

Innodisk's Strict Testing & Certification Standards

■ Reliability

■ Compatibility

■ Ruggedness

In the industrial space, reliability, ruggedness, and compatibility are just as important, and oftentimes even more important than speed and capacity. To offer its customers the highest quality products, and to ensure peace of mind among industrial leaders, Innodisk sends its products through a myriad of in-house tests and has also obtained a series of reputable third-party certifications.

Abnormal Power Loss Test

To ensure Innodisk FLASH products preserve and restore data correctly during and after an unexpected loss of power, drives are tested thoroughly.



Performance Test



CrystalDiskMark

The performance of Innodisk FLASH products are tested with CrystalDiskMark, and the results are carefully compared with the specified rating of the drive. Prior to testing, Security Erase is used to clean any data on the FLASH device. In addition to this test, performance is also certified with a Linux FIO test, and an AIDA64 test.

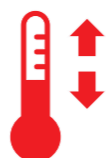
Garbage Collection & Trim Test

The garbage collection & trim test verifies an SSD's ability to organize and move data when the drive has insufficient space. Innodisk FLASH products are put through this test on Windows 10 and Linux Ubuntu.



Temperature Test

To ensure that Innodisk DRAM modules and FLASH products can meet their rated maximum temperatures, devices go through a 48-hour temperature test on at least three different motherboards. DRAM modules specifically go through some of the toughest testing cycles, from -10° to 85°C for the Standard Temperature series, -40° to 85°C for the Wide Temperature series, and -40° to 125°C for the Ultra Temperature series.



TCG OPAL Test



Innodisk FLASH drives are put through the Ulink TCG OPAL test to ensure TCG OPAL functionality is as expected. TCG OPAL is responsible for the encryption and decryption of data on a device.

Humidity Test

Electronic components can experience moisture corrosion in extremely humid environments. To ensure Innodisk DRAM modules and FLASH drives are not vulnerable to this type of corrosion, products are put through a humidity test. The devices are placed in a 95% relative humidity test chamber, and functionality is tested after 48 hours.



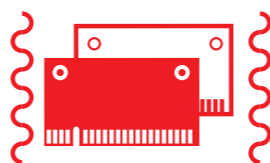
Software & Hardware Security Erase Test

Innodisk FLASH products are put through both software, and hardware security erase tests to ensure data is wiped correctly, and the device functions normally post erase. Software security erase testing is done through a disk security test tool, and hardware security erase testing is done by shorting pins.



Vibration Test

To ensure functionality and durability during and after exposure to intense shaking, Innodisk FLASH and DRAM module's ability to withstand vibrations is tested, and Innodisk DRAM modules have obtained U.S military certification MIL-STD-810G, which further verifies this.



* **DISCLAIMER:** Not all in-house tests are carried out on all devices shipped. Customers can select which tests they wish to be done when an order is placed.

Package Drop Test

To ensure Innodisk DRAM modules and FLASH drives stay secure during shipment to customers, package quality is tested in line with International Safe Transit Association standard ISTA-1A.

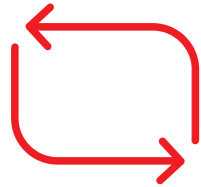


PCB Bending Test

Innodisk DRAM modules' PCB is put to the test, following and achieving the Japan Electronics and Information Technology Industries Association standard EIAJ-4702. The certification verifies the strength of the connection between the PCB and the solder balls via pushing actions.



Warm Boot Test



A warm boot is the act of restarting a device while it is running. Innodisk DRAM modules and FLASH drives are tested to ensure no issues occur during warm boots.

Thermal Shock Test



Innodisk DRAM module's ability to withstand thermal shock, which is the sudden fluctuation of temperature causing stress, is tested and certified following U.S military standard MIL-STD-810G. During the test, the temperature changes from -40° to 110°C within 5 minutes, and goes through 500 cycles. During each cycle, both extremely low and high-temperature patterns last for 15 minutes respectively.

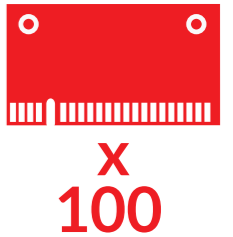
Power ON/OFF Test

It is common for the performance of DRAM modules and FLASH drives to be impacted by constant shutdowns and restarts. Innodisk puts these products to the test by sending them through the boot process hundreds of times, all while being monitored.



Gold Finger Insertion & Extraction Test

The pins of DRAM modules are easily damaged during insertion and extraction from motherboards. This ruggedness of Innodisk DRAM module pins is verified by putting the modules through 100 cycles of insertion and extraction and testing the DIMMs functionality thoroughly afterward.



S3 Test



Windows saves power using sleep mode, where only DRAM modules stay powered, so data can temporarily be stored in them. The S3 cycling test wakes up the memory during sleep mode to ensure data is stored correctly, and no blue screen or automatic restarts occur. Additionally, after waking, other components, such as FLASH devices are powered on, and Innodisk tests the functionality of the drives as well.

S4 Test



In addition to S3 cycle testing, Innodisk FLASH products are also tested during the S4 sleep/wake-up process, which is the lowest-powered sleep state, where an image of DRAM contents is written to the FLASH drive, and then all components are powered down. Upon awakening, the system reads the memory image stored on the FLASH device and moves it back to DRAM ready for regular operation.

Sulfuration Test

Some extreme environments can expose electronics to a high percentage of sulfur, which can lower conductivity and potentially lead to memory failure. Innodisk DRAM modules have been put through sulfuration tests and have met the requirements of the ASTM B809-95 certification, which verifies the DIMMs' ability to resist harsh environments.



Frequency Compatibility Test

To ensure that DRAM modules can operate on systems with different frequencies, Innodisk tests DIMMs on three or more different systems of different frequencies. For example, a 3200MT/s DDR4 module would also be tested on 2933MT/s, 2666MT/s, 2400MT/s, and 2133MT/s systems.

