

AD909A Converter Card

Performance & Burn In Test Rev. 1.0

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1. Overview

AD909A adapters, support 67pin B key type connector to convert M.2(NGFF) SSD into SATA III 7+15pin standard interface.

2. Tools and Results of Performance Measurement

2.1 Test Platform

M/B :	ASUS P8P67
CPU :	Intel i5-2500, 3.3MHz/ 6G Cache/ 5GT
Memory :	Kingston KVR1333D3N9K2/4G, DDR3-1333MHz,4G(2GB DIMM*2)
ATX Power :	TC START W500, 500W ATX,12V V2.2 Power Supplier
Graphic :	MSI , R6700 / AMD HD 6700 Series
OS :	Microsoft Windows 7 64bit OS

Test target: AD909A adapter and M.2 NGFF SSD(LITE-ON LGT-128M6G)



AD909A Adapter

M.2 (NGFF) SSD Lite-On LGT-128M6G)

2.2 Install Hardware

Insert M.2(NGFF) SSD(LITE-ON LGT-128M6G) into AD903D converter's M.2 67pin B key connector, and then with coppers, and screws to fix SSDs. Connect AD903D converter to SATA III Port of ASUS P8P67 motherboard.

2.3 BIOS & Windows 7 OS environment setup

2.4.1 In BIOS(Basic Input/Output Setup) – Change IDE Mode into AHCI Mode



2.4.2 Partition Alignment & I/O Alignment

Windows XP and Windows Server 2000/2003 start partition offset at 31.5KB (32,256 bytes). Due to this misalignment, clusters of data are spread across physical memory block boundaries, incurring a read- modify-write penalty. As a result, the SSD controller must write up to 200% more data to the flash than is sent from the host to the drive.

When choosing a partition starting offset, Storage Systems recommends that system integrators correlate the partition offset with the RAID stripe size and cluster size to achieve optimal SSD I/O performance. As following Figure shows an example of a misaligned partition offset and an example of an aligned partition offset for Windows Server.



Misaligned Partition vs. Aligned Partition

File Edit View Too E: WDC WD5000AACS-00ZU	bls Language Help B0 🔹		File Edit View To	ols Language Help	
WDC 01.0 iaStor-OK 31 K-BAD 465.76 GB	Read:	Write:	INTEL 2CV1 isStor - OK 1024 K - OK 74 53 0B	Read:	Write:
🗷 Seq	MB/s	MB/s	🗹 Seq	MB/s	MB/s
☑ 4K	MB/s	MB/s	☑ 4K	MB/s	MB/s
4K-64Thrd	MB/s	MB/s	☑ 4K-64Thrd	MB/s	MB/s
Acc.time	ms	ms	Acc.time	ms	ms
Score:			Score:		
				*hurt [

XUsing AS SSD Benchmark viewing partition is aligned

 \times Using AS SSD Benchmark to check vendor AHCI Drive is installed

AS SSD Benchmark 1.7.4.	739.38088		AS SSD Benchmark 1.7.4739.	38088			
File Edit View To E: WDC WD5000AACS-00ZU	ols Language Help JB0 🔹		File Edit View Tools G: MINERVA-Mercury PRO(64GE	File Edit View Tools Language Help G: MINERVA-Mercury PRO(64GB) ATA Device			
WDC 01.0 iaStor - OK 31 K - BAD 465.76 GB	Read: 使用Intel AHCI Driver	Write:	MINERVA-Mercury 1916 msahci - OK 1024 K - OK 59.62 GB	Read: 使用Microsoft AHG	Write: CI		
☑ Seq	MB/s	MB/s	✓ Seq	MB/s	MB/s		
☑ 4K	MB/s	MB/s	✓ 4K	MB/s	MB/s		
☑ 4K-64Thrd	MB/s	MB/s	☑ 4K-64Thrd	MB/s	MB/s		
Acc.time	ms	ms	Acc.time	ms	ms		
Score:			Score:				
Start Abort Abort							

- 2.4.3 In Windows 7, formatted SSD to NTFS Mode. Don't install any program. Because FAT32 previous versions do not support NCQ, recommended formatted NTFS file mode.
- 2.4.4 AHCI support Queue CommandAHCI queue command protocol allows each disk contains 32 commands. so QD(Queue Depth) is 32.
- 2.4.5 SSD Write Cache Setting enable the Write Cache setting in Windows 7.

2.4 SSD I/O Performance impact factors

- 2.5.1 SATA I/O performance -- depending on the SSD Controller IC
- 2.5.2 SATA I/O performance -depending on the NAND Flash IC.
 - 2.5.2.1 Toggle DDR mode or ONFI synchronous NAND Flash IC, will show good performance
 - 2.5.2.2 Traditional asynchronous or SDR NAND Flash IC, will show poor performance

Suggestion:

Please use the motherboard containing native SATA 6Gb/s Port testing, can provide more correct I/O performance. (Such as Intel 6 Series chipsets or AMD 9 Series Chipsets). If you are using a motherboard plus SATA III host bus adapter, non-native 6Gb/s Port or SATA to PCI-e adapter provides 6Gb/s Port. I/O performance testing will be very much lower than the native SATA III Port.

- 2.5 CrystalDiskMark 3.0.1 x64 performance test
 ※Benchmark (Sequential Read & Write / default = 1MB)
 - 2.6.1 Used LITE-ON LGT-128M6G performance as below:



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2.7 AS SSD Benchmark 1.7 performance test

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

2.7.1 Used LITE-ON LGT-128M6G performance as below:

AS SSD Benchmark 1.7.4739.38088							
File Edit View Tools Language Help							
D: LITEONIT LGT-128M6G							
LITEONIT LGT-128M6G DG7R iaStor - OK 1024 K - OK 119.24 GB	Read:	Write:					
✓ Seq	494.28 MB/s	305.69 MB/s					
☑ 4K	26.39 MB/s	51.00 MB/s					
☑ 4K-64Thrd	297.16 MB/s	262.60 MB/s					
Acc.time	0.066 ms	0.074 ms					
Score:	373	344					
907							
Start Abort							

2.8 HD Tune Pro 5.5 performance test

※Benchmark (Sequential Read &Write / default block size = 8MB)

2.8.1 Used LITE-ON LGT-128M6G Read performance as below:



2.9 AnvilBenchmark_V110_B337

2.9.1 Used LITE-ON LGT-128M6G performance as below:

🗎 Anvil's Storage Utilities 1.1.0 (2014-January-1)						
File Benchmarks	IOmeter System I	nfo Settings	Test size 1GB	- Drive 国 d: [新华	曾磁碟區)	▼ Screenshot Help
SSD Benchmark						LITEONIT LGT-128M6G 128GB/DG7R
			1050	10		
Read	Resp. time	MB read	IOPS	MB/S		
Seq 4MB	8.0742ms	2,048.0	123.85	495.40		
4K	0.1429ms	341.7	6,996.96	27.33		
4K QD4	0.1440ms	1,356.4	27,777.92	108.51		1,785.22
4K QD16	0.2358ms	3,313.5	67,859.26	265.08	Run read	1,785.22
32K	0.2562ms	1,830.3	3,902.91	121.97		
128K	0.6635ms	2,827.1	1,507.10	188.39	-	3,605.63
Write	Resp. time	MB written	IOPS	MB/s	Run	3,605.63
Seq 4MB	13.0430ms	1,024.0	76.67	306.68		
4K	0.0700ms	558.3	14,293.07	55.83	Durunite	1,820.40
4K QD4	0.0868ms	640.0	46,108.22	180.11	Runwhie	1,020.40
4K QD16	0.2500ms	640.0	64,005.59	250.02		
Microsoft Windows 7 P8P67/1502, LGA11 intel(R) Core(TM) i5-25 Memory : 4,073 MB Professional Edition	/旗艦版 64-bit Build(55 00 CPU @ 3.30GHz	(7600)	Drives : Notes :			LITEONIT LGT-128M6G 128GB/DG7R Drive D: 119.2/119.1GB free (99.9%) NTFS - Cluster size 4096B Storage driveriaStor 10.5.0.1026 Alignment 1024KB OK Compression 100% (Incompressible)

Burn In Tests and Results

3.1 BurnInTest v7.1 Pro

3.1.1 system information for LITE-ON LGT-128M6G as below:

🖗 BurnInTest V7.1 Pro		- • ×	😧 BurnInTest V7.1 Pro		
File Edit Configuration Test Quick Tests Help			File Edit Configuration Test Quick Tests Help		
🕞 🗐 📋 🗶 🧕 🛛	rent configuration 💌 խ 🧮 🕢		🖬 🗐 📋 💥 🚺 🕰 🖬	rrent configuration 👻 խ 📕 🕢	
System Information Burn In Results	Event Log Temperature		System Information Burn In Result	s Event Log Temperature	
System summary Windows 7 Ultimate Edition build 1 1x Intel(R) Core(TM) 5 2500 CPU 4.0GB RAM, AMD Radoon HD 6770, 119GB SSD, 60GB SSD,	7600 (64-bit), / ∲ 3.3034c,	i	Memory Total Physical Memory: Available Physical Memory: Memory devices: Slot 1: Slot 2:	4073MB 3207MB 26B DCR3 SCRAM PC3-10600 Kington 990,5471-002. AULF, serial #: 1713206634, wk/yr: 11/2011 15/V, CB: 666-7Me, Trining: 9-9-9-24 (@ Max. freq.) 26B DCR3 SCRAM PC3-10600	a
General System Name: Motherboard Manufacturer: Motherboard Version: Motherboard Version: BIOS Varufacturer: BIOS Version: BIOS Release Date:	PERRY-PC ASUSTER: Computer INC. PRF07 Rev 1.xx MT013k21307223 American Megabends Inc. 1502 03/02/2011		Slot 3: Slot 4: Virtual Memory: Eraphics AND Radeon HD 6770 Chp Type: DAC Type:	Kington 9905471002.400F, seniali: 1715263818, wityr: 11/2011 1.5V. (dl: 66.79%; Timing 9-9-9-24 (@ Max. Irea.) Not populated ClapageBeurs (alocated base size 407248) ATI deplay adapter (Ibi688A) Internal DAC(400941c)	•
CPU manufacturer: CPU Type: CPUID: Physical CPU's: Cores per CPU: Hyperthreading:	Genuinstintol Chill connexision Intelli() Core (TM) 5-2500 CPU & 3-30GHz Family 6, Model 2A, Stepping 7 1 Sabiled Disabled	CORE'IS	Diver provider: Driver version: Driver version: Driver date: Monitor 1: Disk volumes	102-440 113-4/25600-103 ATT Fechnologes Inc. 8320.0.0 1-122-2011 1920-1080-32 60Hz (Primary monitor)	III
CPU features: Clock frequencies: Measured CPU speed: Multiplier: Base Clock:	MMX SSE SSE2 SSE3 SSE4.1 SSE4.2 DEP PAE IntelA4 MMX SMX Turbo AES d: 3311.6 MHz [Turbox 3713.0MHz] x33.0 [Turbox x77.0] 100.0 MHz		C: Local drive, NTPS, (59.53GB)	total, 39.67GB free)	
Mulpher range: Cache per CPU package: L1 Instruction Cache: L1 Data Cache: L2 Cache: L3 Cache:	Min: x16, Max non turbo: x33 [Turbo: 4C: x34, 3C: x35, 2C: x36, 1C: x37] 4 x 32 KB 4 x 32 KB 4 x 32 KB 4 x 35 KB 6 MB	Ŧ	Disk drives 	28M6G Serial 0023171139G3 (Did: 0, Sine: 119.24GB, Volume: N(A) 2 Serial 00000000121009082940 (Did: 1, Sine: 59.63GB, Volumes: C)	<i>a</i>
Ready			Ready		đ
			Sec. 1		

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3.1.2 show Disk test mode(default cyclic -- 10 ways cycle test)



3.1.3 show LITE-ON LGT-128M6G 24-hour Burn-in test PASSED



4. Summary

- 4.1 LITE-ON LGT-128M6G SSD is SATA III Interface, I/O speed, max. to 600MB/s.
- 4.2 AD903D adapter I/O performance is based on M.2(NGFF) SSD