

# AD911A Converter Card

## Performance & Burn In Test Rev. 1.0

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### 1. Overview

AD911A Interposer card, is M.2 (NGFF) to M.2 (NGFF) converter. It built M.2 (NGFF) 67pin B key connector, and use 22x80(mm) form factor with B + M key dual notch golden finger board. AD911A allows 22x30(mm), 22x42(mm), 22x60(mm) M.2 SSD inserted using.

## 2. Tools and Results of Performance Measurement

2.1 Test Platform

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

#### 2.2 Test target: AD911A adapter and M.2 NGFF SSD(LITE-ON LSS-16L6G)

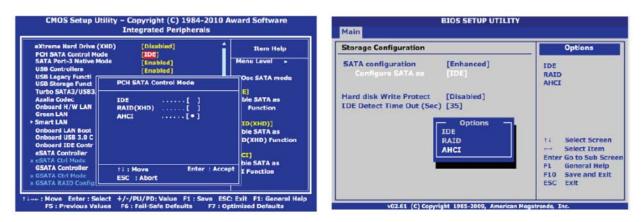


#### 2.3 Install Hardware

Insert M.2(NGFF) SSD(LITE-ON LSS-16L6G) into AD903D converter's M.2 67pin B key connector, and then with coppers, and screws to fix SSDs. Connect AD911A converter to SATA III Port of ASUS P8P67 motherboard.

#### 2.4 BIOS & Windows 7 OS environment setup

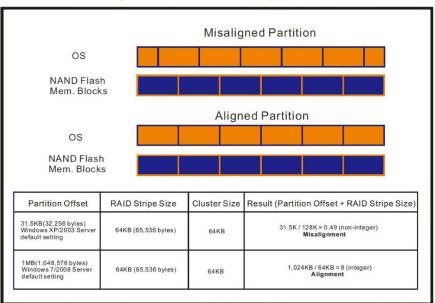
#### 2.4.1 In BIOS(Basic Input/Output Setup) – Change IDE Mode into AHCI Mode



#### 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**

E: WDC WD5000AACS-00ZU	B0 •		D: IN TEL SSDSA2M080G2G	c •	
WDC 01.0 iaStor - OK 31 K - BAD 465.76 GB	Read:	Write:	INTEL 2CV1 iaStor - OK 1024 K - OK 74.53 GB	Read: tition is aligned	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:		1

XUsing AS SSD Benchmark viewing partition is aligned

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

AS SSD Benchmark 1.7.47	and the second se		🕍 AS SSD Benchmark 1.7.4739.38088					
File Edit View Too E: WDC WD5000AACS-00ZU			File         Edit         View         Tools         Language         Help           G: MINERVA-Mercury PRO(64GB)         ATA Device         Image: Compared to the second					
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	I 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								

- 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.

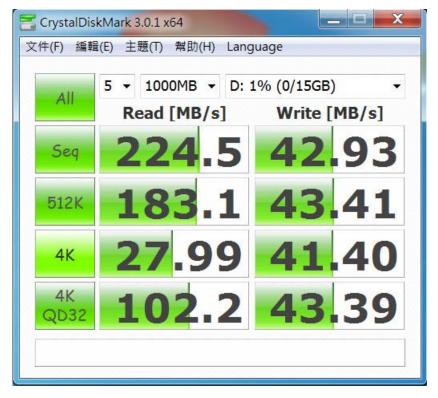
#### 2.5 SSD I/O Performance impact factors

- 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 LSS-16L6G performance as below:



# AD911A Interposer Card

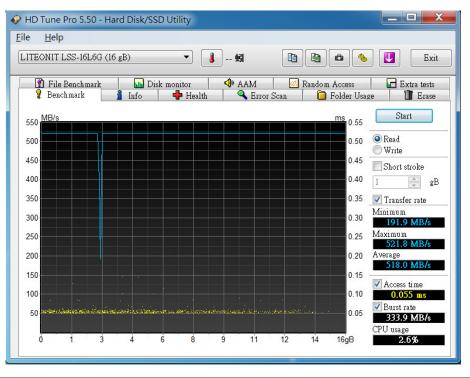
2.7 AS SSD Benchmark 1.7 performance test

※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 Language Help										
D: LITEONIT LSS-16L6G										
LITEONIT LSS-16L6G DS46 iaStor - OK 1024 K - OK 14.91 GB	Read:	Write:								
I Seq	203.32 MB/s	41.06 MB/s								
✓ 4K	24.99 MB/s	38.92 MB/s								
☑ 4K-64Thrd	93.71 MB/s	39.02 MB/s								
Acc.time	0.081 ms	0.135 ms								
Score:	139	82								
	295									
Abort										

- 2.8 <u>HD Tune Pro 5.5 performance test</u>
   ※Benchmark (Sequential Read / default block size = 8MB)
  - 2.8.1 Used LITE-ON LSS-16L6G performance as below:



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## 2.9 AnvilBenchmark\_V110\_B337

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

ile Benchmarks	IOmeter System	Info Settings	Test size 1GB	• Drive 🔲 d: [新纬	曾磁碟區]	<ul> <li>Screenshot   Help</li> </ul>
SD Benchma	LITEONIT LSS-16L6G 16GE					
Read	Resp. time	MB read	IOPS	MB/s		
Seq 4MB	19.4696ms	1,644.0	51.36	205.45		
4K	0.1469ms	332.4	6,806.92	26.59		
4K QD4	0.1871ms	1,043.9	21,378.14	83.51		967.46
4K QD16	0.6415ms	1,217.9	24,942.42	97.43	Run read	967.46
32K	0.3948ms	1,188.0	2,533.05	79.16		
128K	1.1500ms	1,631.3	869.59	108.70	Deres	1,410.35
Write	Resp. time	MB written	IOPS	MB/s	Run	1,410.35
Seq 4MB	97.5000ms	1,024.0	10.26	41.03		
4K	0.1009ms	387.0	9,907.11	38.70	Run write	442.89 <b>442.89</b>
4K QD4	0.3809ms	413.1	10,497.38	41.01	Hunwhie	442.05
4K QD16	1.5115ms	415.4	10,585.86	41.35		
Microsoft Windows 7 旗艦版 64-bit Build (7600) P8P67/1502, LGA1155 Intel(R) Core(TM) i5-2500 CPU @ 3.30GHz Memory : 4,073 MB		Drives : Notes :			LITEONIT LSS-16L6G 16GB/D Drive D: 14.9/14.8GB free (99.4% NTFS - Cluster size 4096B Storage driveriaStor 10.5.0.102	

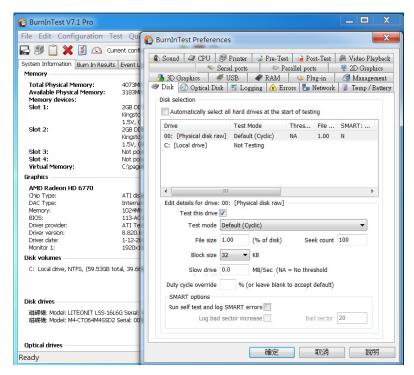
## **Burn In Tests and Results**

3.1 BurnInTest v7.1 Pro

#### 3.1.1 system information for LITE-ON LSS-16L6G as below:

🜔 BurnInTest V7.1 Pro		_ <b>D</b> X		BurnInTest V7.1 Pro		×
File Edit Configuration Tes	t Quick Tests Help			File Edit Configuration Te	est Quick Tests Help	
🕞 🗐 📋 💥 💆 🖎 Curre	ant configuration 💌 խ 🧱 🕢			🖬 🗐 🗋 X 🖉 🕰 🛛	ment configuration 💌 խ 📕 🕢	
System Information Burn In Results	Event Log Temperature			System Information Burn In Results	Event Log Temperature	
System summary				Memory	1 Sectors	•
Windows 7 Utimate Edition build 76 1 x Intel(R) Core(TM) I5-2500 CPU e 4.038 RAM, AMD Radeon HD 6770, 15GB SSD, 60GB SSD, General		Ö		Total Physical Memory: Available Physical Memory: Memory devices: Slot 1: Slot 2:	407398 318306 208 00R3 SORAM PC3-10600 Kington 9905471-002 A01LF, seliaf: 1713266634, wk/yr: 11/2011 1.5%, Cic. 666.7M+R, Tringg 9-9-924 (@ Max. heg.) 208 DDR3 SDRAM PC3-10600 Kington 9905471-002.A01LF, seliaf: 1713263818, wk/yr: 11/2011	4
Motherboard Model: Motherboard Version: Motherboard Serial Number: BIOS Manufacturer: BIOS Version:	PBRY-PC ASUSTRY Computer INC. PBP57 Rev 1.xx MITUI342-2007223 America Megatrends Inc. 1502 00(20/2011	3		Slot 3: Slot 4: Virtual Memory: Graphics AMD Radeon HD 6770 Chp Type: DAC Type:	1.5%, Cik. 665.7M4k, Trining, 9-9-9-24 (@ Max, freq.) Not populated Cr(pagefile.sys (allocated base size 407248) ATI display adapter (0n688A) Interna DAC(4004H2)	-
CPUID: Physical CPU's: Cores per CPU:	GeruneIntel <u>Online G3J comparison</u> Intel(R) Core(TM) 6-2300 CPU (th 3-30GHz Family 6, Model 2A, Stepping 7	(Intel) inter CORE'IS		Memory: BIOS: Driver provider: Driver version: Driver date: Monitor 1: Disk volumes	102498 113 4 - CR460-103 ATT Terhnologies Inc. 8.820.0.0 1-32-2011 1920-(1080:62 COHt (Pinnary monitor)	and a second sec
Multiplier: Base Clock:	Deabled MMX SSE SSE3 SSE3 SSE3 SSE4.1 SSE4.2 DEP PAE Intol64 VMX SMX Turbo AES 3011.6 M Ver [Turbo: 3713.0M v] xd3.0 [Turbo: x37.0] 10.00 M ve			C: Local drive, NTFS, (59:53GB t	otal, 39.6600 free)	
Cache per CPU package: L1 Instruction Cache: L1 Data Cache: L2 Cache:	Cache per CPU package:           L1 Instruction Cache:         4 x 32 kB           L1 Data Cache:         4 x 32 kB           L2 Cache:         4 x 26 kB		Ŧ		16G Serak 50C411542125C4002811 (Delc 0, Sae: 14.91GB, Volumer: N/A) Serak 00000000121005082940 (Delc 1, Sae: 59.62GB, Volumer: C)	<i>a</i>
Ready			,ŝ	Ready		

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



#### 3.1.3 show LITE-ON LSS-16L6G 24-hour Burn-in test PASSED

👸 BurnInTest V7.1 Pro								X		
File Edit Configuration Test Quick Tests Help										
류 🗐 📋 💥 🔯 🖎 Current configuration 🔻 🍉 📕 🚷										
System Information Burn In Results Event Log Temperature										
Results for PERRY-PC										
Test configuration file: LastUsed										
		4 Stop time	: Tue Fel	0 04 17:09:59 2014	Duration:	024h 00m 08s				
000600100000000000000000000000000000000										
			-							
Test Name  Poisk (0:)	Cycle 647	Operations 215 Billion	O	Last Error Descriptio	n					
Temperature	-	-	0	No errors						
	BurnIn	Test test resu	dt					X		
	burnin	rest test rest	unc							
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				AS						
			•							
View errors by categories				0	ĸ					
Ready			_		_		_			

#### 4. Summary

- 4.1 L LITE-ON LSS-16L6G SSD is SATA III Interface, I/O speed, max. to 600MB/s.
- 4.2 AD911A adapter I/O performance is based on M.2(NGFF) SSD