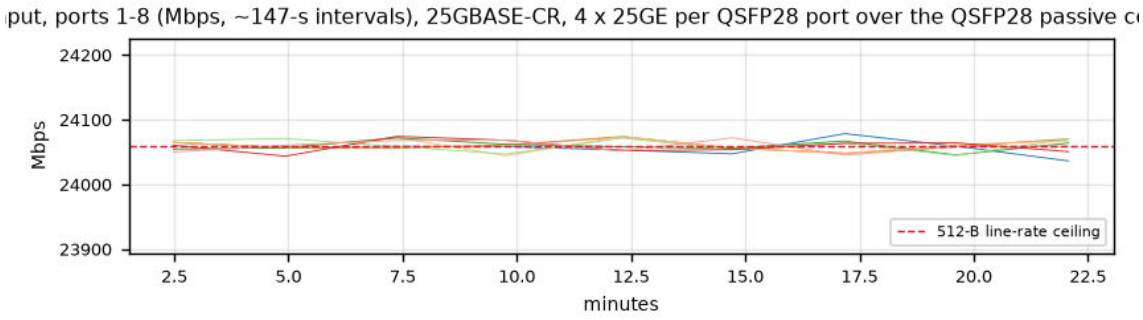


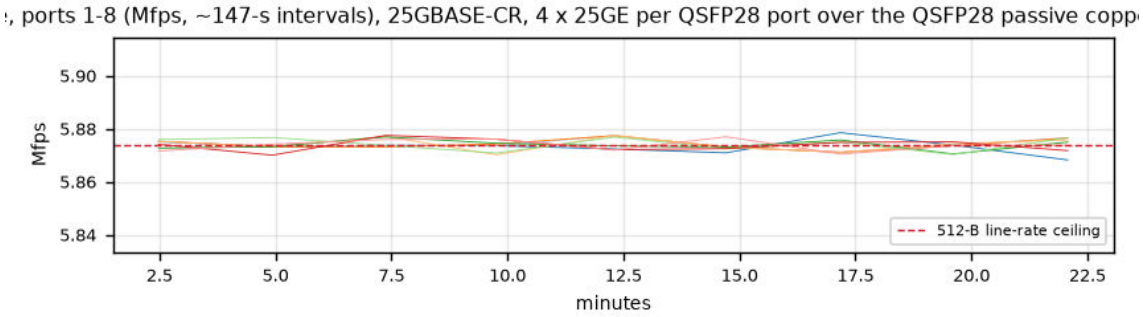


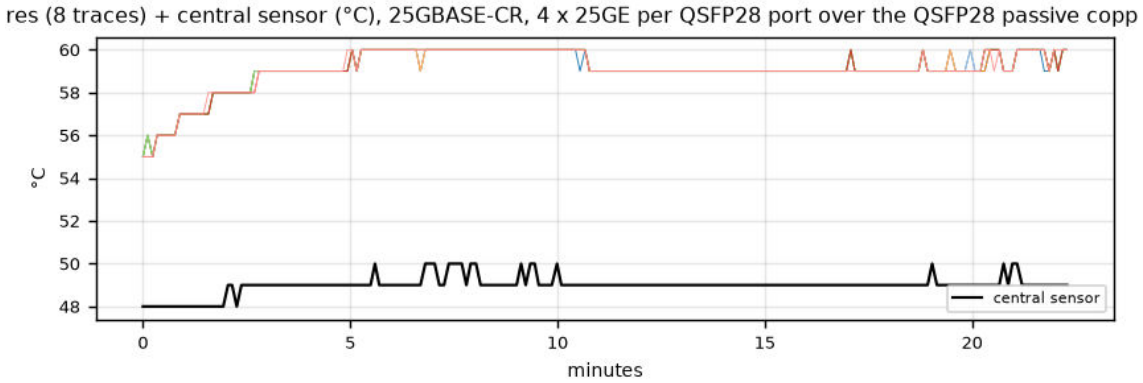
Statistics Log: Time-Series Graphs (25GBASE-CR, 4 x 25GE per QSFP28 port over the QSFP28 passive copper direct-attach cable)

Acceptance criteria	Measured	Result: PASS
AC-6 Throughput: every port within ±100 ppm of the theoretical line-rate frame rate for the frame size under test, measured over the whole window (IEEE 802.3 clock tolerance); the measurement uncertainty is stated	25GE: -69 to +43 ppm vs 5,874,060 fps (least-squares over all samples, 95% uncertainty ±183.0 ppm)	**PASS**
AC-9 Thermal: no over-temperature alarm or shutdown during the window; every exposed sensor below 80 °C. Temperature change over the window is an indication only, not a pass or fail limit	25GE: max 60 °C, no over-temperature alarm; change over the window +0.2 °C (indication only)	**PASS**

Data throughput holds at ≈24,060 Mbps per port and the frame rate at the 5,874,060 fps ceiling for 512-byte frames (dashed line). Rates are exact counter deltas over ~147-second intervals, the window being too short for 10-minute ones; the read instant of a counter is known to about ±0.2 s, which gives up to ±0.3% per interval, the scatter about the ceiling. Window totals are exact.



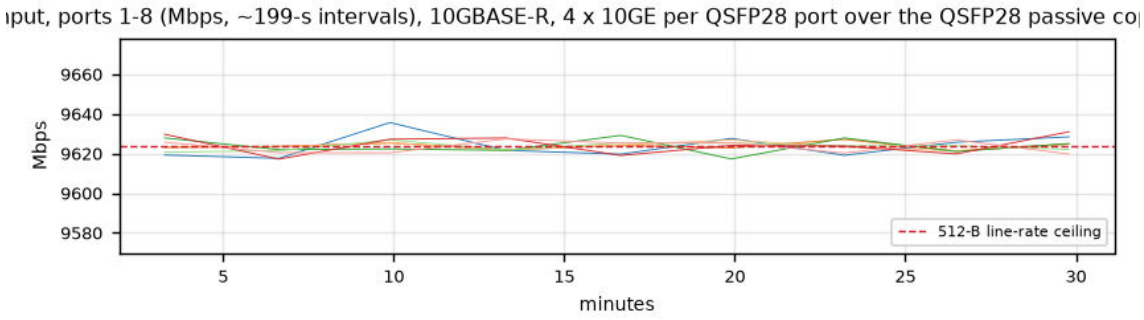


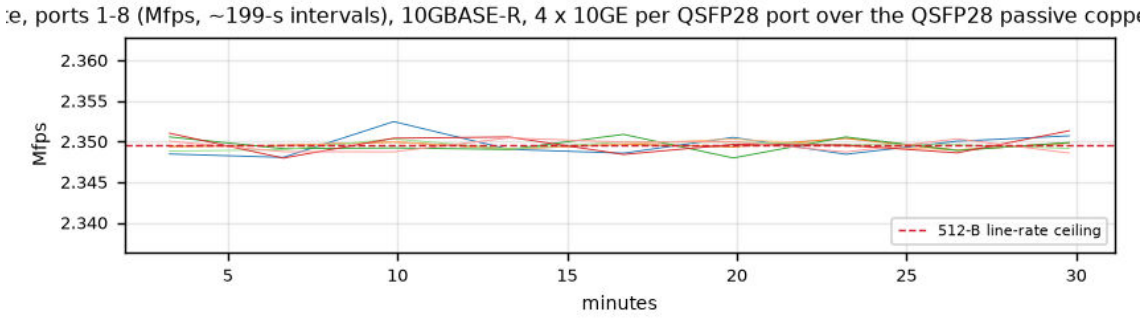


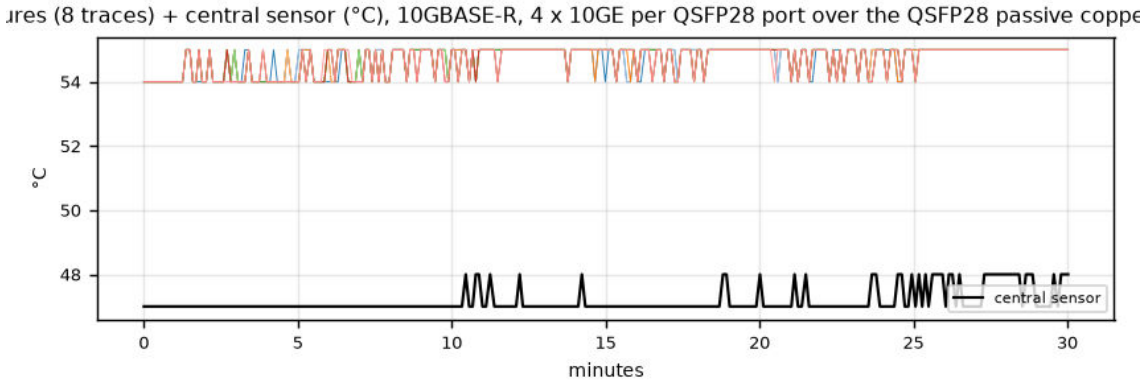
Statistics Log: Time-Series Graphs (10GBASE-R, 4 x 10GE per QSFP28 port over the QSFP28 passive copper direct-attach cable)

Acceptance criteria	Measured	Result: PASS
AC-6 Throughput: every port within ±100 ppm of the theoretical line-rate frame rate for the frame size under test, measured over the whole window (IEEE 802.3 clock tolerance); the measurement uncertainty is stated	10GE: -64 to +9 ppm vs 2,349,624 fps (least-squares over all samples, 95% uncertainty ±132.3 ppm)	**PASS**
AC-9 Thermal: no over-temperature alarm or shutdown during the window; every exposed sensor below 80 °C. Temperature change over the window is an indication only, not a pass or fail limit	10GE: max 55 °C, no over-temperature alarm; change over the window +0.5 °C (indication only)	**PASS**

Data throughput holds at ≈9,624 Mbps per port and the frame rate at the 2,349,624 fps ceiling for 512-byte frames (dashed line). Rates are exact counter deltas over ~199-second intervals, the window being too short for 10-minute ones; the read instant of a counter is known to about ±0.2 s, which gives up to ±0.2% per interval, the scatter about the ceiling. Window totals are exact.







Per-Module Detail

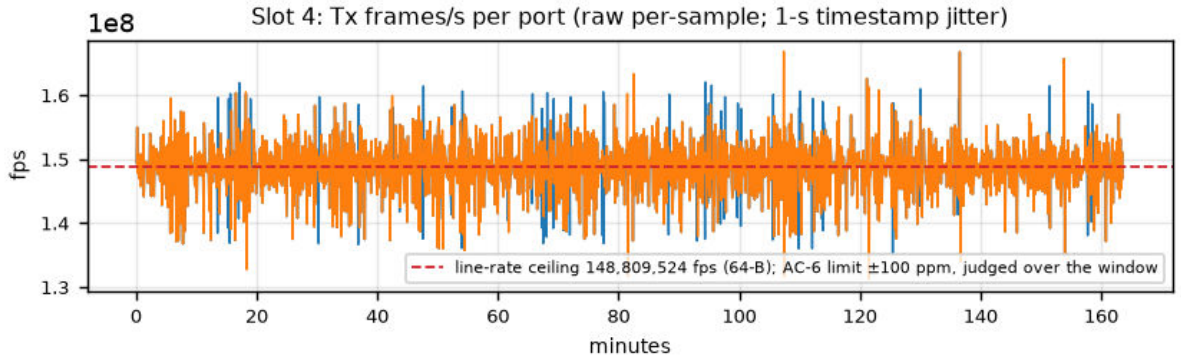
Slot 4: CS100GE2Q28ALLNG · S/N 100087 · 100GE

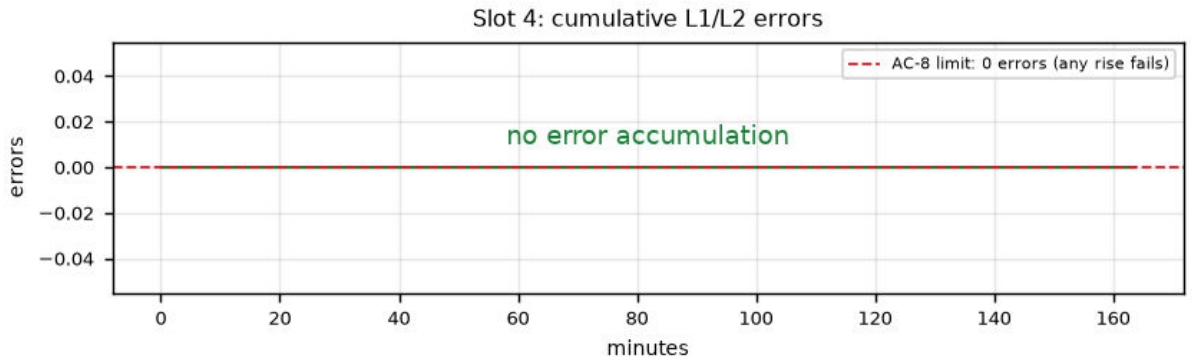
PASS

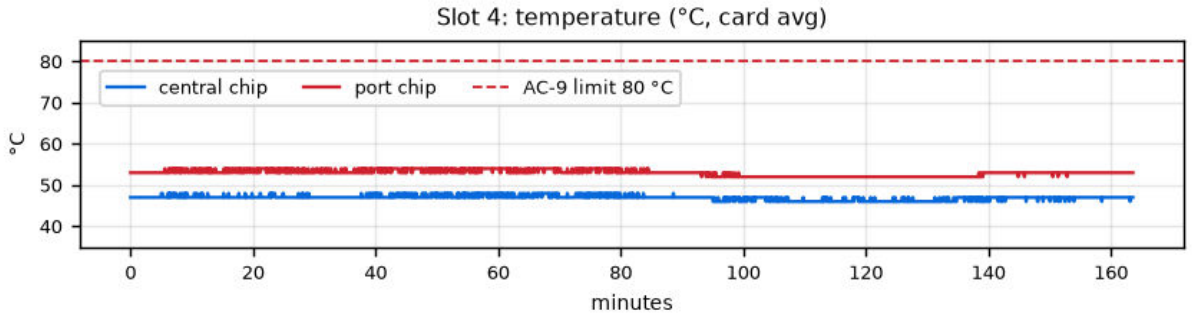
Per-port acceptance criteria	Measured	Result: PASS
AC-4 Link: up on every port in every sample; zero link-down transitions	2 of 2 ports up in 100% of samples with 0 transitions	PASS
AC-5 Line rate: negotiated speed equals the nominal port speed in every sample	2 of 2 ports at 100,000 Mbps	PASS
AC-7 Frame delivery: zero frame loss on every port (RFC 2544 throughput definition). Tx and Rx totals agree within 10 frames, the frames in flight at the read instant	max |Tx−Rx| 3 frames on any port pair (ports cabled to each other; totals of the pair)	PASS
AC-8 Errors: zero increase on every frame-integrity, data-path, line-coding, fault, drop and flow-control counter.	0 counted errors, all ports	PASS
AC-9 Thermal: no over-temperature alarm or shutdown during the window; every exposed sensor below 80 °C	max 54 °C	PASS

Port	Link	Speed	Tx frames	Rx frames	Loss	Avg fps	Throughput	Errors	Result
1	100%	100000	1,460,517,338,377	1,460,517,338,377	pair +3	148,811,457	76.2 Gbps	0	PASS
2	100%	100000	1,460,517,338,378	1,460,517,338,375	pair +3	148,811,457	76.2 Gbps	0	PASS

Thermal: central chip avg 47°C (max 48°C) · port chip avg 53°C (max 54°C) · drift +0°C over run: stable, within normal range.






Slot 4: temperature (°C, card avg)
central chip
port chip
AC-9 limit 80 °C
°C
80
70
60
50
40
0
20
40
60
80
100
120
140
160
minutes

Per-Module Detail

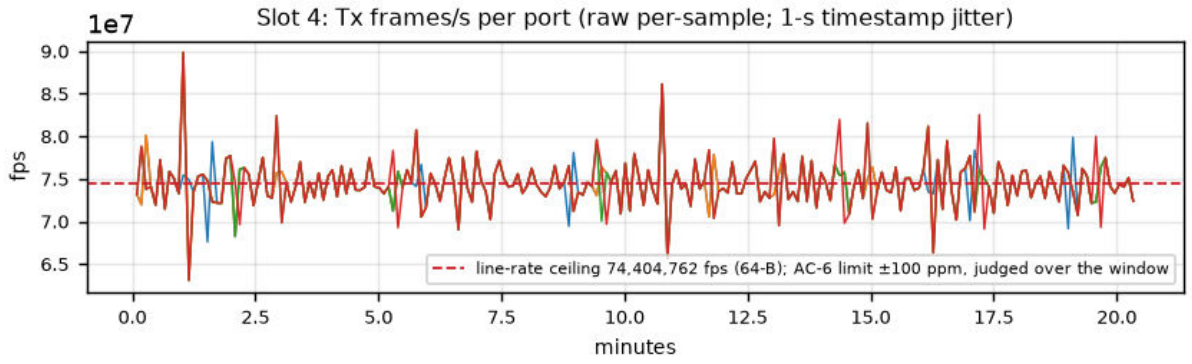
Slot 4: CS100GE2Q28ALLNG · S/N 100087 · 50GE

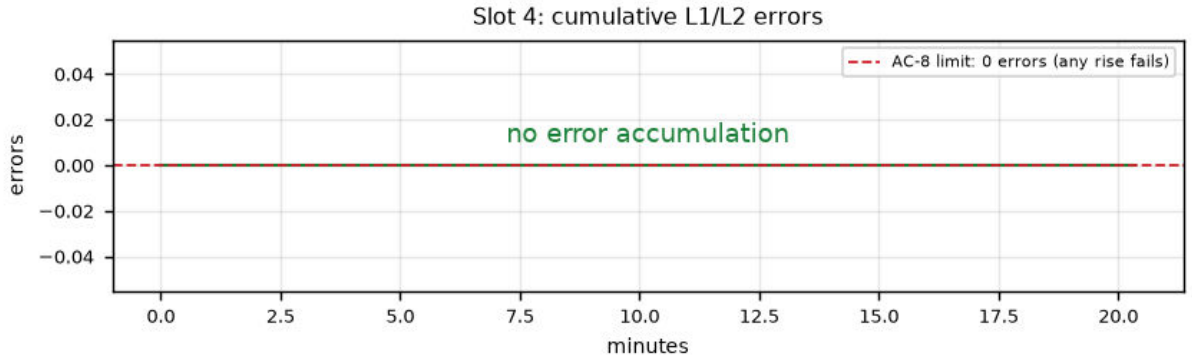
PASS

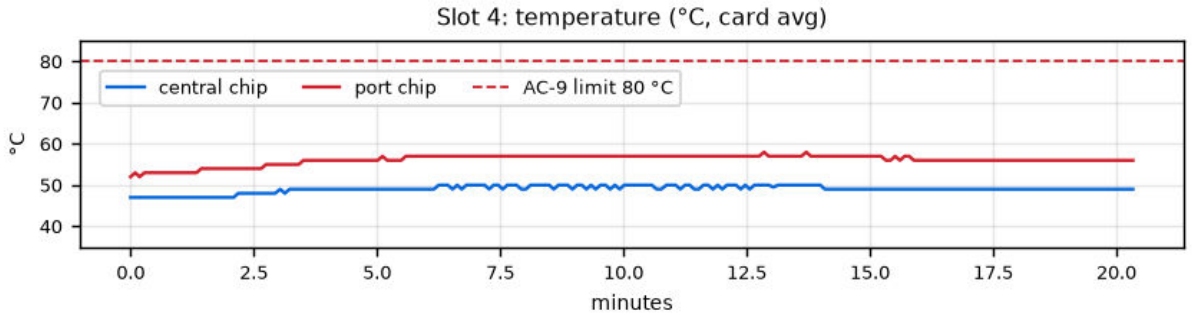
Per-port acceptance criteria	Measured	Result: PASS
AC-4 Link: up on every port in every sample; zero link-down transitions	4 of 4 ports up in 100% of samples with 0 transitions	PASS
AC-5 Line rate: negotiated speed equals the nominal port speed in every sample	4 of 4 ports at 50,000 Mbps	PASS
AC-7 Frame delivery: zero frame loss on every port (RFC 2544 throughput definition). Tx and Rx totals agree within 10 frames, the frames in flight at the read instant	max |Tx−Rx| 1 frame on any port pair (ports cabled to each other; totals of the pair)	PASS
AC-8 Errors: zero increase on every frame-integrity, data-path, line-coding, fault, drop and flow-control counter.	0 counted errors, all ports	PASS
AC-9 Thermal: no over-temperature alarm or shutdown during the window; every exposed sensor below 80 °C	max 58 °C	PASS

Port	Link	Speed	Tx frames	Rx frames	Loss	Avg fps	Throughput	Errors	Result
1	100%	50000	90,776,010,030	90,776,010,030	pair +1	74,396,443	38.1 Gbps	0	PASS
2	100%	50000	90,776,010,031	90,776,010,028	pair +0	74,396,443	38.1 Gbps	0	PASS
3	100%	50000	90,776,010,029	90,776,010,028	pair +1	74,396,443	38.1 Gbps	0	PASS
4	100%	50000	90,776,010,028	90,776,010,031	pair +0	74,396,443	38.1 Gbps	0	PASS

Thermal: central chip avg 49°C (max 50°C) · port chip avg 56°C (max 58°C) · drift +4°C over run: stable, within normal range.






Slot 4: temperature (°C, card avg)
central chip
port chip
AC-9 limit 80 °C
°C
80
70
60
50
40
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
minutes

Per-Module Detail

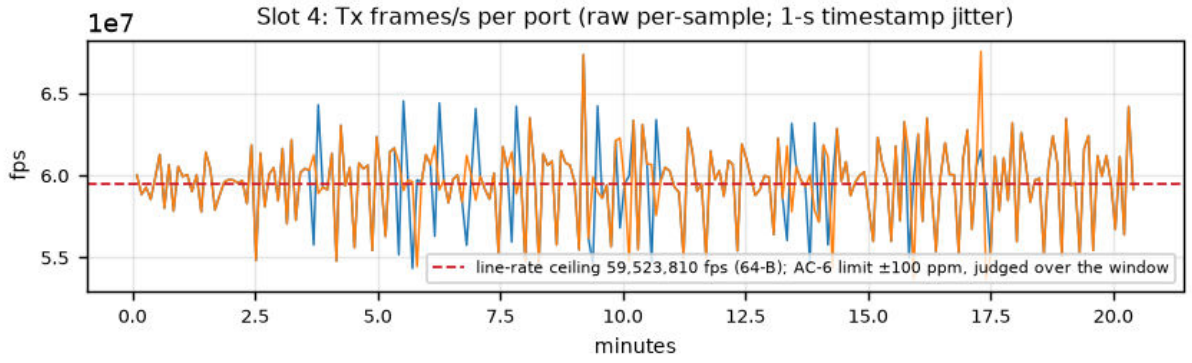
Slot 4: CS100GE2Q28ALLNG · S/N 100087 · 40GE

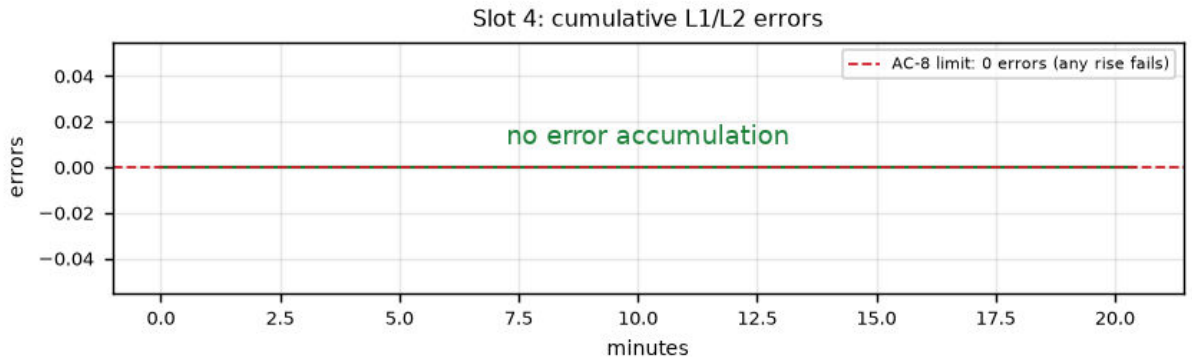
PASS

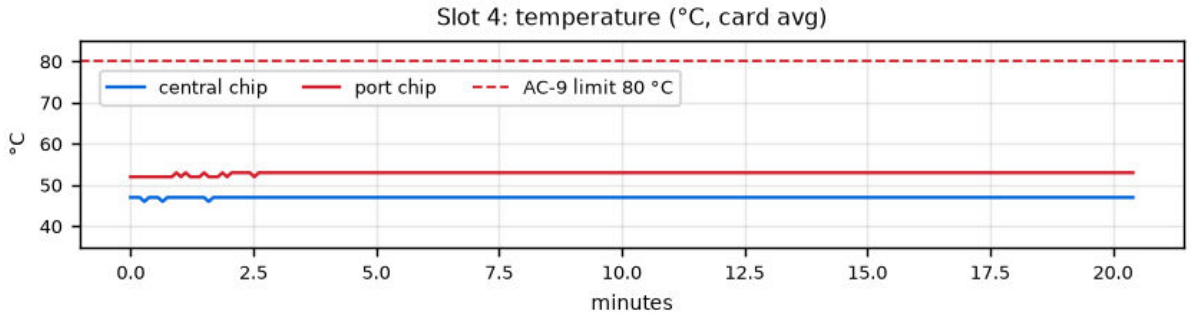
Per-port acceptance criteria	Measured	Result: PASS
AC-4 Link: up on every port in every sample; zero link-down transitions	2 of 2 ports up in 100% of samples with 0 transitions	PASS
AC-5 Line rate: negotiated speed equals the nominal port speed in every sample	2 of 2 ports at 40,000 Mbps	PASS
AC-7 Frame delivery: zero frame loss on every port (RFC 2544 throughput definition). Tx and Rx totals agree within 10 frames, the frames in flight at the read instant	max |Tx−Rx| 1 frame on any port pair (ports cabled to each other; totals of the pair)	PASS
AC-8 Errors: zero increase on every frame-integrity, data-path, line-coding, fault, drop and flow-control counter.	0 counted errors, all ports	PASS
AC-9 Thermal: no over-temperature alarm or shutdown during the window; every exposed sensor below 80 °C	max 53 °C	PASS

Port	Link	Speed	Tx frames	Rx frames	Loss	Avg fps	Throughput	Errors	Result
1	100%	40000	72,889,678,626	72,889,678,624	pair +1	59,523,158	30.5 Gbps	0	PASS
2	100%	40000	72,889,678,626	72,889,678,627	pair +1	59,523,158	30.5 Gbps	0	PASS

Thermal: central chip avg 47°C (max 47°C) · port chip avg 53°C (max 53°C) · drift +1°C over run: stable, within normal range.






Slot 4: temperature (°C, card avg)
central chip
port chip
AC-9 limit 80 °C
°C
80
70
60
50
40
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
minutes

Per-Module Detail

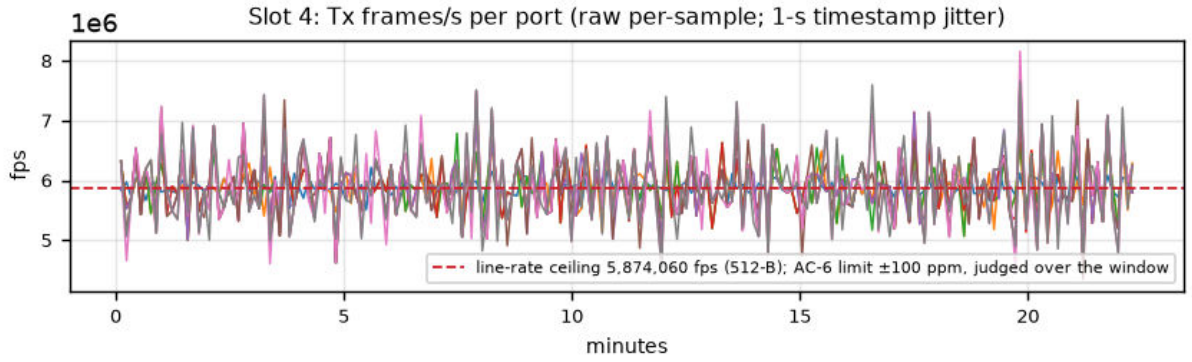
Slot 4: CS100GE2Q28ALLNG · S/N 100087 · 25GE

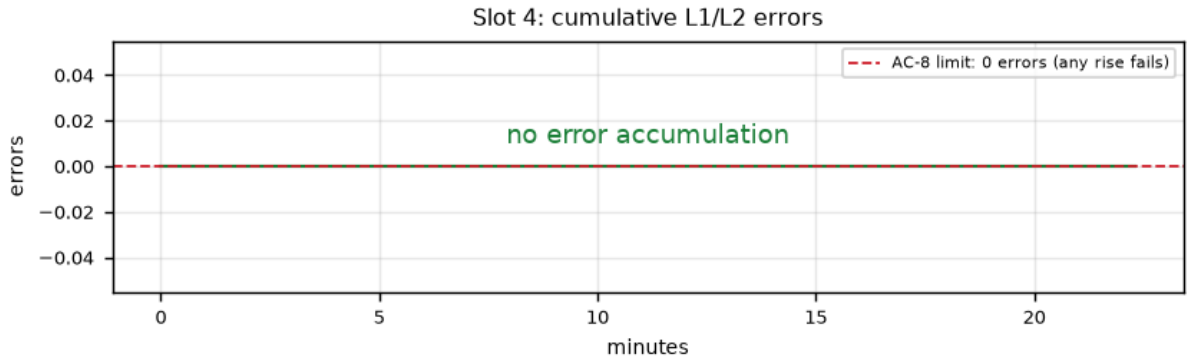
PASS

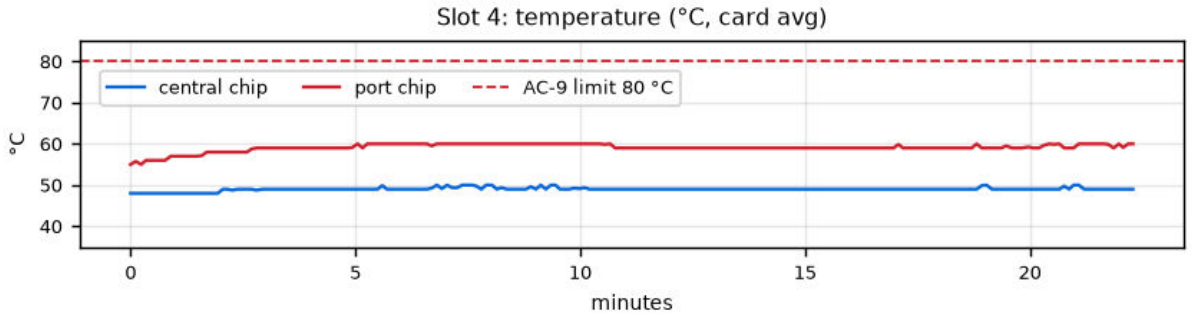
Per-port acceptance criteria	Measured	Result: PASS
AC-4 Link: up on every port in every sample; zero link-down transitions	8 of 8 ports up in 100% of samples with 0 transitions	PASS
AC-5 Line rate: negotiated speed equals the nominal port speed in every sample	8 of 8 ports at 25,000 Mbps	PASS
AC-7 Frame delivery: zero frame loss on every port (RFC 2544 throughput definition). Tx and Rx totals agree within 10 frames, the frames in flight at the read instant	max |Tx−Rx| 1 frame on any port pair (ports cabled to each other; totals of the pair)	PASS
AC-8 Errors: zero increase on every frame-integrity, data-path, line-coding, fault, drop and flow-control counter.	0 counted errors, all ports	PASS
AC-9 Thermal: no over-temperature alarm or shutdown during the window; every exposed sensor below 80 °C	max 60 °C	PASS

Port	Link	Speed	Tx frames	Rx frames	Loss	Avg fps	Throughput	Errors	Result
1	100%	25000	7,856,690,960	7,856,690,960	pair -1	5,873,876	24.1 Gbps	0	PASS
2	100%	25000	7,859,769,227	7,859,769,227	pair -1	5,876,177	24.1 Gbps	0	PASS
3	100%	25000	7,859,769,227	7,859,769,227	pair -1	5,876,177	24.1 Gbps	0	PASS
4	100%	25000	7,859,769,227	7,859,769,227	pair -1	5,876,177	24.1 Gbps	0	PASS
5	100%	25000	7,856,834,200	7,856,834,201	pair -1	5,873,983	24.1 Gbps	0	PASS
6	100%	25000	7,859,729,939	7,859,729,940	pair -1	5,876,148	24.1 Gbps	0	PASS
7	100%	25000	7,856,419,261	7,856,419,262	pair -1	5,873,673	24.1 Gbps	0	PASS
8	100%	25000	7,856,419,261	7,856,419,262	pair -1	5,873,673	24.1 Gbps	0	PASS

Thermal: central chip avg 49°C (max 50°C) · port chip avg 59°C (max 60°C) · drift +5°C over run: stable, within normal range.






Slot 4: temperature (°C, card avg)
central chip
port chip
AC-9 limit 80 °C
°C
80
70
60
50
40
0
5
10
15
20
minutes

Per-Module Detail

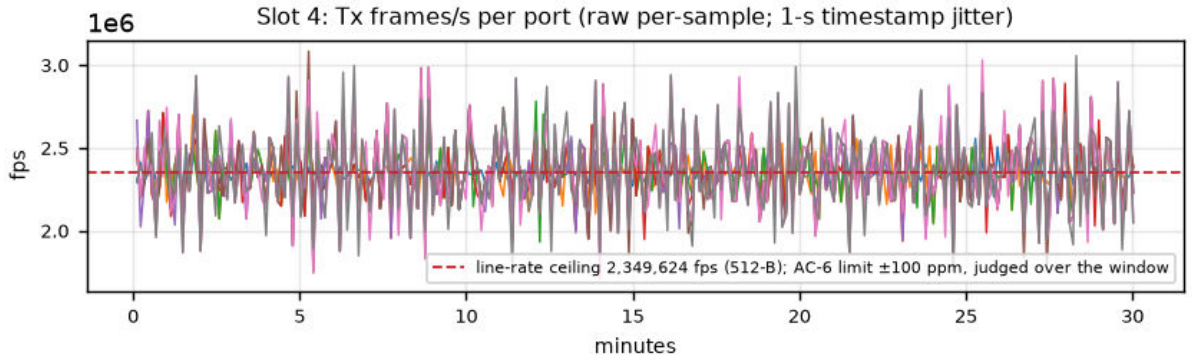
Slot 4: CS100GE2Q28ALLNG · S/N 100087 · 10GE

PASS

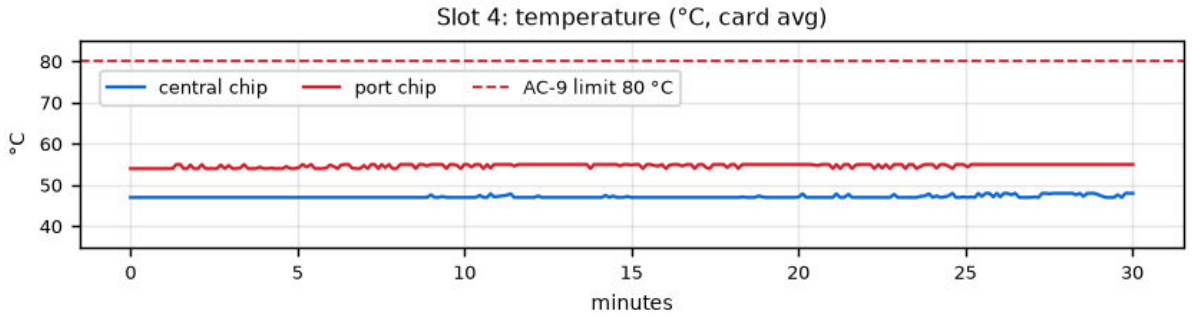
Per-port acceptance criteria	Measured	Result: PASS
AC-4 Link: up on every port in every sample; zero link-down transitions	8 of 8 ports up in 100% of samples with 0 transitions	PASS
AC-5 Line rate: negotiated speed equals the nominal port speed in every sample	8 of 8 ports at 10,000 Mbps	PASS
AC-7 Frame delivery: zero frame loss on every port (RFC 2544 throughput definition). Tx and Rx totals agree within 10 frames, the frames in flight at the read instant	max |Tx−Rx| 1 frame on any port pair (ports cabled to each other; totals of the pair)	PASS
AC-8 Errors: zero increase on every frame-integrity, data-path, line-coding, fault, drop and flow-control counter.	0 counted errors, all ports	PASS
AC-9 Thermal: no over-temperature alarm or shutdown during the window; every exposed sensor below 80 °C	max 55 °C	PASS

Port	Link	Speed	Tx frames	Rx frames	Loss	Avg fps	Throughput	Errors	Result
1	100%	10000	4,232,231,711	4,232,231,710	pair +1	2,349,466	9.6 Gbps	0	PASS
2	100%	10000	4,233,562,180	4,233,562,180	pair -1	2,350,205	9.6 Gbps	0	PASS
3	100%	10000	4,233,562,180	4,233,562,180	pair -1	2,350,205	9.6 Gbps	0	PASS
4	100%	10000	4,233,562,180	4,233,562,180	pair -1	2,350,205	9.6 Gbps	0	PASS
5	100%	10000	4,233,562,180	4,233,562,180	pair +1	2,350,205	9.6 Gbps	0	PASS
6	100%	10000	4,232,368,831	4,232,368,832	pair -1	2,349,542	9.6 Gbps	0	PASS
7	100%	10000	4,232,368,831	4,232,368,832	pair -1	2,349,542	9.6 Gbps	0	PASS
8	100%	10000	4,231,063,012	4,231,063,013	pair -1	2,348,817	9.6 Gbps	0	PASS

Thermal: central chip avg 47°C (max 48°C) · port chip avg 55°C (max 55°C) · drift +1°C over run: stable, within normal range.






Slot 4: temperature (°C, card avg)
central chip
port chip
AC-9 limit 80 °C
°C
80
70
60
50
40
0
5
10
15
20
25
30
minutes



Zombie Components LLC
13177 Foothill Boulevard
Sylmar, CA 91342
United States (US)
TIN 934147673
www.zombiecomponents.com
+1.909.747.9984
ahall@zombiecomponents.com

Acceptance Criteria Summary

All ten acceptance criteria of ZC-TP-860-1422-11 rev C with the value measured on this unit and the result. The overall result is PASS only if every criterion is met: **10 of 10 met.**

Acceptance criteria (ZC-TP-860-1422-11 rev C)	Measured	Result: PASS
AC-1 Identity: enumerated model, port count and serial agree with the order, the unit label and the boot record	CS100GE2Q28ALLNG, 8 active of 8 enumerated ports, SN 100087 (label); EEPROM 100087; boot record SN 100087	**PASS**
AC-2 Boot: zero FAIL records in the as-tested IxServer boot record; card reaches Board Ready	0 FAIL records; 0 BIST/memory-test records; Board Ready logged	**PASS**
AC-3 Test conditions: IxOS client version-matched to the chassis; counters zeroed at window start; sampling interval 10 s or less; capture window at least the module soak time, the longest AC-8 window among the PHYs the module supports and never less than 2 h, applied to the 100GE test set; every other test set runs at least the AC-8 window of its own PHY at its own line rate	100GE: interval 5.6 s, window 2 h 44 min of 2 h 00 min module soak time, counters zeroed yes; 50GE: interval 5.7 s, window 20 min 21 s of 20 min 00 s minimum window (no soak on this test set), counters zeroed yes; 40GE: interval 5.5 s, window 20 min 24 s of 20 min 00 s minimum window (no soak on this test set), counters zeroed yes; 25GE: interval 6.7 s, window 22 min 17 s of 20 min 00 s minimum window (no soak on this test set), counters zeroed yes; 10GE: interval 6.8 s, window 30 min 01 s of 25 min 00 s minimum window (no soak on this test set), counters zeroed yes; IxServer 9.24.3100.10, matched client (full card identity returned)	**PASS**
AC-4 Link: up on every port in every sample; zero link-down transitions	100GE: 3,536 of 3,536 port-samples up, 0 link-down transitions; 50GE: 864 of 864 port-samples up, 0 link-down transitions; 40GE: 446 of 446 port-samples up, 0 link-down transitions; 25GE: 1,608 of 1,608 port-samples up, 0 link-down transitions; 10GE: 2,112 of 2,112 port-samples up, 0 link-down transitions	**PASS**
AC-5 Line rate: negotiated speed equals the nominal port speed in every sample	100GE: 100,000 Mbps in 3,536 of 3,536 port-samples; 50GE: 50,000 Mbps in 864 of 864 port-samples; 40GE: 40,000 Mbps in 446 of 446 port-samples; 25GE: 25,000 Mbps in 1,608 of 1,608 port-samples; 10GE: 10,000 Mbps in 2,112 of 2,112 port-samples	**PASS**
AC-6 Throughput: every port within ±100 ppm of the theoretical line-rate frame rate for the frame size under test, measured over the whole window (IEEE 802.3 clock tolerance); the measurement uncertainty is stated	100GE: -15 to -15 ppm vs 148,809,524 fps (least-squares over all samples, 95% uncertainty ±2.2 ppm); 50GE: -76 to -54 ppm vs 74,404,762 fps (least-squares over all samples, 95% uncertainty ±65.5 ppm); 40GE: -85 to -79 ppm vs 59,523,810 fps (least-squares over all samples, 95% uncertainty ±62.7 ppm); 25GE: -69 to +43 ppm vs 5,874,060 fps (least-squares over all samples, 95% uncertainty ±183.0 ppm); 10GE: -64 to +9 ppm vs 2,349,624 fps (least-squares over all samples, 95% uncertainty ±132.3 ppm)	**PASS**

Acceptance criteria (ZC-TP-860-1422-11 rev C)	Measured	Result: PASS
AC-7 Frame delivery: zero frame loss on every port (RFC 2544 throughput definition). Tx and Rx totals agree within 10 frames, the frames in flight at the read instant	100GE: max |Tx−Rx| 3 frames per port pair (ports 1 and 2 cabled to each other; totals of the pair); 50GE: max |Tx−Rx| 1 frame per port pair (ports 1 and 3, 2 and 4 cabled to each other; totals of the pair); 40GE: max |Tx−Rx| 1 frame per port pair (ports 1 and 2 cabled to each other; totals of the pair); 25GE: max |Tx−Rx| 1 frame per port pair (ports 1 and 5, 2 and 6, 3 and 7, 4 and 8 cabled to each other; totals of the pair); 10GE: max |Tx−Rx| 1 frame per port pair (ports 1 and 5, 2 and 6, 3 and 7, 4 and 8 cabled to each other; totals of the pair)	**PASS**
AC-8 Errors: zero increase on every frame-integrity, data-path, line-coding, fault, drop and flow-control counter. The demonstrated bit-error-ratio bound per port (95% confidence, zero errors) is at least 5× tighter than the IEEE 802.3 objective for the PHY. On copper, FCS errors are attributed to cabling and excluded	100GE: 0 errors / 31 counters; BER ≤ 3.1e-15 (target 2e-13, IEEE 802.3 cl.82/86); 50GE: 0 errors / 31 counters; BER ≤ 4.9e-14 (target 2e-13, IEEE 802.3 cl.133); 40GE: 0 errors / 31 counters; BER ≤ 6.1e-14 (target 2e-13, IEEE 802.3 cl.82/86); 25GE: 0 errors / 31 counters; BER ≤ 9.0e-14 (target 2e-13, IEEE 802.3 cl.107/110); 10GE: 0 errors / 31 counters; BER ≤ 1.7e-13 (target 2e-13, IEEE 802.3 cl.49/52)	**PASS**
AC-9 Thermal: no over-temperature alarm or shutdown during the window; every exposed sensor below 80 °C. Temperature change over the window is an indication only, not a pass or fail limit	100GE: max 54 °C, no over-temperature alarm; change over the window -0.2 °C (indication only); 50GE: max 58 °C, no over-temperature alarm; change over the window +0.9 °C (indication only); 40GE: max 53 °C, no over-temperature alarm; change over the window +0.2 °C (indication only); 25GE: max 60 °C, no over-temperature alarm; change over the window +0.2 °C (indication only); 10GE: max 55 °C, no over-temperature alarm; change over the window +0.5 °C (indication only)	**PASS**
AC-10 Stability: zero card hardware events logged by IxServer during the capture window	100GE: 0 card hardware events; 50GE: 0 card hardware events; 40GE: 0 card hardware events; 25GE: 0 card hardware events; 10GE: 0 card hardware events	**PASS**

Demonstrated error bound for this unit: 100GE: zero errors over at least 9.81e+14 bits per port gives BER ≤ 3.1e-15 at 95% confidence, 327× tighter than the IEEE 802.3 cl.82/86 objective of 1e-12; 50GE: zero errors over at least 6.10e+13 bits per port gives BER ≤ 4.9e-14 at 95% confidence, 20× tighter than the IEEE 802.3 cl.133 objective of 1e-12; 40GE: zero errors over at least 4.90e+13 bits per port gives BER ≤ 6.1e-14 at 95% confidence, 16× tighter than the IEEE 802.3 cl.82/86 objective of 1e-12; 25GE: zero errors over at least 3.34e+13 bits per port gives BER ≤ 9.0e-14 at 95% confidence, 11× tighter than the IEEE 802.3 cl.107/110 objective of 1e-12; 10GE: zero errors over at least 1.80e+13 bits per port gives BER ≤ 1.7e-13 at 95% confidence, 6× tighter than the IEEE 802.3 cl.49/52 objective of 1e-12 (the criterion requires 5×).



Zombie Components LLC
13177 Foothill Boulevard
Sylmar, CA 91342
United States (US)
TIN 934147673
www.zombiecomponents.com
+1.909.747.9984
ahall@zombiecomponents.com

Validation Sign-Off

Zombie Components LLC certifies that the health-validation testing described in this report was performed on the line-card module and chassis identified below, and that the recorded results are accurate and complete to the best of the tester's knowledge.

Document	ZC-TR-STOCK-100087 · issue 2, 2026-11-12
Tested to	ZC-TP-860-1422-11 rev C · assembly 860-1422-11
Customer	Stock inventory, Zombie Components LLC
Order / Invoice	STOCK / n/a
Service	Test to stock
Chassis	Ixia XGS12 · S/N XGS12-J0701117
IxOS version	IxOS 9.24.3100.10 (chassis IxServer; testing client version-matched)
Module tested	CS100GE2Q28NGALL · Ixia CloudStorm 100GE 2-Port NG ALL · S/N 100087 · 100GE + 50GE + 40GE + 25GE + 10GE
100GE window	2026-11-12 04:11:03 to 06:54:38 local (2 h 44 min), 1,768 samples
50GE window	2026-11-12 08:11:24 to 08:31:45 local (20 min 21 s), 216 samples
40GE window	2026-11-12 07:04:21 to 07:24:45 local (20 min 24 s), 223 samples
25GE window	2026-11-12 08:35:18 to 08:57:35 local (22 min 17 s), 201 samples
10GE window	2026-11-12 07:34:12 to 08:04:13 local (30 min 01 s), 264 samples
Overall result	**PASS**

Tested by: Allen E. Hall

Title: President

Signature: 

Date: November 12, 2026