



Qualifying SSDs

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SSD Failure

There is **90%+** Failure rate for SSDs that haven't been properly tested prior to the OEM Qualification Testing



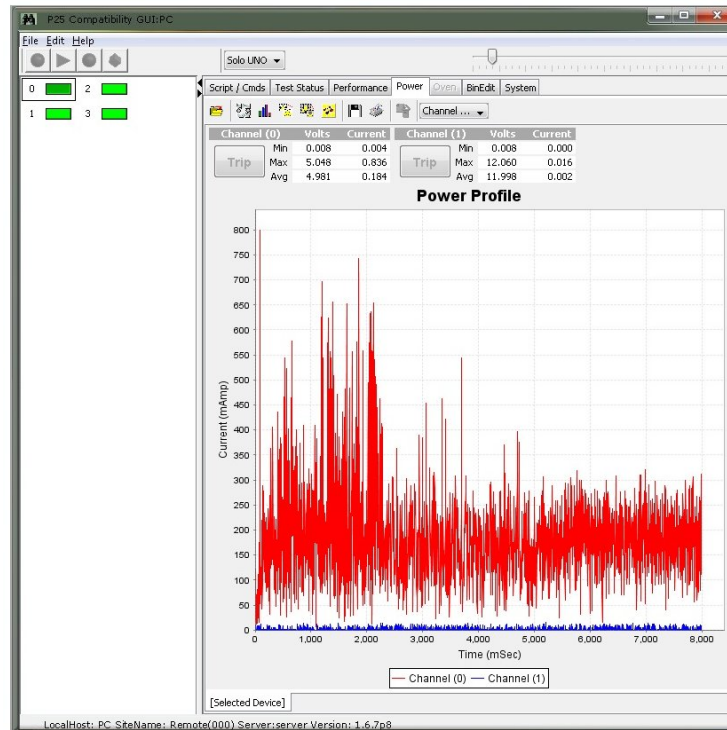
Without thorough testing throughout the manufacturing process and adherence to JEDEC and SNIA certification, SSD manufacturers will likely fail OEM Qualification Testing.

Engineering Verification Testing

Engineering Verification Testing (EVT) is performed to ensure that the storage device meets the set design goals and specifications. Here are a few of the tests included in EVT testing:

- Power Cycling
- Voltage Margining to Failure
- Wear Leveling

EVT Testing Requires:
Ambient Test System
a capacity of 4-16 drives
a time period of up to 2 weeks

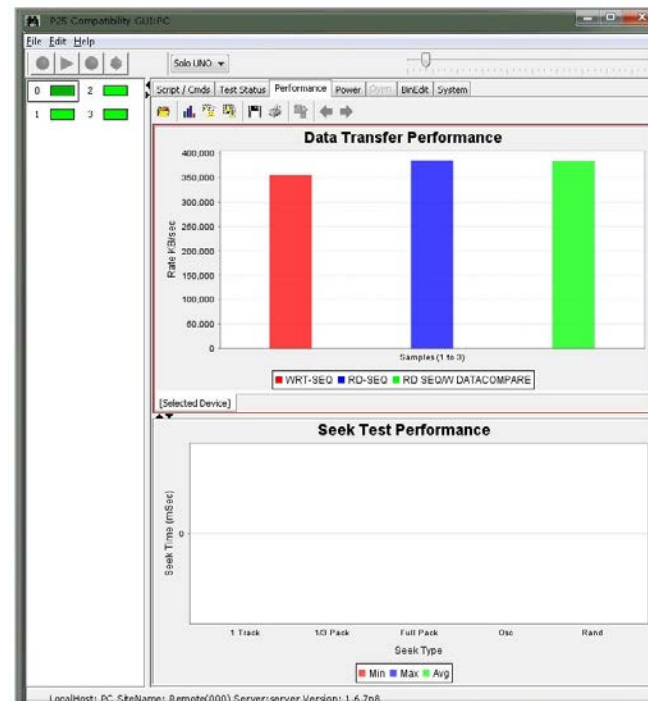


Design Verification Testing

Design Verification Testing (DVT) is performed to deliver objective and comprehensive testing to verify product specifications, interface standards and OEM requirements. Here are a few of the tests included in DVT testing :

- Workload
- Access Test
- Buffer Test

DVT Testing Requires:
Burn-in Test System
a capacity of 100-200 drives
a time period of up to 4 weeks

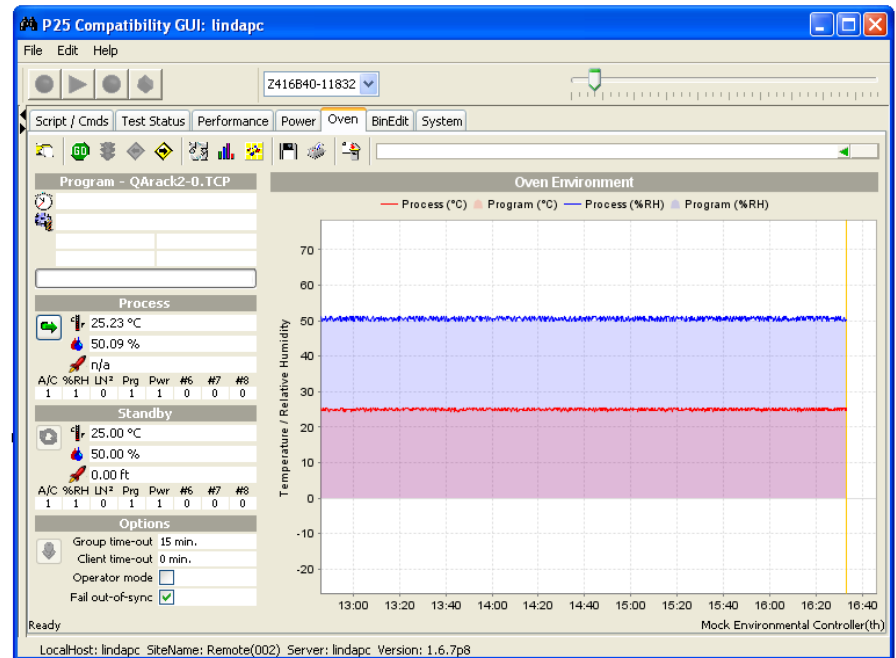


Reliability Demonstration Testing

Reliability Demonstration Testing (RDT) demonstrates the specified life and reliability of a drive and is typically performed at the system level. Here are a few of the tests included in RDT testing:

- Command Queuing
- Write Shut Off
- Buffer Test

RDT Testing Requires:
 Burn-in and Environmental Test System
 a capacity of 1,000 drives
 a time period of 1,000 hours

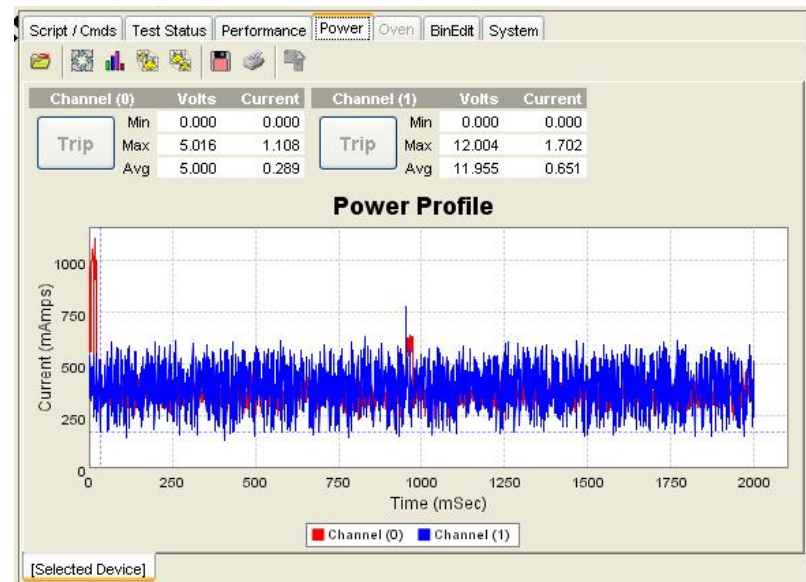


Ongoing Reliability Testing

Ongoing Reliability Testing (ORT) ensures that the quality of SSDs are of the same specifications as the day they first went into production. Here are a few of the tests included in ORT testing:

- Power Margining
- Power Management
- Write Shut Off

ORT Testing Requires:
Burn-in Test System
a capacity of 20-400 drives
(dependent on overall quantity)
Samples from each weekly batch



JEDEC Certification Testing

JEDEC's requirements for Client and Enterprise application classes are based on the following conditions:

- Capacity
- UBER Requirements
- FFR needs
- Data maintained when power is off

JEDEC Testing Requires:

Testing on an Environmental System

a minimum capacity of 31 drives

a time period of 7 days to 6 weeks

(dependent on capacity and speed of drive)



SNIA Testing

SNIA's certification testing is highly dependent on SSD's:

- prior usage
- pretest state of the device
- the testing parameters

The procedure consists of:

- IOPs Testing
- Throughput Testing
- Latency Testing

SNIA Certification Requires:
Ambient System
a time period of 700 minutes



Qualification Testing

OEMs require manufacturers to prove that they're providing SSDs with proven quality and reliability. Qualification testing entails the testing of storage devices under extreme conditions for:

- Performance
- Environmental Tolerance
- Power Consumption
- Longevity

Qualification Testing Requires:

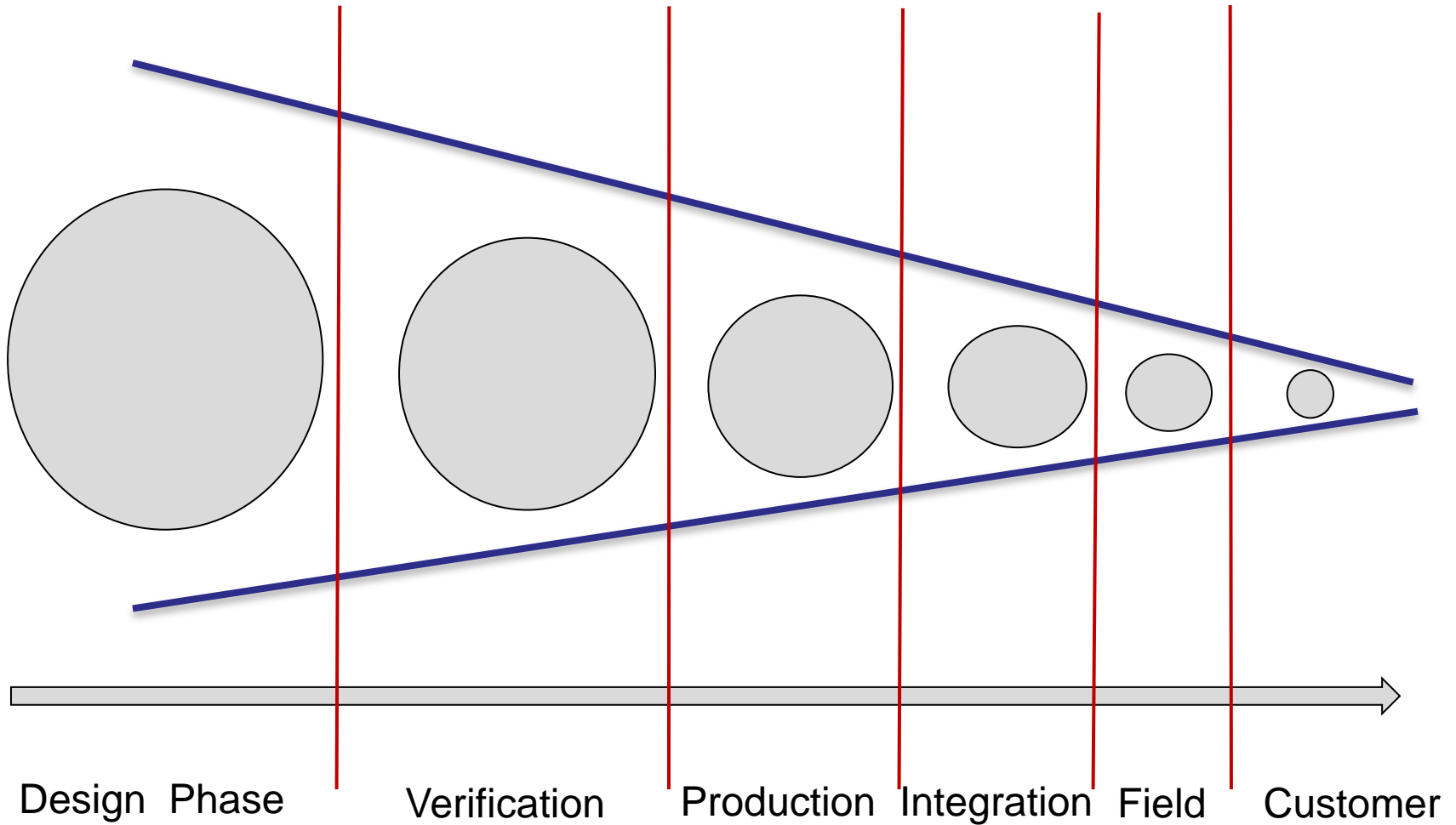
Burn-in and Environmental Test Systems

Environmental capacity of 30-60 drives for 1- 2 weeks

Burn-in capacity of 200 for 3 weeks



Quality Improvement @ All Phases



- To pass most OEM Qualification Testing, manufacturer's should:
 - Thoroughly test their products throughout the manufacturing process
 - Attain certification from groups such as SNIA and JEDEC
 - Work with a qualified 3rd party testing service to ensure accurate testing results