



PE0412 Converter Card

Performance & Burn In Test Rev. 1.0

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4. Summary

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1. Overview

PE0412 adapter, providing SFF-8612 OCulink connector can be U.2(SFF-8639)SSD or SFF-8639 to M.2 NVMe SSD converted into 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: PE0412 PCIe to SFF-8612 OCulink Adapter
CABLE: Amphenol U.2(SFF-8639) to SFF-8611 OCulink Cable
OS : Microsoft **Windows 10 64bit OS**

2.2 Test target: PU410A adapter & Sumsung SM961 512GB NVMe SSD



PE0412 Adapter



U.2 to Oculink Cable



PU410G Adapter



Samsung SM961 M.2 SSD

2.3 Install Hardware

Insert M.2 SSD into PU3401F converter's M.2 M-key connector, and then connect PU3401F converter to PE0412 adapter(PCI-e 4-lane to SFF-8612), using U.2(SFF-8639) to SFF-8611 OCulink Cable. The PE0412 plugs into **PCI-e slot of Z170X UD5 TH**.

2.4 BIOS & Windows 10 OS environment setup

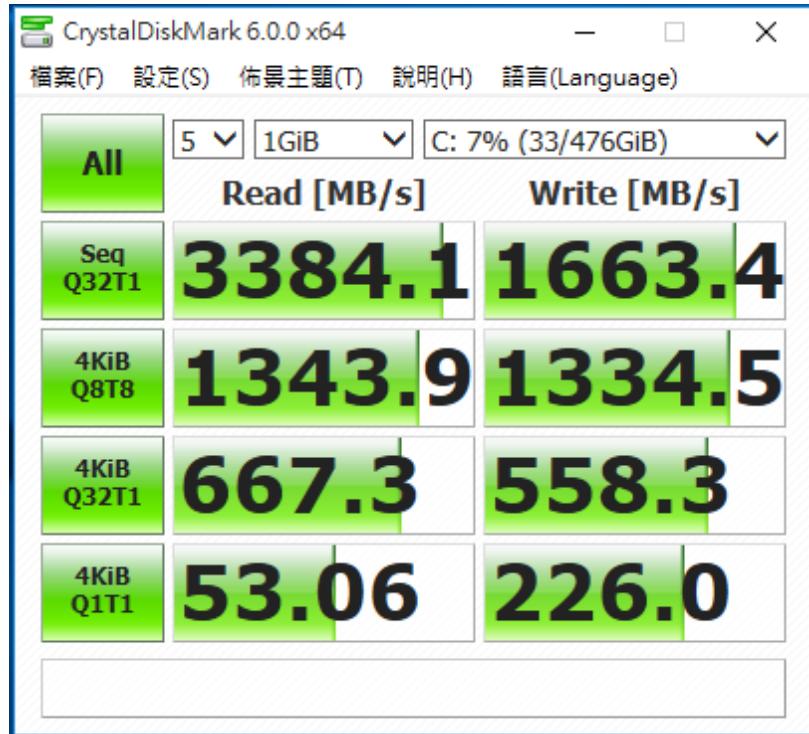
2.4.1 Install Windows 10 64bit OS into PU3401F(including M.2 NVMe SSD)

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2.5 CrystalDiskMark 6.0.0 x64 performance test

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

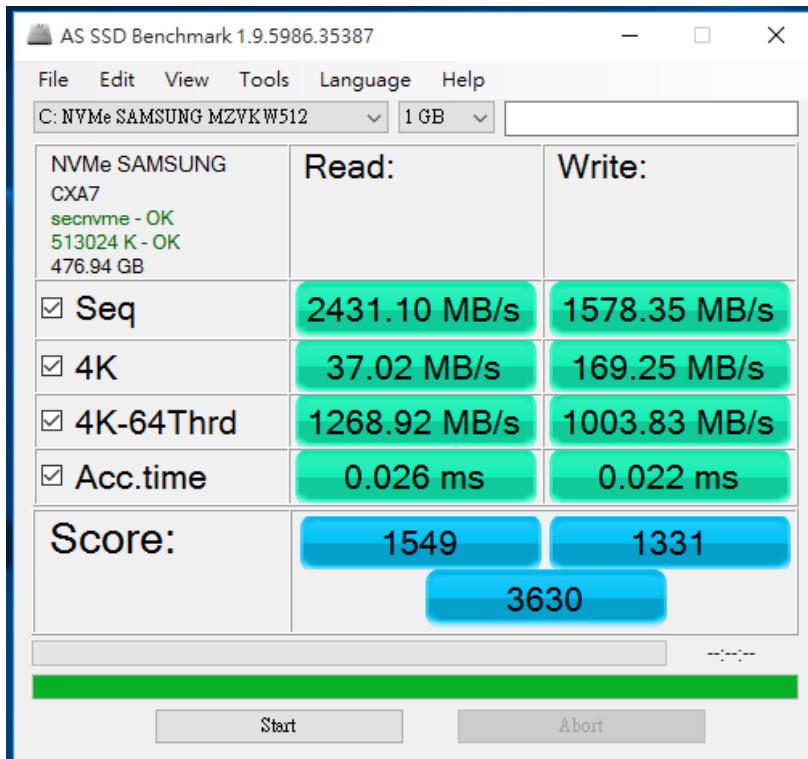
2.5.1 Show Samsung SM961 M.2(NVMe)/512GB performance as below:



2.6 AS SSD Benchmark 1.9 performance test

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

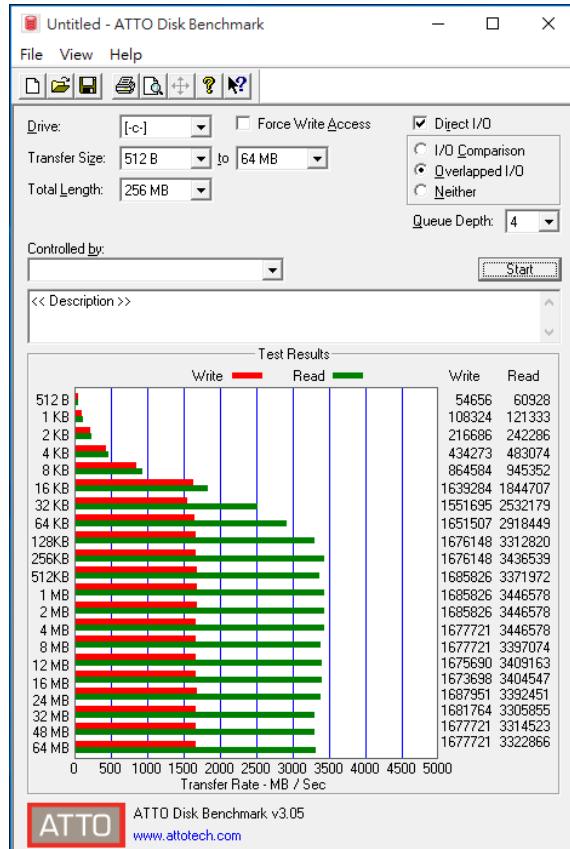
2.6.1 Show Samsung SM961 M.2(NVMe)/512GB performance as below:



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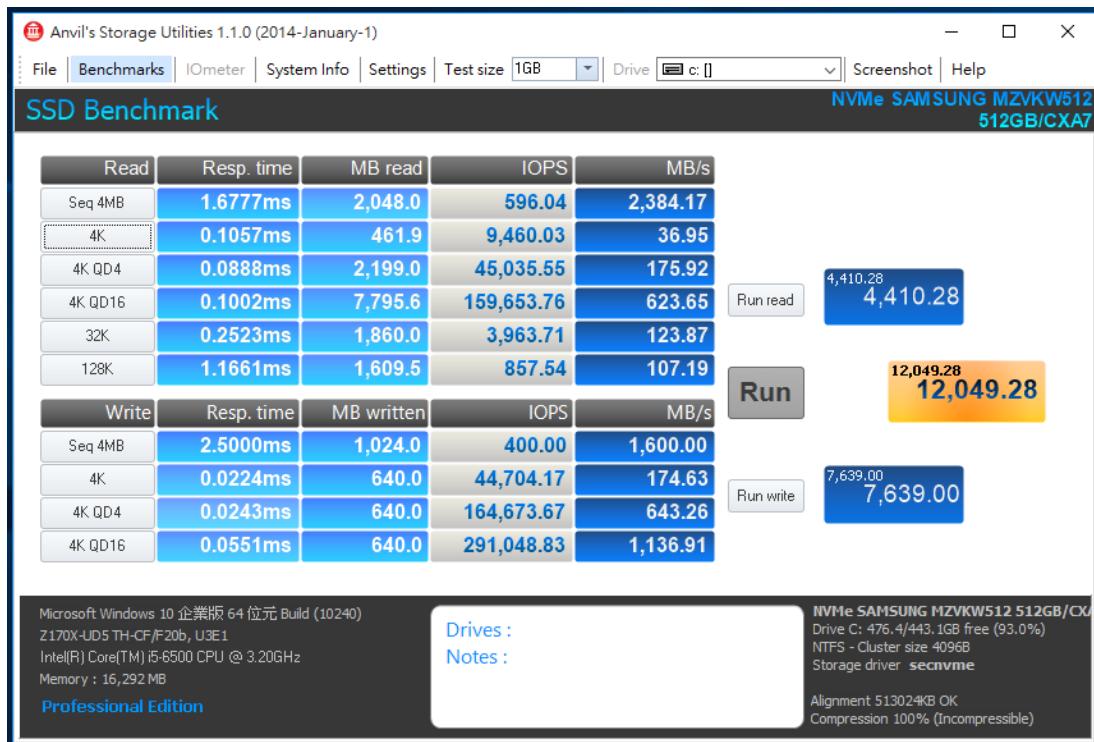
2.7 ATTO Disk Benchamrk 3.0.5 performance test

2.7.1 Show Samsung SM961 M.2(NVMe)/512GB performance as below:



2.8 AnvilBenchmark_V110_B337

2.8.1 Show Samsung SM961 M.2(NVMe)/512GB performance as below:



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3. Burn In Tests and Results

3.1 BurnInTest v8.1 Pro for Samsung SM961 M.2(NVMe)/512GB SSD

3.1.1 system information as below:

The screenshot displays two windows of the BurnInTest V8.1 Pro software interface.

System Information Window:

- 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, 477GB HDD,
- General:**
 - System Name: DESKTOP-KUCU2U1
 - 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
 - CPU Type: Online CPU comparison
 - Codename: Intel(R) Core(TM) i5-6500 CPU @ 3.20GHz
 - CPUID: Family 6, Model 5E, Stepping 3
 - Socket: LGA 1151
 - Lithography: 14nm
 - Physical CPUs: 1
 - Cores per CPU: 4
 - Hyperthreading: Enabled
 - CPU features: MMX SSE SSE2 SSE3 SSE3 SSE4.1 SSE4.2 DEP PAE Intel64 VMX SMX AES
 - Clock frequencies:
 - Measured CPU speed: 3192.6 MHz [Turbo: 3591.6MHz]
 - 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

The screenshot displays the second window of the BurnInTest V8.1 Pro software interface.

Memory:

- Total Physical Memory: 16292MB
- Available Physical Memory: 14903MB
- Memory devices:
 - 0: Not populated
 - U : 8192MB, Not populated
 - 2: 8192MB
 - U : 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: 20.19.15.4364
 - Driver date: 1-6-2016
 - Monitor 1: 1920x1080x32 59Hz (Primary monitor)

Disk volumes:

- C: Local Drive, \\?\Volume{39605e96-0000-0000-0000-501f00000000}\, NTFS, (476.45GB total, 443.07GB free)

Disk drives:

- 磁盘: Model: NVMe SAMSUNG MZVKW512 Serial: N/A (Disk: 0, Size: 476.94GB, Volumes: C)

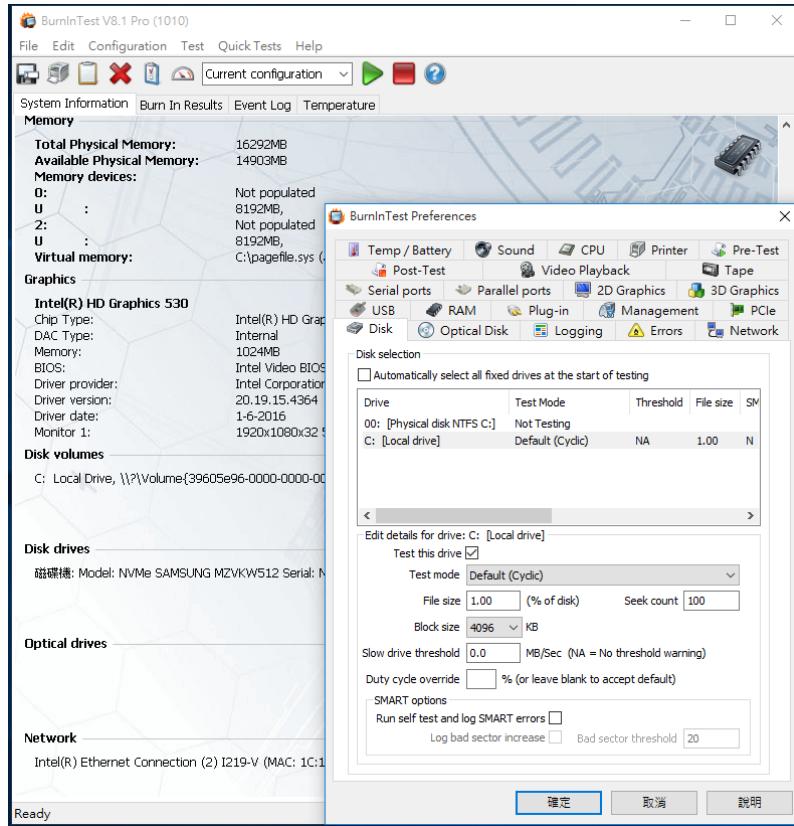
Optical drives:

Network:

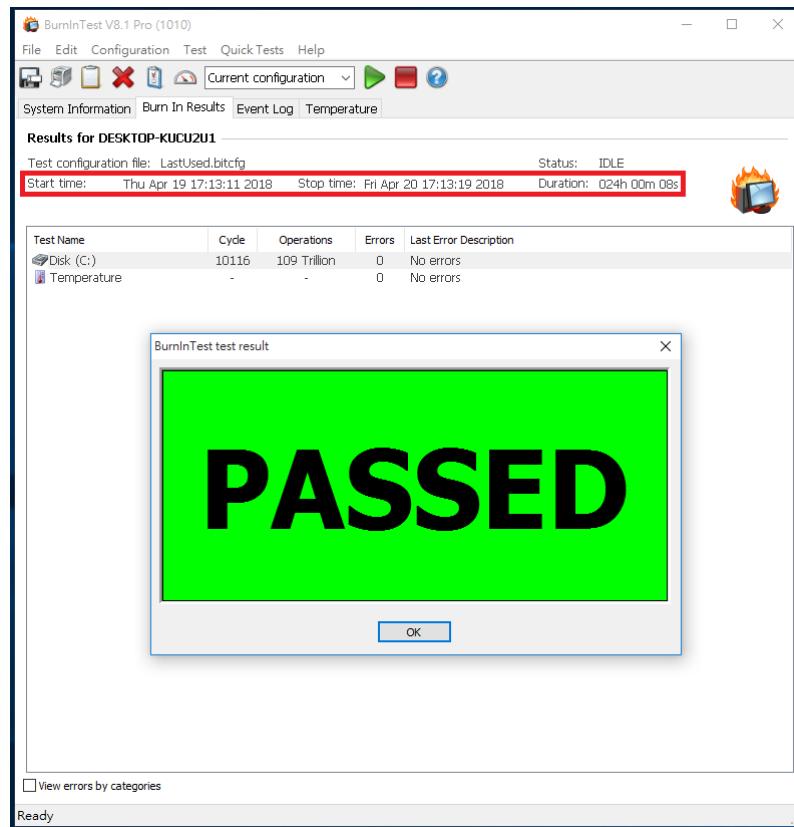
- Intel(R) Ethernet Connection (2) I219-V (MAC: 1C:1B:0D:66:CC:F5)

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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 SFF-8612 OCulink supports SAS 4 & PCI-e Gen 4 / 4 Lanes Interface.
- 4.2 PE0412 adapter I/O performance is based on M.2 NVMe PCI-e Gen 3 / 4 Lanes SSD.