# MINERVA
## GCE36-1002 External Mini SAS HD for PCIe 3.0,100cm Cable

# Performance & Burn In Test    Rev 1.0

## Table of Contents

# SFF-8644 1x male to male cable

## 1. Overview

This riser card has built-in external Mini SAS HD(SFF-8644) 2x connector. It is designed for use by PCIe x8 to be bifurcated two x4 link width or can extend PCIe x8 channel reach. The ReDriver may support CTLE boosts up to **15 dB at 4 GHz.**

## 2. Tools and Results of Performance Measurement

### 2.1 Test Platform

| | |
|---|---|
| M/B : | GIGABYTE **X570 AORUS MASTER** |
| CPU : | AMD **Ryzen 7, 3700X 8-Core** |
| Memory : | Kingston **KVR26N19D8/16,** DDR4-2666MHz, **32GB**(16GB DIMM*2) |
| ATX Power : | COOLER MASTER G750M, **750W ATX**, 12V V2.2 Power Supply |
| Add in Card: | PE0806 PCIe x8 to SFF-8644 2x AIC |
| Cable: | **PCIe Gen 3 external Mini SAS 1x, 100cm Cable x2** |
| Adapter: | PF807A SFF-8644 2x to PCIe x8 Slot adapter |
| Add in Card: | PE0802 PCIe x8 to M.2 dual port |
| OS : | Microsoft **Windows 10 64bit OS** |

### 2.2 Test target: **GCE36-1002 cable**, PE0806, PF807A adapter & PE0802 with M.2 NVMe SSD
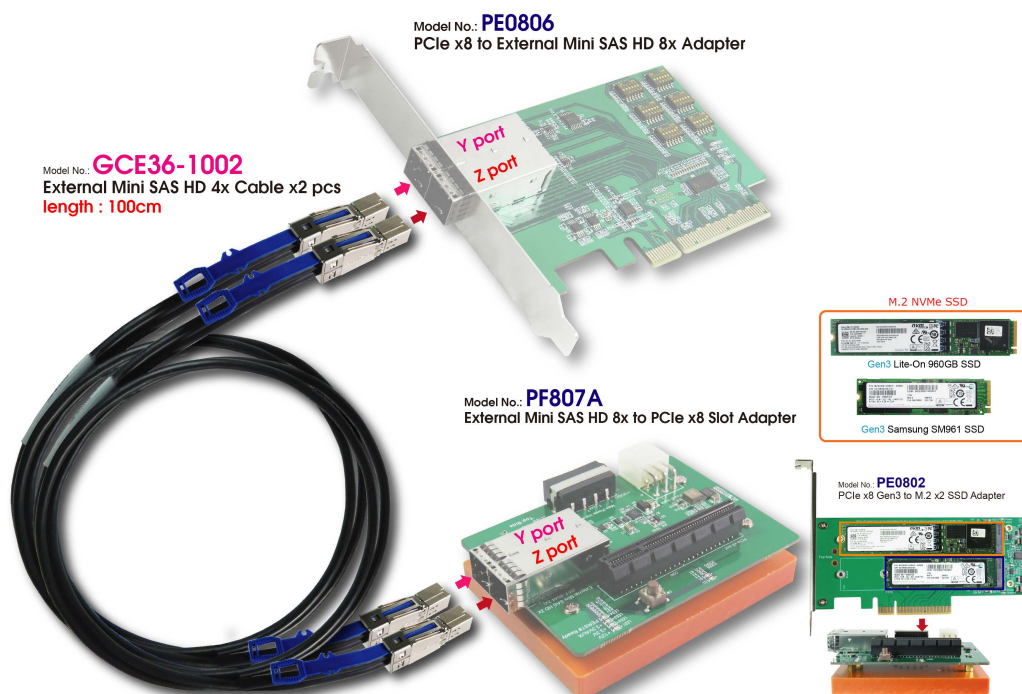
## 2.3    Install Hardware

First inserts the M.2 SSD into the PE0802 M.2 connector, then with copper nuts, and screws to fix SSDs. (Please refer to the Installation Notes). Plugs PE0802 into PF807A adapter and connects it to the PE0806 AIC card (PCIe x16 Gen 4 to SFF-8654 8i x2), using the **GCE36-1002 Cable**, and Plugs PE0806 AIC into GIGABYTE **X570 AORUS MASTER**.

## 2.4    BIOS & Windows 10 OS environment setup

2.4.1    Primary SATA NVMe SSD install Windows 10 OS.

2.4.2    Two M.2 NVMe SSDs , formatted to NTFS Mode. Don't install any program.

# SFF-8644 1x male to male cable

2.5    CrystalDiskMark 8.0.0 x64 performance test

※Benchmark (Sequential Read & Write / default = 1MB)

2.5.1      **LITEON M.2 22x110mm /1TB** in **Drive D:** performance as below:

| CrystalDiskMark 8.0.0 x64 [Admin] | Read (MB/s) | Write (MB/s) |
|---|---|---|
| SEQ1M Q8T1 | 2269.65 | 926.63 |
| SEQ1M Q1T1 | 1910.86 | 923.42 |
| RND4K Q32T1 | 532.76 | 511.28 |
| RND4K Q1T1 | 46.84 | 167.52 |

5  1GiB  D: 0% (0/894GiB)  MB/s

2.5.2      **Samsung SM961 M.2 22x80mm /512GB** in **Drive E:** performance as below:

| Random Write (3/5) [Admin] | Read (MB/s) | Write (MB/s) |
|---|---|---|
| Stop | 3559.16 | 1788.76 |
| Stop | 2460.03 | 1777.79 |
| Stop | 573.25 | 559.99 |
| Stop | 58.69 | 212.21 |

5  1GiB  E: 0% (0/477GiB)  MB/s

# SFF-8644 1x male to male cable

2.6 AS SSD Benchmark 2.0 performance test
  ※Benchmark (Read & Write by MB/s, default block size = 16MB)
  2.6.1  **LITEON M.2 22x110mm**/**1TB** in **Drive D:** performance as below:



  2.6.2  **Samsung SM961 M.2 22x80mm**/**512GB** in **Drive E:** performance as below



:
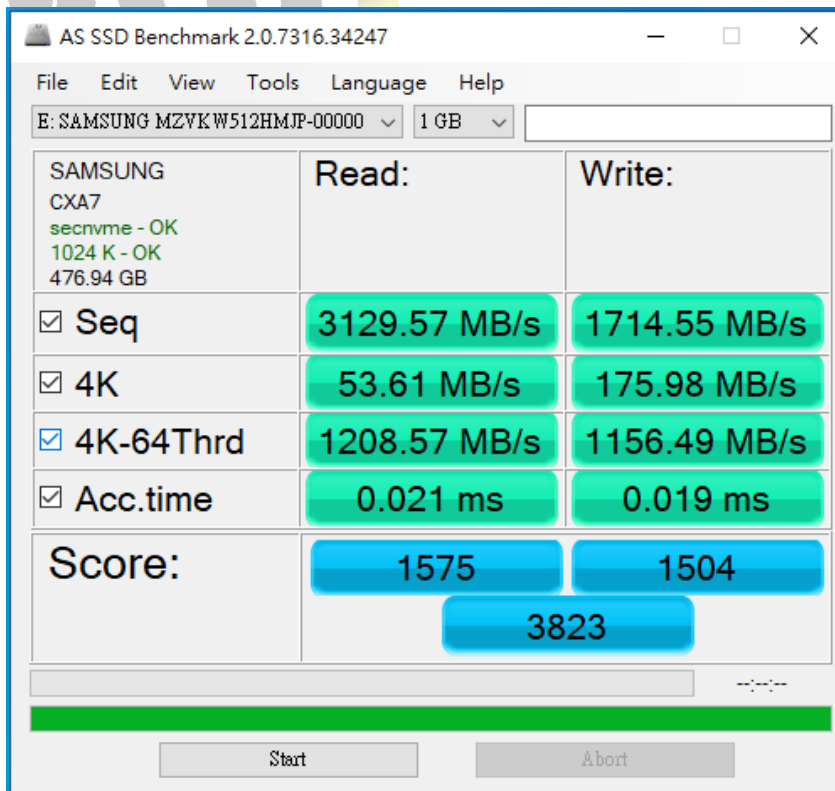
2.7 ATTO Disk Benchamrk 4.01 performance test

2.7.1 **LITEON M.2 22x110mm** /**1TB** in **Drive D:** performance as below:



2.7.2 **Samsung SM961 M.2 22x80mm** /**512GB** in **Drive E:** performance as below:

2.8 AnvilBenchmark_V110_B337

    2.8.1 **LITEON M.2 22x110mm /1TB** in **Drive D:** performance as below:



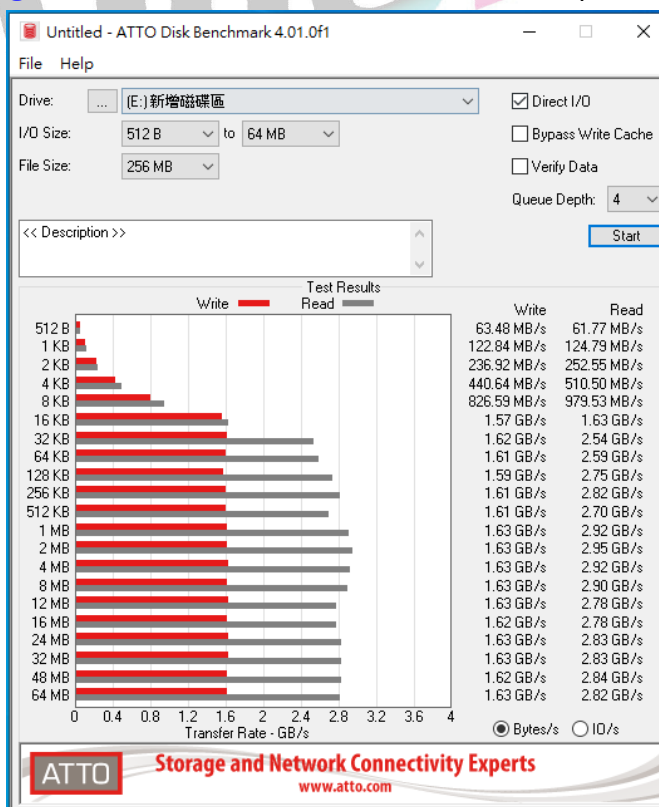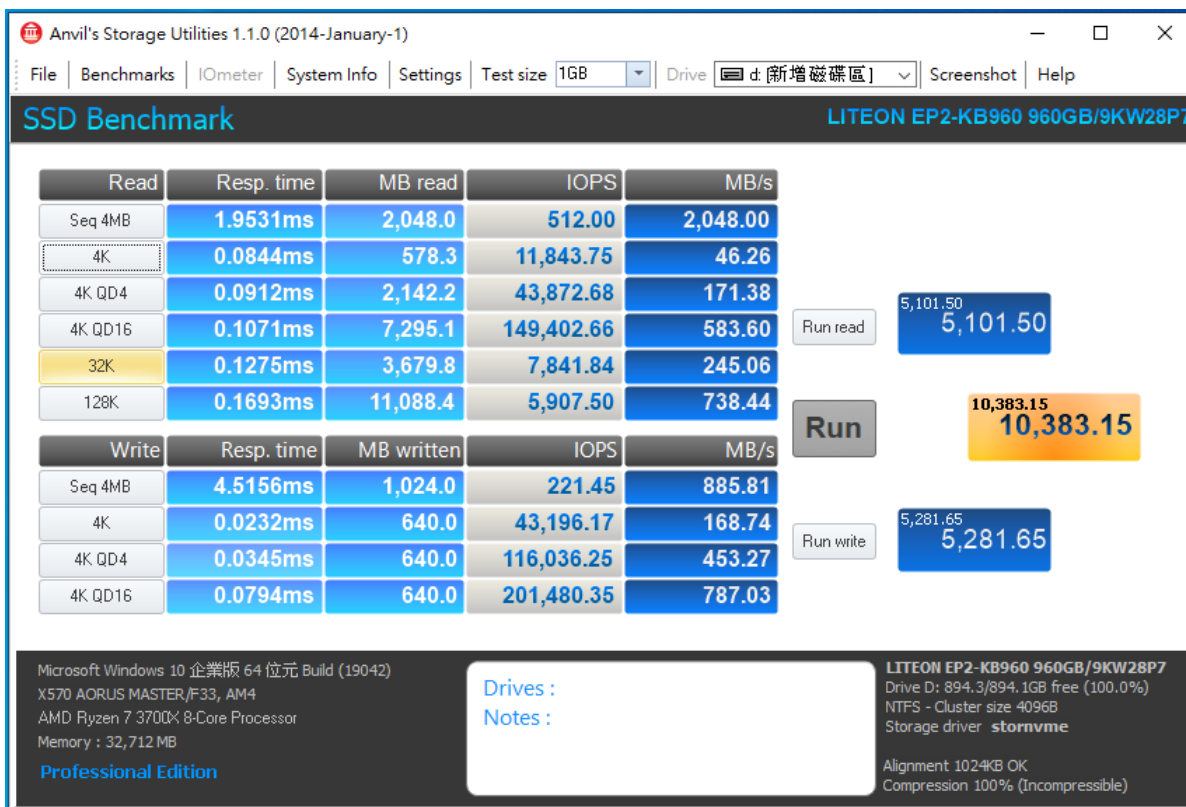| Read | Resp. time | MB read | IOPS | MB/s |
|---|---|---|---|---|
| Seq 4MB | 1.9531ms | 2,048.0 | 512.00 | 2,048.00 |
| 4K | 0.0844ms | 578.3 | 11,843.75 | 46.26 |
| 4K QD4 | 0.0912ms | 2,142.2 | 43,872.68 | 171.38 |
| 4K QD16 | 0.1071ms | 7,295.1 | 149,402.66 | 583.60 |
| 32K | 0.1275ms | 3,679.8 | 7,841.84 | 245.06 |
| 128K | 0.1693ms | 11,088.4 | 5,907.50 | 738.44 |

| Write | Resp. time | MB written | IOPS | MB/s |
|---|---|---|---|---|
| Seq 4MB | 4.5156ms | 1,024.0 | 221.45 | 885.81 |
| 4K | 0.0232ms | 640.0 | 43,196.17 | 168.74 |
| 4K QD4 | 0.0345ms | 640.0 | 116,036.25 | 453.27 |
| 4K QD16 | 0.0794ms | 640.0 | 201,480.35 | 787.03 |

Run read: 5,101.50

Run: 10,383.15

Run write: 5,281.65

LITEON EP2-KB960 960GB/9KW28P7

Microsoft Windows 10 企業版 64 位元 Build (19042)
X570 AORUS MASTER/F33, AM4
AMD Ryzen 7 3700X 8-Core Processor
Memory : 32,712 MB
Professional Edition

Drives :
Notes :

LITEON EP2-KB960 960GB/9KW28P7
Drive D: 894.3/894.1GB free (100.0%)
NTFS - Cluster size 4096B
Storage driver **stornvme**
Alignment 1024KB OK
Compression 100% (Incompressible)

    2.8.2 **Samsung SM961 M.2 22x80mm/512GB** in **Drive E:** performance as below:



| Read | Resp. time | MB read | IOPS | MB/s |
|---|---|---|---|---|
| Seq 4MB | 1.3125ms | 2,048.0 | 761.90 | 3,047.62 |
| 4K | 0.0715ms | 682.5 | 13,976.91 | 54.60 |
| 4K QD4 | 0.0792ms | 2,465.1 | 50,484.76 | 197.21 |
| 4K QD16 | 0.1196ms | 6,531.0 | 133,755.00 | 522.48 |
| 32K | 0.1448ms | 3,240.0 | 6,904.70 | 215.77 |
| 128K | 1.0194ms | 1,841.1 | 980.95 | 122.62 |

| Write | Resp. time | MB written | IOPS | MB/s |
|---|---|---|---|---|
| Seq 4MB | 2.3789ms | 1,024.0 | 420.36 | 1,681.44 |
| 4K | 0.0194ms | 640.0 | 51,549.59 | 201.37 |
| 4K QD4 | 0.0253ms | 640.0 | 157,828.91 | 616.52 |
| 4K QD16 | 0.0501ms | 640.0 | 319,323.38 | 1,247.36 |

SAMSUNG MZVKW512HMJP-00000 512GB/CXA7

Run read: 5,149.66

Run: 13,228.20

Run write: 8,078.54

Microsoft Windows 10 企業版 64 位元 Build (19042)
X570 AORUS MASTER/F33, AM4
AMD Ryzen 7 3700X 8-Core Processor
Memory : 32,712 MB
Professional Edition

Drives :
Notes :

SAMSUNG MZVKW512HMJP-00000 512
Drive E: 476.9/476.5GB free (99.9%)
NTFS - Cluster size 4096B
Storage driver **secnvme**
Alignment 1024KB OK
Compression 100% (Incompressible)
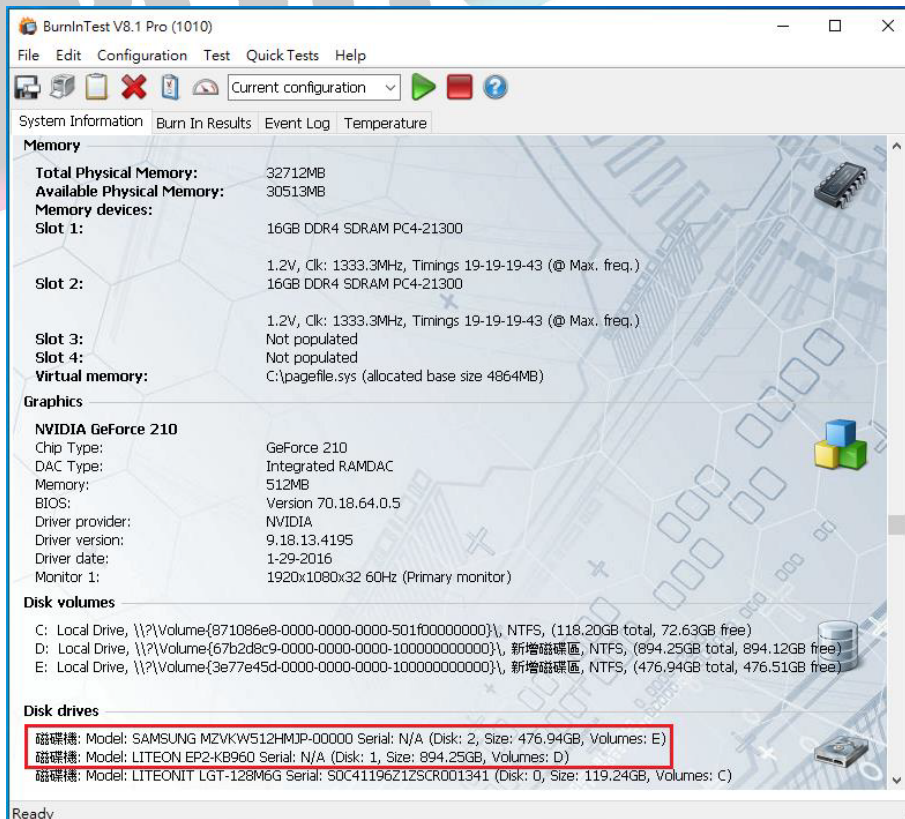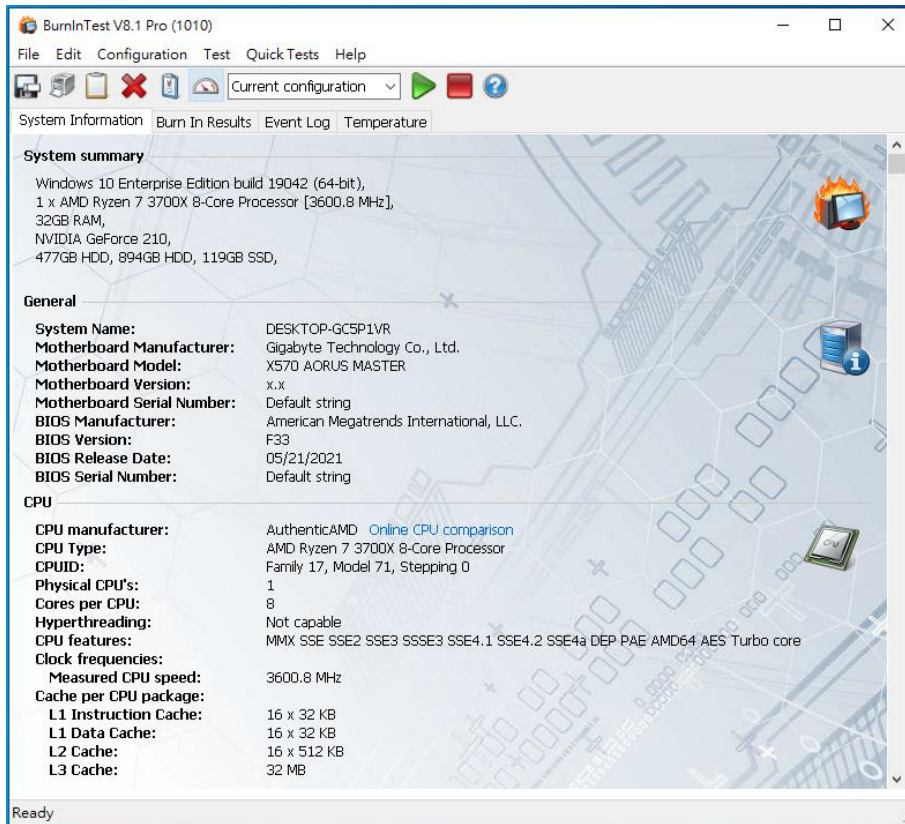
## 3. Burn In Tests and Results
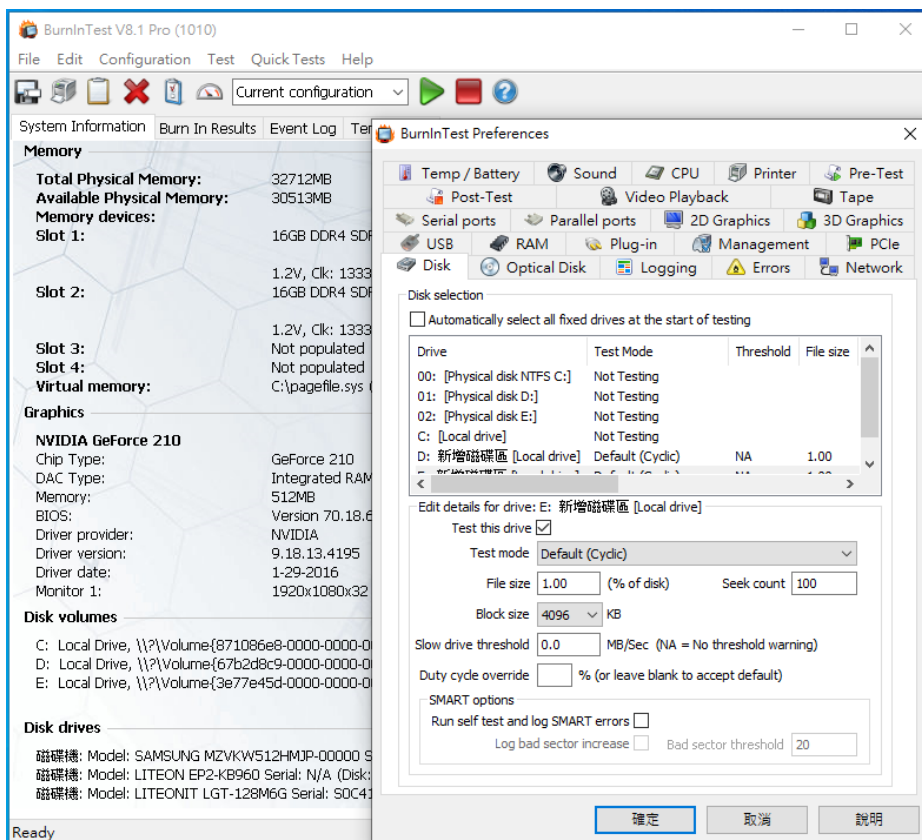
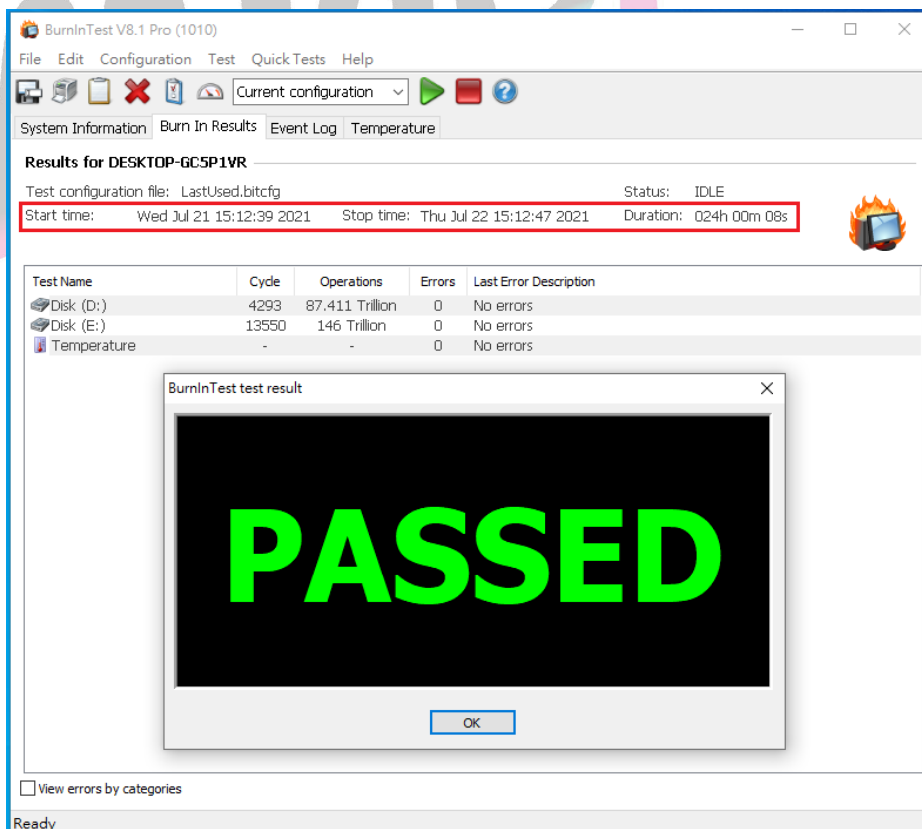### 3.1 BurnInTest v8.1 Pro

#### 3.1.1 system information as below:

# SFF-8644 1x male to male cable

### 3.1.2    Disk test mode( 10 ways cycle test)



### 3.1.3    24-hour Burn-in test PASSED

## 4. Summary

4.1  M.2 NVMe SSD is PCIe Gen 3 / 4 Lane Interface, I/O speed, max. to32Gbps.

4.2  PE0806 AIC I/O performance is based on NVMe SSD.