Test Report

Client Name	:	Shen Zhen JHC Technology Development Co.,LTD
Address	:	B, 3rd Fl, A Block Junxiangda Bldg., No.9 Zhongshanyuan Rd. West, Tongle Village, Nanshan District, Shenzhen City, China, 518052
Product Name	:	Fanless In-Vehicle Computer
Date	:	2020.03.13

Shenzhen Anbotek Compliance Laboratory Limited

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3. The test report is invalid without the signatures of testing engineer, reviewer and approver.
4. The test report is invalid if altered.
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6. The test report is valid for the tested samples only.
7. As for test verdict, "—"means "no need for judgment" "N/A" means "not applicable".

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Report No.:18290KC00007101

TEST REPORT

Client Name	:	Shen Zhen JHC Technology Development Co.,LTD
Address	:	B, 3rd Fl, A Block Junxiangda Bldg., No.9 Zhongshanyuan Rd. West, Tongle Village, Nanshan District, Shenzhen City, China, 518052

Report on the submitted sample(s) said to be:

Product Name	:	Fanless In-Vehicle Computer
Model	:	Basic Model No:SIGM-3250/S001 Serial Model No:SIGM-3250/S002,SIGM-3250/S003,SIGM-3250/S004, SIGM-3250/T001,SIGM-3250/T002,SIGM-3250/T003,SIGM-3250/T004
Trademark	:	JHCTECH
Description	:	/
Sample(s) received quantity	:	2pcs
Sample(s) Testing quantity	:	2pcs
Manufacturer	:	Shen Zhen JHC Technology Development Co.,LTD
Factory	:	Shen Zhen JHC Technology Development Co.,LTD
Other information	:	/
Sample(s) received Date	:	2020.02.24
Testing period	:	2020.02.24 - 2020.03.06
Report Date	:	2020.03.13

Test Conclusion :

Please refer next page.

Prepared by:	**Checked by:**	**Approved by:**
name: Carlos Ye	name: Jimmy Zhou	name: Jeff Zhu
Title: Test Engineer	Title: Lab Manager	Title: Authorized signatory

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1. Test overview

Table 1 test project overview

Test items/		Test method	Conclusion
4.1	Visual inspection	EN 50155:2017	Pass
4.2	Performance test	EN 50155:2017	Pass
4.3	Power supply test	EN 50155:2017	Pass
4.4	Insulation test	EN 50155:2017	Pass
4.5	Low temperature start-up test	EN 50155:2017	Pass
4.6	Dry heat test	EN 50155:2017	Pass
4.7	Cyclic damp heat test	EN 50155:2017	Pass
4.8	Vibration and shock test	EN 50155:2017	Pass

2. Test environment

Ambient temperature: 21.0℃ ~ 26.0℃

Relative humidity: 50.0%RH ~ 65.0%RH

Atmospheric pressure: 100.0kpa ~ 101.0kpa

3. Initial inspection

Before the test, the appearance, structure and function of the sample are normal.

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4. Test items

4.1 Visual inspection

4.1.1 Test requirements

Test standard: EN 50155:2017

Sample NO.: 18290KC000014-1-2-1

Sample status: Bare machine, power off

Test conditions:

a）Visually inspect the sample at 25℃±10℃.

4.1.2 Judgement basis

The appearance of the sample is normal without damage and corrosion.

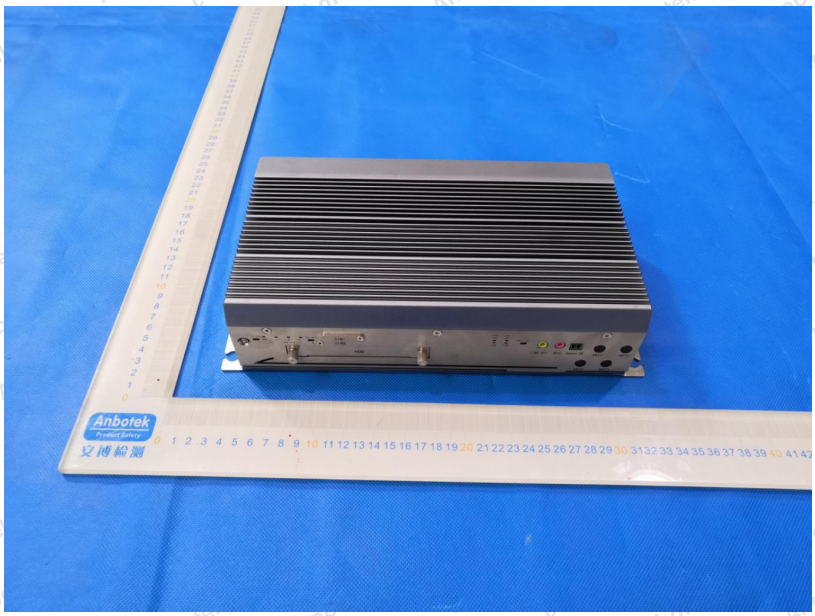
4.1.3 Test result

The appearance of the sample is normal without damage and corrosion.

4.1.4 Test conclusion

Pass

4.1.5 Test photos



Test photos

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4.2 Performance test

4.2.1 Test requirements

Test standard: EN 50155:2017

Sample NO.: 18290KC000014-1-2-1

Sample status: Bare machine, power off

Test conditions:

a）After the sample is powered on, the equipment operates normally, and each channel index is normal.

4.2.2 Test equipment

Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
DC power supply	SE-1438	eTM-3010F	2020.07.30

4.2.3 Judgement basis

After the sample is energized, the equipment shall work as expected and within the specified scope.

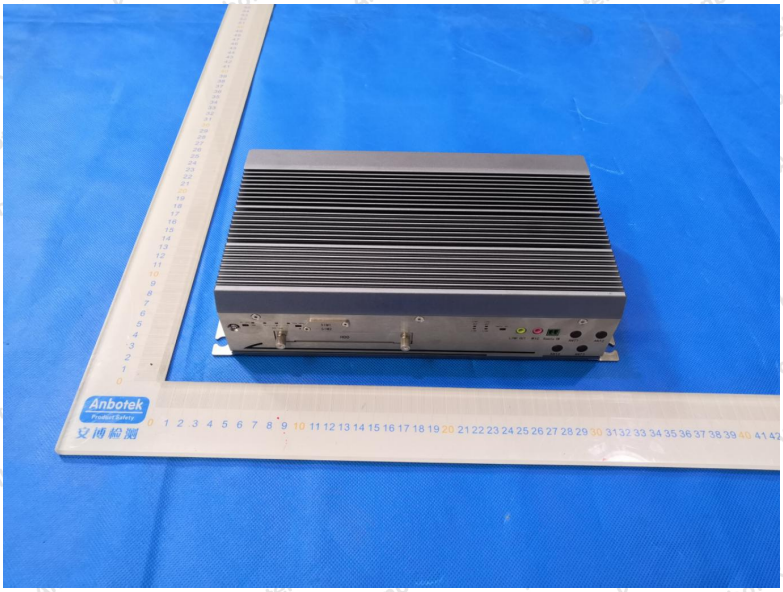
4.2.4 Test result

After the sample is energized, the equipment shall work as expected and within the specified scope.

4.2.5 Test conclusion

Pass

4.2.6 Test photos



Sample photos

Test photos

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4.3 Power supply test

4.3.1 Test requirements

Test standard: EN 50155:2017

Sample NO.: 18290KC000058-1-5-1

Sample status: Bare machine, power on

Test conditions:

a）EMC and RF testing according to national / international standards

b）Input Power: 110V DC

c）The test shall be carried out in accordance with the provisions of the standards en 50155:2017 13.4.3.2, en 50155 13.4.3.3, en 50155 13.4.3.4 and en 50155 13.4.3.5.

4.3.2 Summary of Test results

Test items	Standard	Criteria Requirement	Result	Conclusion
Supply variations(Figure 6)	EN 50155 13.4.3.2	Criterion A	A	Pass
Supply variations(Figure 7)	EN 50155 13.4.3.2	Criterion B	A	Pass
Temporary supply dips	EN 50155 13.4.3.3	Criterion A	A	Pass
Interruptions of voltage supply	EN 50155 13.4.3.4	Criterion A	A	Pass
Supply change-over	EN 50155 13.4.3.5	Criterion A	A	Pass

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4.3.3 Supply variations

4.3.3.1 Test Summary

Test Room	:	Shielding room1
Power Source (Un)	:	DC 110V
Standards	:	EN 50155:2017 (13.4.3.2)
EUT configuration	:	normal

4.3.3.2 Block diagram of test setup

4.3.3.3 Measurement method

Tests shall be performed to prove correct functioning at nominal supply voltage and at the specified upper and lower limits.

DC power supply range:

Tests shall be performed to prove correct functioning for the voltage range.

DC power supply fluctuation:

The rise/fall waveforms of the diagrams are purely indicative.

Temporary supply overvoltages shall be assumed to be generated with respect to the control system voltage supply return potential and to be present only as an increase to the level of the control system voltage, which shall be assumed to be present before and after the application of the overvoltage. Overvoltage of opposite polarity to the control of the system voltage supply need not be considered.

Overvoltage exceeding in duration or amplitude the specified voltage fluctuation shall be assumed to

occur only in the case of a failure in the control system voltage supply.

Temporary supply overvoltages up to 1.4 Un lasting no more than 0.1 s shall not cause deviation of function (**performance criterion A**).

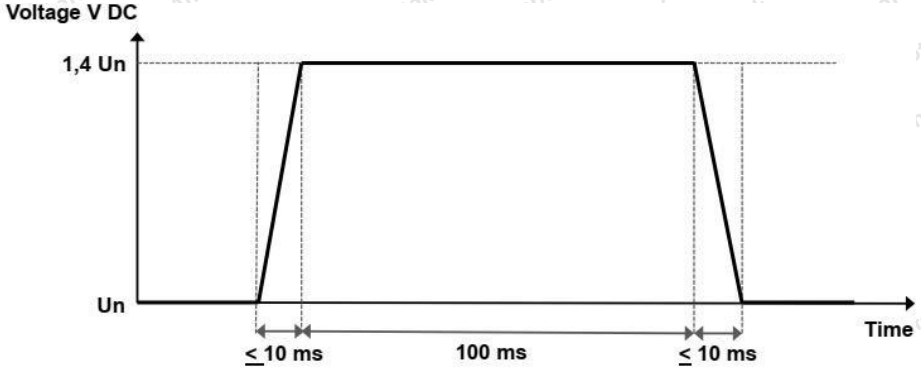

Figure 6 — Temporary supply overvoltages (a)

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For temporary supply overvoltages up to 1.4 Un lasting no more than 1 s the equipment shall fulfil **performance criterion B**.

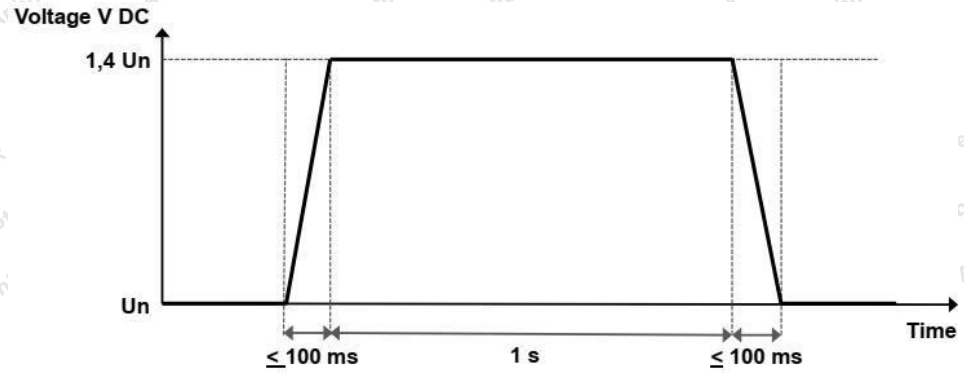
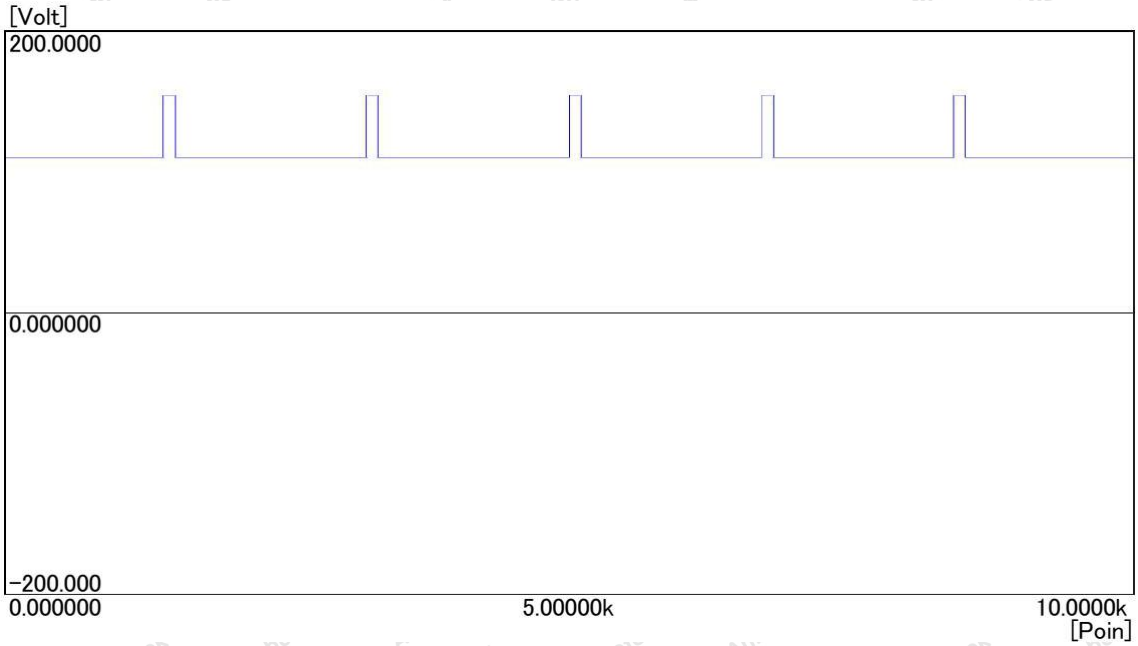


Figure 7 — Temporary supply overvoltages (b)

4.3.3.4 Result

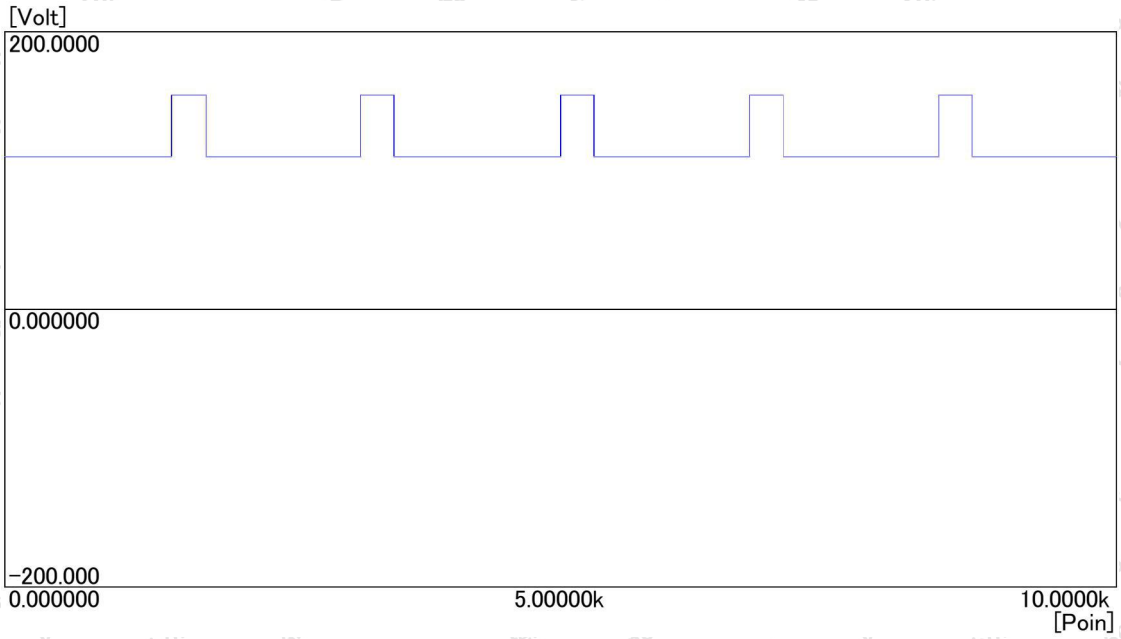
PASS

EUT	:	Fanless In-Vehicle Computer
Power Source (Un)	:	DC 110V
Test Level	:	154V (1.4 Un)
sequence number	:	10
interval time	:	30s
Dwell time	:	100ms
Result	:	Criteria A



Report No.:18290KC00007101

EUT	:	Fanless In-Vehicle Computer
Power Source (Un)	:	DC 110V
Test Level	:	154V (1.4 Un)
sequence number	:	10
interval time	:	30s
Dwell time	:	1s
Result	:	Criteria A



4.3.4 Temporary supply dips

4.3.4.1 Test Summary

Test Room	:	Shielding room1
Power Source (Un)	:	DC 110V
Standards	:	EN 50155:2017 (13.4.3.3)
EUT configuration	:	normal

4.3.4.2 Block diagram of test setup

4.3.4.3 Measurement method

Voltage dips are mainly caused by faults in the DC distribution system, or by sudden large changes of load (low impedance condition).

Temporary supply dips down to 0.6 Un not exceeding 0.1 s shall not cause deviation of function (p**erformance criterion A**).

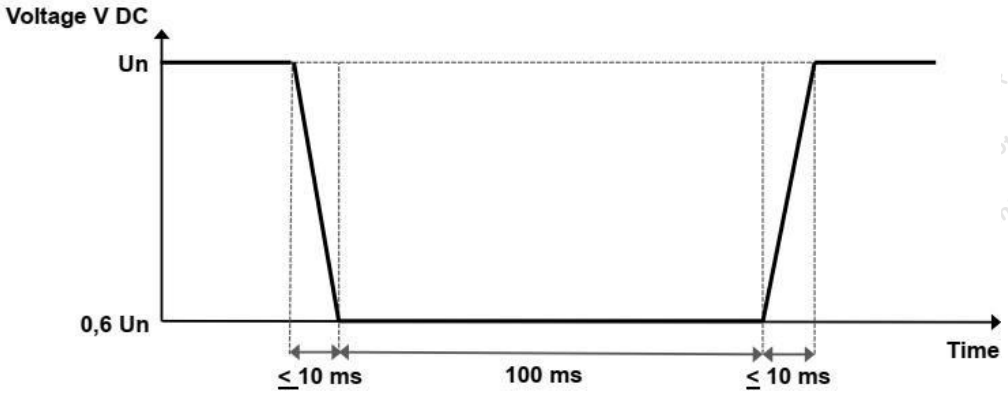
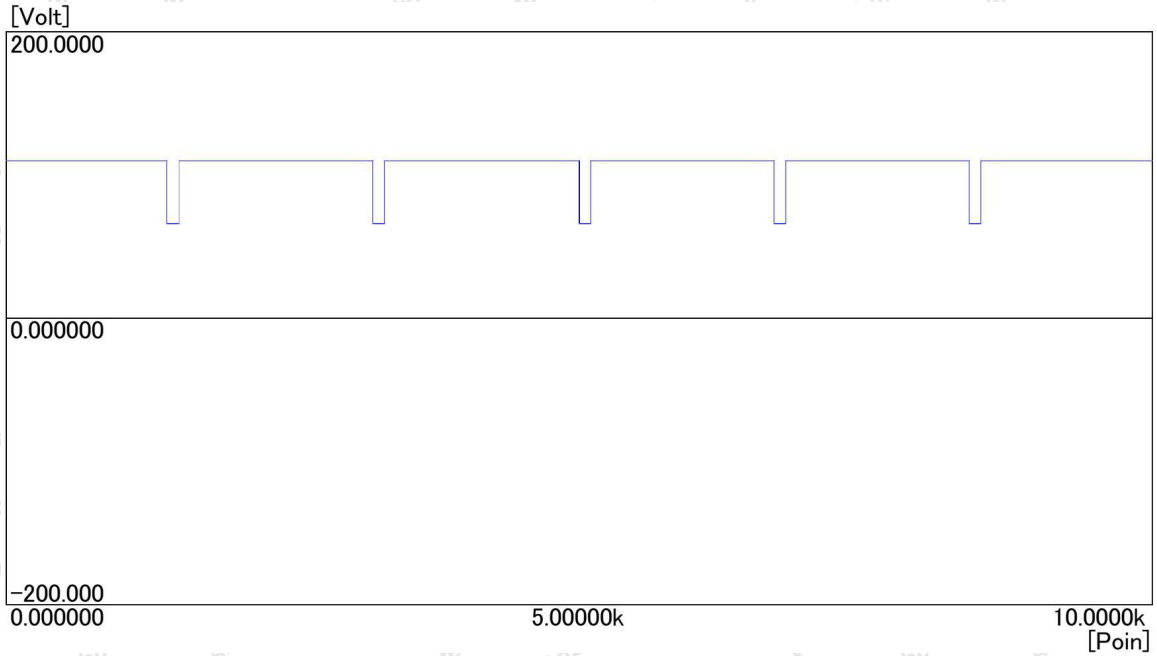


Figure 8 — Temporary supply dips

4.3.4.4 Result

PASS

EUT	:	Fanless In-Vehicle Computer
Power Source (Un)	:	DC 110V
Test Level	:	66V (0.6 Un)
Sequence number	:	10
Interval time	:	30s
Dwell time	:	0.1s
Result	:	Criteria A



4.3.5 Interruptions of voltage supply

4.3.5.1 Test Summary

Test Room	:	Shielding room1
Power Source (Un)	:	DC 110V
Standards	:	EN 50155:2017 (13.4.3.4)
EUT configuration	:	normal

4.3.5.2 Block diagram of test setup

4.3.5.3 Measurement method

During a short interruption, the DC distribution system presents a " low impedance " (short circuit) condition due to the clearing of an overload or fault condition on the supply bus. This condition can cause reverse current (negative peak inrush current) from the load.

Regarding interruptions on supply voltage, there are three classes of equipment:

Table 13 — Interruptions of voltage supply classes

Class	Requirements	Duration of the interruption time Tint (See Figure 9)
S1	No performance criterion is requested but the equipment shall continue to operate as specified after the voltage interruption.	NOTE As defined in 5.1.1.4, this test is not required.
S2	The equipment shall behave according performance criterion A.	10 ms
S3	The equipment shall behave according performance criterion A.	20 ms

For voltage interruption longer than specified within the class, equipment shall behave at minimum according performance criterion C.

Tests shall be carried out at nominal voltage.

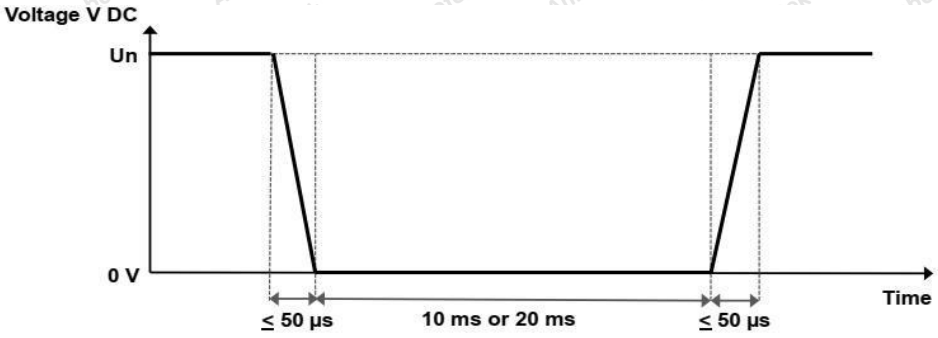
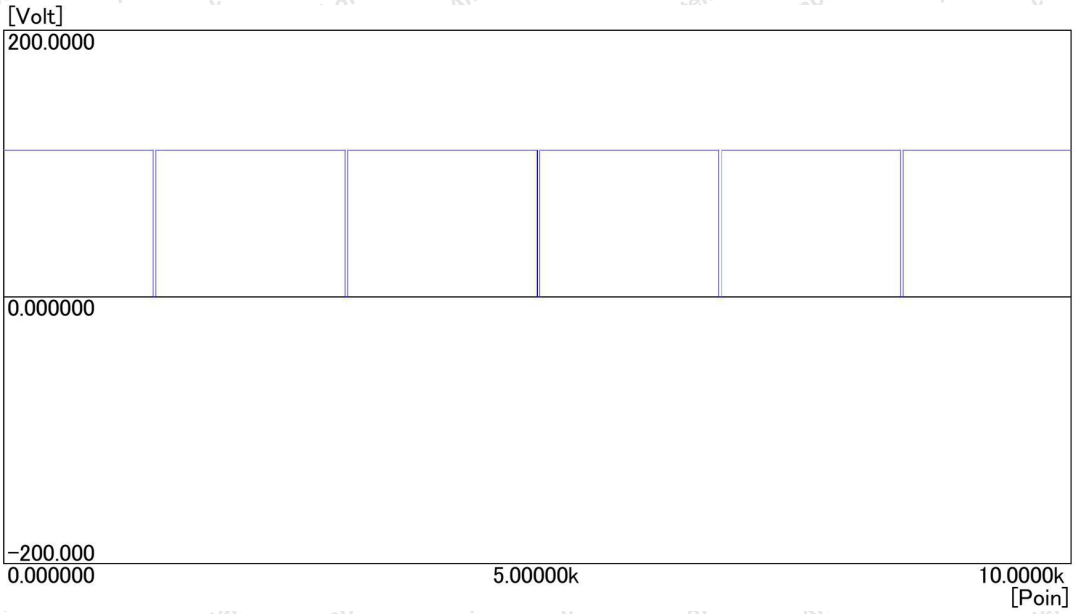


Figure 9 — Interruption of supply voltage

4.3.5.4 Result

PASS

EUT	:	Fanless In-Vehicle Computer
Power Source (Un)	:	DC 110V
Test Level	:	0V
Sequence number	:	10
Interval time	:	60s
Dwell time	:	10ms (class S2)
Result	:	Criteria A



4.3.6 Supply change-over

4.3.6.1 Test Summary

Test Room	:	Shielding room1
Power Source (Un)	:	DC 110V
Standards	:	EN 50155:2017 (13.4.3.5)
EUT configuration	:	normal

4.3.6.2 Block diagram of test setup

4.3.6.3 Measurement method

In the case of equipment supplied with power alternatively from an accumulator battery and a DC stabilized source, the DC distribution system presents a " high impedance " condition due to switching from one source to another.

The equipment shall operate satisfactorily under the conditions stated in Subclauses 5.1.1, 5.1.1.2, 5.1.1.6 and 5.1.3.

—Class C1: at 0,6 Un during 100 ms (without interruptions). **Performance criterion A**;

—Class C2: during a supply break of 30 ms starting at Un **Performance criterion B**.

The supply break is an open circuit and not a short circuit "(high impedance" condition).

Unless otherwise specified, the requirements of class C1 apply to power supply only.

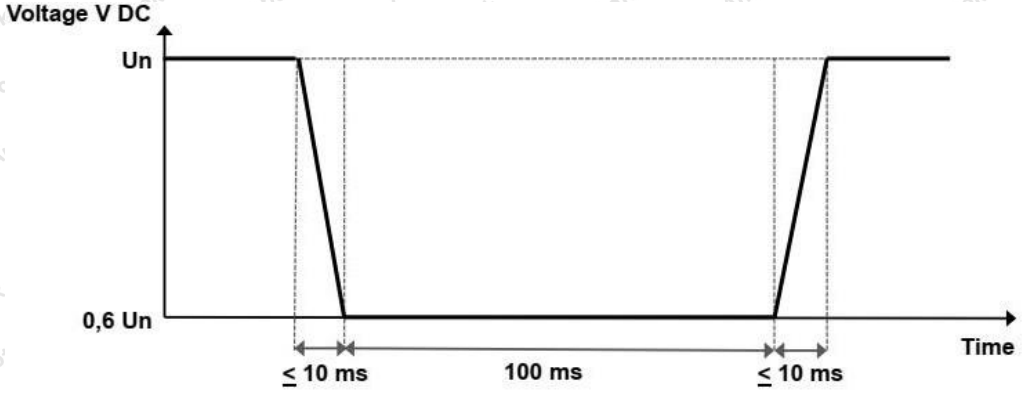


Figure 10 — Supply change-over Class C1

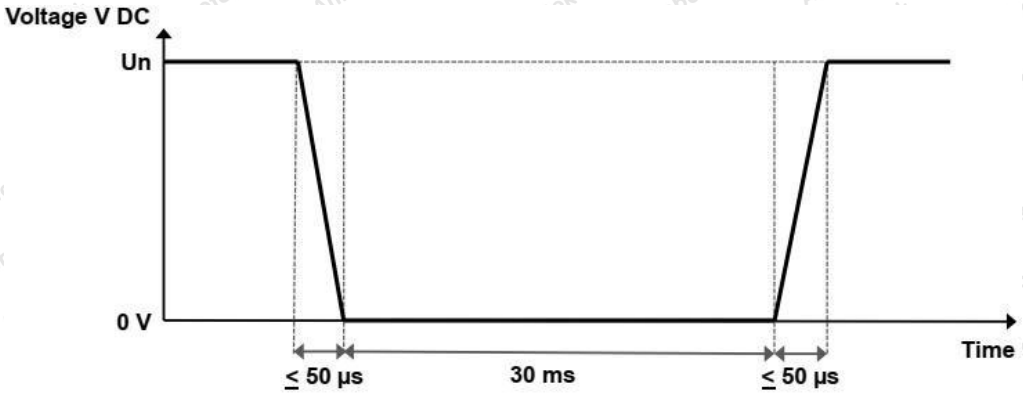
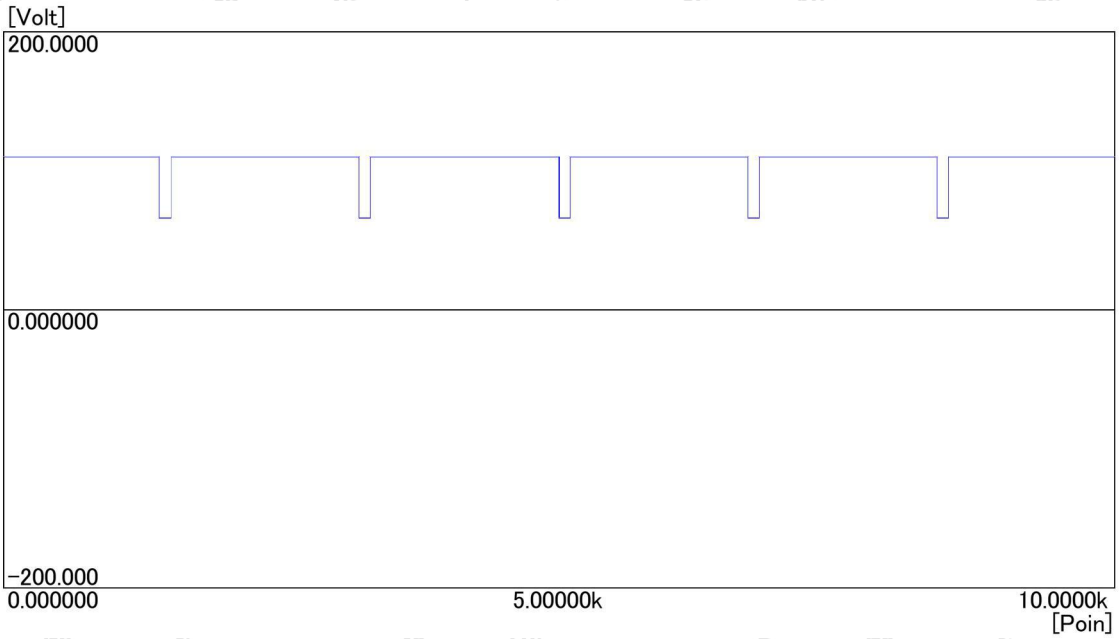


Figure 11 — Supply change-over Class C2

4.3.6.4 Result

PASS

EUT	:	Fanless In-Vehicle Computer
Power Source (Un)	:	DC 110V
Test Level	:	66V (0.6 Un)
Sequence number	:	10
Interval time	:	30s
Dwell time	:	100ms (class C1)
Result	:	Criteria A



4.3.7 Test equipment

Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
Power Source	SE-5001	KP3000GS	2020.04.22
Test software	SE-5002	KP-G (V1.0.0)	2020.04.22

4.3.8 Test Uncertainty

Test	Confidence Level	CISPR Uncertainty	Our Uncertainty
Radiated emission (3m) 30-1000MHz	95%	5.2dB	4.3dB
Conducted Emission (Mains) 0.15- 30MHz	95%	3.6dB	3.3dB

4.3.9Test photos

Sample photos

Sample photos

Test setup photos

4.4 Insulation test

4.4.1 Test requirements

Test standard: EN 50155:2017

Sample NO.: 18290KC000014-1-2-1

Sample status: Bare machine, power off

Test conditions:

a）Insulation resistance test: 500V (AC), hold for 1 minute.

b）Test voltage: 500V (DC), frequency: 50Hz, test time: 1 minute.

c）During the test, the equipment cannot be energized.

4.4.2 Test equipment

Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
Insulation Resistance Tester	SE-2167	TOS7200	2020.4.2
Withstand voltage tester	SE-2174	TOS5101	2020.4.2

4.4.3 Judgement basis

1. After the insulation resistance test pressure value should be greater than 20 m Ω;After the insulation test, the equipment shall work as expected and within the specified scope.

2. Neither disruptive discharge nor flashover shall occur during the voltage withstand test.After the withstand test, the equipment shall work as intended and within its specified limits.

4.4.4 Test result

Test serial number	Test items	Test results
1	Insulation resistance	≥5000 MΩ
2	Voltage withstand test	Neither disruptive discharge nor flashover occurred.
3	Insulation resistance	≥5000 MΩ
The equipment could work as intended and within its specified limits .		

4.4.5 Test conclusion

Pass

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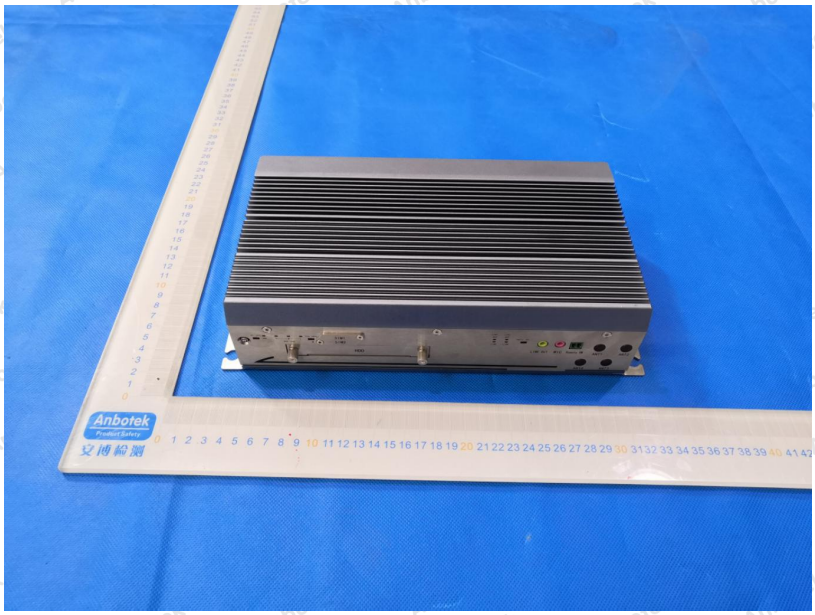
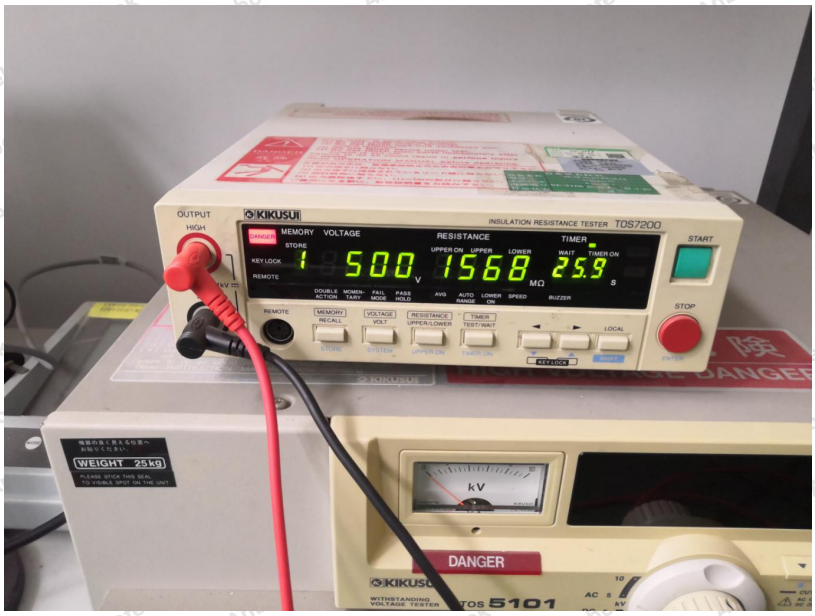
4.4.6 Test photos

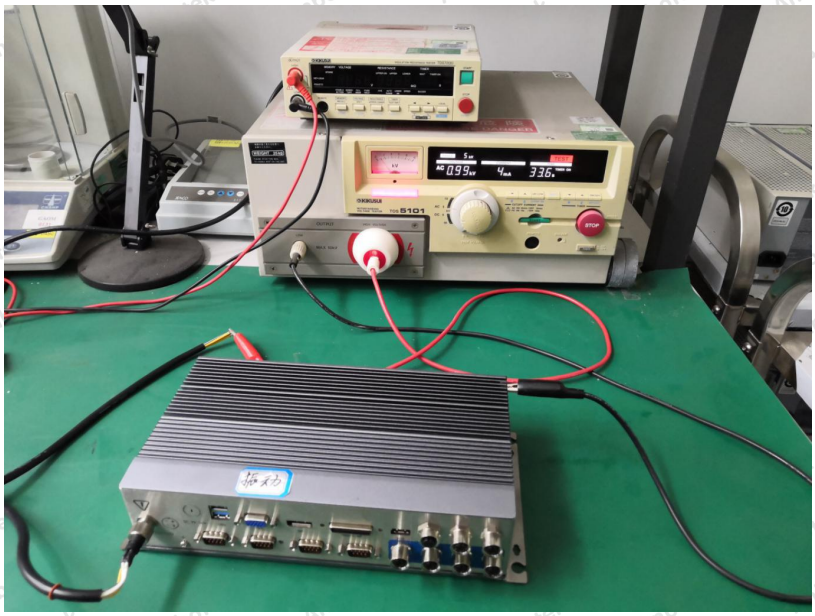


Sample photos

Insulation resistance test



Insulation resistance test



Voltage withstand test

Voltage withstand test

4.5 Low temperature start-up test

4.5.1 Test requirements

Test standard: EN 50155:2017

Sample NO.: 18290KC000014-1-2-2

Sample status: Bare machine, power on

Test conditions:

a） The low operating temperature is -40℃.

The equipment is placed without any voltage applied, after thermal stabilization of the chamber at-40 ℃, for 2h to achieve stabilization.

At the end of this period the equipment shall be switched on and a performance check is carried out, keeping the equipment at the low temperature.

After recovery, this performance check is repeated at normal room temperature.

See the figure below for details:

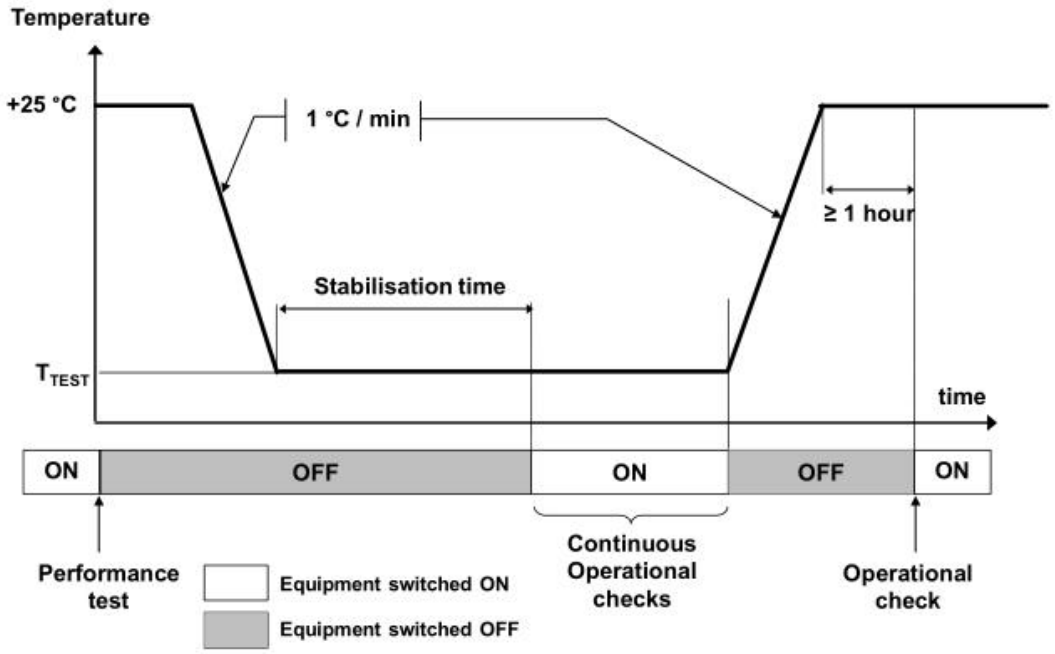


Figure 12 — Low temperature start-up test

4.5.2 Test equipment

Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
Temperature & humidity chamber	SE-3301	ZJ-HWS1000C	2020.8.22
DC power supply	SE-1438	eTM-3010F	2020.07.30

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4.5.3 Judgement basis

During and after the test, the equipment shall work as expected and within the specified range (performance standard A).

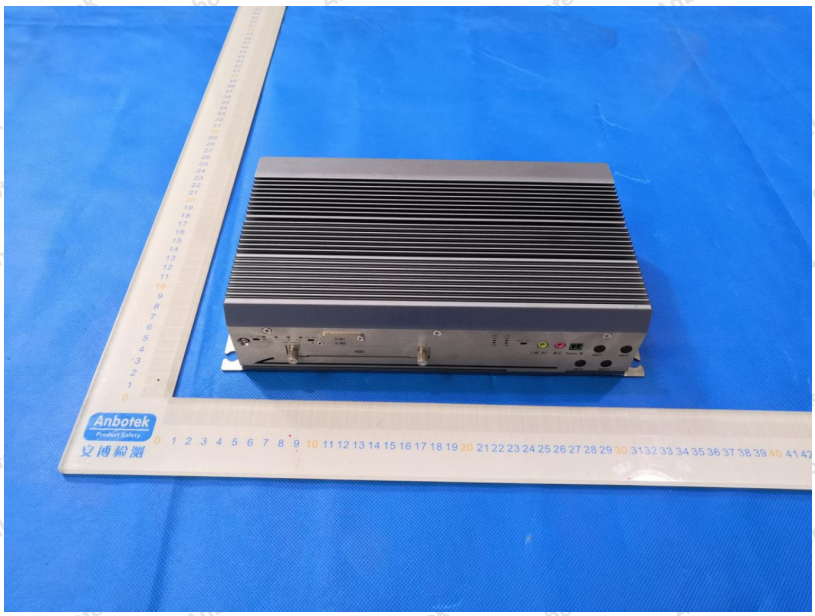
4.5.4 Test result

During and after the test, the equipment works as expected and within the specified range (performance standard A).

4.5.5 Test conclusion

Pass

4.5.6 Test photos



Sample photos

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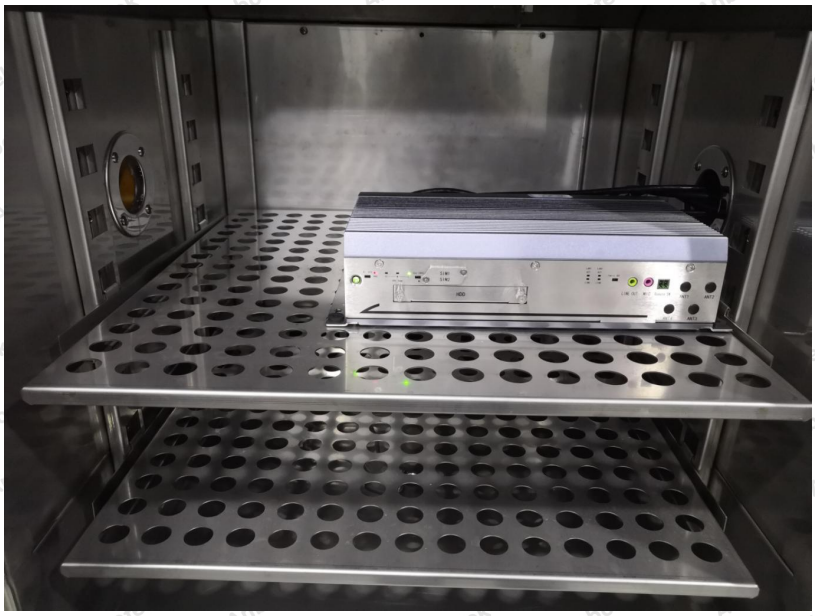
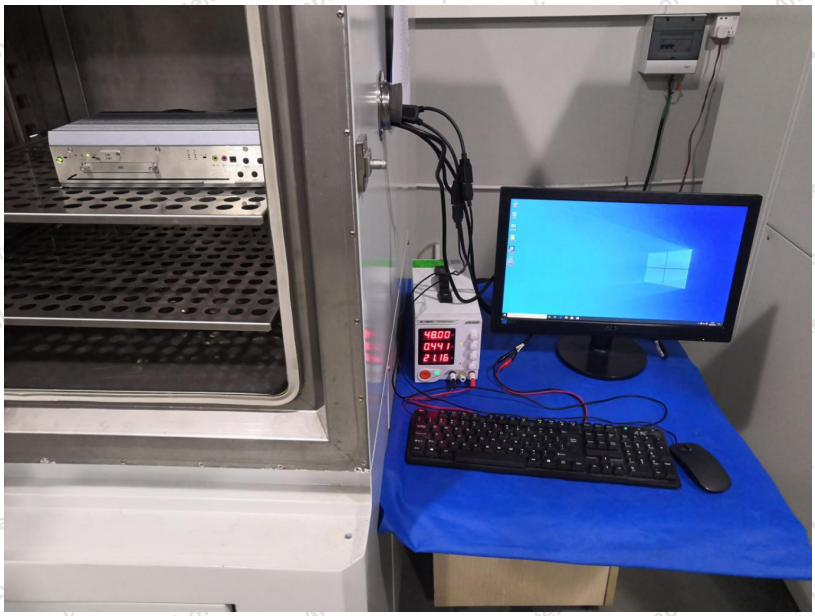


Low temperature start-up



Low temperature start-up

Low temperature start-up

Restore room temperature

4.6 Dry heat test

4.6.1 Test requirements

Test standard: EN 50155:2017

Sample NO.: 18290KC000014-1-2-2

Sample status: Bare machine, power on

Test conditions:

a) Rain from room temperature to 70 ℃ at the rate of 1 ℃ / min, after 2 hours of stabilization, open the equipment for operation inspection and keep working for 6 hours;

b) Rise from 70 ℃ to 85 ℃ at the rate of 1 ℃ / min for continuous operation inspection and continuous operation for 10min;

c) Then shut down the equipment and cool the equipment to room temperature at the rate of 1 ℃ / min, and conduct further performance test after holding for 1 hour.

See the figure below for details:

13.4.5.3 Dry heat thermal test — Cycle B

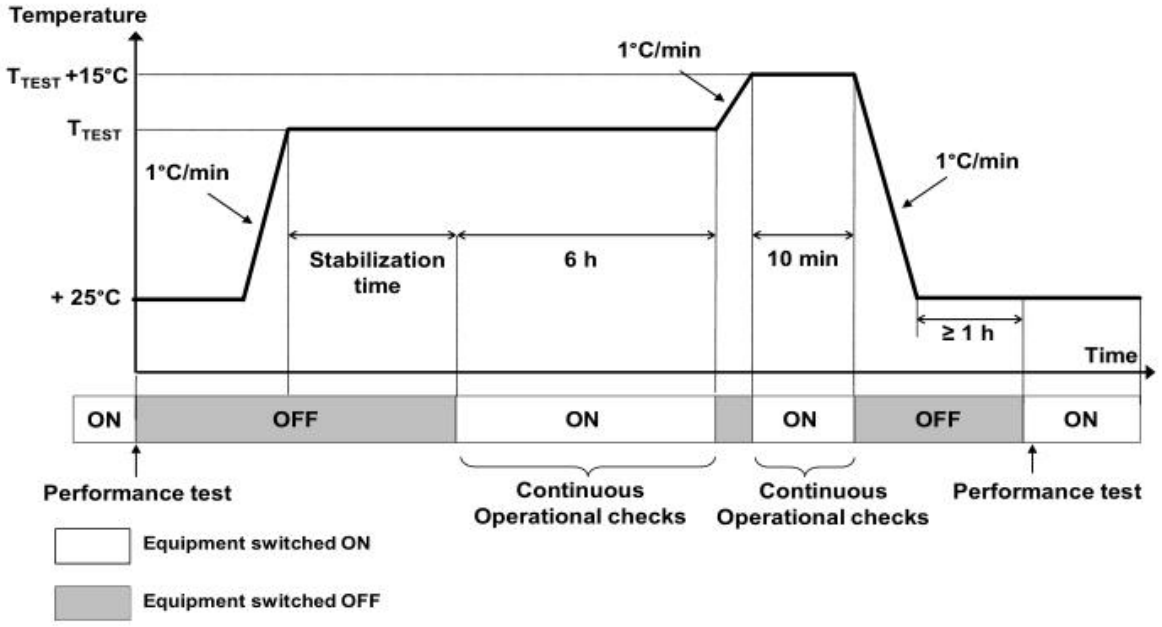


Figure 14 — Dry heat thermal test — Cycle B

4.6.2 Test equipment

Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
Temperature & humidity chamber	SE-3301	ZJ-HWS1000C	2020.8.22
DC power supply	SE-1438	eTM-3010F	2020.07.30

4.6.3 Judgement basis

During and after the test, the equipment shall work as expected and within the specified range (performance standard A).

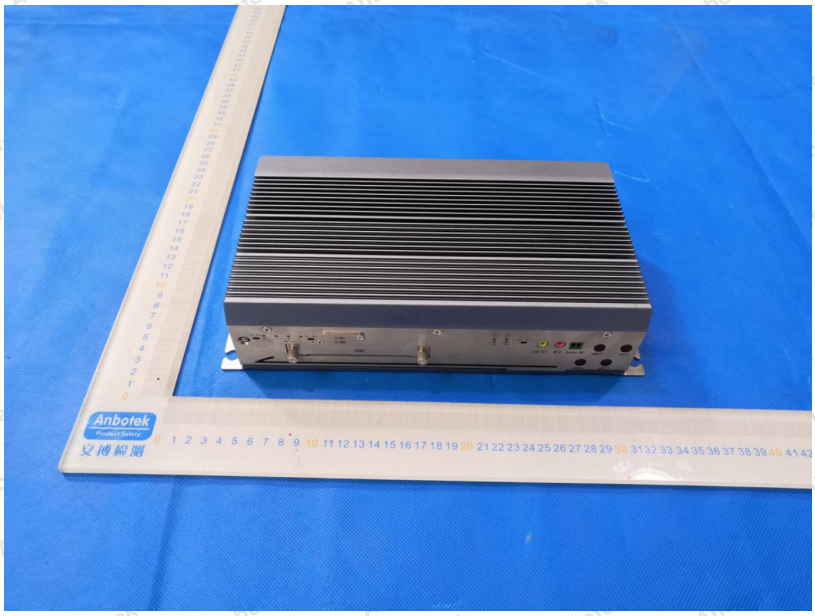
4.6.4 Test result

During and after the test, the equipment works as expected and within the specified range (performance standard A).

4.6.5 Test conclusion

Pass

4.6.6 Test photos



Sample photos

Dry heat test

Dry heat test

Dry heat test

Restore room temperature

4.7 Cyclic damp heat test

4.7.1 Test requirements

Test standard: EN 50155:2017

Sample NO.: 18290KC000014-1-2-1

Sample status: Bare machine, power off

Test conditions:

The equipment under test shall not be powered except during the performance check.

Temperatures: 55℃ and 25℃

Number of cycles:2

Test time:2×24h

Intermediate measurements:an operational check shall be carried out at the rise in temperature during the beginning of the 2nd cycle.

Insulation resistance test: 500V (DC)

Withstand voltage test: 1000V (AC), 50HZ, 1 minute.

See the figure below for details:

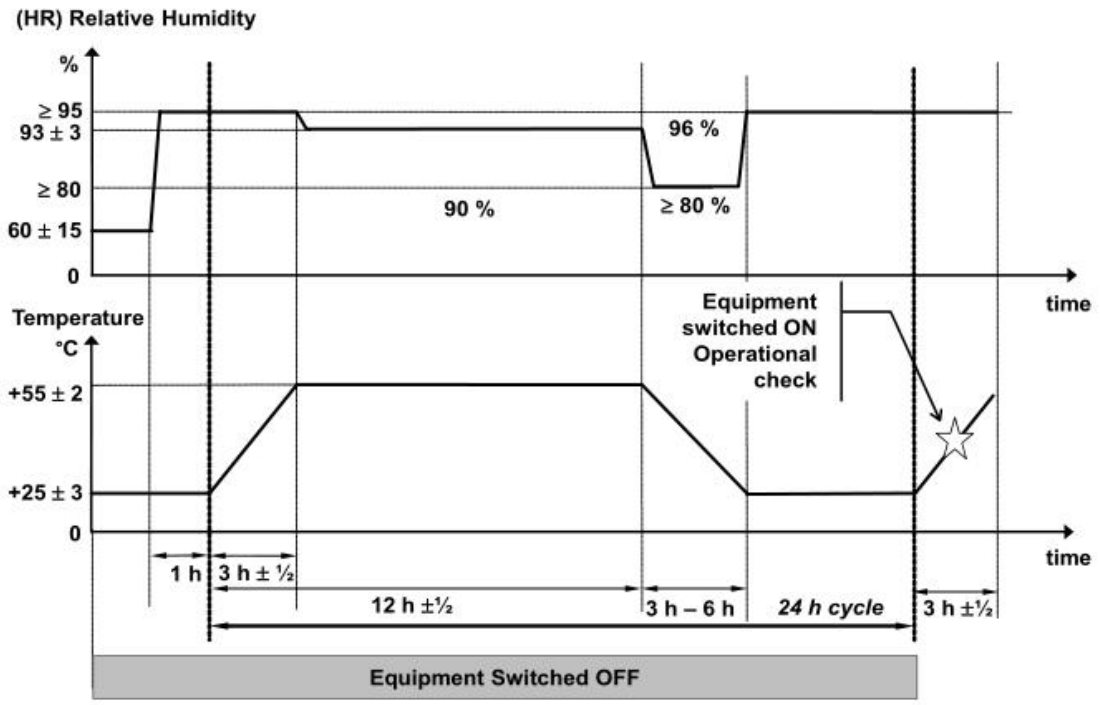


Figure 16 — Cyclic damp heat test: Description of the first 24-h cycle

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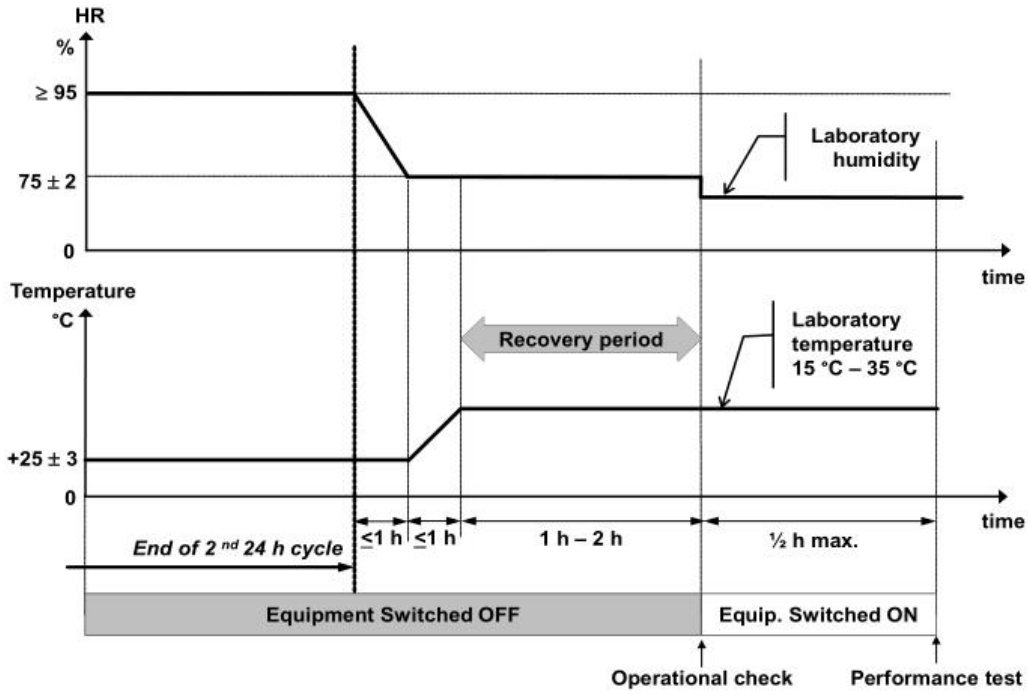

Figure 17 — Cyclic damp heat test: Recovery period

4.7.2 Test equipment

Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
Insulation Resistance Tester	SE-2167	TOS7200	2020.4.2
Withstand voltage tester	SE-2174	TOS5101	2020.4.2
Temperature & humidity chamber	SE-3301	ZJ-HWS1000C	2020.8.22

4.7.3 Judgement basis

1. The results of all insulation and performance test(results after the first and second cycles)shall be within the specified tolerances and operation performance respectively.

2. Before and after the test(initial and final voltage withstand and insulation), the equipment works as expected and within the specified range (performance standard A).

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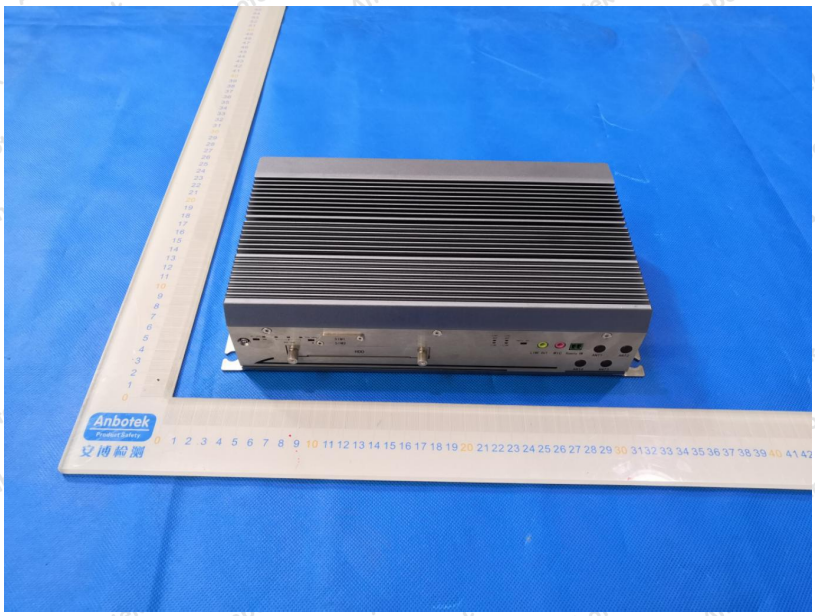
4.7.4 Test result

Test serial number	Test items	Test results
1	Insulation resistance	⩾5000 MΩ
2	Voltage withstand test	Neither disruptive discharge nor flashover occurred.
After recovery, the equipment works as expected and within the specified range (performance standard A).		

4.7.5 Test conclusion

Pass

4.7.6 Test photos



Sample photos

Cyclic damp heat test

Cyclic damp heat test

Cyclic damp heat test

Insulation resistance test

Voltage withstand test

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4.8 Vibration and shock test

4.8.1 Functional random vibration test

4.8.1.1 Test requirements

Test standard: EN 50155:2017

Sample NO.: 18290KC000014-1-2-2

Sample status: Bare machine, power on

Test conditions:

	Direction	RMS(m/s^2)	Frequency
1 Class B	Vertical	1.01	5Hz ~ 150Hz
	Horizontal	0.45	
	Longitudinal	0.70	
Test time	10 min per direction		
Test mode	power on		

4.8.1.2 Test equipment

Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
Vibration tester	SE-1199	DC-2200-26	2020.12.15
DC power supply	SE-1438	eTM-3010F	2020.07.30

4.8.1.3 Judgement basis

There shall be no damage during the test; during the test, the equipment shall be monitored and operated as expected within its specified limits (performance standard a).

4.8.1.4 Test result

No damage occurred during the test; during the test, the equipment was monitored and operated as expected within its specified limits (performance standard a).

4.8.1.5 Test conclusion

Pass

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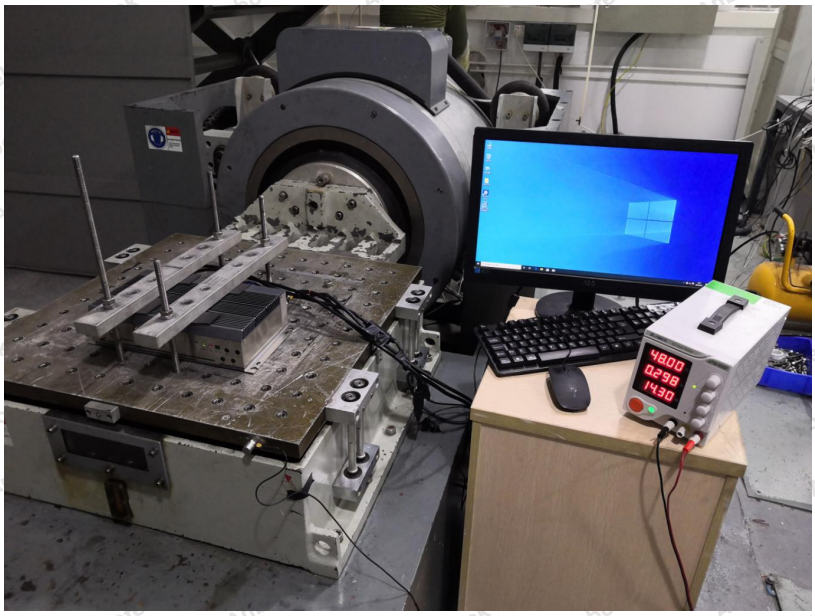
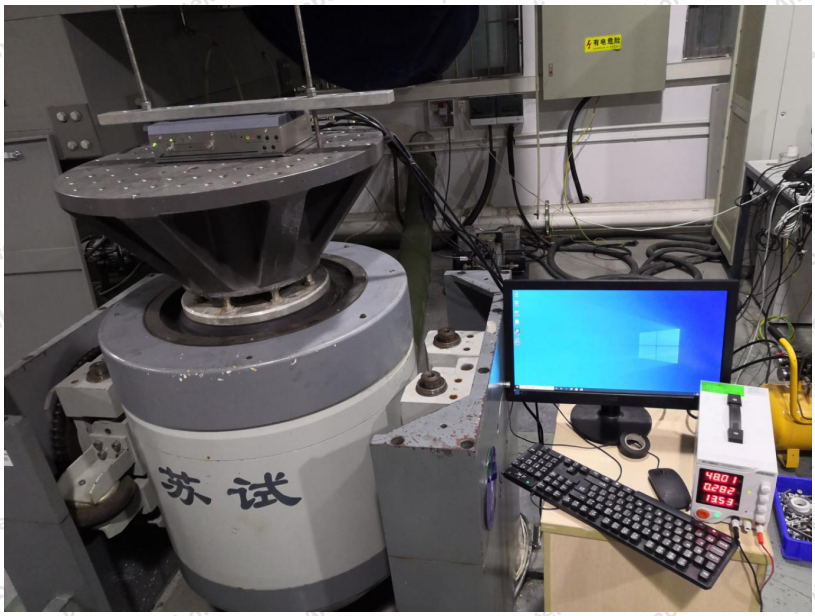
4.8.1.6 Test photos

Sample photos

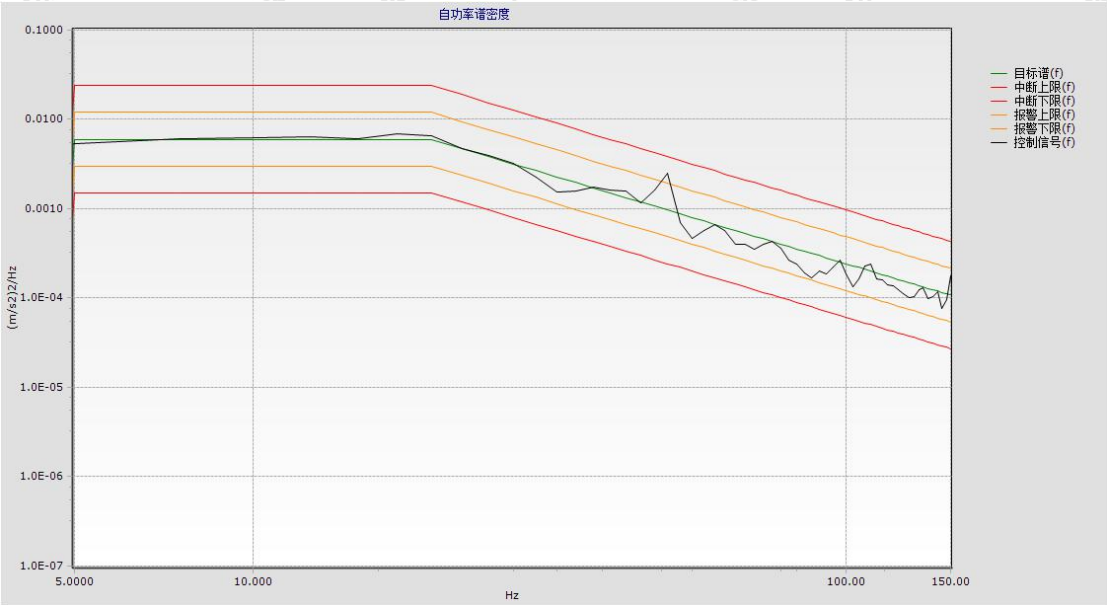
Functional random vibration test(X axis)



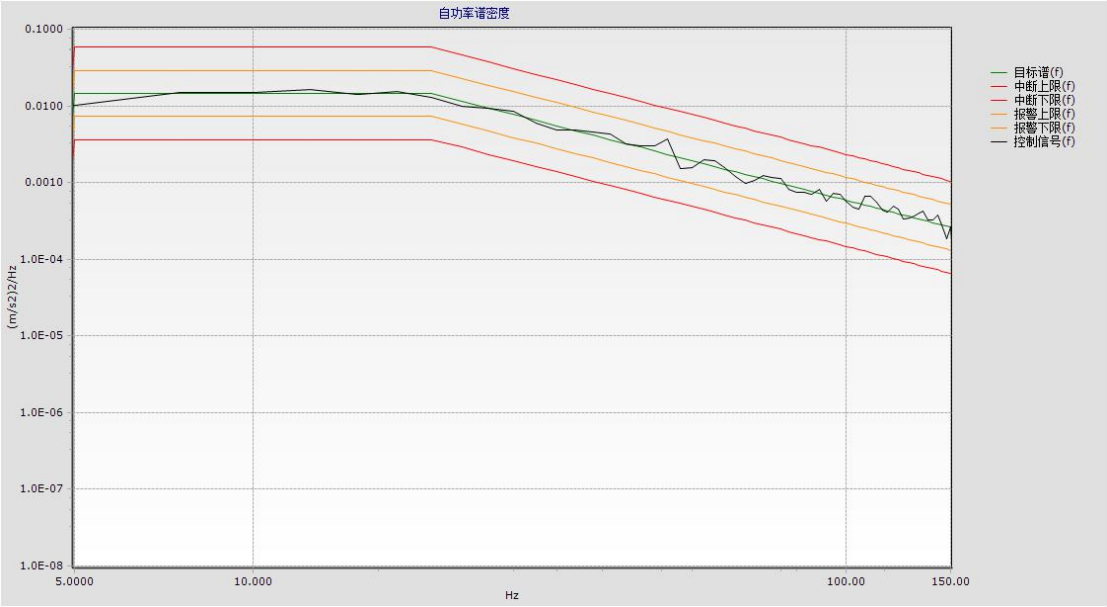
Functional random vibration test(Y axis)



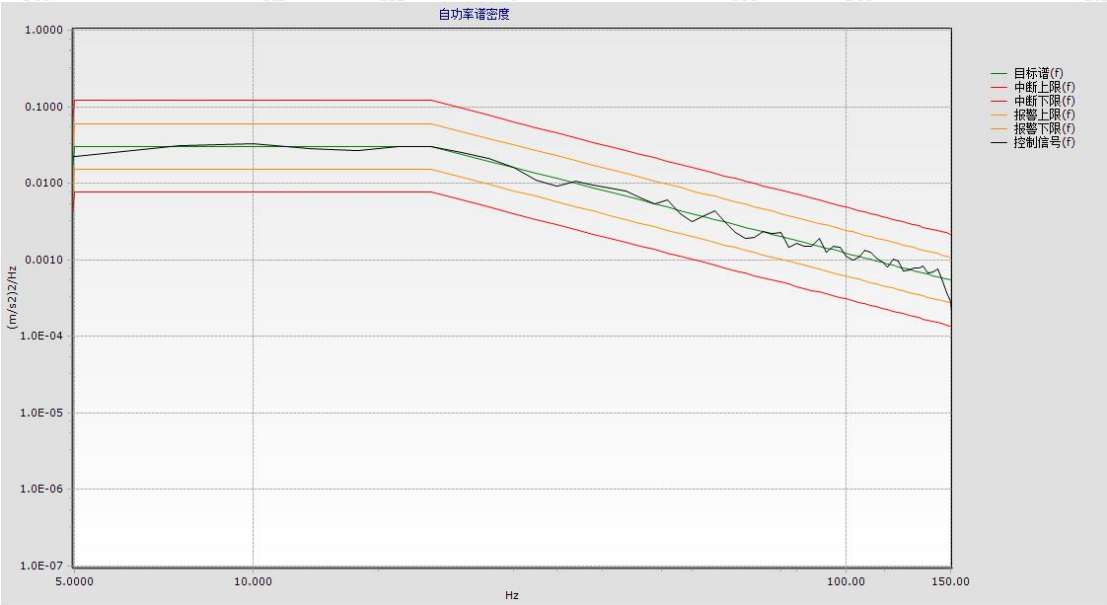
Functional random vibration test(Z axis)



Functional random vibration test Spectrogram(X axis)



Functional random vibration test Spectrogram(Y axis)



Functional random vibration test Spectrogram(Z axis)

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4.8.2 Simulated long life test

4.8.2.1 Test requirements

Test standard: EN 50155:2017

Sample NO.: 18290KC000014-1-2-2

Sample status: Bare machine, power off

Test conditions:

	Direction	RMS(m/s^2)	Frequency
1 Class B	Vertical	5.72	5Hz ~ 150Hz
	Horizontal	2.55	
	Longitudinal	3.96	
Test time	5 hours per direction		
Test mode	power off		

4.8.2.2 Test equipment

Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
Vibration tester	SE-1199	DC-2200-26	2020.12.15

4.8.2.3 Judgement basis

After the test, there shall be no damage; after the test, the equipment shall work as expected and within the specified scope.

4.8.2.4 Test result

There is no damage after the test; after the test, the equipment shall work as expected and within the specified scope.

4.8.2.5 Test conclusion

Pass

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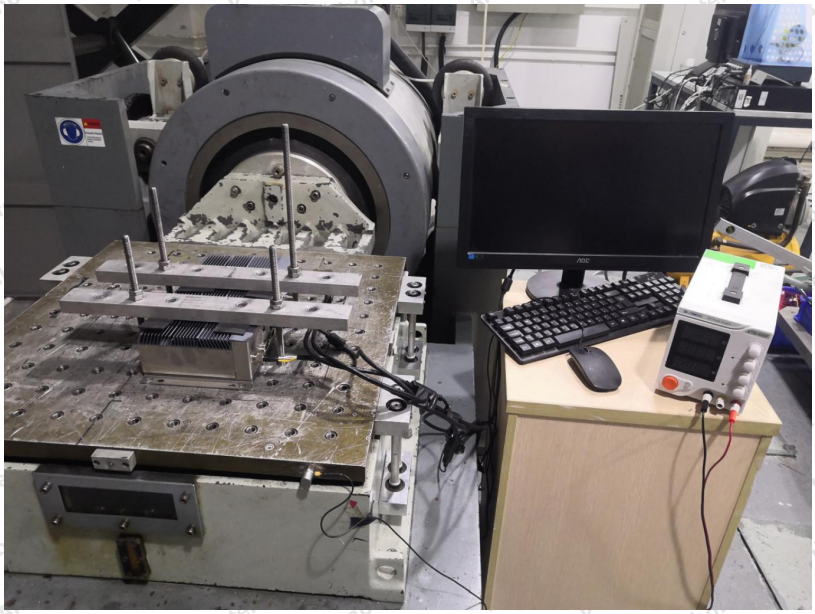
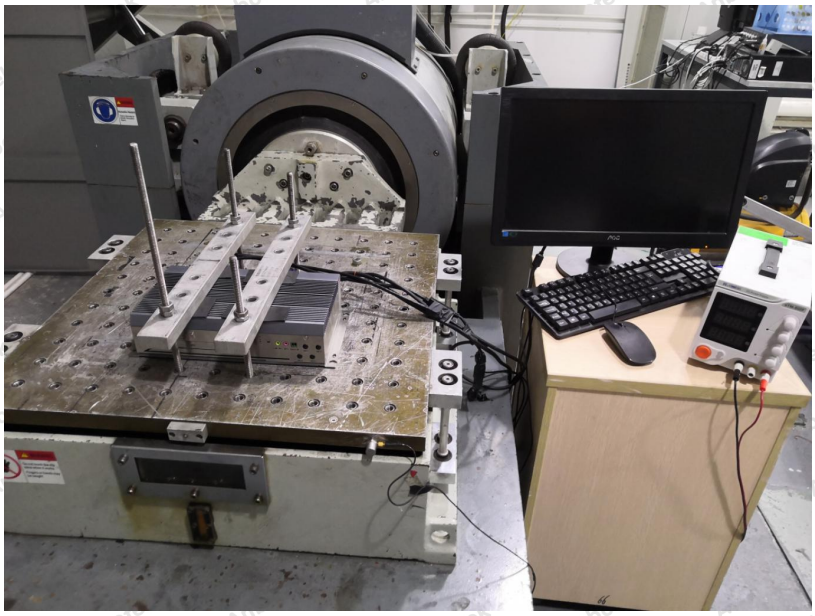
4.8.2.6 Test photos

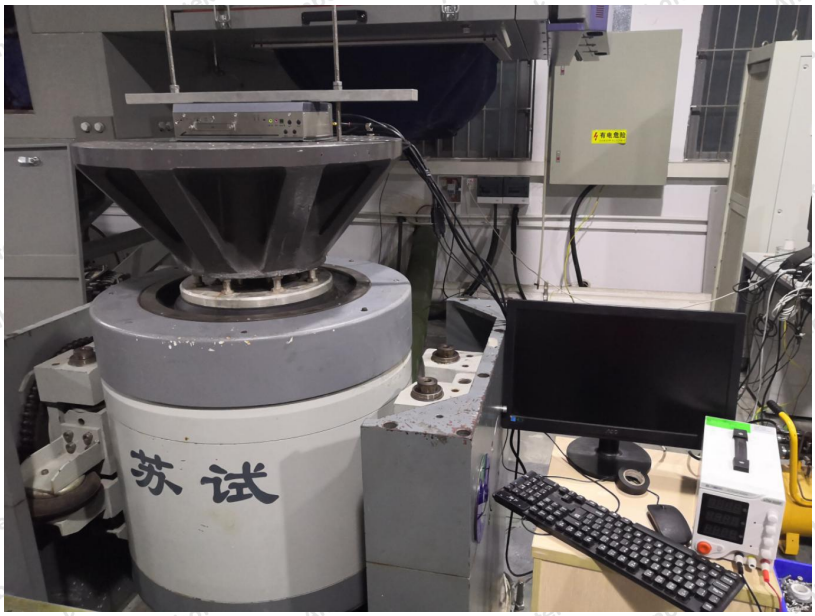
Sample photos



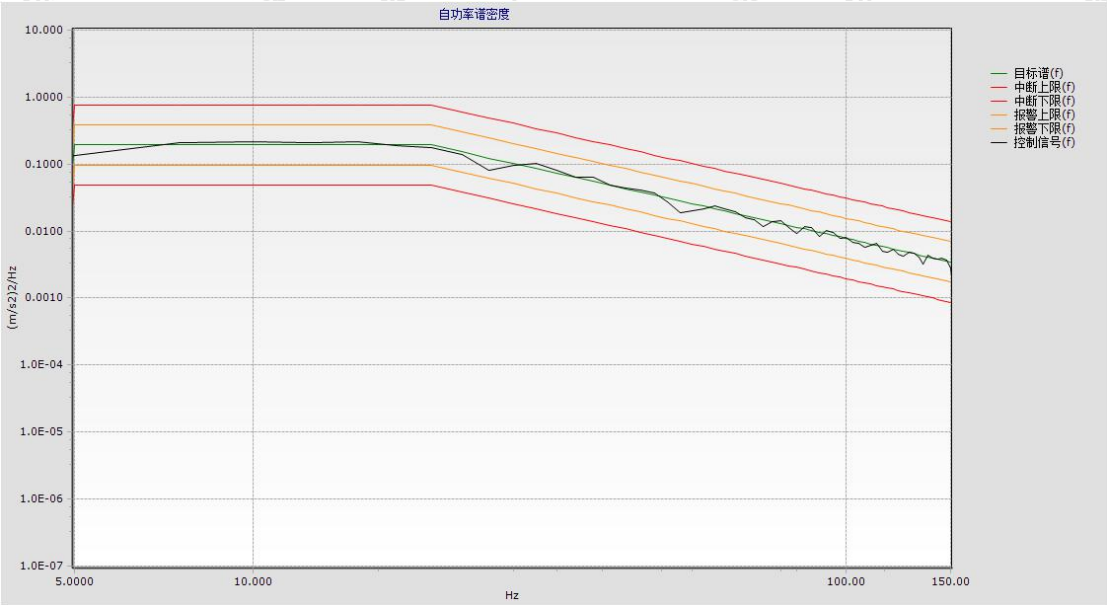
Simulated long life test (X axis)



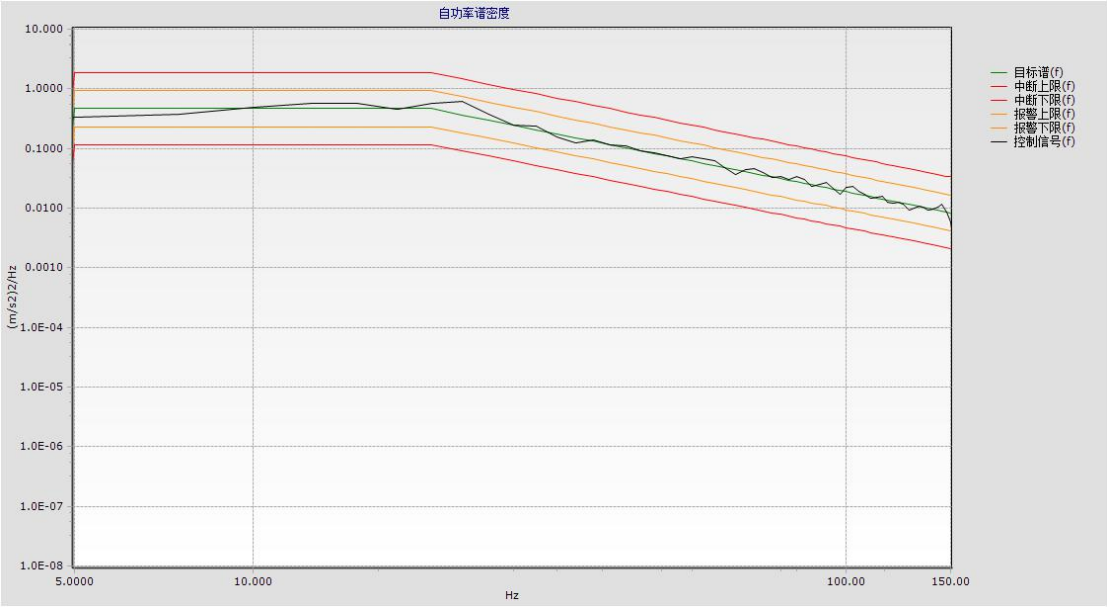
Simulated long life test (Y axis)



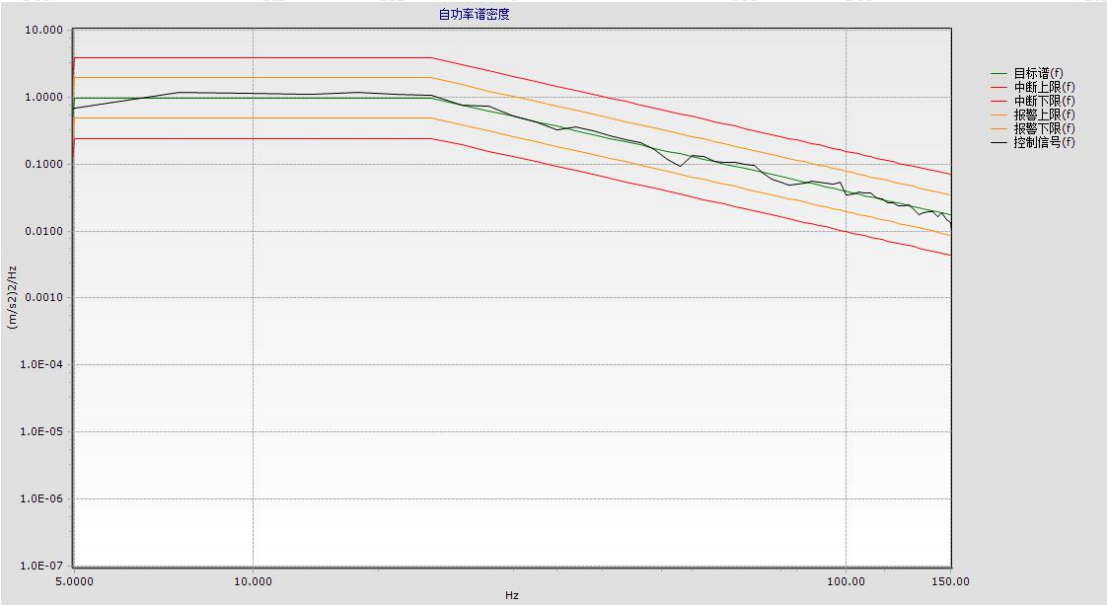
Simulated long life test (Z axis)



Simulated long life test Spectrogram(X axis)



Simulated long life test Spectrogram(Y axis)



Simulated long life test Spectrogram(Z axis)

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4.8.3 Shock test

4.8.3.1 Test requirements

Test standard: EN 50155:2017

Sample NO.: 18290KC000014-1-2-2

Sample status: Bare machine, power on

Test conditions:

Classification	Direction	Acceleration(m/s^2)	Pulse width(ms)
1 Class B	Vertical	30	30
	Horizontal	30	30
	Longitudinal	50	30
Test time	3 times in each direction, 18 times in total		

4.8.3.2 Test equipment

Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
Vibration tester	SE-1199	DC-2200-26	2020.12.15
DC power supply	SE-1438	eTM-3010F	2020.07.30

4.8.3.3 Judgement basis

There shall be no damage during the test; during the test, the equipment shall be monitored and operated as expected within its specified limits (performance standard a).

4.8.3.4 Test result

No damage occurred during the test; during the test, the equipment was monitored and operated as expected within its specified limits (performance standard a).

4.8.3.5 Test conclusion

Pass

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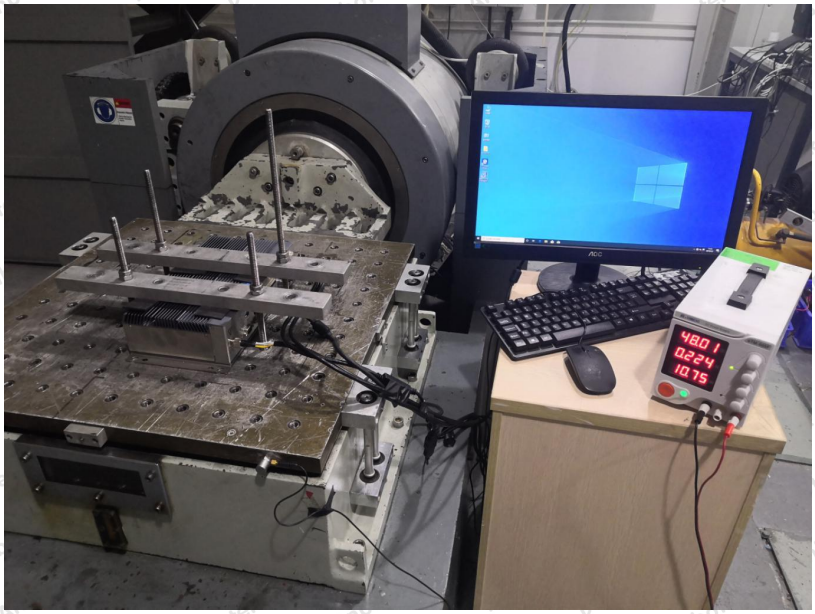
4.8.3.6 Test photos

Sample photos



Shock test (X axis)

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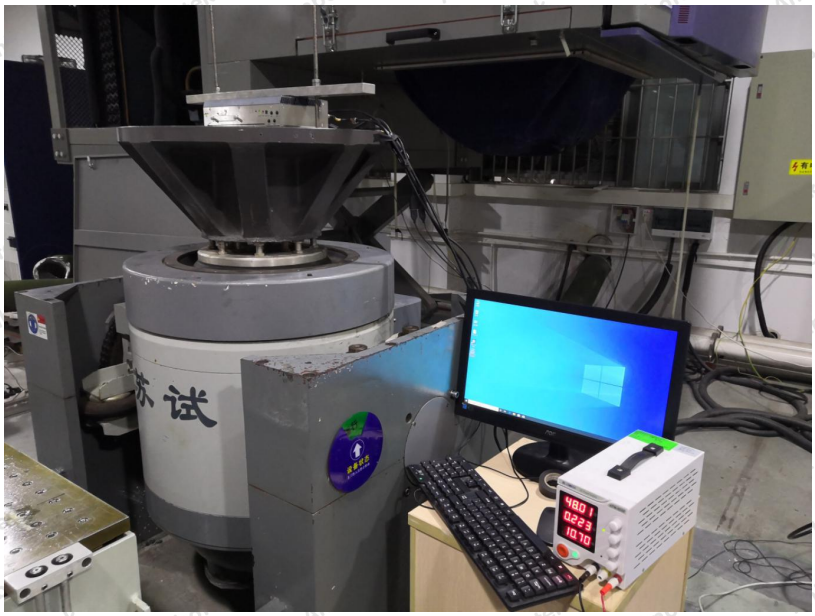
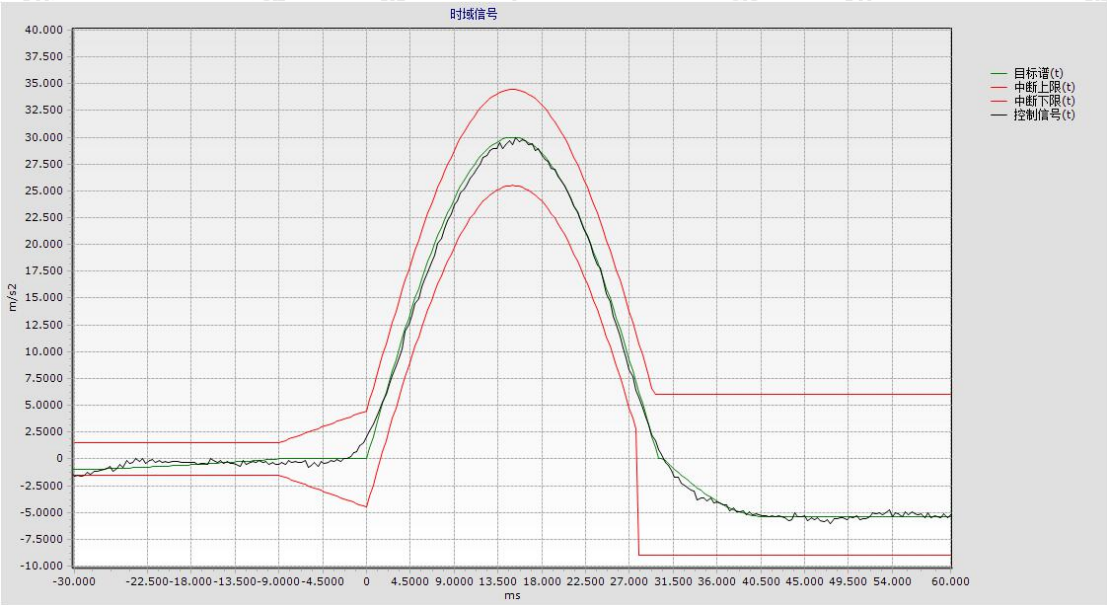
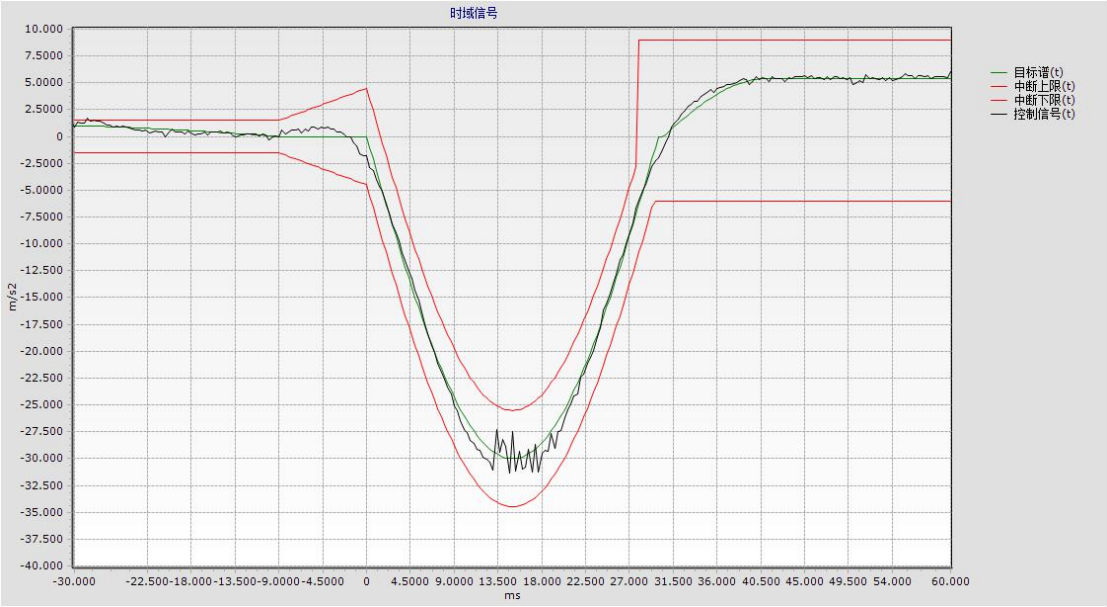
Shock test (Y axis)



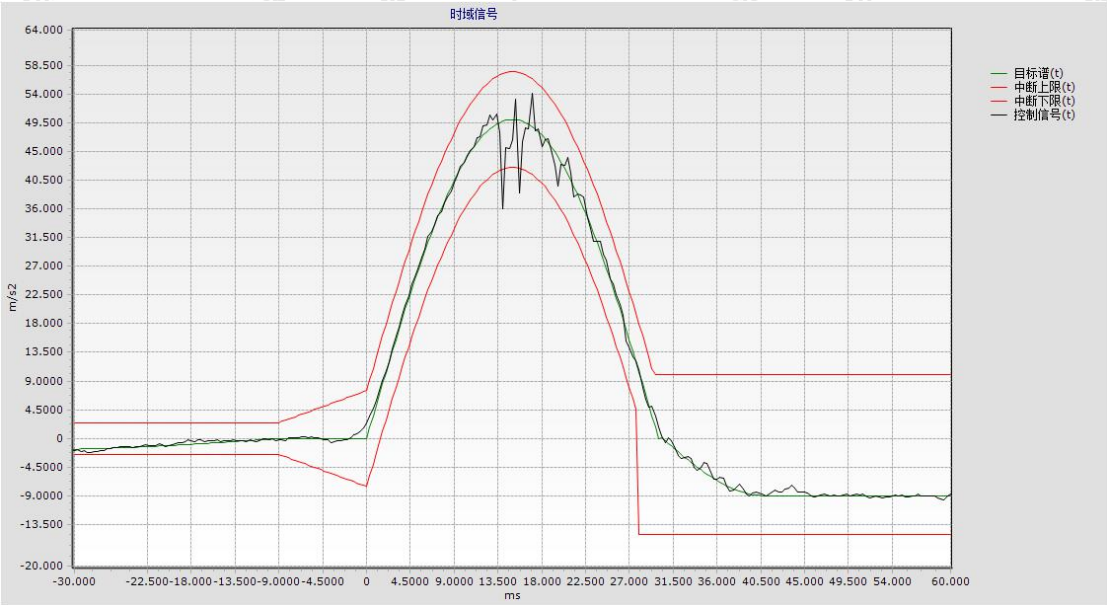
Shock test (Z axis)



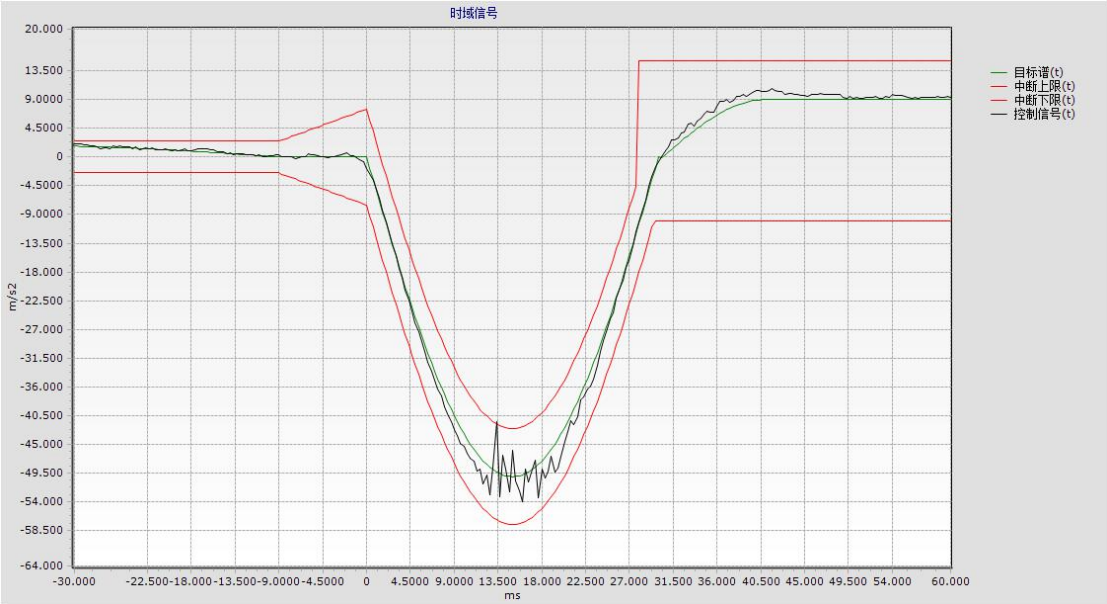
Shock test Spectrogram(X axis)



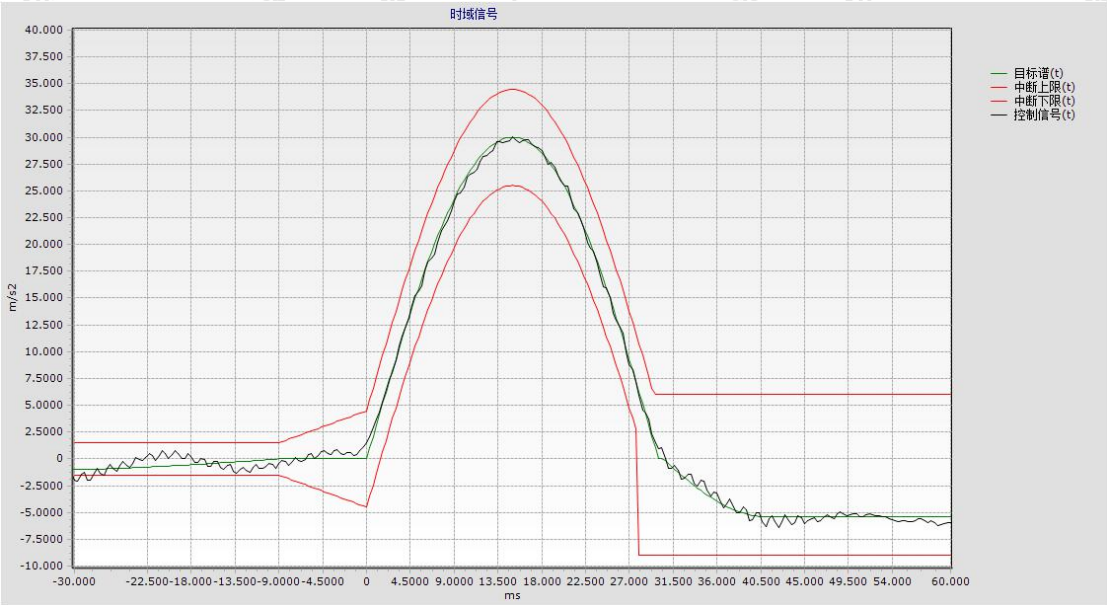
Shock test Spectrogram(-X axis)



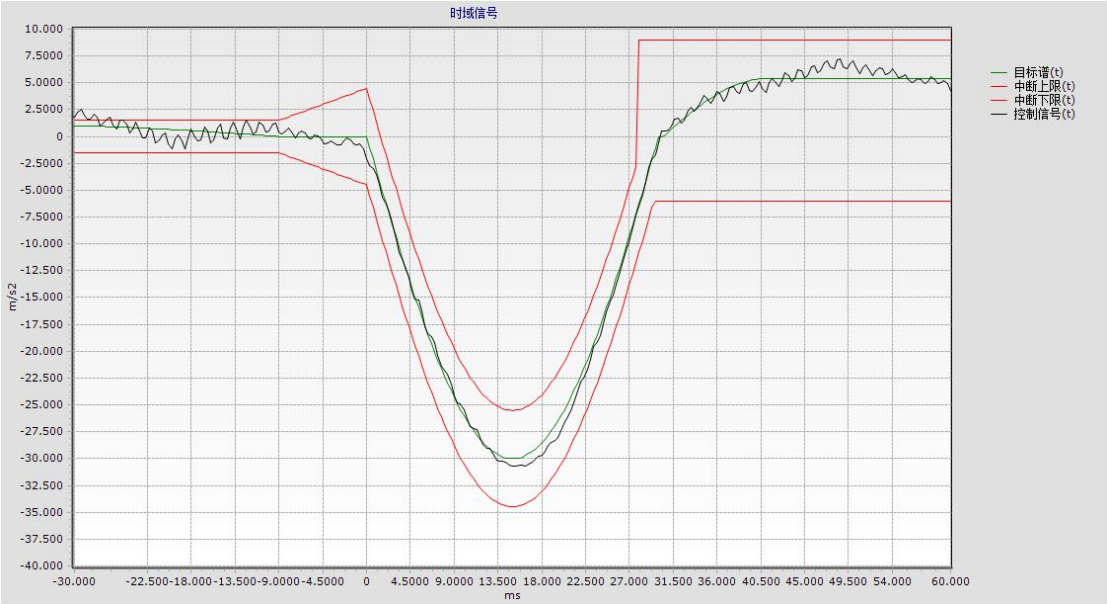
Shock test Spectrogram(Y axis)



Shock test Spectrogram(-Y axis)



Shock test Spectrogram(Z axis)



Shock test Spectrogram(-Z axis)

End of Report