

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 Anbotech Compliance Laboratory Limited



Marking

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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.
5. Objections to the test report must be submitted to Shenzhen Anbotek Compliance Laboratory Limited within 15 days.
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”.
8. The test report SZA EK191217003-01-M1 supersedes the test report SZA EK191217003-01 which is withdrawn.



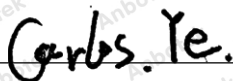
Report No.:SZAEEK191217003-01-M1

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
Basic Model No:SIGM-2650/S002
Model : Serial Model No:SIGM-2650/S001, SIGM-2650/S003, SIGM-2650/S004
SIGM-2650/T001, SIGM-2650/T002, SIGM-2650/T003,SIGM-2650/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 : 2019.12.16
Testing period : 2019.12.19 - 2020.1.2
Report Date : 2020.03.13

Test Conclusion :

Please refer next page.

Prepared by:**Checked by:****Approved by:**

name: Carlos Ye
Title: Test Engineer



name: Jimmy Zhou
Title: Lab Manager



name: Jeff Zhu
Title: Authorized signatory

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Section No.	Test Item		Test Method	Evaluation
1	Visual inspection		EN 50155:2017	Pass
2	Insulation test		EN 50155:2017	Pass
3	Performance test		EN 50155:2017 and client's requirements	Pass
4	Low temperature storage test		EN 50155:2017	Pass
5	Low temperature start-up test		EN 50155:2017	Pass
6	Dry heat test		EN 50155:2017 and client's requirements	Pass
7	Cyclic damp heat test		EN 50155:2017	Pass
8	Vibration and shock test	Functional random vibration test	EN 50155:2017	Pass
		Simulated long life test		
		Shock test		
9	Power supply test		EN 50155:2017	Pass




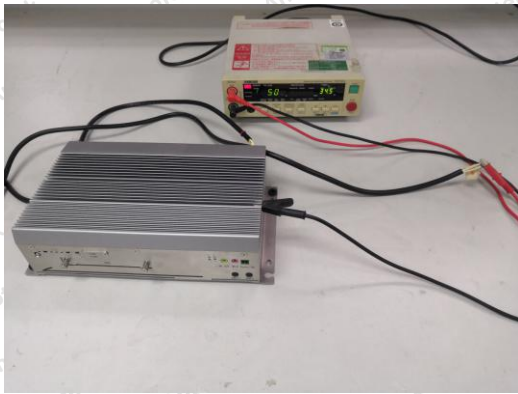
Report No.:SZA EK191217003-01-M1



1. Visual inspection

Test Method	EN 50155:2017		
Test Condition	Visual inspection of the sample at 25 °C ± 10°C		
Test Requirement	The appearance of the sample is normal without damage.		
Test Result	Sample No.	Test Result	Conclusion
	SZA EK19121 7003-1-2-1	The appearance of the sample was normal without damage.	Pass
Photos			
	Sample as received		Sample as received
			/
	Sample as received		/

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2. Insulation test

Test Method	EN 50155:2017			
Test Condition	1. Insulation resistance test: 500V (DC) 2. Voltage withstand test: 1000V (AC), 50HZ, 1 minute 3. During the test, the equipment shall not be powered on			
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
Test Requirement	1. Insulation resistance after pressure test >100 MΩ 2. Neither disruptive discharge nor flashover shall occur during the voltage withstand test. Withstand voltage test current ≤10mA. 3. After the withstand test, the equipment shall work as intended and within its specified limits.			
Test Result	Sample No.	Test Result		
	SZA EK 191217 003-1-2 -1	Insulation resistance (MΩ)		Voltage withstand test
		Before voltage withstand test	After voltage withstand test	
		>5000	>5000	Neither disruptive discharge nor flashover occurred. Withstand voltage test current <10mA.
				The equipment could work as intended and within its specified limits .
				Pass
Photos				
	Before test		Test Set-up Insulation resistance test	

Photos		
	Test set-up Insulation resistance test	Test Set-up Voltage withstand test
		/
	Test Set-up Voltage withstand test	/


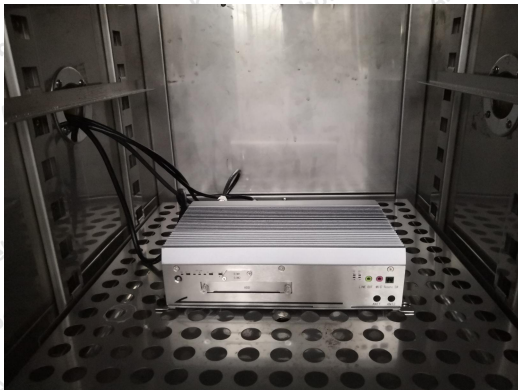

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3. Performance test

Test Method	According to EN 50155:2017 and client's requirements		
Test Condition	The equipment can operate normally and The indicators of each channel are normal after the sample is powered on.		
Test Requirement	The equipment can operate normally and The indicators of each channel are normal after the sample is powered on.		
Test Result	Sample No.	Test Result	Conclusion
	SZA EK191 217003-1-2- 1	The equipment can operate normally and The indicators of each channel are normal after the sample is powered on.	Pass
Photos			
	Before test		Test set-up



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4. Low temperature storage test



Test Method	EN 50155:2017			
Test Condition	The equipment is placed in a chamber at -40℃ for 16h without any voltage applied. After recovery, a performance check is carried out at ambient reference temperature.			
Test Equipment	Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
	Temperature & humidity chamber	SE-3301	ZJ-HWS1000C	2020.8.22
Test Requirement	After recovery, the equipment shall work as intended and within its specified limits: 1.The apparatus shall continue to operate as intended during and after the test/event. 2.No degradation of performance or loss of function is allowed.			
Test Result	Sample No.	Test Result		Conclusion
	SZAEEK191217003-1-2-1	After recovery, the equipment could work as intended and within its specified limits. The equipment can operate normally and The indicators of each channel are normal after the sample is powered on.		Pass
Photos				
	Before test		Test set-up	
			/	
	Test set-up		/	

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5. Low temperature start-up test


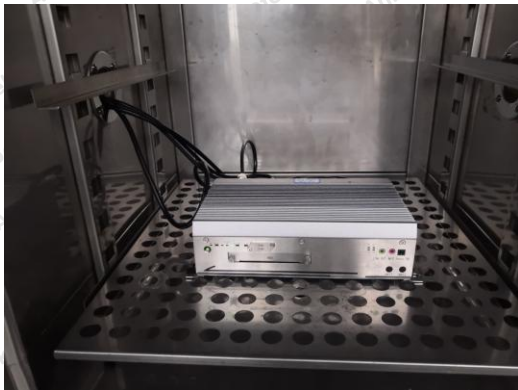
Test Method	EN 50155:2017			
Test Condition	<p>The low operating temperature is -40℃.</p> <p>The equipment is placed without any voltage applied, after thermal stabilization of the chamber at-40 ℃, for 2 h to achieve stabilization.</p> <p>At the end of this period the equipment shall be switched on and a performance check is carried out, keeping the equipment at the low temperature.</p> <p>After recovery, this performance check is repeated at normal room temperature.</p>			
Test Equipment	Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
	Temperature & humidity chamber	SE-3301	ZJ-HWS1000C	2020.8.22
Test Requirement	<p>During and after the test, the equipment shall work as intended.</p> <p>1. The apparatus shall continue to operate as intended during and after the test.</p> <p>2. No degradation of performance or loss of function is allowed.</p>			
Test Result	Sample No.	Test Result		Conclusion
	SZA EK191217003-1-2-1	After recovery, the equipment could work as intended and within its specified limits. The equipment can operate normally and The indicators of each channel are normal after the sample is powered on.		Pass
Photos				
	Before test		Test set-up	



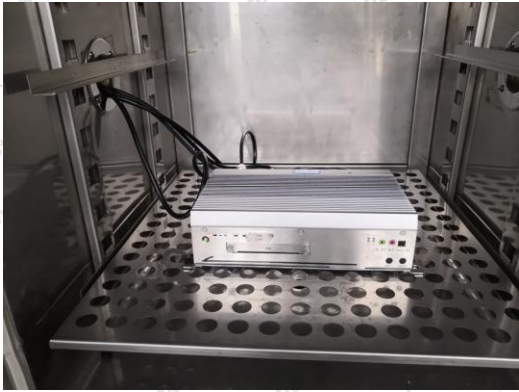
Report No.:SZA EK191217003-01-M1

<p>Photos</p>	<div><p>Test set-up</p></div>	<div><p>Test set-up</p></div>
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6. Dry heat test


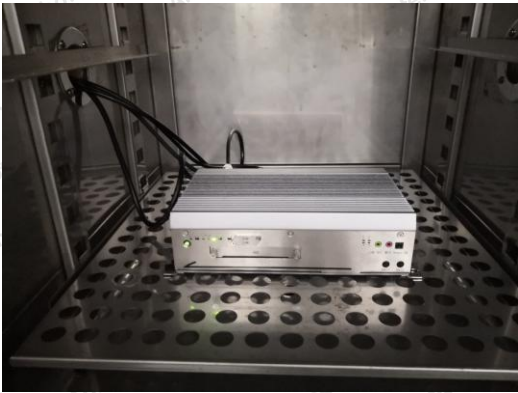


Test Method	According to EN 50155:2017 and client's requirements			
Test Condition	<p>Rise the temperature from room temperature to 70 °C at 1 °C/min, stable for 6h, then the equipment shall be switched on operational checks carried.</p> <p>Rise the temperature to 85°C at 1 °C/min, left for 10 min with continuous operational checks carried.</p> <p>The equipment is then allowed to cool to ambient temperature and a further performance test.</p>			
Test Equipment	Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
	Temperature & humidity chamber	SE-3301	ZJ-HWS1000C	2020.8.22
Test Requirement	<p>During and after the test, the equipment shall work as intended.</p> <p>1. The apparatus shall continue to operate as intended during and after the test.</p> <p>2. No degradation of performance or loss of function is allowed.</p>			
Test Result	Sample No.	Test Result		Conclusion
	SZAEEK191217003-1-2-1	After recovery, the equipment could work as intended and within its specified limits. The equipment can operate normally and The indicators of each channel are normal after the sample is powered on.		Pass
Photos				
	Before test		Test set-up	

Photos		
	Test set-up	Test set-up
		/
	Test set-up	/

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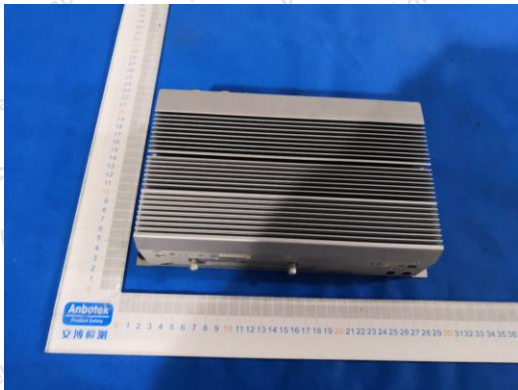

7. Cyclic damp heat test

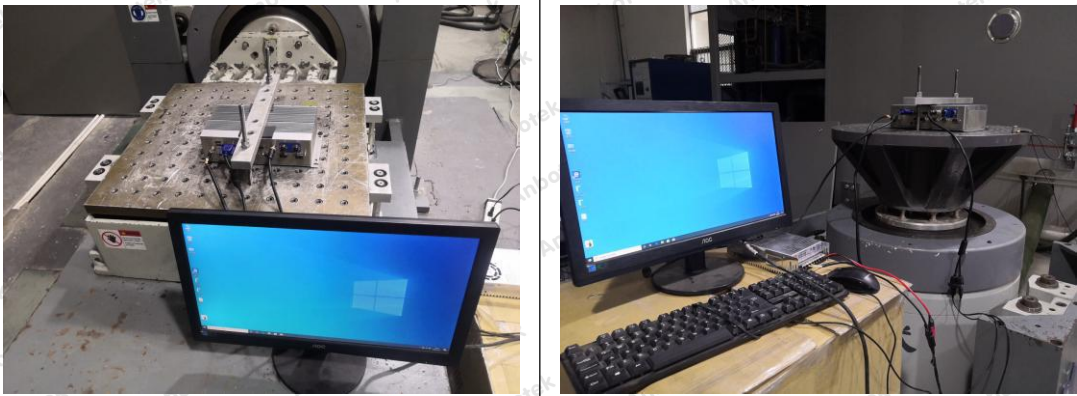
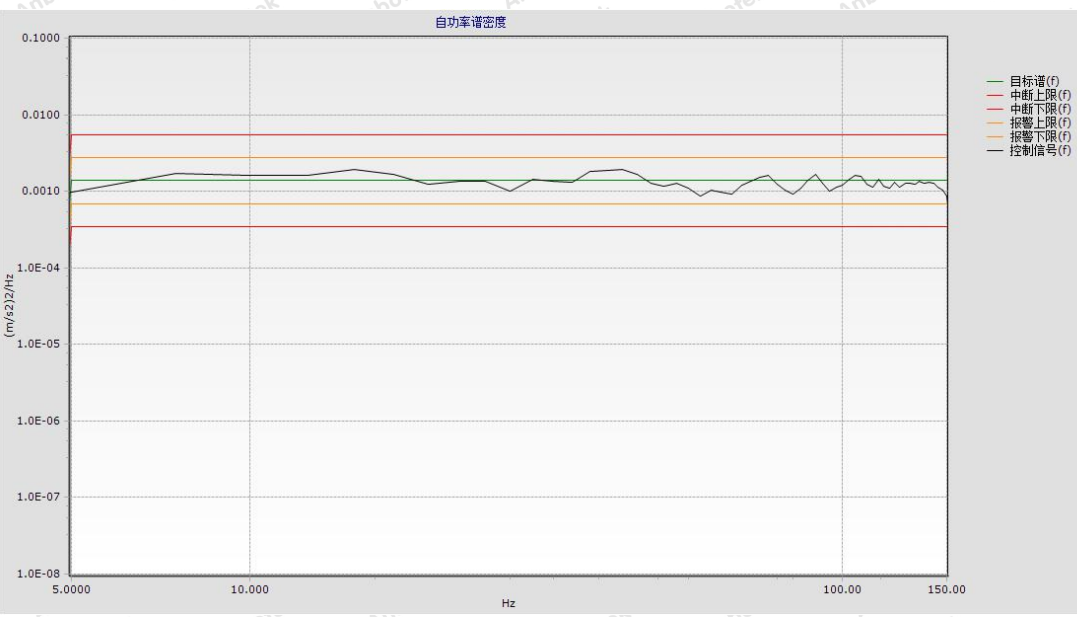
Test Method	EN 50155:2007				
Test Condition	The equipment under test shall not be powered except during the performance check. Temperatures: 55℃ and 25℃ Number of cycles:2 Test time:2×24h Intermediate measurements:an operational check shall be carried out at the rise in temperature during the beginning of the 2nd cycle. Insulation resistance test: 500V (DC) Withstand voltage test: 1000V (AC), 50HZ, 1 minute.				
Test Equipment	Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period	
	Temperature & humidity chamber	SE-3301	ZJ-HWS1000C	2020.8.22	
	Insulation Resistance Tester	SE-2167	TOS7200	2020.4.2	
	Withstand voltage tester	SE-2174	TOS5101	2020.4.2	
Test Requirement	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 shall work as intendeds specified limits 1) The apparatus shall continue to operate as intended during and after the test. 2) No degradation of performance or loss of function is allowed.				
Test Result	Sample No.	Test Item	Initial	Final	Conclusion
	SZA EK 191217 003-1-2 -1	Insulation resistance	>5000 MΩ	>5000 MΩ	Pass
		Withstand voltage	Neither disruptive discharge nor flashover occurred. Withstand voltage test current <10mA.	Neither disruptive discharge nor flashover occurred. Withstand voltage test current <10mA.	
		After recovery, the equipment could work as intended and within its specified limits. The equipment can operate normally and The indicators of each channel are normal after the sample is powered on.			

Photos		
	Before test	Test set-up
		
	After test	After test

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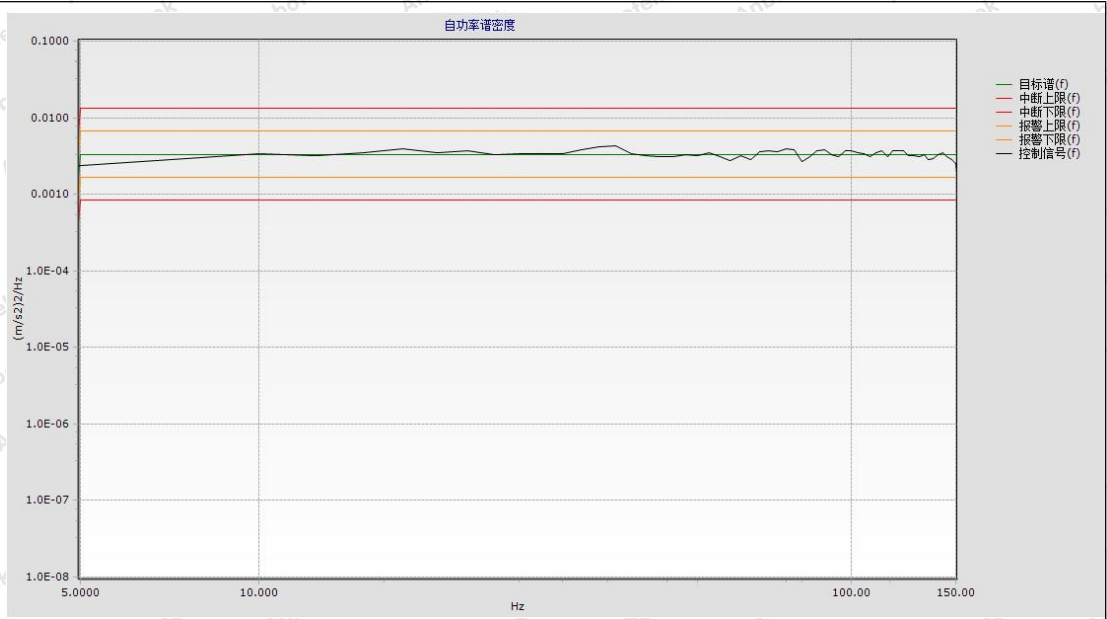
8. Vibration and shock test**8.1 Functional random vibration test**

Test Method	EN 50155:2017			
Test Condition	1 Class B	Direction	RMS(m/s ²)	Frequency
		Vertical	1.01	5Hz ~ 150Hz
		Horizontal	0.45	
		Longitudinal	0.70	
	Test time	10 min per direction.		
Test mode	power on			
Test Equipment	Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
	Vibration tester	SE-1199	DC-2200-26	2019.12.25
Test Requirement	1.No damage shall occur during the test 2.During the test, the equipment shall work as intended. 1) The apparatus shall continue to operate as intended during and after the test. 2) No degradation of performance or loss of function is allowed.			
Test Result	Sample No.	Test Result		Conclusion
	SZAEK19121 7003-1-2-2	1. No damage occurred during the test. 2. During the test, the equipment could work as intended.		Pass
Photos				
	Before test		Test set-up(X)	

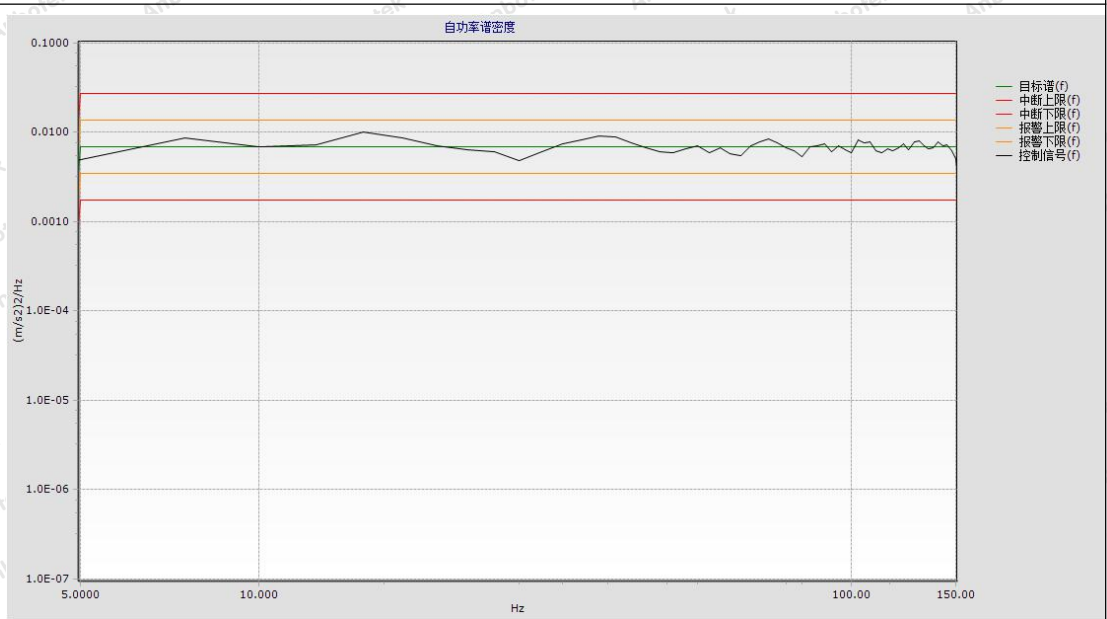
Photos		
	Test set-up(Y)	Test set-up(Z)
		
	Test spectrogram(X)	

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Photos



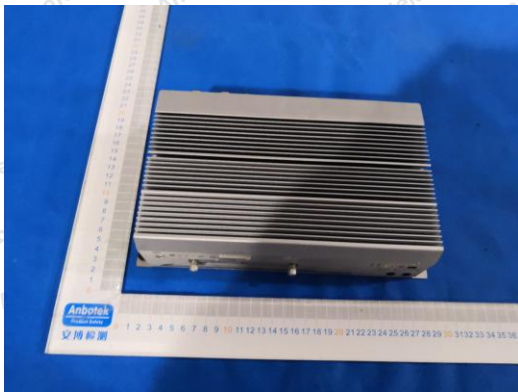
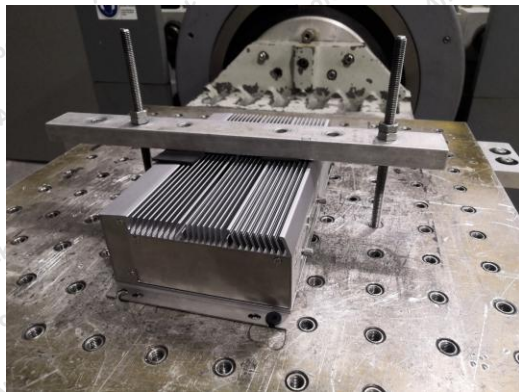
Test spectrogram(Y)



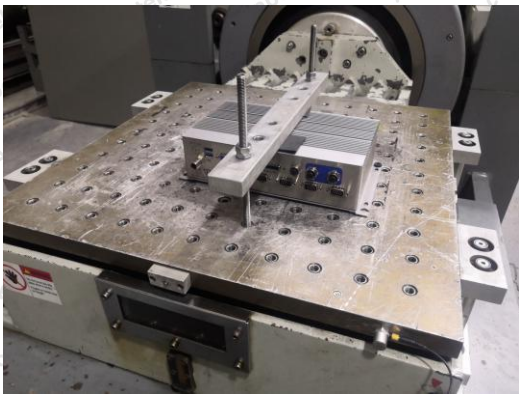
Test spectrogram(Z)

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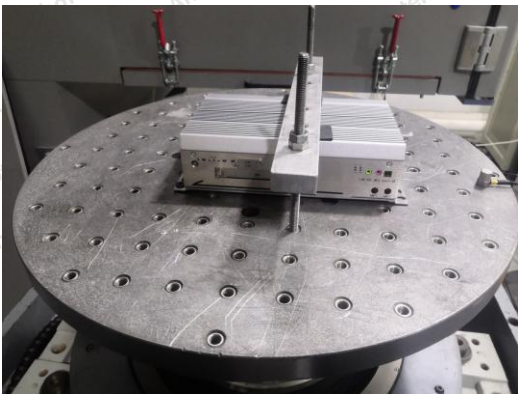
8.2 Simulated long life test

Test Method	EN 50155:2017			
Test Condition	1 Class B	Direction	RMS(m/s²)	Frequency
		Vertical	5.72	5Hz ~ 150Hz
		Horizontal	2.55	
		Longitudinal	3.96	
	Test time	5 hours per direction.		
Test mode	power off			
Test Equipment	Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
	Vibration tester	SE-1199	DC-2200-26	2019.12.25
Test Requirement	1.No damage shall occur during the test 2.after the test, the equipment shall work as intended. 1) The apparatus shall continue to operate as intended after the test. 2) No degradation of performance or loss of function is allowed.			
Test Result	Sample No.	Test Result		Conclusion
	SZAEK19121 7003-1-2-2	1. No damage occurred during the test. 2. During the test, the equipment could work as intended.		Pass
Photos				
	Before test		Test set-up(X)	

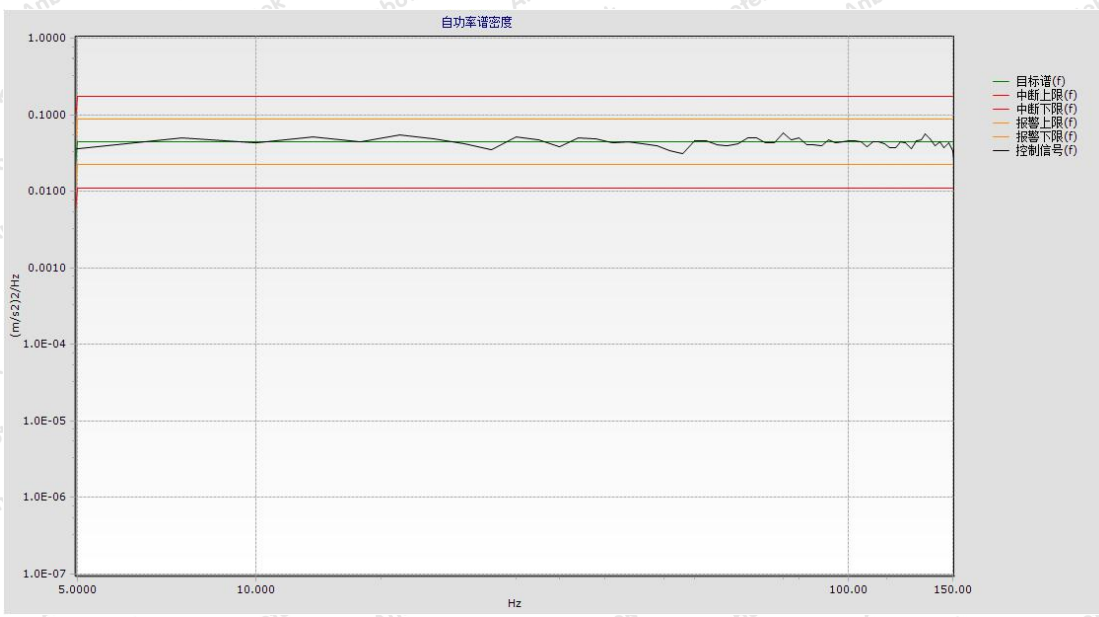
Photos



Test set-up(Y)



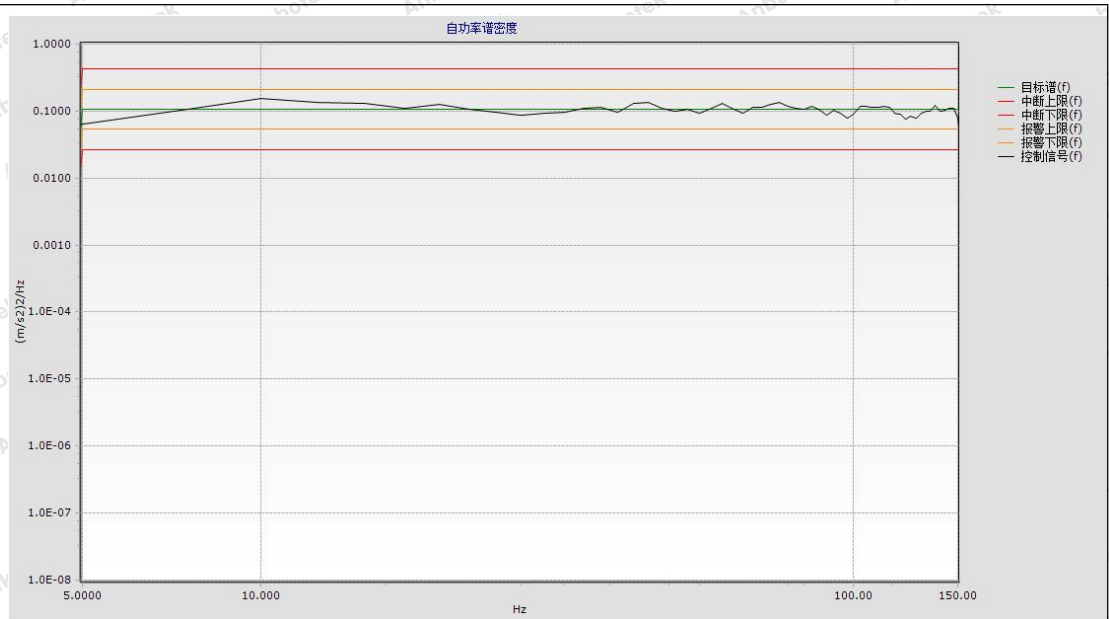
Test set-up(Z)



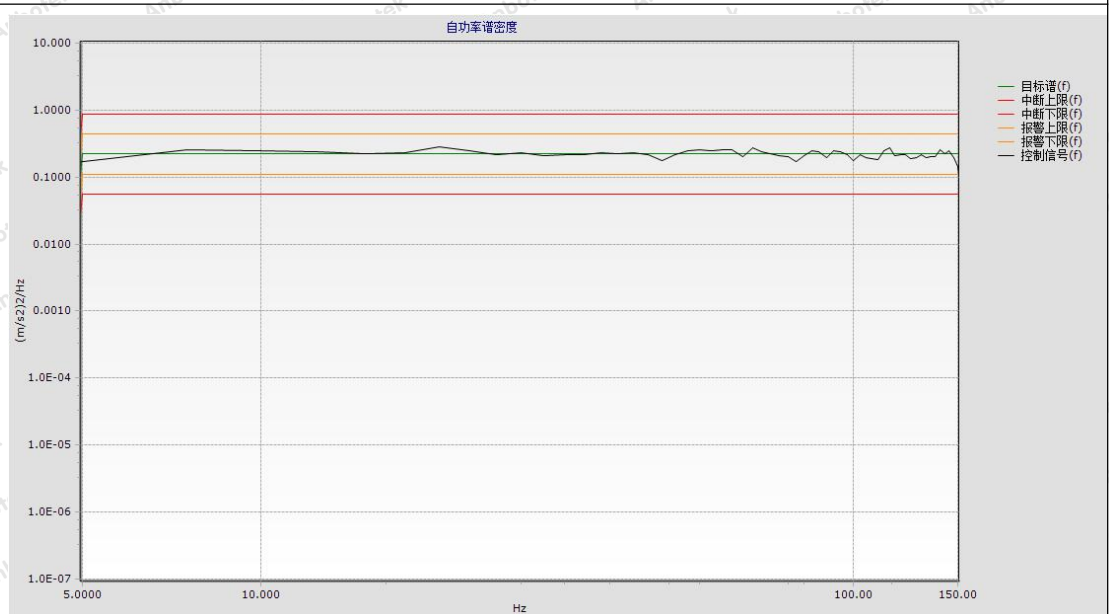
Test spectrogram(X)

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Photos



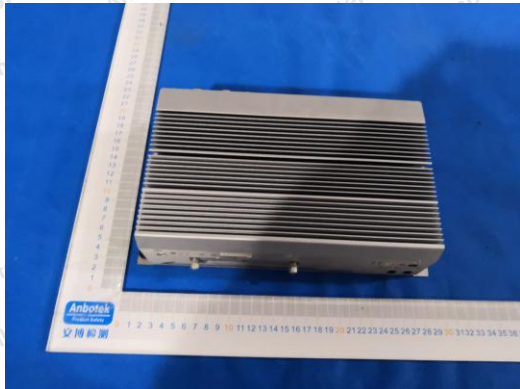
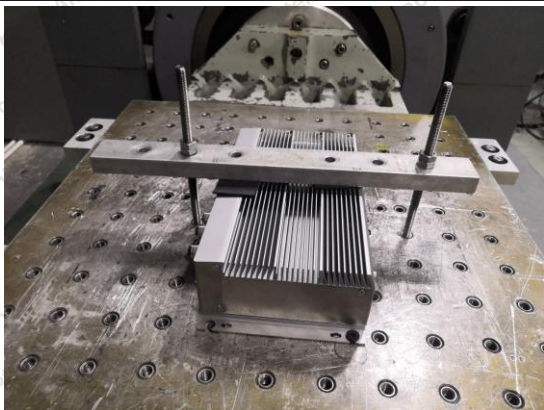
Test spectrogram(Y)



Test spectrogram(Z)

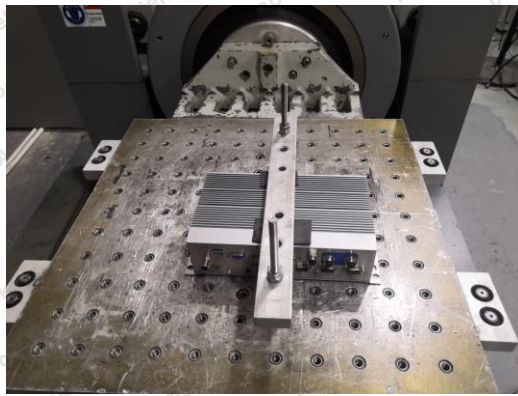
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8.3. Shock test

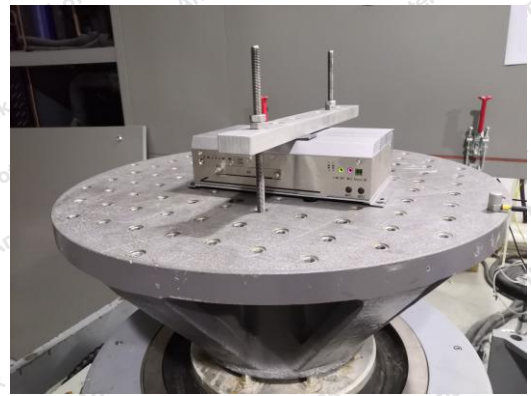
Test Method	EN 50155:2017			
Test Condition	Classification	Direction	Acceleration(m/s ²)	Pulse width(ms)
	1 Class B	Vertical	30	30
		Horizontal	30	30
		Longitudinal	50	30
	Test time	3 times in each direction, 18 times in total		
Test Equipment	Equipment Name	Equipment No.	Equipment model	Equipment Cal validity period
	Vibration tester	SE-1199	DC-2200-26	2019.12.25
Test Requirement	1.No damage shall occur during the test 2.after the test, the equipment shall work as intended. 1) The apparatus shall continue to operate as intended after the test. 2) No degradation of performance or loss of function is allowed.			
Test Result	Sample No.	Test Result		Conclusion
	SZAEK19121 7003-1-2-2	1. No damage occurred during the test. 2. after the test, the equipment could work as intended.		Pass
Photos				
	Before test		Test set-up(X)	

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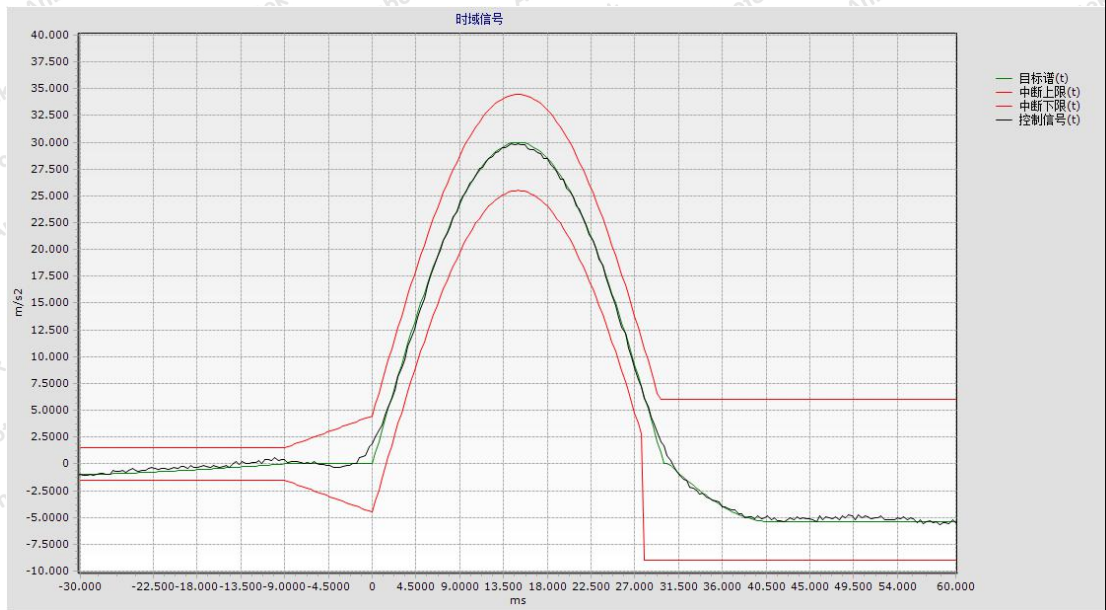
Photos



Test set-up(Y)



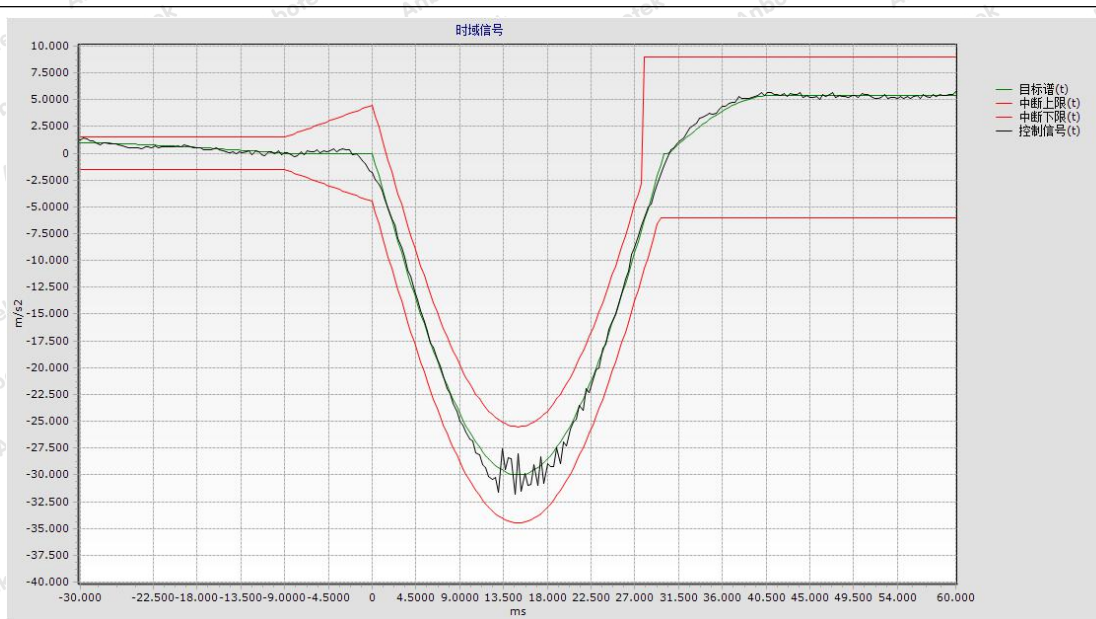
Test set-up(Z)



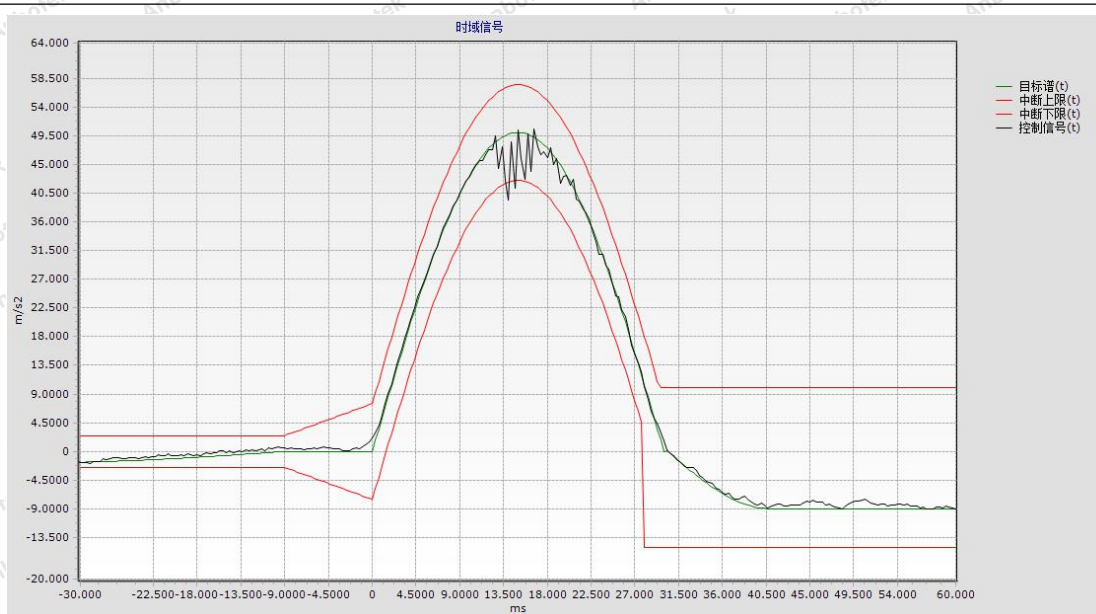
Test spectrogram(+X)

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Photos



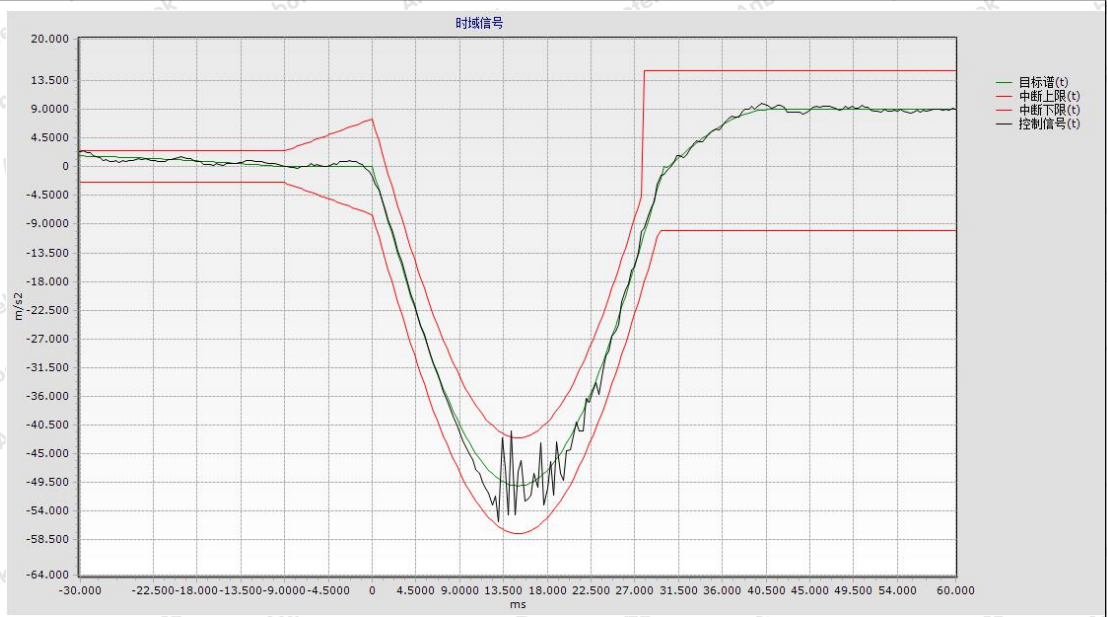
Test spectrogram(-X)



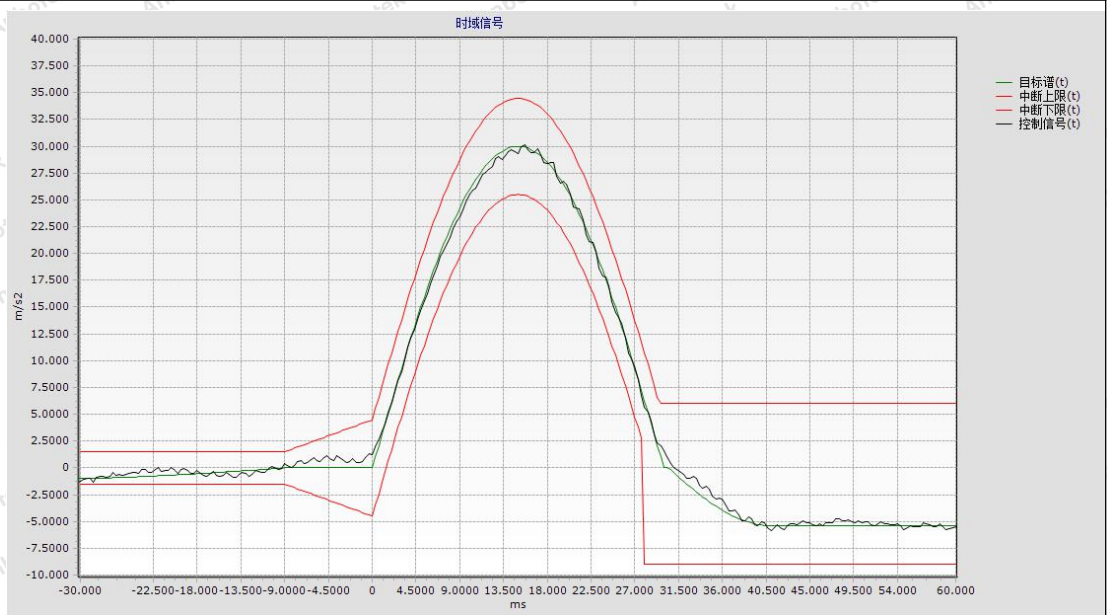
Test spectrogram(+Y)

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Photos



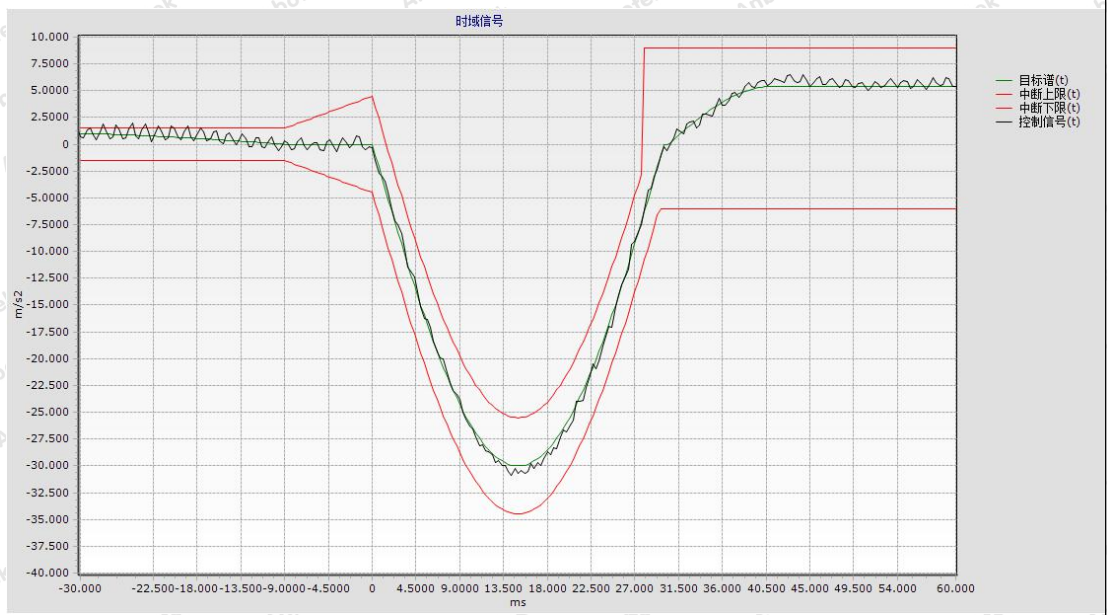
Test spectrogram(-Y)



Test spectrogram(+Z)

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Photos



Test spectrogram(-Z)

Report No.:SZA EK191217003-01-M1

9 Power supply test

9.1 Test requirements

Test standard: EN 50155:2017

Sample NO.: SZA EK191217003-1-2-2

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.

9.2 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

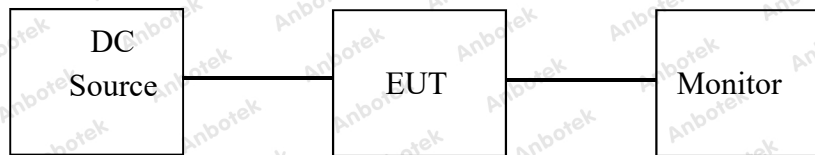
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9.3 Supply variations

9.3.1 Test Summary

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

9.3.2 Block diagram of test setup



9.3.3 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 $1,4 U_n$ lasting no more than 0,1 s shall not cause deviation of function (**performance criterion A**).

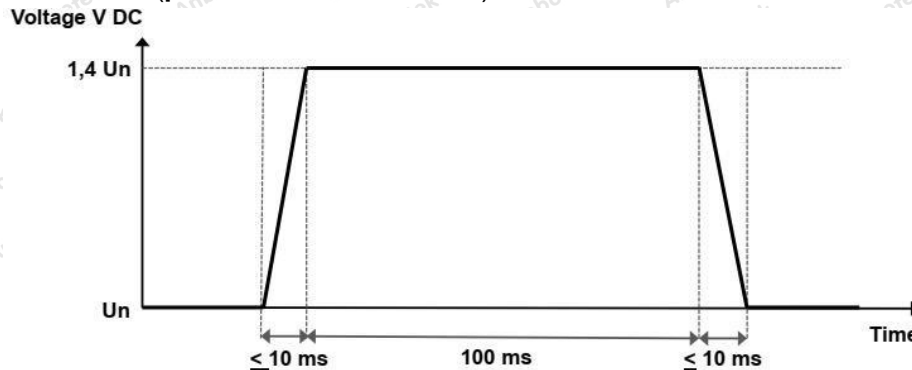


Figure 6 — Temporary supply overvoltages (a)

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For temporary supply overvoltages up to 1,4 U_n lasting no more than 1 s the equipment shall fulfil **performance criterion B**.

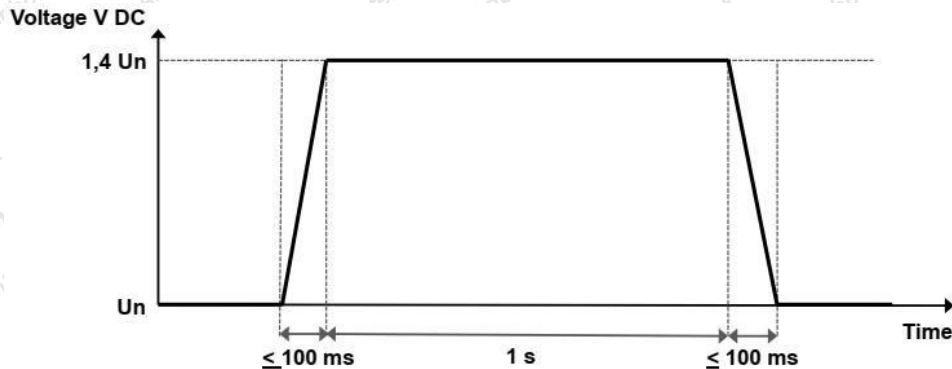


Figure 7 — Temporary supply overvoltages (b)

9.3.4 Result

PASS

EUT : Fanless In-Vehicle Computer

Power Source (U_n) : DC 110V

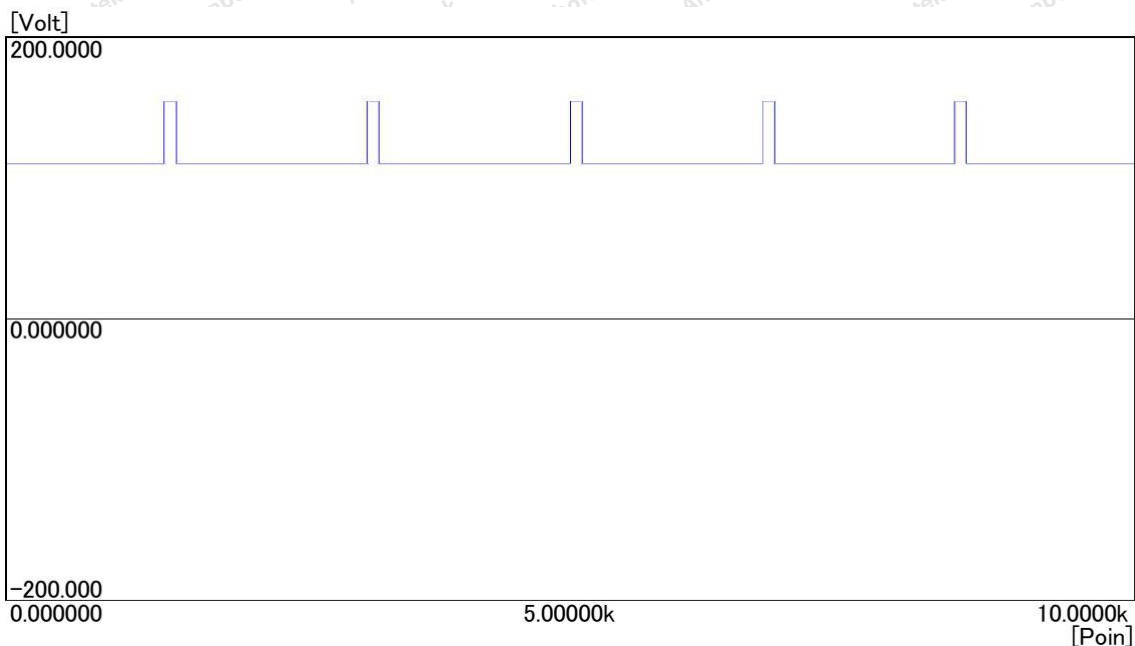
Test Level : 154V (1.4 U_n)

sequence number : 10

interval time : 30s

Dwell time : 100ms

Result : Criteria A



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EUT : Fanless In-Vehicle Computer

Power Source (Un) : DC 110V

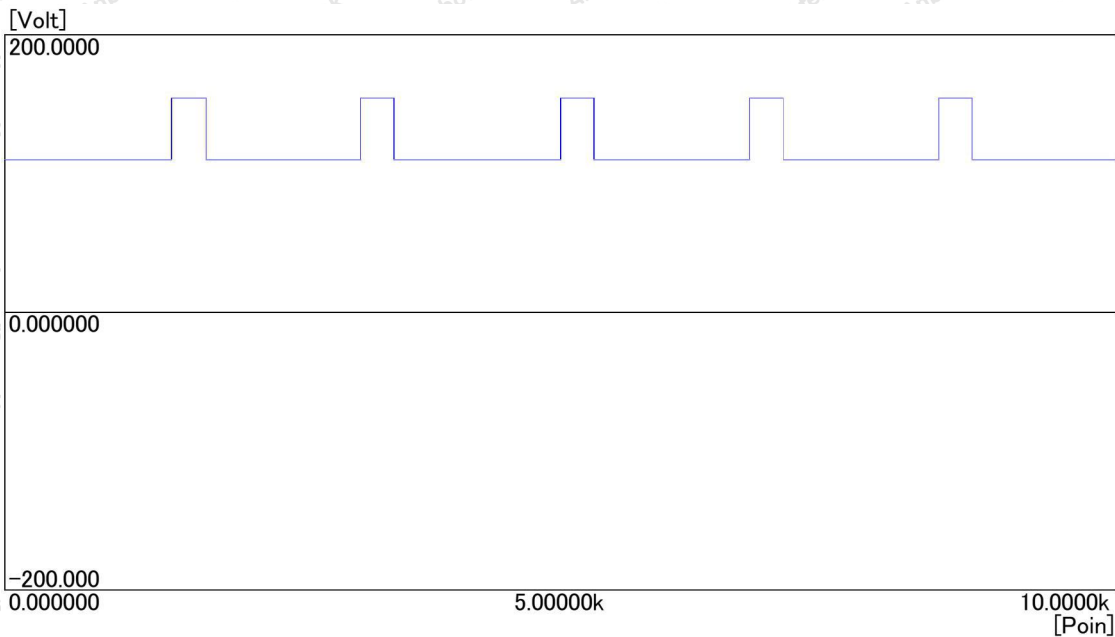
Test Level : 154V (1.4 Un)

sequence number : 10

interval time : 30s

Dwell time : 1s

Result : Criteria A



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9.4 Temporary supply dips

9.4.1 Test Summary

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

9.4.2 Block diagram of test setup



9.4.3 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 (performance criterion A).

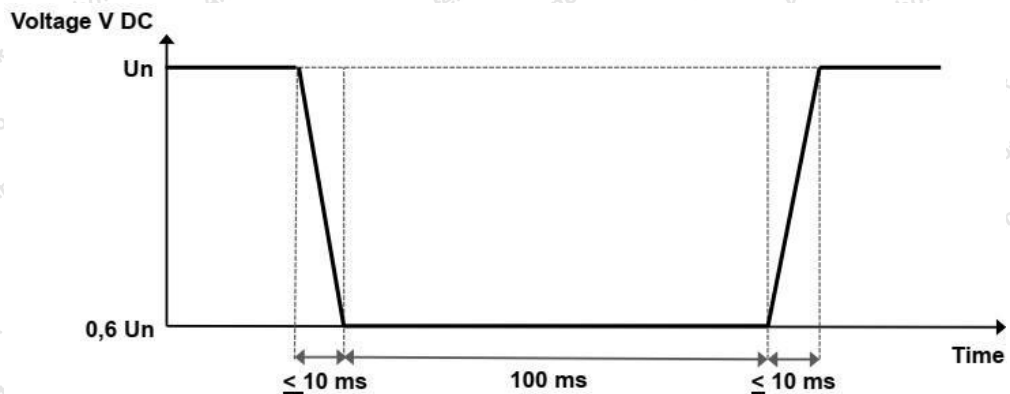


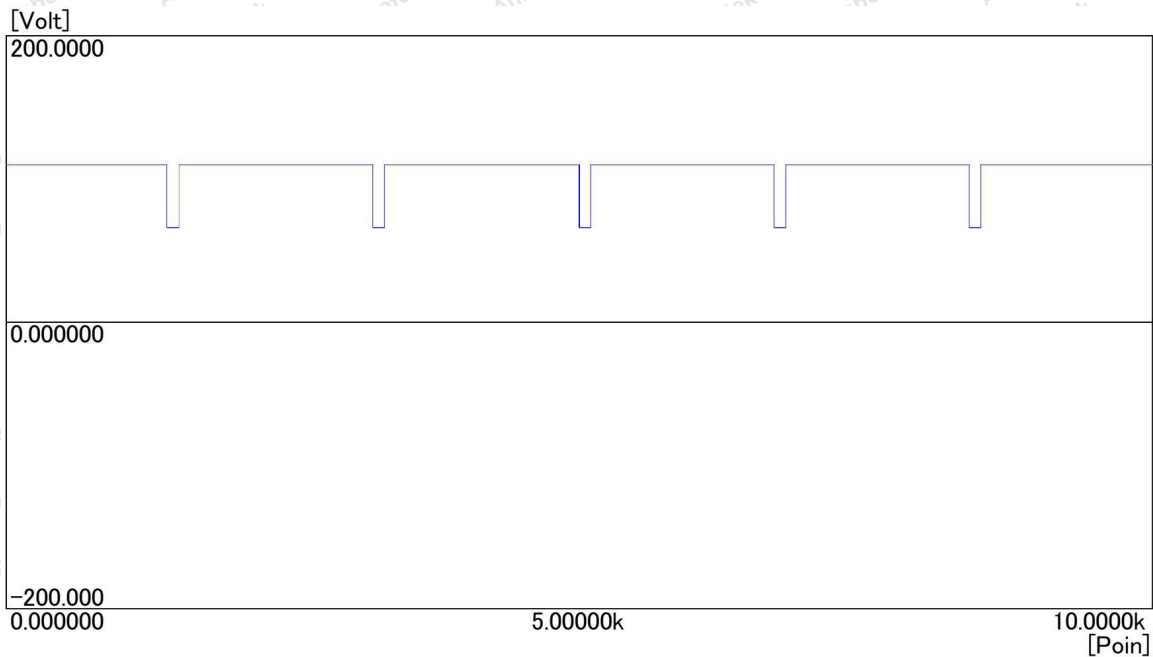
Figure 8 — Temporary supply dips

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9.4.4 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



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9.5 Interruptions of voltage supply**9.5.1 Test Summary**

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

9.5.2 Block diagram of test setup**9.5.3 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.

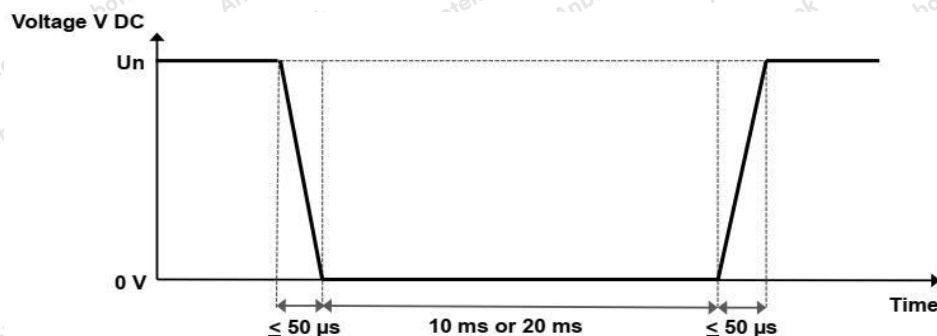


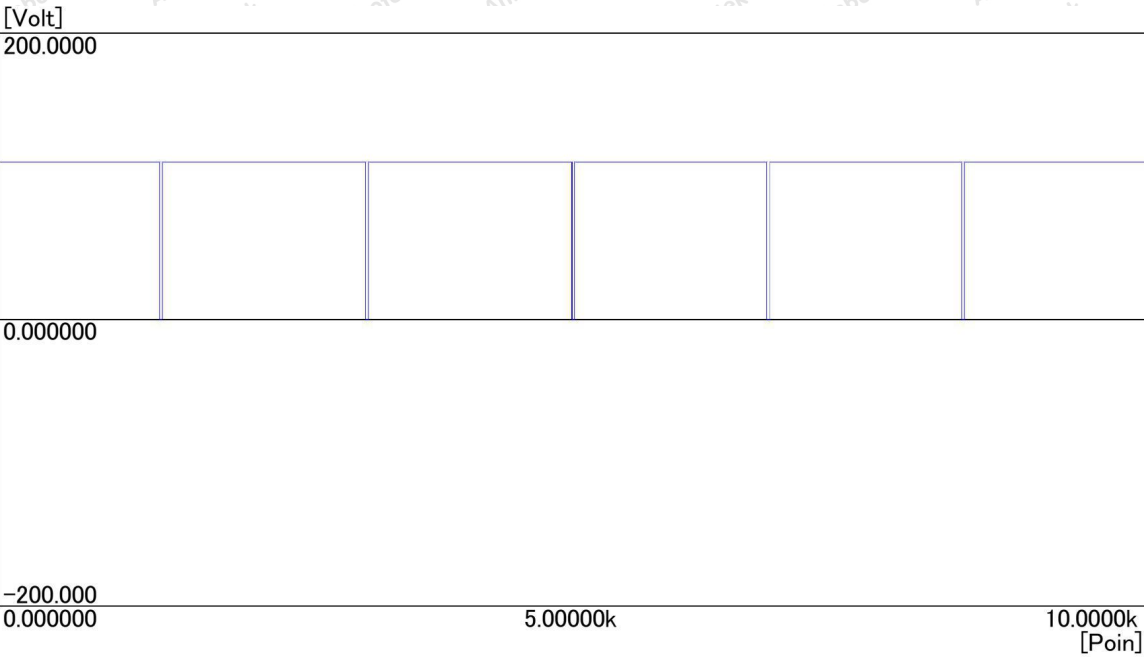
Figure 9 — Interruption of supply voltage

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9.5.4 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



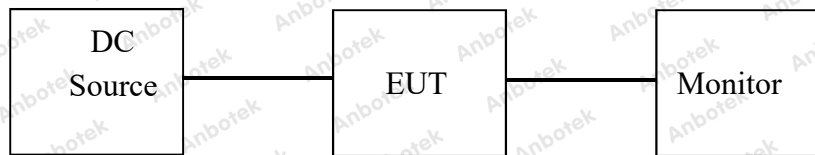
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9.6 Supply change-over

9.6.1 Test Summary

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

9.6.2 Block diagram of test setup



9.6.3 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.

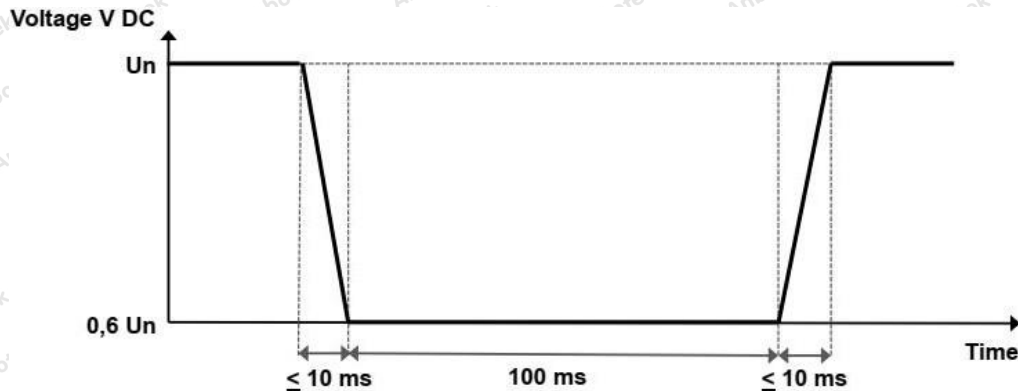


Figure 10 — Supply change-over Class C1

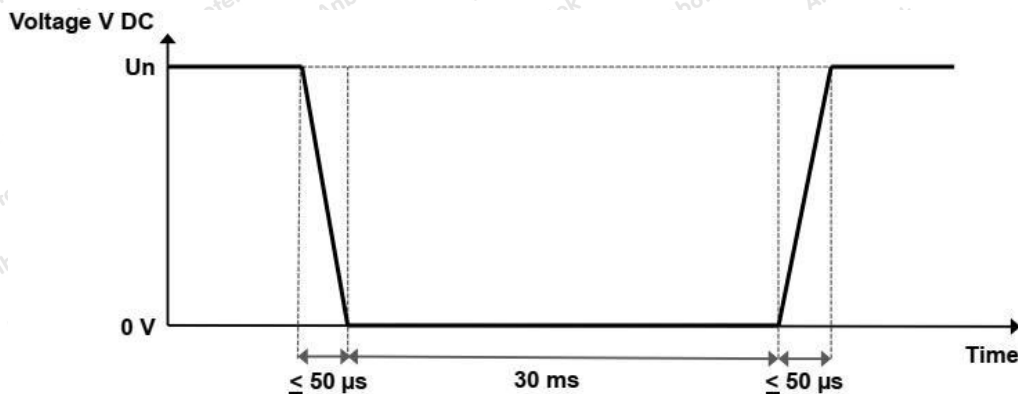


Figure 11 — Supply change-over Class C2

9.6.4 Result

PASS

EUT : Fanless In-Vehicle Computer

Power Source (Un) : DC 110V

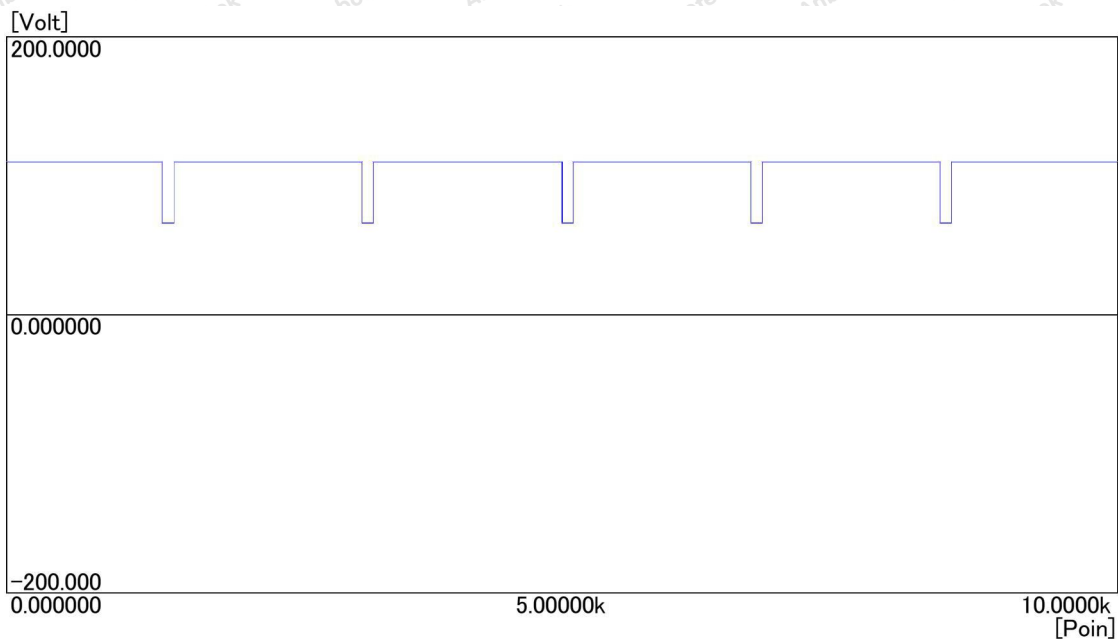
Test Level : 66V (0.6 Un)

Sequence number : 10

Interval time : 30s

Dwell time : 100ms (class C1)

Result : Criteria A



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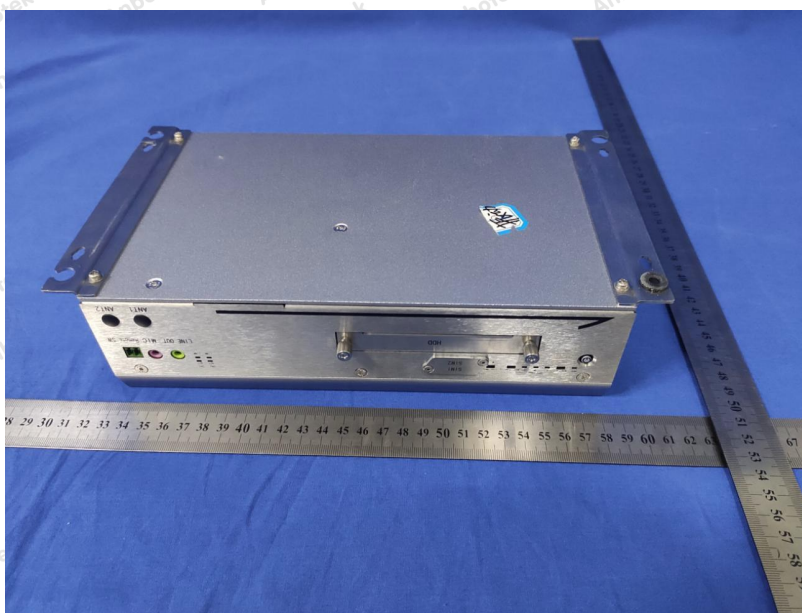
9.7 Test equipment

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

9.8 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

9.9 Test photos



Sample photos

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Sample photos



Sample photos

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Test setup photos

End of Report