

Product Qualification

--- Compatibility Test ---

Product Name: PCIe M.2 2280 256GB 512Gbx4
Product P/N: APP256G1AN-01TT
Firmware Version: SFPE721A(E7FM02.1)
Description: PCIe M.2 2280 256GB 512Gbx4
Controller: PS5007
Flash Type: TH58TFG9DDLBA8C
Qualification: Qual All
Test Result: PASS

| APPROVAL | | | | | |
|---------------|------------|----------------------|-------------|------------|-------------------|
| QT | Date | Signature | Approved by | Date | Signature |
| Martin Chiang | 2016/10/20 | <i>Martin Chiang</i> | Danny Chen | 2016/10/20 | <i>Danny Chen</i> |

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SUMMARY RESULT

| | | PC1 | PC2 | PC3 | PC4 | | |
|----------------------------|-------------------------------------|-----------------------------|-----------------------------------|------------|-----------------------------|--------------------------|--------------------------------|
| Testing Product | | PCIe M.2 2280 256GB 512Gbx4 | | | | | |
| System | | Windows 10 Enterprise | Windows Embedded 8.1 Industry Pro | | | | |
| M/B | Name | Z170-A | H97M-E | | | | |
| | Vendor | ASUS | ASUS | | | | |
| | Chipset | Intel Z170 | Intel H97 | | | | |
| | Interface | SATA III | SATA III | | | | |
| | BIOS | 1702 | 2602 | | | | |
| Test Result | | | | | | | |
| Basic Function Test | | √ | √ | | | | |
| Burn In Test | Comp32 | √ | -- | | | | |
| | PassMark Burn In Test Pro V8.0 | √ | -- | | | | |
| | PassMark Burn In Test Pro V3.0.1007 | -- | -- | | | | |
| Warm Boot Test | | √ | -- | | | | |
| Cold Boot Test | | -- | √ | | | | |
| Install System Test | | | | | | | |
| | Windows Emb. 7 Standard | Windows Emb. 8 Standard | Windows Emb. 8.1 Industry | Windows 10 | Fedora kernel 3.3.4 -5 fc17 | Ubuntu kernel 3.13.0 -32 | Red Hat kernel 2.6.32 -431.e16 |
| Result | √ | √ | √ | √ | √ | √ | √ |
| Remark: | | Test Result — PASS | | | | | |

A. Function Test With M/B : Gigabyte GA-Z170X Gaming 3

| | | | |
|----------------------------|---|--|------------------|
| Testing Product | PCIe M.2 2280 256GB 512Gbx4 | Testing Engineer | Martin Chiang |
| Testing Environment | M/B: Gigabyte GA-Z170X Gaming 3 | Chipset: Intel Z170 Interface: SATA III | BIOS: F5b |

1. Basic Function Test

| | Copy | Delete | Restart | Compare | Suspend (S3) | Hibernate (S4) | LED |
|-----------------------|------|--------|---------|---------|--------------|----------------|-----|
| Windows 10 Enterprise | V | V | V | V | V | V | V |

2. Format Test

| | FAT32 | NTFS |
|-----------------------|-------|-------|
| Windows 10 Enterprise | -- | 238GB |

3. Burn In Test

| | Comp32 15 hours | Burn In Test V8.0 Pro 168 hours |
|-----------------------|--------------------|------------------------------------|
| Windows 10 Enterprise | V | V |

4. Reboot Test

| | Warm Boot 6000 Cycles |
|-----------------------|-----------------------|
| Windows 10 Enterprise | V |

5. Install System Test

| Install System | Result |
|-----------------------------------|--------|
| Windows Embedded Standard 7 | V |
| Windows Embedded 8 Standard | V |
| Windows Embedded 8.1 Industry Pro | V |
| Windows 10 Enterprise | V |
| Windows 10 Multiple Edition | V |

6. Test Result

| |
|------|
| Pass |
|------|

B. Function Test With M/B : Asus H97M-E

| | | | |
|----------------------------|-----------------------------|---|-------------------|
| Testing Product | PCIe M.2 2280 256GB 512Gbx4 | Testing Engineer | Martin Chiang |
| Testing Environment | M/B: Asus H97M-E | Chipset: Intel H97 Interface: SATA III | BIOS: 2602 |

1. Basic Function Test

| | Copy | Delete | Restart | Compare | Suspend (S3) | Hibernate (S4) | LED |
|-----------------------------------|------|--------|---------|---------|--------------|----------------|-----|
| Windows Embedded 8.1 Industry Pro | V | V | V | V | V | V | V |

2. Reboot Test

| | Cold Boot 6000 Cycles |
|-----------------------------------|-----------------------|
| Windows Embedded 8.1 Industry Pro | V |

3. Install System Test

| Install System | Result |
|-----------------------------------|--------|
| Windows Embedded Standard 7 | V |
| Windows Embedded 8 Standard | V |
| Windows Embedded 8.1 Industry Pro | V |
| Windows 10 Enterprise | V |
| Windows 10 Multiple Edition | V |
| Fedora kernel 3.3.4 -5 | V |
| Ubuntu kernel 3.13.0 -32 | V |
| Red Hat Kernel 2.6.32 -431.e16 | V |

4. Test Result

| |
|------|
| Pass |
|------|

C. Performance Test With M/B : Gigabyte GA-Z170X Gaming 3

| | | | |
|----------------------------|------------------------------------|--|---------------|
| Testing Product | PCIe M.2 2280 256GB 512Gbx4 | Testing Engineer | Martin Chiang |
| Testing Environment | M/B: Gigabyte GA-Z170X Gaming 3 | Chipset: Intel Z170 Interface: SATA III | BIOS: F5b |

| OS : Windows 10 / Performance Tool : CrystalDiskMark 5.1.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|----------------|--------------|--------------|-----------|------|-------|----------|-------|-------|-----|------|-------|----|-------|-------|---|------|-------------|--------------|-----------|------|-------|----------|-------|-------|-----|------|-------|----|-------|-------|
| Before the Test | After the Test | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Test</th> <th>Read [MB/s]</th> <th>Write [MB/s]</th> </tr> </thead> <tbody> <tr> <td>Seq Q32T1</td> <td>2454</td> <td>416.2</td> </tr> <tr> <td>4K Q32T1</td> <td>520.9</td> <td>417.2</td> </tr> <tr> <td>Seq</td> <td>1162</td> <td>415.3</td> </tr> <tr> <td>4K</td> <td>31.79</td> <td>136.4</td> </tr> </tbody> </table> | Test | Read [MB/s] | Write [MB/s] | Seq Q32T1 | 2454 | 416.2 | 4K Q32T1 | 520.9 | 417.2 | Seq | 1162 | 415.3 | 4K | 31.79 | 136.4 | <table border="1"> <thead> <tr> <th>Test</th> <th>Read [MB/s]</th> <th>Write [MB/s]</th> </tr> </thead> <tbody> <tr> <td>Seq Q32T1</td> <td>2471</td> <td>697.5</td> </tr> <tr> <td>4K Q32T1</td> <td>528.0</td> <td>431.9</td> </tr> <tr> <td>Seq</td> <td>1069</td> <td>612.2</td> </tr> <tr> <td>4K</td> <td>31.84</td> <td>136.2</td> </tr> </tbody> </table> | Test | Read [MB/s] | Write [MB/s] | Seq Q32T1 | 2471 | 697.5 | 4K Q32T1 | 528.0 | 431.9 | Seq | 1069 | 612.2 | 4K | 31.84 | 136.2 |
| Test | Read [MB/s] | Write [MB/s] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Seq Q32T1 | 2454 | 416.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4K Q32T1 | 520.9 | 417.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Seq | 1162 | 415.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4K | 31.79 | 136.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test | Read [MB/s] | Write [MB/s] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Seq Q32T1 | 2471 | 697.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4K Q32T1 | 528.0 | 431.9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Seq | 1069 | 612.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4K | 31.84 | 136.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| OS : Ubuntu 15.01 / Performance Tool : Benchmark | |
|---|--|
| Performance Before the Test | |
| <p>Benchmark</p> <p>Disk or Device 256 GB Block Device (/dev/nvme0n1)</p> <p>Last Benchmarked Thu 06 Oct 2016 05:04:05 PM CST (Less than a minute ago)</p> <p>Sample Size 10.0 MiB (10,485,760 bytes)</p> <p>Average Read Rate 1.7 GB/s (100 samples)</p> <p>Average Write Rate 367.2 MB/s (100 samples)</p> <p>Average Access Time 0.11 msec (1000 samples)</p> <p>Start Benchmark... Close</p> | |

D. Additional Qualification:

1. Environmental

- 1. RoHS Standard 2011/65/EU / PCRD005
- 2. Other Environmental Standard REACH / China RoHS
- 3. WEEE (By Product) 2012/19/EU
- 4. Battery Standard N/A
- 5. Packing Standard 94/62/EC
- 6. Others N/A

2. Certification

- 1. CE No. _____
- 2. FCC No. _____
- 3. BSMI No. _____
- 4. VCCC No. _____
- 5. C-tick No. _____
- 6. Other _____

