

96ND500G-ST-SG5K2

Test Report

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Approved by	Sophie.Song	Job Title	AKDC DQA assistant manager	Release Status	Formal Release

Revision History

Revision Date	Revision	Description	Creator
2011/07/20	1.0	First version released	Jier.liu
2011/09/21	1.1	Add BIOS/Driver for RAID card.	Jier.liu
2012/04/17	1.2	Adjust the test method, update report format.	Jeans.Zhou
2013-12-09	1.3	SATA IO update to SATA3 from SATA2	Jason.Jiang

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Test Result Definition

Item	Description
Pass	Compatibility test properly without any problem.
Fail	Compatibility test can't work properly and can't meet the product spec, please describe issue to the "Remark" item.
No test	No test (no test tool or device or driver not ready), please write reason to the "Remark" item.
N/A	Spec not support.
Limitation	Compatibility issue Limitation, it needs formal approval mail or other formal reply from PM or Applicant or Manufacturer.

Test Item List Summary

Num.	Test item	Result	Remark
Chapter 1	Function test	Pass	
1.1	Device Information confirm	Pass	
1.2	Basic function test	Pass	
1.3	HDD LED test	Pass	
Chapter 2	Compatibility test	Pass	
2.1	With OS compatibility test	Pass	
2.2	With motherboard compatibility test	Pass	
2.3	With RAID card compatibility test	Pass	
Chapter 3	Performance test	Pass	
3.1	HD Tach	Pass	
3.2	HD Tune	Pass	
Chapter 4	Reliability test	Pass	
4.1	Loading test	Pass	

Appendix 1:Motherboard compatibility List

MB/SBC	Core Chipset	Remark
PCA-6011	Intel G41+ICH7	
PCE-5124	Intel Q35 GMCH+ICH9DO	
PCM-8206	Atom D2700+NM10	
PCE-5026	Intel H61	
PCE-5126	Sandy bridge Q67	
UNO-2184	Intel QM77	

Appendix 2: Raid card compatibility List

P-TD Part Number	Band	MN/PN	BIOS	Driver Rev	Remark
96RC-SAS-4C-PE-HP	HighPoint	Rocket SAS RAID 2640	V1.3	1.5.10.1012	Win7 32bit
96RC-SAS-8P-PE-LS1	LSI	SAS 9260-8i	3.25.00	6.504.5.0	Win7 32bit
96RC-SAS-8P-PE-LS3	LSI	SAS 9271-8i	5.33.00	6.505.5.0	Win7 64bit
96RC-SAS-4P-PE-AD1	ADAPTEC	ASR-6405E	V5.2-0[Build 19076]	5.2.0.19076	Win7 32bit
96RC-SAS-8P-PE-AD1	ADAPTEC	ASR-6805E	V5.2-0[Build 19076]	5.2.0.19076	Win7 32bit
96RC-SAS-8P-PE-AD	ADAPTEC	ASR-6805	V5.2-0[Build 19109]	5.2.0.19076	Win7 64bit

Product Information

Advantech Part Number	96ND500G-ST-SG5K2
Manufacturer	Seagate
Model Number	ST500LT012-1DG142
Model Generation	Momentum® Thin
Form Factor	2.5''
Interface	SATAIII
Capacity	500GB
Cache Capacity	16MB
Rotation Speed (RPM)	5400RPM
Host Transfer Rate	6Gb/s
Internal Transfer Rate	100MB/s(max)
Bytes per physical sector	512 (logical) / 4096 (physical)
Number of disc	1
Power On Hour (POH)	8x5
Annualized Failure Rate (AFR)	1 per 10 ¹⁴ bits read
MTBF	N/A
Voltage Tolerance	5V ± 5%
Operating Temperature	0° to 60°C
Firmware	0001SDM1
Country of origin	China
Dimension (W x H x D)	69.85x x100.35x6.8(mm)
ROHS Status (Yes/No)	Yes

Photo:



Test Platform

MB/SBC	PCA-6011		
PCB version	A101-3	CPU	Intel Pentium Dual E21802.00GHZ
BIOS version	V1.11	DRAM	Apacer DDR3 1333 4GB DIMM
Core Chipset	Intel G41+ICH7	Backplane	PCA-6114P12_B301-1
VGA Chipset	G41 integrated	Other	

MB/SBC	PCE-5124		
PCB version	A101-2	CPU	Intel Core2 E8400 3.00GHZ
BIOS version	V1.23	DRAM	Transcend 2G DDR2 667 DIMM
Core Chipset	Intel Q35 GMCH+ICH9DO	Backplane	PCE-5B12-07_A101-1
VGA Chipset	Q35 integrated	Other	


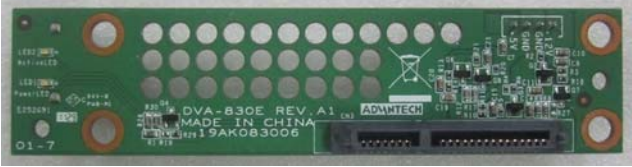
MB/SBC	PCM-8206		
PCB version	A101-2	CPU	Intel Onboard D2700 2.13GHz
BIOS version	8206X010	DRAM	Apacer DDR3 1333 2GB SODIMM
Core Chipset	Intel D2700+NM10	Backplane	N/A
VGA Chipset	D2700 integrated	Other	

MB/SBC	PCE-5026VG		
PCB version	A101-2	CPU	Intel i3-2120 3.3GHZ
BIOS version	V1.10	DRAM	Apacer DDR3 1333 4GB DIMM
Core Chipset	Intel H61	Backplane	PCE-5B12-07_A101-1
VGA Chipset	CPU integrated	Other	

MB/SBC	PCE-5126QG		
PCB version	A101-4	CPU	Intel i7-2600 3.4GHZ
BIOS version	V1.10	DRAM	Apacer DDR3 1333 4GB DIMM
Core Chipset	Sandy bridge Q67	Backplane	PCE-5B12-07_A101-1
VGA Chipset	CPU integrated	Other	

MB/SBC	UNO-2184G		
PCB version	A101-2	CPU	Intel i7-3555LE 2.50GHZ
BIOS version	Y1.12	DRAM	4G DDR3 1333
Core Chipset	Intel QM77	Backplane	N/A
VGA Chipset	CPU integrated	Other	

Test Software

Utilities	Version / Description
Power On/Off (For Reliability test)	
Passmark BurnIn Test Pro (For Reliability test)	V7.0 build 1015
SiSoftware Sandra 2013	V19.11
HD Tach (For Performance test)	V3.0.4.0
HD Tune (For Performance test)	V5.0
HDD board(for HDD LED test)	 <p>DVA-830E_A101-7(add 20k resistor on R19)</p>

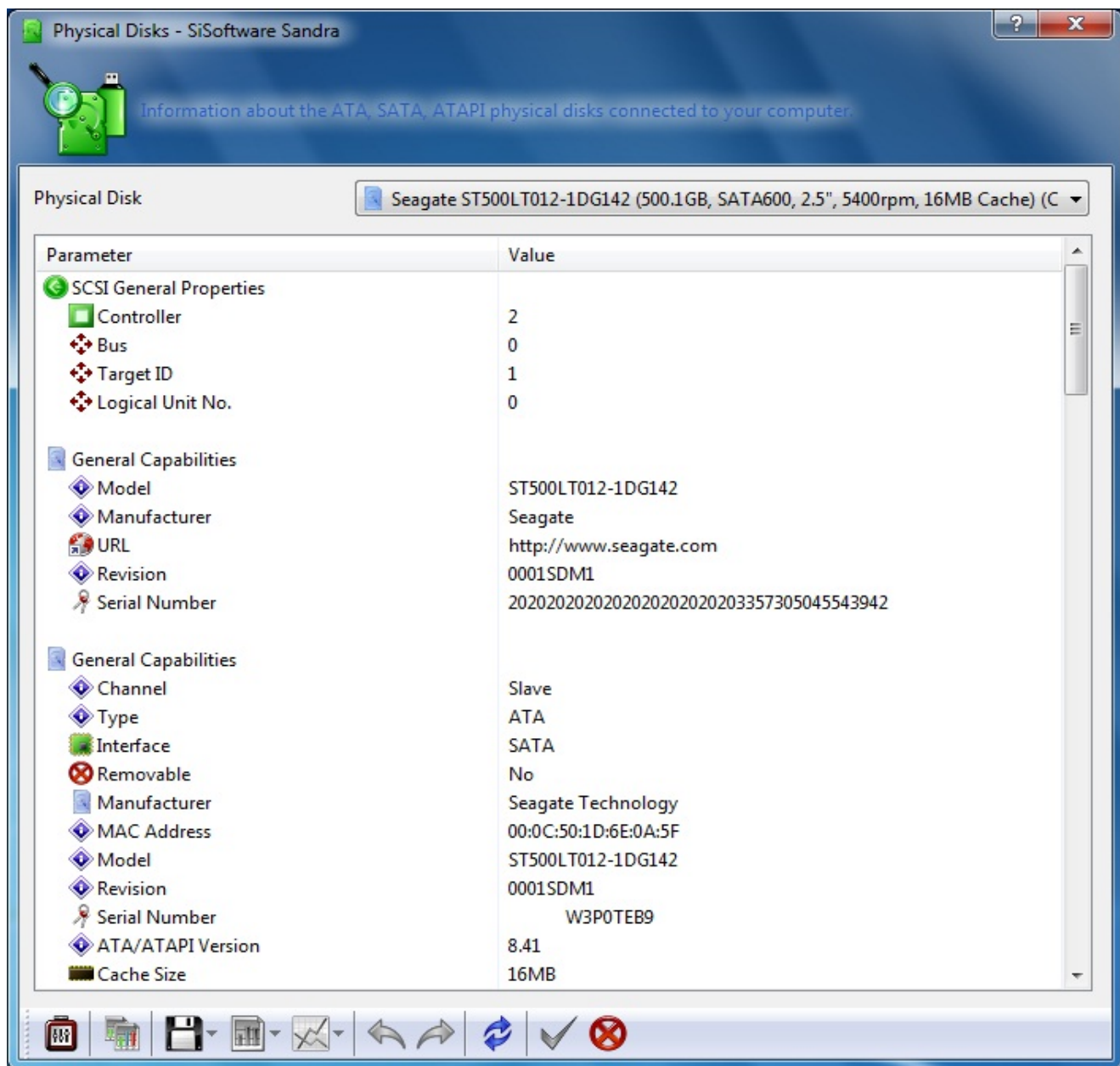
Test Item

Chapter 1: Function test

1.1 Device Information confirm

The test ensures the product meets SPEC. Check disk information under SiSoftware Sandra, and paste the screenshot of test result as below.

Test result (MB/SBC:PCA-6011):



Physical Disk: Seagate ST500LT012-1DG142 (500.1GB, SATA600, 2.5\", 5400rpm, 16MB Cache) (C)

Parameter	Value
Sensors	
Disk Enclosure Temperature	28.00°C
Transfer Modes Support	
I/O Queue Depth	32
Block Size	16
Maximum SATA Mode	G3 / SATA600
Transfer Modes Active	
Current Block Transfer	16
Current SATA Mode	G3 / SATA600
Translation Mode Disk Geometry	
CHS Geometry	60801 x 255 x 63
Bytes Per Sector	512bytes
Capacity	465.76GB
Cache Information	
Read Cache	Yes
Write Cache	Yes
Prefetch Buffer	No
Partitions Information	
Partition 1	MBR Boot IFS-NTFS 100MB
Partition 2	MBR IFS-NTFS 153.16GB

Basic function test

The test ensures the product basic function normally. Please see the table list as below:

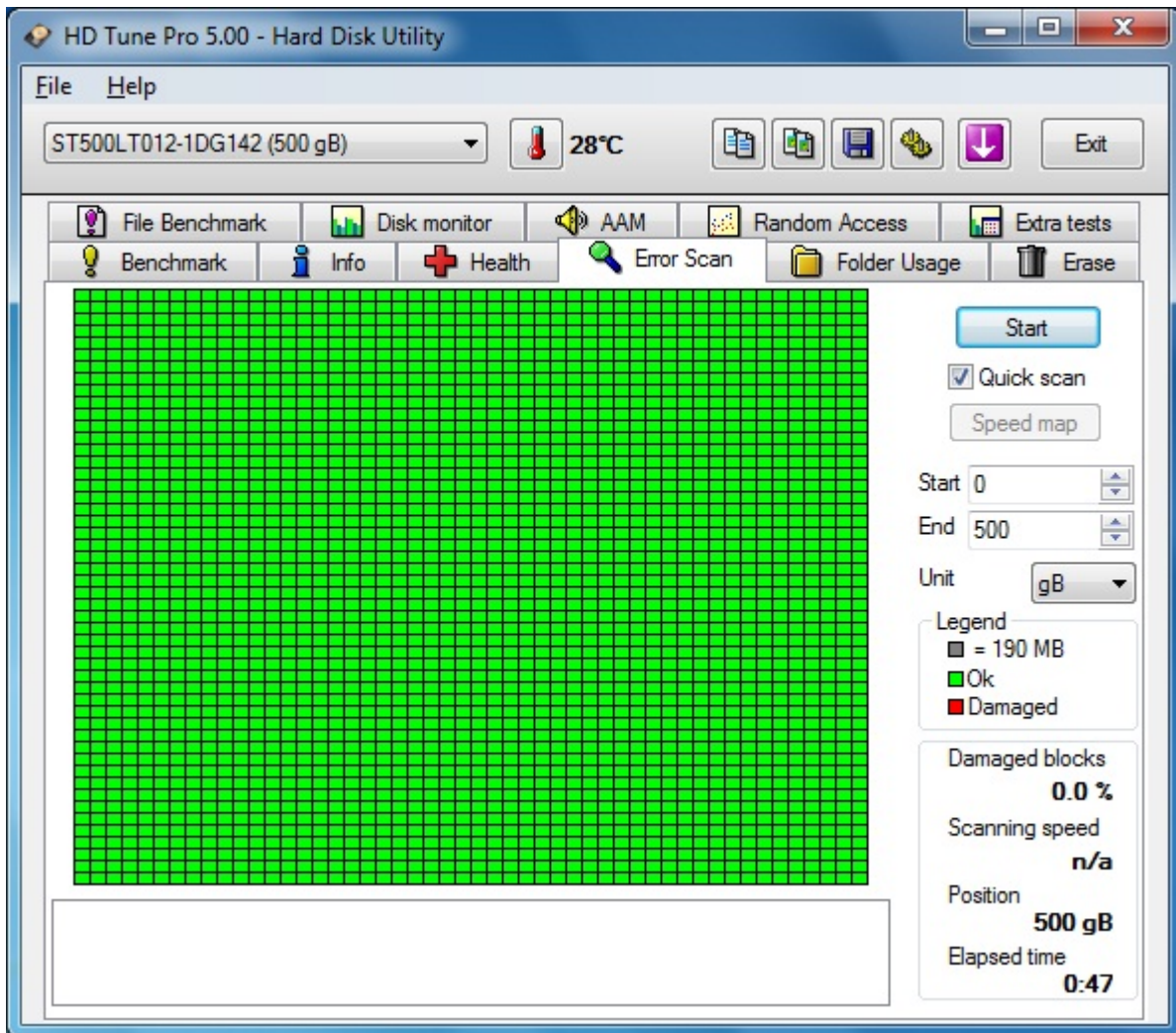
Please see the test criteria as below:

1. The disk can partition and format without any problem;
2. Run HD TUNE test error scan without any problem, and paste the screenshot of test result as below.

MB/SBC:PCA-6011

Test Item	Result	Remark
Disk partition and format test	Pass	
Disk errors scan test	Pass	

Error scan test result:



1.2 HDD LED test

The test ensures the function of HDD LED on SATA P11 is effective.

Please see the table list as below:

1. The Power LED (LED1) can be lighted all the time when HDD power on.
2. The Active LED (LED2) can blink when HDD in working status.

HDD Board	PCE-5026	
Item	Result	Remark
LED1	Pass	
LED2	Pass	

Chapter 2: Compatibility test

2.1 With OS compatibility test

The test ensures mainstream windows OS can be installed and boot into OS properly.

Please see the test criteria as below:

1. Check disk capacity can display correctly;
2. Make sure Partition and format function is normal.
3. Run Burn-in test 30 minutes with disk, the test must pass at 100% loading.

Test platform	PCE-5026	
OS	Version	Result
Windows XP	Windows XP professional edition 32bit	Pass
Windows 7	Windows 7 Ultimate 32bit	Pass
Windows 2008	Windows 2008 Server R2 64bit	Pass
Windows 8	Windows 8 Ultimate 64bit	Pass

2.2 With motherboard compatibility test

The test ensures the disk can work properly with different framework and chipsets of Motherboard.

Please see the test criteria as below:

1. Check disk model, capacity can display correctly, and record the result in BIOS.
2. The OS can be installed successfully and boot into OS properly.
3. Make sure Partition and format function is normal.
4. Run Power on/off, the test must pass at least 10 times.

5. Run Burn-in test 30 minutes with disk, the test must pass at 100% loading.

MB/SBC	Drive model	Capacity	OS	Result	Remark
PCA-6011	ST500LT012-1DG142	500.1GB	Win7 32bit	Pass	
PCE-5124	ST500LT012-1DG142	500.1GB	Win7 32bit	Pass	
PCM-8206	ST500LT012-1DG142	500.1GB	Win7 32bit	Pass	
PCE-5026	ST500LT012-1DG142	500.1GB	Win7 32bit	Pass	
PCE-5126	ST500LT012-1DG142	500.1GB	Win7 32bit	Pass	
UNO-2184	ST500LT012-1DG142	500.1GB	Win7 64bit	Pass	

2.3 With RAID card compatibility test

The test ensures the disk can work properly with different RAID card.

Please see the test criteria as below:

1. The disk can be detected, and the BIOS of Raid card should show the correct drive model and capacity etc information.
2. Make sure the disk can build Raid, Check Raid disk size should be as below:

RAID Level	Size	RAID Level	Size
RAID 0	1+1=2	RAID 1	1+1=1
RAID 5	1+1+1=(N-1)*1	RAID 10	2+2=2

3. OS can be installed into the RAID disk without any problem.
4. Run Burn-in test 30 minutes with disk, the test must pass at 100% loading.
5. Run Power on/off, the test must pass at least 10 times.

MB/SBC:PCE-5026

RAID Card	Disk	RAID Level	Raid size	In Slot	OS	Result	Remark
96RC-SAS-4C-PE-HP	ST500LT012-1DG142*2	RAID0	1000.05GB	P1PCIE1 (PCIEX1)	Win7 32bit	Pass	
96RC-SAS-8P-PE-AD2	ST500LT012-1DG142*2	RAID0	930.0GB	P1PCIE1 (PCIEX4)	Win7 32bit	Pass	
96RC-SAS-4P-PE-AD1	ST500LT012-1DG142*2	RAID1	465.0GB	P1PCIE1 (PCIEX4)	Win7 32bit	Pass	
96RC-SAS-8P-PE-AD	ST500LT012-1DG142*2	RAID1	465.0GB	PPCIE1 (PCIEX8)	Win7 64bit	Pass	

96RC-SAS-8P-PE-LS1	ST500LT012-1DG142*2	RAID0	929.458GB	PPCIE1 (PCIEX8)	Win7 32bit	Pass	
96RC-SAS-8P-PE-LS3	ST500LT012-1DG142*2	RAID1	465.250GB	PPCIE1 (PCIEX8)	Win7 64bit	Pass	

Ps:RAID card information

Advantech PN	Band	MN/PN	Bus	BIOS	Driver
96RC-SAS-4C-PE-HP	HighPoint	Rocket SAS RAID 2640	PCIEX4	V1.4	1.5.10.1012
96RC-SAS-8P-PE-AD2	ADAPTEC	ASR-6805E R5	PCIEX4	V5.2-0[Build 19076]	5.2.0.19076
96RC-SAS-4P-PE-AD1	ADAPTEC	ASR-6405E	PCIEX1	V5.2-0[Build 19676]	5.2.0.19076
96RC-SAS-8P-PE-AD	ADAPTEC	ASR-6805	PCIEX8	V5.2-0[Build 19109]	5.2.0.19076
96RC-SAS-8P-PE-LS1	LSI	SAS 9260-8i	PCIEX8	3.25.00	6.504.5.0
96RC-SAS-8P-PE-LS3	LSI	SAS 9271-8i	PCIEX8	5.33.00	6.505.5.0

Chapter 3: Performance test

The test ensures the disk performance can reach the average value. Record the benchmark score and compare the score with other product.

3.1 HD Tach

MB/SBC	HD Tach				Result	Remark
	Burst Speed (MB/s)	Average Read (MB/s)	CPU Utilization	Random Access Time (ms)		
PCA-6011	258.1	97.6	5%	18.3	Pass	WinXP 32bit
PCE-5124	259.5	97.4	4%	18.4	Pass	WinXP 32bit
PCM-8206	231.2	97.6	4%	18.3	Pass	WinXP 32bit
PCE-5026	233.1	96.5	2%	19.1	Pass	WinXP 32bit
PCE-5126	298.6	97.5	3%	18.3	Pass	WinXP 32bit
UNO-2184	368.0	97.6	4%	18.2	Pass	WinXP 32bit

3.2 HD Tune

3.2.1 Read test

MB/SBC	HD Tune						Result	Remark
	Minimum Transfer Rate (MB/s)	Maximum Transfer Rate (MB/s)	Average Transfer Rate (MB/s)	Access Time (ms)	CPU Usage	Burst Speed (MB/s)		
PCA-6011	57.8	120.4	93.1	18.4	2.3%	228.7	Pass	WinXP 32bit
PCE-5124	57.8	120.4	93.0	18.5	2.2%	229.7	Pass	WinXP 32bit
PCM-8206	57.8	119.9	93.1	18.3	2.8%	194.0	Pass	WinXP 32bit
PCE-5026	55.0	118.5	91.0	18.2	3.4%	209.7	Pass	WinXP 32bit
PCE-5126	54.4	118.5	90.9	18.1	2.2%	361.9	Pass	WinXP 32bit
UNO-2184	57.8	120.4	93.1	18.4	3.9%	311.5	Pass	WinXP 32bit

3.2.2 Write test

MB/SBC	HD Tune						Result	Remark
	Minimum Transfer Rate (MB/s)	Maximum Transfer Rate (MB/s)	Average Transfer Rate (MB/s)	Access Time (ms)	CPU Usage	Burst Speed (MB/s)		
PCA-6011	55.2	118.7	90.4	24.7	2.1%	208.3	Pass	WinXP 32bit
PCE-5124	54.0	118.5	90.3	24.5	2.0%	173.9	Pass	WinXP 32bit
PCM-8206	53.6	118.9	90.1	24.9	2.7%	177.5	Pass	WinXP 32bit
PCE-5026	51.6	118.1	88.3	25.0	15.2%	174.5	Pass	WinXP 32bit
PCE-5126	54.7	120.3	90.2	25.2	2.2%	184.4	Pass	WinXP 32bit
UNO-2184	54.7	117.8	90.0	24.5	3.2%	196.6	Pass	WinXP 32bit

Chapter 4: Reliability test

4.1 Loading test

The test ensures under the environment of high load the HDD can work properly.

Test platform	PCE-5026	
OS	Windows 7 Ultimate 32bit	
Item	Pass Criteria	Result
Power on/off	Power on/off 100 times, successful boot rate 100%;	Pass
Passmark Burn_in	Set DISK loading 100%, all disks file size 15%; The result of all disks should be Passed when running Burn_in for 12 hours.	Pass

Chapter 5: Appendix