Apacer Technology Inc. **Qual Report**

SX170-uSSD
Reliability & Environment Test Report

Test Start : 2022,3,21
Test End : 2022,4,22

Tested by:

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Approved by:

Danny TC Chen

Ver 1.0

April 22, 2022

Apacer Technology

Qual Report

1. High Temperature Storage Test(Pass)

1.1 Testing Objective

To verify the varied temperature requirements from the different areas because products may be subjected to varied operation temperature condition. The product must be tested to verify its temperature endurance.

1.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Connect the component (DUT) to the motherboard and verify its functionality for baseline.
3. Put the component (DUT) into chamber and the motherboard is outside.
4. Program the test profile and turn on the chamber based on specification.
5. Inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.

1.3 Testing Component (DUT)

5pcs SX170-uSSD

1.4 Testing Equipment

KSON THS-A6T-150 Temperature/Humidity chamber

1.5 Testing Specification

1.Temperature:85 ºC
2.Duration:72Hours

1.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

1.7 Testing Result

Testing Condition	Temperature	Testing Time	Result	Remark
			Sample No. 1,2,3,4,5	
Storage	85ºC	72 hours	Pass	-

2. High Temperature Operating Test(Pass)

2.1 Testing Objective

To verify the varied temperature requirements from the different areas because products may be subjected to varied operation temperature condition. The product must be tested to verify its temperature endurance.

2.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Connect the component (DUT) to the motherboard and verify its functionality for baseline.
3. Put the component (DUT) into chamber and the motherboard is outside then power on the motherboard.
4. Program the test profile and turn on the chamber based on specification.
5. Inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.

2.3 Testing Component (DUT)

5pcs SX170-uSSD

2.4 Testing Equipment

KSON THS-A6T-150 Temperature/Humidity chamber

2.5 Testing Specification

1.Temperature:70 °C
2.Duration72 Hours

2.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

2.7 Testing Result

Testing Condition	Temperature	Testing Time	Result	Remark
			Sample No. 1,2,3,4,5	
Operation	70°C	72 hours	Pass	-

3. Low Temperature Storage Test(Pass)

3.1 Testing Objective

To verify the varied temperature requirements from the different areas because products may be subjected to varied operation temperature condition. The product must be tested to verify its temperature endurance.

3.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Connect the component (DUT) to the motherboard and verify its functionality for baseline.
3. Put the component (DUT) into chamber and the motherboard is outside.
4. Program the test profile and turn on the chamber based on specification.
5. Inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.

3.3 Testing Component (DUT)

5pcs SX170-uSSD

3.4 Testing Equipment

KSON THS-A6T-150 Temperature/Humidity chamber

3.5 Testing Specification

1.Temperature:-40 ºC
2.Duration:72 Hours

3.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

3.7 Testing Result

Testing Condition	Temperature	Testing Time	Result	Remark
			Sample No. 1,2,3,4,5	
Storage	-40ºC	72 hours	Pass	-

4. Low Temperature Operating Test(Pass)

4.1 Testing Objective

To verify the varied temperature requirements from the different areas because products may be subjected to varied operation temperature condition. The product must be tested to verify its temperature endurance.

4.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Connect the component (DUT) to the motherboard and verify its functionality for baseline.
3. Put the component (DUT) into chamber and the motherboard is outside then power on the motherboard.
4. Program the test profile and turn on the chamber based on specification.
5. Inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.

4.3 Testing Component (DUT)

5pcs SX170-uSSD

4.4 Testing Equipment

KSON THS-A6T-150 Temperature/Humidity chamber

4.5 Testing Specification

1.Temperature:0 ºC
2.Duration:72 Hours

4.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

4.7 Testing Result

Testing Condition	Temperature	Testing Time	Result	Remark
			Sample No. 1,2,3,4,5	
Operation	0ºC	72 hours	Pass	-

5. High Humidity Operating Test(Pass)

5.1 Testing Objective

To verify the varied temperature requirements from the different areas because products may be subjected to varied operation temperature condition. The product must be tested to verify its temperature/humidity endurance.

5.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Connect the component (DUT) to the motherboard and verify its functionality for baseline.
3. Put the component (DUT) into chamber and the motherboard is outside.
4. Program the test profile and turn on the chamber based on specification.
5. Inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.

5.3 Testing Component (DUT)

5pcs SX170-uSSD

5.4 Testing Equipment

KSON THS-A6T-150 Temperature/Humidity chamber

5.5 Testing Specification

1.Temperature:40 ºC
2.Humidity:95%
3.Duration:4Hours

5.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

5.7 Testing Result

Testing Condition	Temperature/Humidity	Testing Time	Result	Remark
			Sample No. 1,2,3,4,5	
Operation	40ºC/95%	4 hours	Pass	

6. High Humidity Storage Test(Pass)

6.1 Testing Objective

To verify the varied temperature requirements from the different areas because products may be subjected to varied operation temperature condition. The product must be tested to verify its temperature/humidity endurance.

6.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Connect the component (DUT) to the motherboard and verify its functionality for baseline.
3. Put the component (DUT) into chamber and the motherboard is outside then power on the motherboard.
4. Program the test profile and turn on the chamber based on specification.
5. Inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.

6.3 Testing Component (DUT)

5pcs SX170-uSSD

6.4 Testing Equipment

KSON THS-A6T-150 Temperature/Humidity chamber

6.5 Testing Specification

1.Temperature:40 ºC
2.Humidity:95%
3.Duration:72Hours

6.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

6.7 Testing Result

Testing Condition	Temperature	Testing Time	Result	Remark
			Sample No. 1,2,3,4,5	
Storage	40ºC/95%	72 hours	Pass	-

7. Temperature Cycling Operating Test(Pass)

7.1 Testing Objective

To verify the varied temperature requirements from the different areas because products may be subjected to varied operation temperature condition. The product must be tested to verify its temperature endurance.

7.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Connect the component (DUT) to the motherboard and verify its functionality for baseline.
3. Put the component (DUT) into chamber and the motherboard is outside then power on the motherboard.
4. Program the test profile and turn on the chamber based on specification.
5. Inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.

7.3 Testing Component (DUT)

5pcs SX170-uSSD

7.4 Testing Equipment

KSON THS-A6T-150 Temperature/Humidity chamber

7.5 Testing Specification

1.0 °C for 30 minutes
2.70 °C for 30 minutes
3.No. of Cycles:10

7.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

7.7 Testing Result

Testing Condition	Temperature	Testing Time	Result	Remark
			Sample No. 1,2,3,4,5	
Operation	0~70°C	10 hours	Pass	-

8. Temperature Cycling Non-Operating Test(Pass)

8.1 Testing Objective

To verify the varied temperature requirements from the different areas because products may be subjected to varied operation temperature condition. The product must be tested to verify its temperature endurance.

8.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Connect the component (DUT) to the motherboard and verify its functionality for baseline.
3. Put the component (DUT) into chamber and the motherboard is outside then power on the motherboard.
4. Program the test profile and turn on the chamber based on specification.
5. Inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.

8.3 Testing Component (DUT)

5pcs SX170-uSSD

8.4 Testing Equipment

KSON THS-A6T-150 Temperature/Humidity chamber

8.5 Testing Specification

1.-40 ºC for 30 minutes
2.85 ºC for 30 minutes
3.No. of Cycles:10

8.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

8.7 Testing Result

Testing Condition	Temperature	Testing Time	Result	Remark
			Sample No. 1,2,3,4,5	
Operation	-40~85ºC	10 hours	Pass	-

9. Bending Test(Pass)

9.1 Testing Objective

To verify the product can withstand any external forces caused by real application.

9.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Connect the component (DUT) to the motherboard and verify its functionality for baseline.
3. Setup the testing environment.
4. Program the test profile and turn on the equipment based on specification.
5. Inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.

9.3 Testing Component (DUT)

3pcs SX170-uSSD

9.4 Testing Equipment

Universal Load Tester

9.5 Testing Specification

1.Applied Force:20N
2.Duration:Hold 60 seconds/cycle
3.No. of Trial:5

9.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

9.7 Testing Result

Testing Condition	Force	Duration	Result	Remark
			Sample No. 1,2,3	
Storage	20N	60 seconds/cycle	Pass	-

9.8 Testing Photo

10. Torque Test(Pass)

10.1 Testing Objective

To verify the product can withstand any external forces caused by real application.

10.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Connect the component (DUT) to the motherboard and verify its functionality for baseline.
3. Setup the testing environment.
4. Program the test profile and turn on the equipment based on specification.
5. Inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.

10.3 Testing Component (DUT)

3pcs SX170-uSSD

10.4 Testing Equipment

Torgue Tester Model:2205S

10.5 Testing Specification

1.Applied Force:0.1N-m or ±2.5deg
2.Duration:Hold 60 seconds/cycle
3.No. of Trial:5

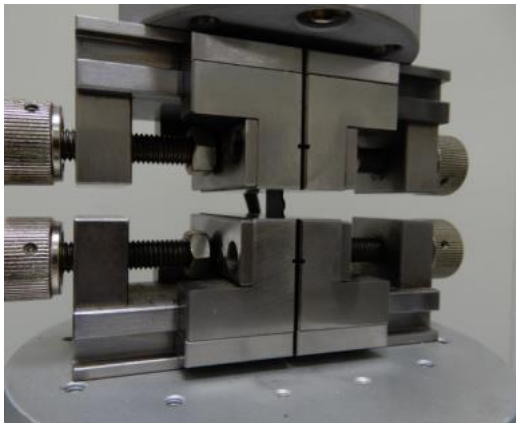
10.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

10.7 Testing Result

Testing Condition	Force	Duration	Result	Remark
			Sample No. 1,2,3	
Storage	0.1N-m or ±2.5deg	60 seconds/cycle	Pass	-

10.8 Testing Photo



11. Drop Test(Pass)

11.1 Testing Objective

To verify the product can withstand any external forces caused by real application.

11.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Connect the component (DUT) to the motherboard and verify its functionality for baseline.
3. Setup the testing environment.
4. Program the test profile and turn on the equipment based on specification.
5. Inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.

11.3 Testing Component (DUT)

3pcs SX170-uSSD

11.4 Testing Equipment

Manual

11.5 Testing Specification

1.Height:80cm
2.Drop Surface:6 surfaces
3.No. of Trial:Each face 1time

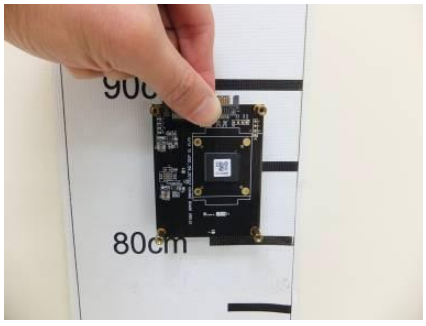
11.6 Testing Criteria

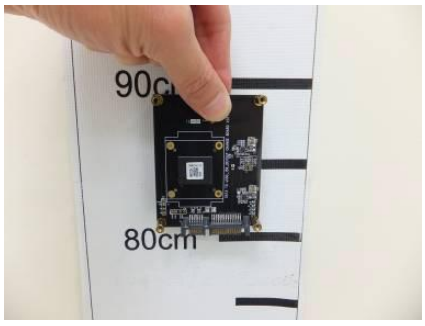
1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

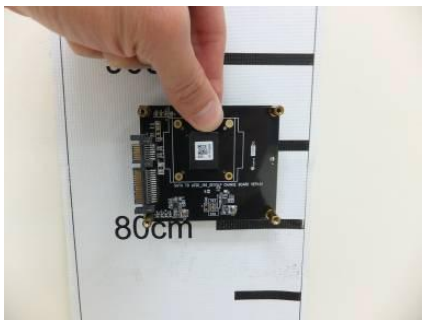
11.7 Testing Result

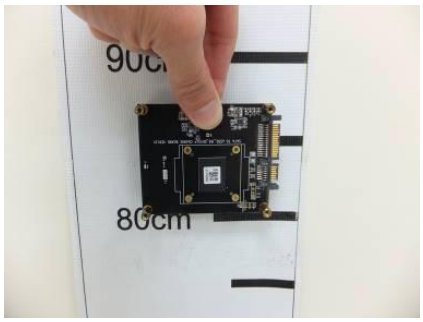
Testing Condition	Height	Drop Surface	Result	Remark
			Sample No. 1,2,3	
Storage	80cm	6 surfaces	Pass	

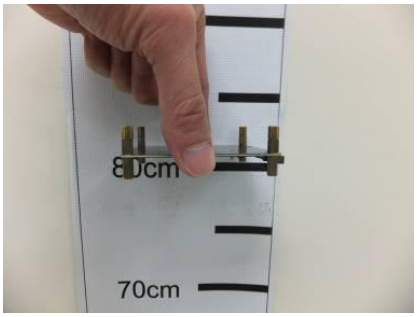
11.8 Testing Photo








80cm


70cm


70cm

12. Vibration Test(Pass)

12.1 Testing Objective

The purpose of the vibration test is to determine mechanical weakness or performance degradation of a component(DUT) when subjected to vibration. Based on this information, to decide whether the component(DUT) is acceptable or not. It may be used in some cases to determine the structural integrity of specimens and study their dynamic behavior. Vibration testing may be performed anytime during the course of the test program. The accumulated effects of vibration induced stress may affect component(DUT) performance under other environmental conditions, such as temperature, altitude, humidity.

12.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Verify the component (DUT) functionality.
3. Fix component (DUT) on vibration table properly by adequate fixture
4. Expose the component (DUT) to the test level and duration as determined from the specifications.
5. After the test, inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.
6. Repeat step 3~5 for each axis.

12.3 Testing Component (DUT)

3pcs SX170-uSSD

12.4 Testing Equipment

1. Vibration Tester: KING DESIGN KD-9363EM-1000F2K-50N120,S/N:GUG02102091
2. Controller: DACTRON LASER USB, S/N: 12448370
3. Control Accelerometer: WILCOXON RESEARCH WR-784A, S/N: 23116

12.5 Testing Specification

1.Waveform:Sine waveform
2.Frequency/Displacement:20~80Hz/1.52mm
3.Frequency/Acceleration:80~2000Hz/20G
4.Axis:X/Y/Z
5.Duration:30min/Axis
6.No. of Trials:1

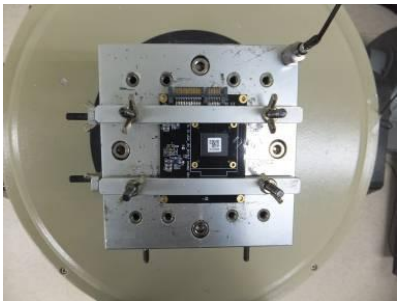
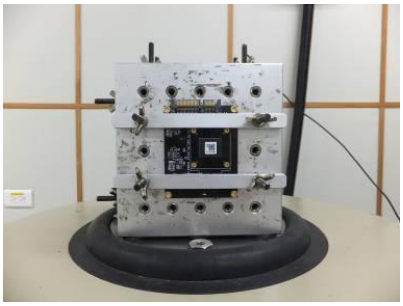
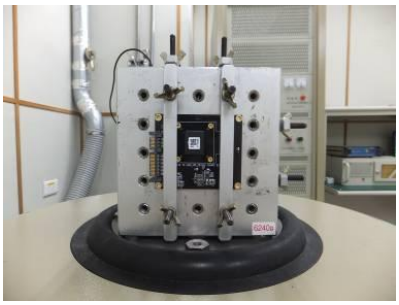
12.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

12.7 Testing Result

Testing Condition	Waveform	Duration	Result	Remark
			Sample No. 1,2,3	
Storage	Sine	30min/Axis	Pass	-

12.8 Testing Photo/Profile

13. Durability Test(Pass)

13.1 Testing Objective

To verify the product can withstand a certain number of mating caused by real application.

13.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Verify the component (DUT) functionality.
3. Fix component (DUT) on equipment properly by adequate fixture
4. Expose the component (DUT) to the test level and duration as determined from the specifications.
5. After the test, inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.

13.3 Testing Component (DUT)

3pcs SX170-uSSD

13.4 Testing Equipment

UNIVERSAL Load Tester

13.5 Testing Specification

No. of Trials:1,000

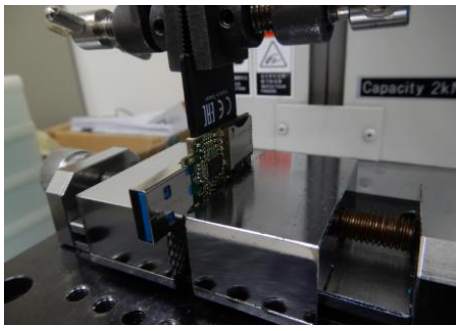
13.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

13.7 Testing Result

Testing Condition	No. of Trials	Result	Remark
		Sample No. 1,2,3	
Storage	1,000	Pass	-

13.8 Testing Photo/Profile



14. Mechanical Shock Test(Pass)

14.1 Testing Objective

The purpose of the vibration test is to determine mechanical weakness or performance degradation of a component(DUT) when subjected to vibration. Based on this information, to decide whether the component(DUT) is acceptable or not. It may be used in some cases to determine the structural integrity of specimens and study their dynamic behavior. Vibration testing may be performed anytime during the course of the test program. The accumulated effects of vibration induced stress may affect component(DUT) performance under other environmental conditions, such as temperature, altitude, humidity.

14.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Verify the component (DUT) functionality.
3. Fix component (DUT) on Shock table properly by adequate fixture
4. Expose the component (DUT) to the test level and duration as determined from the specifications.
5. After the test, inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.
6. Repeat step 3~5 for each axis.

14.3 Testing Component (DUT)

3pcs SX170-uSSD

14.4 Testing Equipment

1. Vibration Tester: KING DESIGN KD-9363EM-1000F2K-50N120,S/N:GUG02102091
2. Controller: DACTRON LASER USB, S/N: 12448370
3. Control Accelerometer: WILCOXON RESEARCH WR-784A, S/N: 23116

14.5 Testing Specification

1. Acceleration:1500G with Half Sine Wave
2. Durations:0.5ms
3. No. of shocks:6 shocks

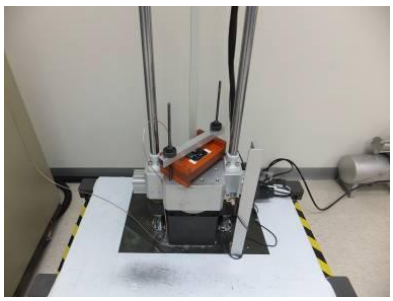
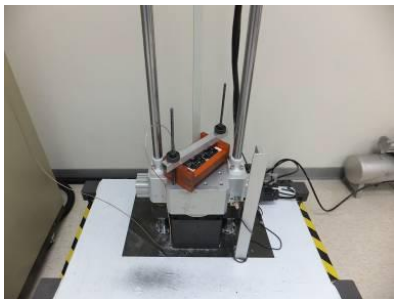
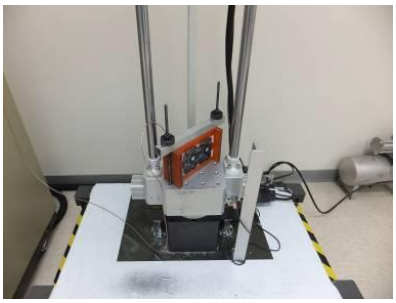
14.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

14.7 Testing Result

Testing Condition	Acceleration	Result	Remark
		Sample No. 1,2,3	
Storage	1500G	Pass	-

14.8 Testing Photo/Profile

15. X-Ray Exposure Test(Pass)

15.1 Testing Objective

To verify the product can withstand the X-Ray exposure caused by read application.

15.2 Testing Procedure

1. Inspect the component (DUT) to establish operation pretest criteria and physical condition.
2. Verify the component (DUT) functionality.
3. Fix component (DUT) on equipment properly by adequate fixture
4. Expose the component (DUT) to the test level and duration as determined from the specifications.
5. After the test, inspect the component (DUT) and compare it to pretest data and physical condition.
   If any physical issue or malfunction happened during the testing ,this should be recorded and reported.

15.3 Testing Component (DUT)

3pcs SX170-uSSD

15.4 Testing Equipment

Dage XD7600NT

15.5 Testing Specification

0.1Gy of medium-energy radiation (70 keV to 140 keV cumulative dose per year) to both sides of the card

15.6 Testing Criteria

1. No crack.
2. Card is functional.
3. No transfigure,deformity.
4. No warp or rust for metal parts.

15.7 Testing Result

Testing Condition	Energy	Result	Remark
		Sample No. 1,2,3	
Storage	0.1Gy	Pass	-

15.8 Testing Photo/Profile