



MINERVA

PU410G Converter Card

Performance & Burn In Test Rev. 1. 0

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PU410G Converter Card

1. Overview

PU410G adapter, providing M.3 M-key connector can be M.3 (PCI-e I/F NVMe) SSD converted into U.2(SFF-8639), PCI-e Gen 3 / 4 Lanes interface.

2. Tools and Results of Performance Measurement

2.1 Test Platform

M/B : GIGABYTE **Z170X UD5 TH**
CPU : Intel **i5-6500**, 3.2GHz/ 6M Cache/ LGA1150
Memory : Kingston **KVR21N15D8/8**, **DDR4-2133MHz**, **16G**(8GB DIMM*2)
ATX Power : COOLER MASTER G750M, **750W ATX**, 12V V2.2 Power Supply
Graphic : Z170 Chipsets built-in **HD Graphics 530**
Adapter: PE0404 PCIe to SFF-8643 mini SAS HD
Cable: Amphenol SFF-8643 Slimline SAS to U.2(SFF-8639) Cable
OS : Microsoft **Windows 10 64bit OS**

2.2 Test target: PU410G adapter & M.3 [Samsung MZ4LB3T8HALS-000 4TB NVMe SSD](#)



PE0404 Adapter



U.2 to mini SAS HD Cable



PU410G + M.3 SSD / 4TB

2.3 Install Hardware

Insert M.3 SSD into PU410G converter's M.2 M-key connector, and then connect PU410G converter to PE0404 adapter(PCI-e 4-lane to SFF-8643) using SFF-8643 mini SAS HD to U.2(SFF-8639) cable, Plug PE0404 into **PCI-e slot of Z170X UD5 TH**.

2.4 BIOS & Windows 10 OS environment setup

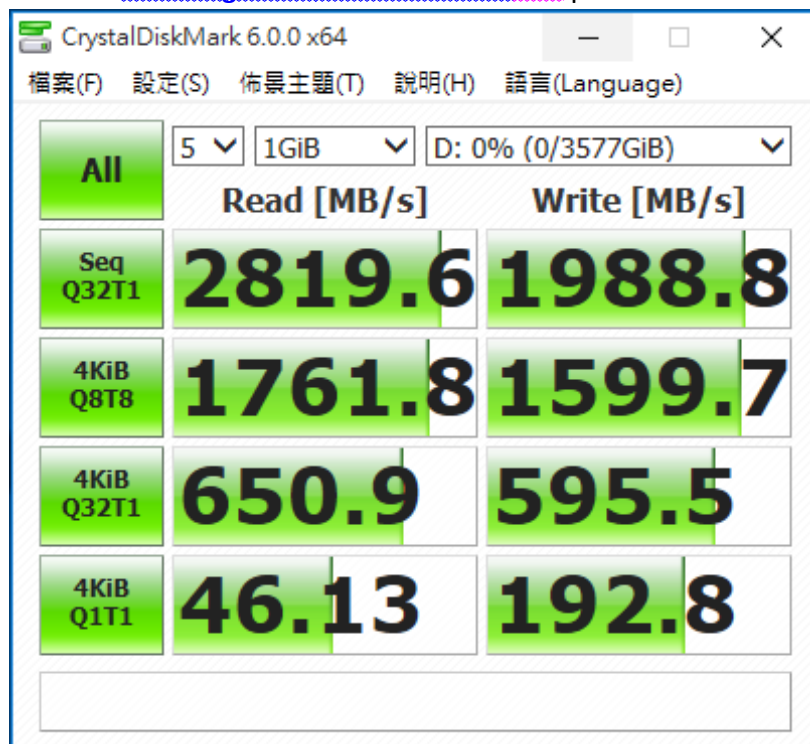
- 2.4.1 Primary SSD Drive installs win10 64bit OS
- 2.4.2 Tested Target M.3 SSD is formatted to NTFS Mode. Don't install any program.

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2.5 CrystalDiskMark 6.0 x64 performance test

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

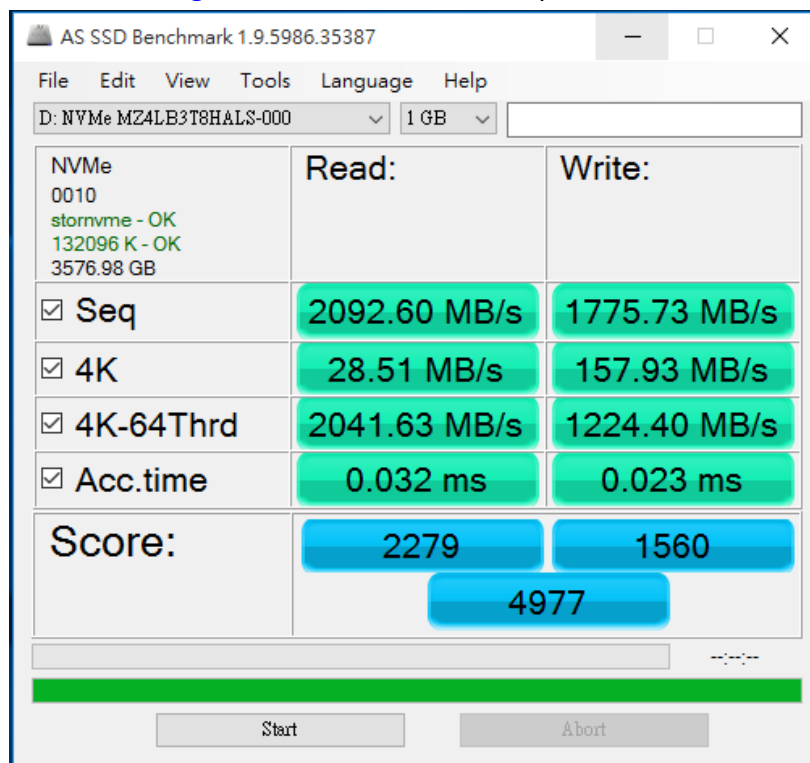
2.5.1 Show [Samsung MZ4LB3T8HALS-000 4TB](#) performance as below:



2.6 AS SSD Benchmark 1.9 performance test

※Benchmark (**Read & Write** by MB/s, default block size = **16MB**)

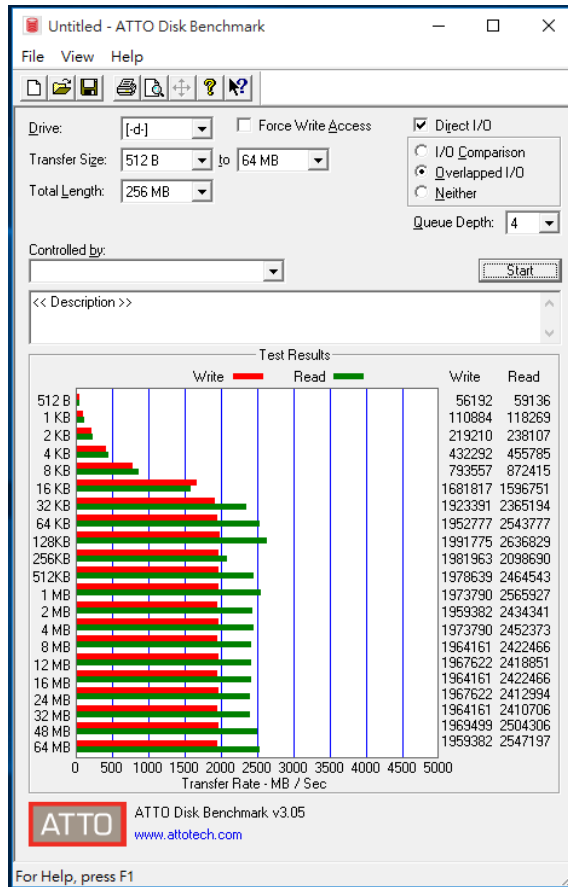
2.6.1 Show [Samsung MZ4LB3T8HALS-000 4TB](#) performance as below:



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2.7 ATTO Disk Benchmark 3.05 performance test

2.7.1 Show [Samsung MZ4LB3T8HALS-000 4TB](#) performance as below:



2.8 AnvilBenchmark_V110_B337

2.8.1 Show [Samsung MZ4LB3T8HALS-000 4TB](#) performance as below:



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3. Burn In Tests and Results

3.1 BurnInTest v8.1 Pro for [Samsung MZ4LB3T8HALS-000 4TB](#)

3.1.1 system information as below:

System summary

Windows 10 Enterprise Edition build 10240 (64-bit),
1 x Intel(R) Core(TM) i5-6500 CPU @ 3.20GHz,
16GB RAM,
Intel(R) HD Graphics 530,
60GB SSD, 3577GB HDD,

General

System Name: DESKTOP-7FB106L
System Model: Z170X-UD5 TH
Motherboard Manufacturer: Gigabyte Technology Co., Ltd.
Motherboard Model: Z170X-UD5 TH-CF
Motherboard Version: x.x
Motherboard Serial Number: Default string
BIOS Manufacturer: American Megatrends Inc.
BIOS Version: F20b
BIOS Release Date: 11/07/2016
BIOS Serial Number: Z170X-UD5 TH

CPU

CPU manufacturer: GenuineIntel [Online CPU comparison](#)
CPU Type: Intel(R) Core(TM) i5-6500 CPU @ 3.20GHz
Codename: Skylake
CPUID: Family 6, Model 5E, Stepping 3
Socket: LGA 1151
Lithography: 14nm
Physical CPU's: 1
Cores per CPU: 4
Hyperthreading: Disabled
CPU features: MMX SSE SSE2 SSE3 SSSE3 SSE4.1 SSE4.2 DEP PAE Intel64 VMX SMX AES
Clock frequencies:
Measured CPU speed: 3192.2 MHz [Turbo: 3591.2MHz]
Multiplier: x32.0 [Turbo: x36.0]
Base Clock: 100.0 MHz
Multiplier range: Min: x8, Max non turbo: x32 [Ratio: 4C: x36, 3C: x36, 2C: x36, 1C: x36]
Cache per CPU package:
L1 Instruction Cache: 4 x 32 KB
L1 Data Cache: 4 x 32 KB
L2 Cache: 4 x 256 KB
L3 Cache: 6 MB

Memory

Total Physical Memory: 16292MB
Available Physical Memory: 14648MB
Memory devices:
0: Not populated
1: 8192MB
2: Not populated
3: 8192MB
Virtual memory: C:\pagefile.sys (allocated base size 2432MB)

Graphics

Intel(R) HD Graphics 530
Chip Type: Intel(R) HD Graphics Family
DAC Type: Internal
Memory: 1024MB
BIOS: Intel Video BIOS
Driver provider: Intel Corporation
Driver version: 21.20.16.4550
Driver date: 11-11-2016
Monitor 1: 1920x1080x32 59Hz (Primary monitor)

Disk volumes

C: Local Drive, \\?\Volume{ba66688e-0000-0000-00c0-f52500000000}\, NTFS, (59.03GB total, 22.57GB free)
D: Local Drive, \\?\Volume{5971d158-471b-409e-917c-792874808781}\, 新增磁碟區, NTFS, (3576.86GB total, 3576.57GB free)

Disk drives

磁碟機: Model: M4-CT064M4SSD3 Serial: 00000000121403347E23 (Disk: 0, Size: 59.62GB, Volumes: C)
磁碟機: Model: NVMe MZ4LB3T8HALS-000 Serial: N/A (Disk: 1, Size: 3576.98GB, Volumes: D)

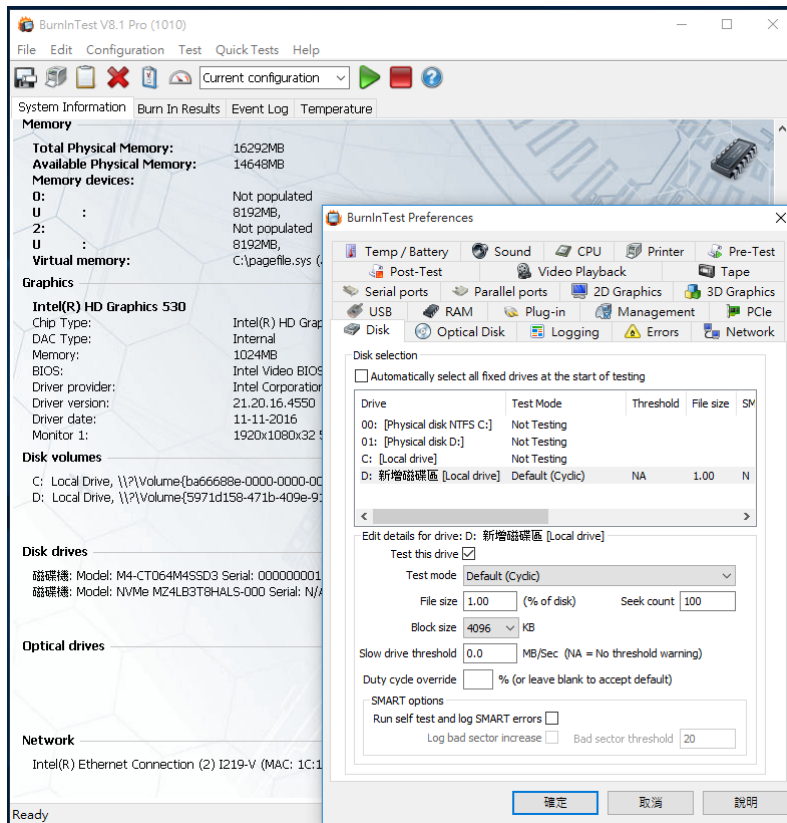
Optical drives

Network

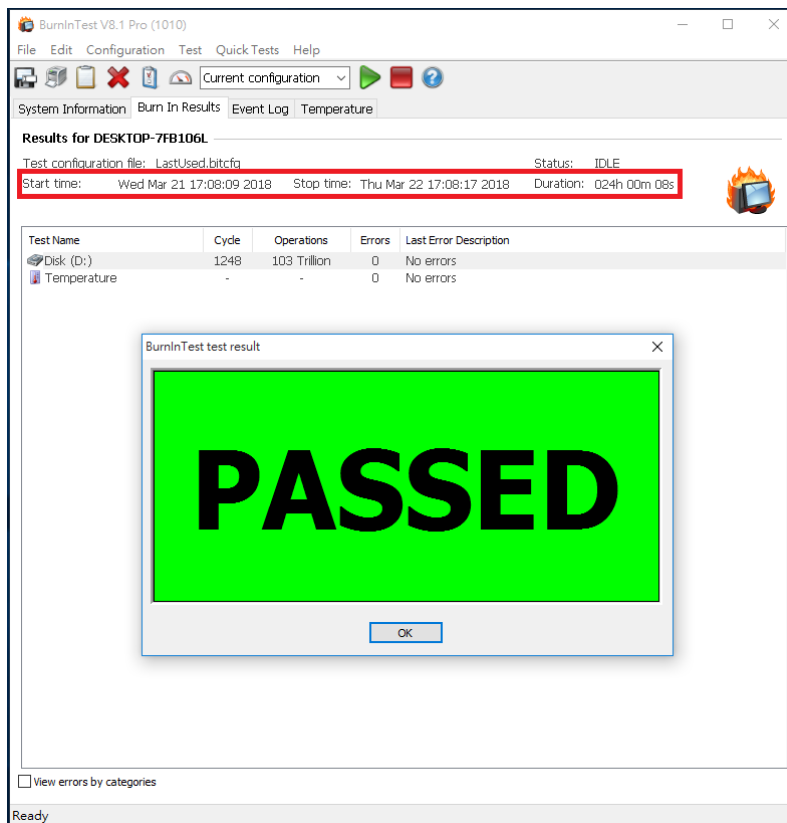
Intel(R) Ethernet Connection (2) I219-V (MAC: 1C:1B:0D:66:CC:F5)

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3.1.2 show Disk test mode (10 ways cycle test)



3.1.3 show 24-hour Burn-in test PASSED



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4. Summary

- 4.1 M.3 NVMe SSD is PCI-e Gen 3 / 4 Lanes Interface, I/O speed, max. to 32Gbps.
- 4.2 PU410G adapter I/O performance is based on M.3 NVMe SSD.