

AD913A Interposer Card

Performance & Burn In Test Rev. 1.0

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1. Overview

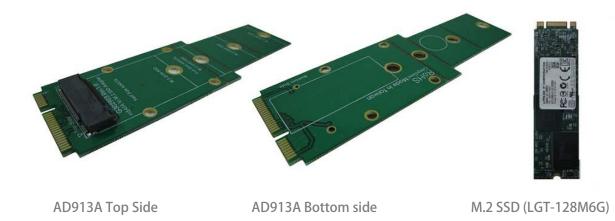
AD913A Interposer card, is mSATA to M.2 (NGFF) converter. It built M.2 (NGFF) 67pin B key connector, and use mini PCI-e 52pin golden finger board. AD913A allows 22x30(mm), 22x42(mm), 22x60(mm), 22x80(mm) M.2 SSD inserted using.

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

2.2 Test target: AD913A adapter and M.2 NGFF SSD(LITE-ON LGT-128M6G)

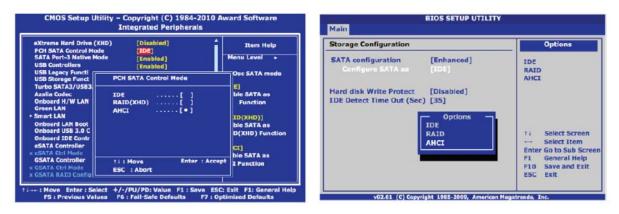


2.3 Install Hardware

Insert M.2(NGFF) SSD(LITE-ON LGT-128M6G) into AD913A converter's M.2 67pin B key connector, and then with coppers, and screws to fix SSDs. Connect AD913A converter to SATA III Port of ASUS P8P67 motherboard.

2.4 BIOS & Windows 7 OS environment setup

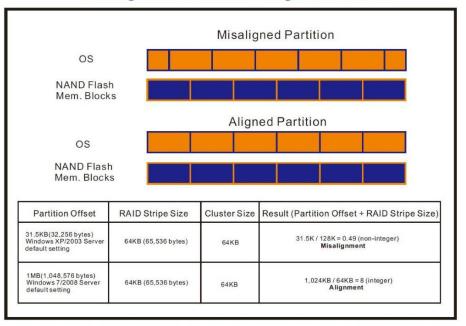
2.4.1 In BIOS(Basic Input/Output Setup) – Change IDE Mode into AHCI Mode



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

WDC 01.0 isStor - OK 31 K - BAD C Partition is not aligned		Write:	INTEL 2CV1 iaStor-OK 1024 K-OK	Read:	Write:
465.76 GB	MB/s	MB/s	74.53 GB	MB/s	MB/s
✓ 4K	MB/s	MB/s		MB/s	MB/s
4K-64Thrd	MB/s	MB/s	☑ 4K-64Thrd	MB/s	MB/s
Acc.time	ms	ms	Z Acc.time	ms	ms
Score:			Score:		-

XUsing AS SSD Benchmark viewing partition is aligned

XUsing AS SSD Benchmark to check vendor AHCI Drive is installed

AS SSD Benchmark 1.7.47	Contraction of the local division of the loc		AS SSD Benchmark 1.7.4739	.38088	
File Edit View Too E: WDC WD5000AACS-00ZU			File Edit View Tools G: MINERVA-Mercury PRO(64G		
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:
⊠ Seq	MB/s	MB/s	✓ Seq	MB/s	MB/s
<mark> </mark>	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:		
5	tart	+ though	St	art	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.

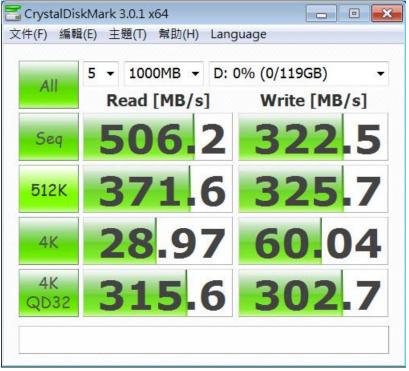
2.5 SSD I/O Performance impact factors

- 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.

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



AD913A Interposer Card

2.7 AS SSD Benchmark 1.7 performance test

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

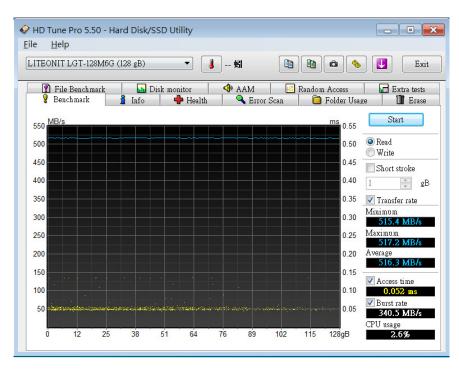
2.7.1 Used LITE-ON LSS-16L6G performance as below:

🚢 AS SSD Benchmark 1.7.4739.	38088	- • ×					
File Edit View Tools I	Language Help						
D: LITEONIT LGT-128M6G	•]						
LITEONIT LGT-128M6G DG7R iaStor - OK 1024 K - OK 119.24 GB	Read:	Write:					
I Seq	494.58 MB/s	306.04 MB/s					
☑ 4K	25.98 MB/s	50.51 MB/s					
4K-64Thrd	296.92 MB/s	262.72 MB/s					
Acc.time	0.067 ms	0.074 ms					
Score:	372	344					
	906						
		-:-:-					
Start Abort							

2.8 HD Tune Pro 5.5 performance test

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

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



2.9 AnvilBenchmark_V110_B337

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

le Benchmarks	IOmeter System I	nfo Settings	Test size 1GB	- Drive 回 d: [新纬	曾磁碟區	 Screenshot Help
SD Benchma	rk					LITEONIT LGT-128M6G 128GB/DC
Read	Resp. time	MB read	IOPS	MB/s		
Seq 4MB	7.7383ms	2,048.0	129.23	516.91		
4K	0.1425ms	342.7	7,017.86	27.41		
4K QD4	0.1443ms	1,353.2	27,713.79	108.26		1,780.16
4K QD16	0.2356ms	3,316.7	67,924.90	265.33	Run read	1,780.16
32K	0.2776ms	1,689.6	3,602.55	112.58		
128K	0.7068ms	2,654.0	1,414.81	176.85	D	3,600.76
Write	Resp. time	MB written	IOPS	MB/s	Run	3,600.76
Seq 4MB	13.0391ms	1,024.0	76.69	306.77		
4K	0.0699ms	558.9	14,307.61	55.89	Run write	1,820.60 1,820.60
4K QD4	0.0867ms	640.0	46,120.03	180.16	Fun whie	1,020.00
4K QD16	0.2501ms	640.0	63,982.90	249.93		
8P67/1502, LGA1	2500 CPU @ 3.30GHz	7600)	Drives : Notes :		1	LITEONIT LGT-128M6G 128GB/DG Drive D: 119.2/119.1GB free (99.9%) NTFS - Cluster size 4096B Storage driveriaStor 10.5.0.1026

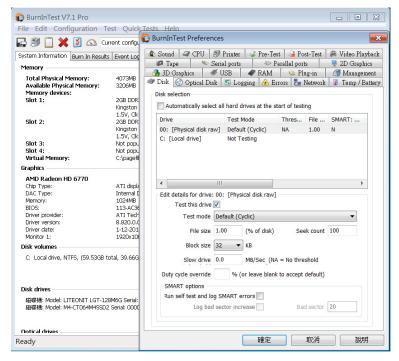
Burn In Tests and Results

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		- • X
File Edit Configuration Te	est Quick Tests Help		File Edit Configuration T	est Quick Tests Help	
🖬 🗐 🗋 X 💆 🗠 W	rent configuration 🔻 խ 🧱 🕜		🕞 🗊 📋 🗙 🔰 🕰 🛛	rrent configuration 🔻 Þ 📕 🕢	
System Information Burn In Results	Event Log Temperature		System Information Burn In Result	s Event Log Temperature	
System summary			Memory		· ·
Windows 7 Ultimate Edition build 1 x Intel(R) Core(TM) G-2200 CPL 4.008 RAM, AMD Raden FD G770, 119GB SSD, GGB SSD, General System Name: Motherboard Manufacturer: Motherboard Version:	PERV PC ASUSTOK COmputer INC. PERS7 Rev 1.vo		Total Physical Memory: Available Physical Memory: Memory devices: Slot 1: Slot 2: Slot 3: Slot 4: Virtual Memory:	4073/98 3200/98 205 DDR3 SDRAM PC3-10000 Kingston 99/5471-002.401LF, seial#: 1713226634, wk/yr: 11/2011 1.5V, Clic 606.7M+tr, Timings 99-9-24 (@ Max, freg.) 200 DDR3 SDRAM PC3-10600 Kingston 99/5471-002.401LF, seial#: 1712263010, wk/yr: 11/2011 1.5V, Clic 666.7M it; Timings 99-9-24 (@ Max, freg.) Not populated Cilpagetie.sys (allocated base size 4072MD)	ų
Motherboard Serial Number: BIUS Manufacturer: BIUS Version: BIUS Release Date: CPU	MT/U3/2130/223 American Megatrends inc. 1562 U3/02/2011		Graphics AMD Radeon HD 6770 Chip Type: DAC Type: Memory:	ATI diglay adapter (0x688A) Internal DAC(400M+2) 1024WB	-
CPU manufacturer: CPU Type: CPUID: Physical CPU's: Corres per CPU: Hyperthreading:	GenuineIntel <u>Online (R1 commarison</u> Intel(R) Core(TM) (5-2500 (RU @ 3-30GHz Parally, Model 2A, Stepping 7 1 Nokelied	(intel) man	Prieritory. BIOS: Driver provider: Driver version: Driver delle: Monitor 1: Disk volumes	2004-00 ATT Technologies br 8 8200.0 1-12-2011 1920a1080x32 60Hz (Primery monitor)	
CPUI features: Clock frequencies: Measured CPU speed: Multiplier: Base Clock:	MMX SE SSE2 SSE3 SSSE3 SSE4.1 SSE4.2 DEP PAE Intel/4 VMX SMX Turbo AES 3311.6 MHz [Turbo: 3713.0MHz] x33.0 [Turbo: x37.0] 100.0 MHz		C: Local drive, NTFS, (59.53GB t	otal, 39.6668 free)	
Muliplier 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 23 KB 4 x 25 KB 6 MB	Ŧ		9M9G Seriał: 002317115993 (Disk: 0, Sive: 119.24GB, Volumes: N/A) Seriał: 00000000121009082940 (Disk: 1, Size: 59.62GB, Volumes: C)	9.
Ready			Ready		.4

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

ile Edit Configuration							<u> </u> Σ
3 🗊 🗋 X 💆 🖎	Current co	nfiguration 🔻					
ystem Information Burn In Re	sults Event	: Log Tempera	ture				
Results for PERRY-PC							
Test configuration file: LastUse	ed.bitcfg				Status:	IDLE	
Start time: Sat Feb 01 14	:53:42 2014	\$ Stop time	: Sun Fel	0 02 14:53:50 2014	Duration:	024h 00m 08s	
Test Name	Cycle		Errors	Last Error Description	on		
ØDisk (0:)	88	226 Billion	0	No errors			
👔 Temperature	-	-	0	No errors			
		P)	AS	S	EC)

4. Summary

- 4.1 L LITE-ON LGT-128M6G SSD is SATA III Interface, I/O speed, max. to 600MB/s.
- 4.2 AD913A adapter I/O performance is based on M.2(NGFF) SSD