



AIC J2024-06-35X JBOD Certification Report

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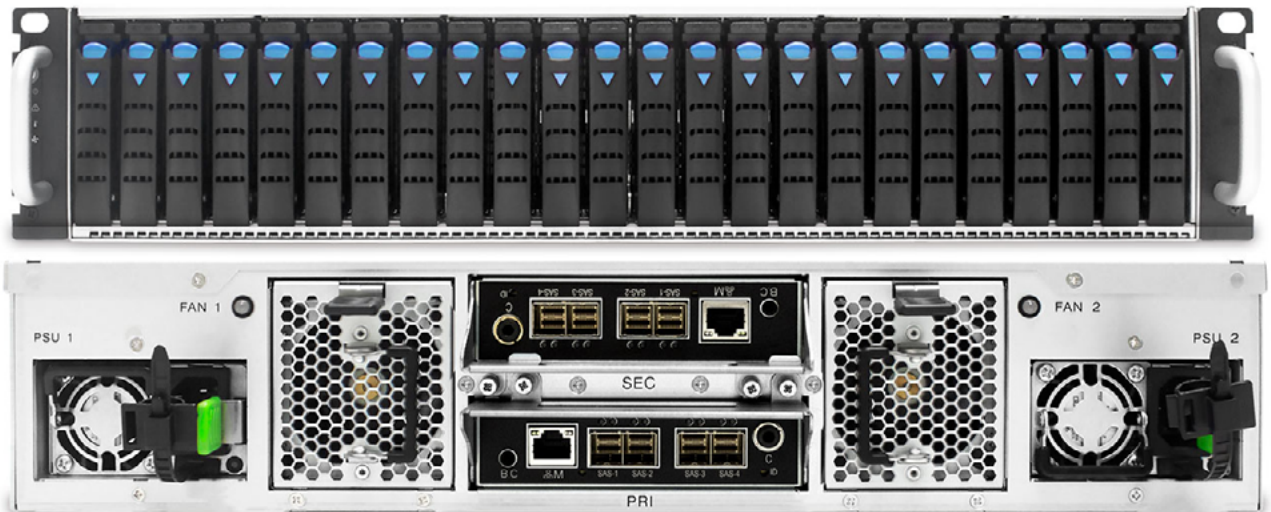


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1. INTRODUCTION

The AIC J2024-06-35X JBOD is a 2U 24-bay storage enclosure that supports both SAS and SATA drives with 12Gb/s or 6Gb/s speed. It features a ruggedized design, a tool-less design, hot-swap expander modules, drives, PSU, and fans, clear front panel LED indicators, and an optimized thermal solution. It also offers high performance, reliability, and scalability for various applications and use cases.

This certification report details the testing and verification process of the AIC J2024-06-35X JBOD with Open-E JovianDSS, a ZFS-based data storage software that delivers enterprise-class functionality, performance, and data protection.

The report aims to present a list of tests and results of the certification process conducted for AIC J2024-06-35X JBOD with Open-E JovianDSS, as well as the benefits and advantages of using them together.

Functional testing was carried out for the following configurations to ensure full compatibility:

- **Single-Node**
- **High Availability Shared Storage Cluster**

2. TESTED DEVICE DESCRIPTION

During the certification process, an AIC J2024-06-35X JBOD was tested. A detailed description can be found in Table 1.

Table 1. JBOD specifications

Product name	AIC J2024-06-35X JBOD
Rack size	2U
Drives number and form factor	24x SFF 2.5"
Number of Expanders	Dual expander
Drive Interface	12Gb/6Gb SAS
Expansion Interface	4x mini SAS HD (SFF-8644) per expander module
Expander chip	LSI SAS35X40
Power supply	550W, 1+1 hot-swap, redundant
Front panel LED indicators	Yes
Audible alarm	Yes
BMC	Yes
Dimensions (W x D x H)	438 x 345 x 87.5 mm
Mounting standard	20" tool-less rail

3. TEST ENVIRONMENT DESCRIPTION

Hardware specifications for environments used during certification testing are included in the following tables. The configuration described in Table 2 was used for the Single-Node test. Table 3 shows the configuration of each node when testing High Availability Shared Storage Cluster nodes.

Table 2. Hardware specifications for Single-Node tests

System name	Supermicro SYS-620U-TNR
Motherboard	Supermicro X12DPU-6
CPU	2x Intel Xeon Gold 6330
RAM	64 GB - 4x SK Hynix HMA82GR7DJR8N-XN 3200 MHz DDR4 ECC 16 GB
Storage controller	2x Broadcom 9500-8i8e Tri-Mode Host Bus Adapter
Disks in JBOD	24x Toshiba PX02SMU020
System	Open-E JovianDSS up29r4 b50996

Table 3. Hardware specifications for HA Shared Storage cluster tests

System name	Tarox ParX R2242i G6 Server
Motherboard	Intel S2600WFT
CPU	2x Intel Xeon Gold 5222
RAM	192 GB - 16x Micron MTA18ASF2G72PDZ-3G2E1 3200 MHz DDR4 ECC 16 GB
Storage controller	Broadcom 9500-16e Tri-Mode Host Bus Adapter
Disks in JBOD	24x Toshiba PX02SMU020
System	Open-E JovianDSS up29r4 b50996

4. FUNCTIONAL AND STABILITY TESTS

To ensure the proper operation of the tested device when used with Open-E JovianDSS software, functional testing was done for both the Single-Node and High Availability Shared Storage cluster configurations. The performed tests, along with their results, are described in Tables 4 and 5 respectively.

4.1. FUNCTIONAL AND STABILITY TEST RESULTS

Table 4. Single-Node functional tests

Tested functionality	Result
ZFS Functions and various Zpool configurations	passed
Self Encryption Disk (SED) functionality	passed
Disk failure simulation and replacement functionality	passed
Hot-plug / hot-swap and scalability functionality	passed
SAS MPIO functionality	passed
Disk health monitoring functionality	passed
Disk activity statistics functionality	passed
Drive identification functionality (front panel LED)	passed
Failure recovery (power outage, cable disconnection)	passed
OODP with iSCSI, SMB and NFS protocols	passed
AIC BMC System	passed

Table 5. HA Shared Storage cluster functional and stability tests

Tested functional and non-functional aspects	Result
Manual Failover	passed
Automatic Failover triggered after network failure	passed
Automatic Failover triggered after system shutdown	passed
Automatic Failover triggered after system reboot	passed
Automatic Failover triggered after system power-off	passed
Automatic Failover triggered after I/O failure	passed
System stability under load over extended period of time	passed

4.2. FUNCTIONAL AND STABILITY TEST CONCLUSIONS

The **AIC J2024-06-35X JBOD** passed both the functional and stability tests with Open-E JovianDSS data storage software. The information provided by Tables 4 and 5 points to all the testing scenarios for the JBOD features, and no faulty behavior was found.

The JBOD demonstrated its reliability and resilience in different failure scenarios, such as disk removal, disk insertion, power failure, and cable disconnection. The JBOD was able to recover from the failures and restore the data integrity and availability.

The JBOD also maintained a stable performance and throughput during the test, and showed no errors or warnings during the test and performed as expected.

The AIC J2024-06-35X JBOD with Open-E JovianDSS confirmed its ability to protect data and efficiently recover in case of failures.

5. PERFORMANCE TESTS

The following performance tests were intended to ensure that the **AIC J2024-06-35X JBOD** can be used as the efficient enclosure for the data storage devices:

- **Mixed Random IO Performance**
- **Random Read IO Performance**
- **Random Write IO Performance**
- **Sequential Read MB/s Performance**
- **Sequential Write MB/s Performance**

Open-E JovianDSS was configured in the Single-Node architecture using the storage parameters described in Table 6. To obtain optimal test results the JBOD was connected to 2 storage controllers with 2 paths and SAS MPIO was configured. The Fio testing tool was run locally on the Open-E JovianDSS system, as described in Table 7, for every test profile listed in Table 8.

Table 6. Storage configuration for Single-Node performance test

Zpool redundancy	Single group
Zvol volblocksize	64K
Zvol sync	Disabled
Zvol compression	lz4
Zvol provisioning	Thin
Zvol size	200 GB

Table 7. Fio parameters used for Single-Node performance test

Version	3.31
IOengine	libaio
Direct IO	Yes
Ramp time	30s
Runtime	90s
Direct IO	Yes
Threads Count	1, 4, 8, 16
Queue Depth	1, 16, 64, 128

Table 8. Test profiles description for Single-Node performance test

Test profiles	IO pattern	Read to write %	Block size
Mixed	random	70/30	4 kB
Random read	random	100/0	4 kB
Random write	random	0/100	4 kB
Sequential read	sequential	100/0	1 MB
Sequential write	sequential	0/100	1 MB

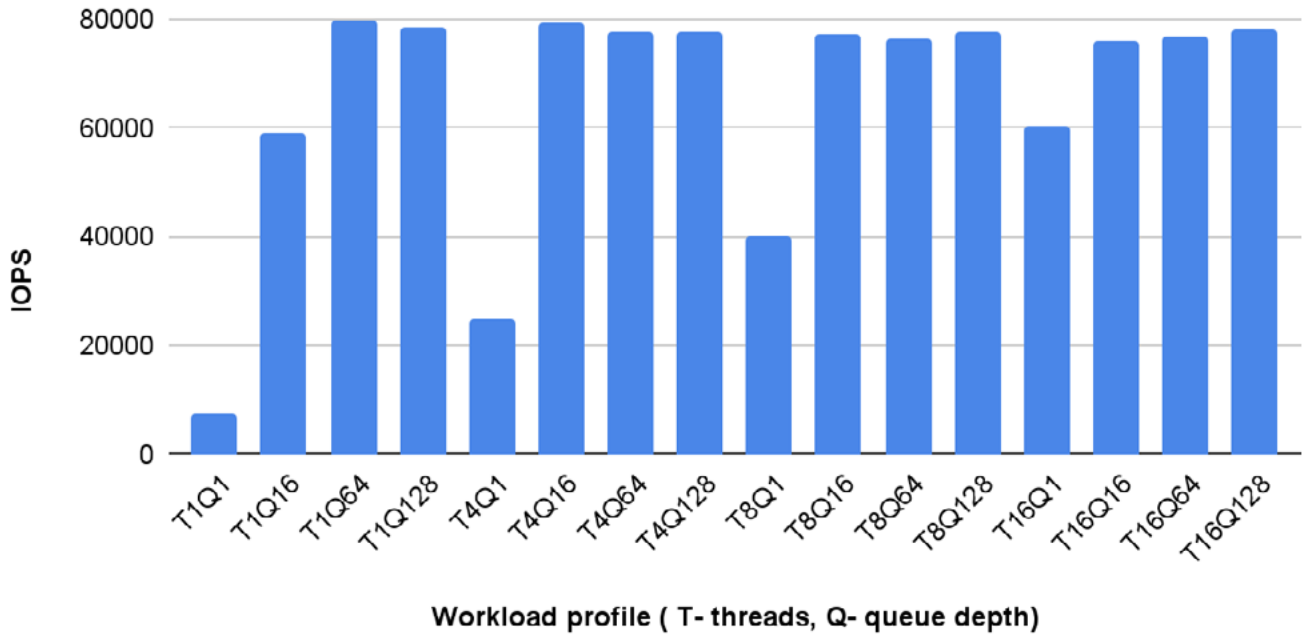
5.1. PERFORMANCE TEST RESULTS

The charts below present the following performance results:

- **Mixed Random IO Performance**
- **Random Read IO Performance**
- **Random Write IO Performance**
- **Sequential Read MB/s Performance**
- **Sequential Write MB/s Performance**

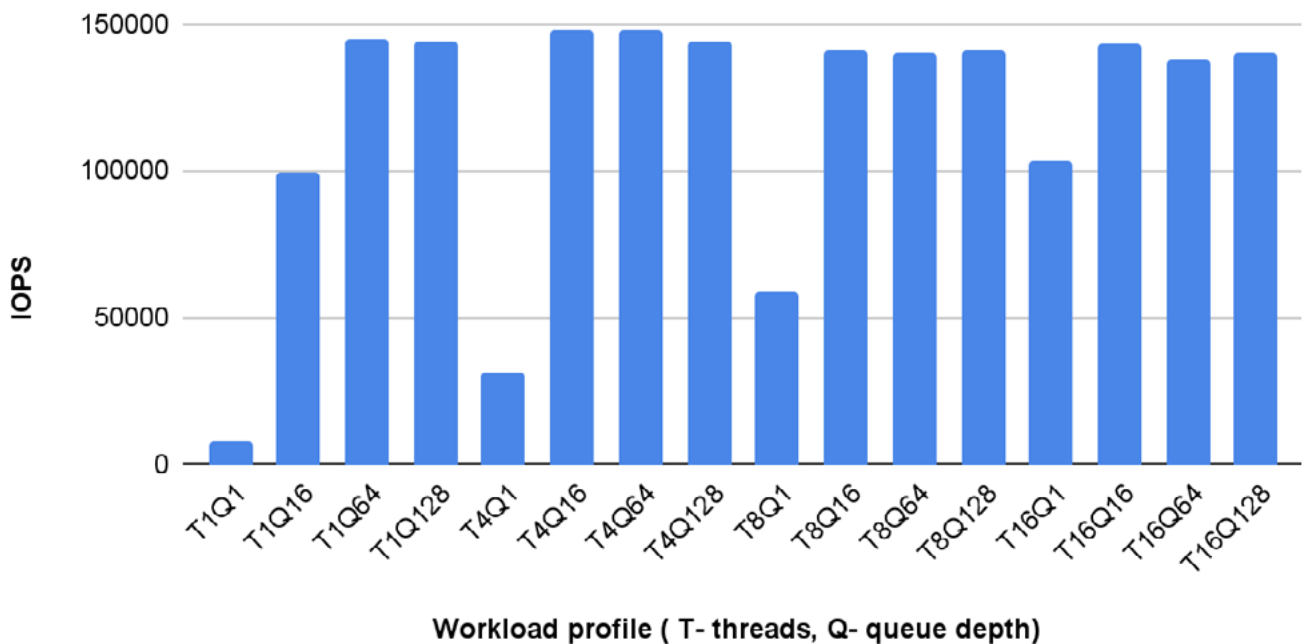
Mixed Random IO Performance

Single node local test



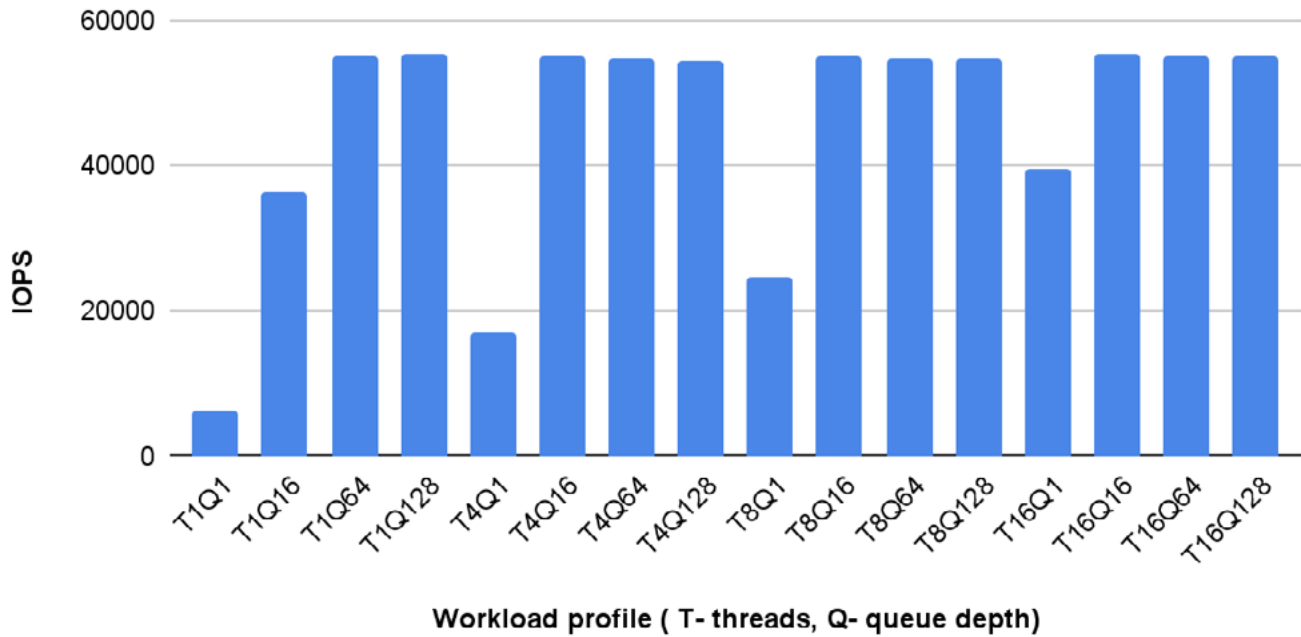
Random Read IO Performance

Single node local test



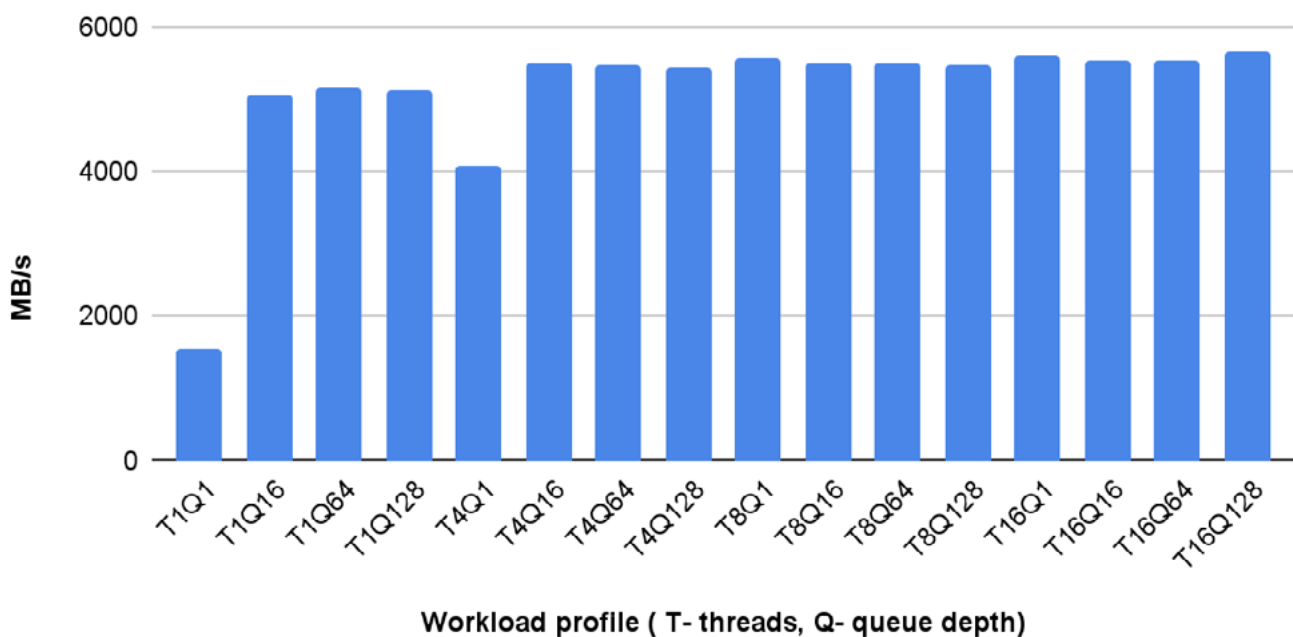
Random Write IO Performance

Single node local test



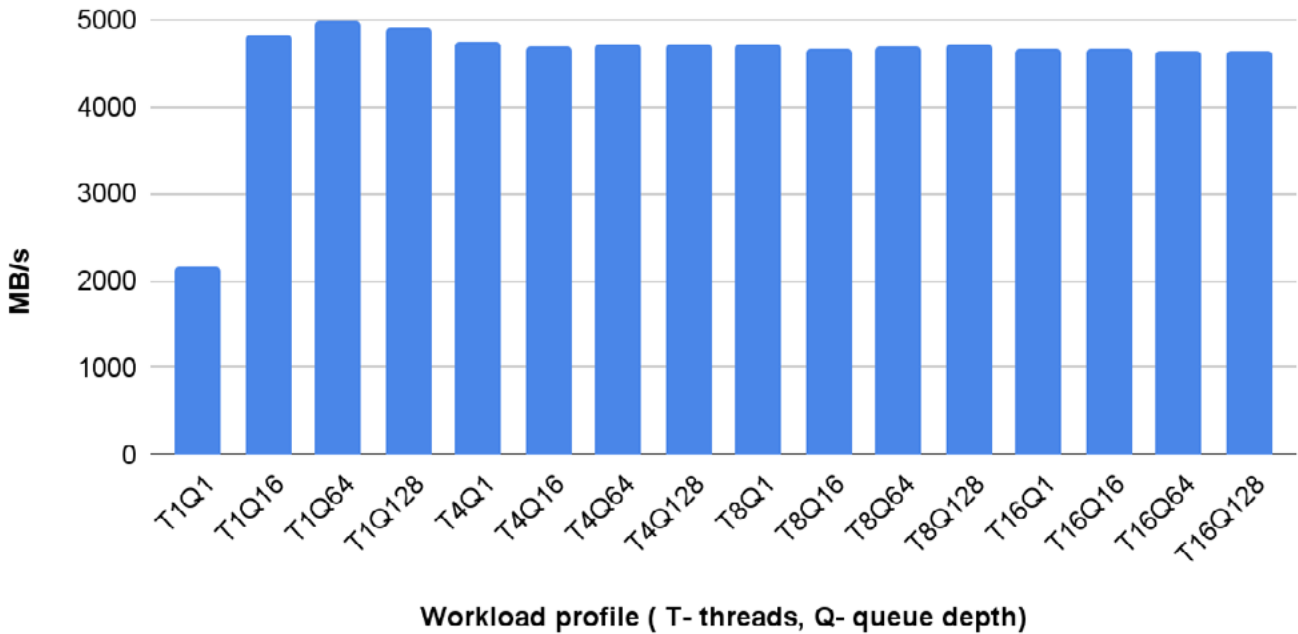
Sequential Read MB/s Performance

Single node local test



Sequential Write MB/s Performance

Single node local test



5.2. PERFORMANCE TEST CONCLUSIONS

The AIC J2024-06-35X JBOD can be seamlessly integrated with Open-E JovianDSS software. Both hardware and software worked harmoniously, ensuring data storage system stability and consistency.

During in-system performance assessments using Open-E JovianDSS, the Fio tool conducted sequential read tests and achieved a throughput of approximately 6 GB/s. The sequential write tests reached a peak throughput of around 5 GB/s, which is satisfactory for most operations.

The software takes full advantage the device's performance during storage device operations, affirming the system's efficacy in resource utilization. **These findings demonstrate the advantages of the AIC J2024-06-35X JBOD and Open-E JovianDSS solution in various scenarios and configurations.**

6. CERTIFICATION SUMMARY

Open-E is pleased to announce that **the AIC J2024-06-35X JBOD has successfully passed the certification process with Open-E JovianDSS software**. The solution demonstrated full compatibility, stability, and efficiency in various scenarios and configurations. The solution meets the standards of data storage system reliability and performance.

The AIC J2024-06-35X JBOD is an efficient solution for customers who require medium storage capacity, consistent performance, and reliability. The device offers a flexible and scalable design, and can be easily integrated with other devices and systems.

Based on the certification test results, Open-E recommends using the certified model in the following applications:

- **Virtualization:** to handle multiple virtual machines and workloads with high availability and fault tolerance.
- **Artificial intelligence:** to support advanced artificial intelligence applications that require high-performance computing.
- **Research & Development:** to support complex and innovative projects that require flexible data storage resources.
- **High-performance Computing:** to support systems for high-speed data processing and analysis with low latency and high throughput.
- **Testing Environments:** to provide a reliable and secure environment for testing and debugging software and hardware products.
- **Distributed Solutions:** to support data sharing and collaboration across multiple locations and devices.
- **Collaborative Work:** to facilitate teamwork and communication among different users and groups.

After passing the certification tests, Open-E added the **AIC J2024-06-35X JBOD** to the Hardware Certification List and granted it the "Certified by Open-E" status. This status confirms that the solution meets the highest quality and performance standards of Open-E and its partners.