

**TEST REPORT
EN 50155
Railway applications – Rolling stock – Electronic equipment**

Report Number: 2405007
Date of issue: 2024-06-11
Total number of pages: 17 (excluding attachments)

Name of Testing Laboratory preparing the Report.....: Universal Certification Technology Co. Ltd.
 13F-5, No. 93, Sec. 1, Xintai 5th Rd.,
 Xizhi Dist., New Taipei City 221,
 Taiwan

Applicant's name.....: Vecow Co., Ltd.
Address: 3F., No. 10, Jiankang Rd., Zhonghe Dist., New Taipei City 23586,
 Taiwan

Test specification:
Standard: Testing requirement of EN 50155: 2021
Test procedure.....: Test report
Non-standard test method.....: N/A

TRF template used: EN 50155_1A
Test Report Form No......: EN 50155_1A
Test Report Form(s) Originator.....: Universal Certification Technology Co. Ltd.
Master TRF: Dated 2024-05

General disclaimer:
 The test results presented in this report relate only to the object tested.
 This report shall not be reproduced, except in full, without the written approval of the Issuing NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description :	High Performance Fanless Embedded System	
Trade Mark	Vecow	
Manufacturer	Vecow Co., Ltd.	
Model/Type reference :	IVH-9204MX-ICY, IVH-9204MX-ICYXXXXXXXXXXXX ("X" can be 0-9, A-Z or blank for marketing purpose)	
Ratings :	DC 110V	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	Testing Laboratory:	
Testing location/ address	Universal Certification Technology Co. Ltd. 13F-5, No. 93, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 221, Taiwan	
Tested by (name, function, signature) :	Leo Jiang / Test engineer	
Approved by (name, function, signature) .. :	David Wang / Reviewer	
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
Testing location/ address		
Tested by (name, function, signature) :		
Approved by (name, function, signature) .. :		
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
Testing location/ address		
Tested by (name + signature) :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) .. :		
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	Testing procedure: CTF Stage 4:	
Testing location/ address		
Tested by (name, function, signature) :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) .. :		
Supervised by (name, function, signature) :		

List of Attachments (including a total number of pages in each attachment)		
Document No.	Documents included / attached to this report (description)	Pages.
Attachment 1:	Test report of Vibration and shock Test (Report No. VS-TV-1130129-02)	22
Attachment 2:	Test Report of Electromagnetic compatibility test (Report No. CEBDBO-WTW-P24010022-1 R1)	55
Attachment 3:	Test report of Fire behaviour requirement (Report No. AJFS2401000536FF)	19

Documents referenced by this report (available on request):		
Document Name or No.	Documents description	Page No.
--	--	--

Summary of testing:	
Clause	Comment
All applicable tests were performed	Pass
Test Report History: This report may consist of more than one report and is only valid with additional or previous issued reports:	
Report Ref. No.	Item
2405007	Initial report
Tests performed (name of test and test clause): 1. All tests were performed and found to be in conformity with the following standards: EN 50155: 2021 2. Name of test and test clause of tests performed are given in appended Compliance Checklist, Measurement section and Attachments if any. 3. This equipment is operated with maximum rated measuring current.	Testing location: Universal Certification Technology Co. Ltd. 13F-5, No. 93, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 221, Taiwan
Summary of compliance with National Differences (List of countries addressed): N/A	
Statement concerning the uncertainty of the measurement systems used for the tests	
<input type="checkbox"/> Internal procedure used for type testing through which traceability of the measuring uncertainty has been established: Procedure number, issue date and title: Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.	
<input checked="" type="checkbox"/> Statement not required by the standard used for type testing	

Test item particulars:	
Function	:
Power Source	: 110 Vdc
Connection to the mains	: <input type="checkbox"/> plugged equipment <input type="checkbox"/> type A <input type="checkbox"/> type B <input type="checkbox"/> permanent connection <input type="checkbox"/> detachable power supply cord <input type="checkbox"/> non-detachable power supply cord <input checked="" type="checkbox"/> not directly connected to the mains
Accessories	: No
Altitude	: <input checked="" type="checkbox"/> A1 (default requirement) <input type="checkbox"/> A2 <input type="checkbox"/> A3 <input type="checkbox"/> AX
Operation temperature	: <input type="checkbox"/> OT1 <input checked="" type="checkbox"/> OT2 <input type="checkbox"/> OT3 (default requirement) <input type="checkbox"/> OT4 <input type="checkbox"/> OT5 <input type="checkbox"/> OT6
Switch-on extended operating temperature	: <input type="checkbox"/> ST0 <input checked="" type="checkbox"/> ST1 (default requirement) <input type="checkbox"/> ST2 <input type="checkbox"/> N/A
Rapid temperature variation	: <input type="checkbox"/> H1 (default requirement) <input type="checkbox"/> H2 <input checked="" type="checkbox"/> N/A
Vibration and shock	: <input type="checkbox"/> Category 1 Class A <input checked="" type="checkbox"/> Category 1 Class B (recommended requirement) <input type="checkbox"/> Category 2 <input type="checkbox"/> Category 3
Interruption voltage supply	: <input checked="" type="checkbox"/> S1 <input type="checkbox"/> S2 (default requirement) <input type="checkbox"/> S3 <input type="checkbox"/> N/A
Supply change-over	: <input checked="" type="checkbox"/> C1 (default requirement) <input type="checkbox"/> C2 <input type="checkbox"/> N/A
Documentation	: <input type="checkbox"/> Class M1 <input checked="" type="checkbox"/> M0 (default requirement)
Overall size of equipment (W x D x H)	: 260mm x 215mm x 155mm
Mass of equipment (kg)	: 8.48kg
Marked degree of protection to IEC 60529	: IP20
Possible test case verdicts:	
- Test case does not apply to the test object	: N/A (Not Applicable)
- Test object does meet the requirement.....	: P (Pass)
- Test object does not meet the requirement.....	: F (Fail)
Testing:	
Date of receipt of test item	: 2024-01-02
Date (s) of performance of tests	: 2024-05-02 to 2024-05-10

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.
"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a Table appended to the report.

Throughout this report a comma / point is used as the decimal separator.

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

This report is for the exclusive use of UCT's Client and is provided pursuant to the agreement between UCT and its Client. UCT's responsibility and liability are limited to the terms and conditions of the agreement. UCT assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the UCT name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by UCT. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an UCT certification program.

The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... : **Yes** **Not applicable**

When differences exist; they shall be identified in the general product information section.

Name and address of factory (ies) : N/A

General product information and other remarks:

1. This equipment is a High Performance Fanless Embedded System, which is intended to be used as data processing, transferring and storage equipment covered by the scope of this standard.
2. The operating temperature class is OT2, temperature range as -40~+55°C
3. The power supply comes from 110Vdc DC sources.
4. This device is intended for indoor use only.
5. Performance test program provided by applicant.

Description of model differences:

All models are identical in construction except the model name.

Description of special features:

N/A

EN 50155			
Clause	Requirement + Test	Result – Remark	Verdict
13	Testing		P
13.1	General		P
13.2	Categories of tests		P
	- type tests;		P
	- routine tests;		N/A
	- investigation tests.		N/A
13.3	Tests summary	Details see below.	P
13.4	Test specification		P
13.4.1	Visual inspection		P
13.4.2	Performance test		P
13.4.3	DC Power supply test		P
13.4.3.1	General		P
13.4.3.2	Supply voltage variations		P
	Meet the requirement of minimum continuous voltage $0.7 U_n$	77Vdc, meet performance criterion A	P
	Meet the requirement of maximum continuous voltage $1.25 U_n$	137.5Vdc, meet performance criterion A	P
13.4.3.3	Temporary supply overvoltage		P
	Temporary supply overvoltage up to $1.4 U_n$ and not exceeding 0.1 s	154Vdc, meet performance criterion A	P
	Temporary supply overvoltage up to $1.4 U_n$ and not exceeding 1 s	154Vdc, meet performance criterion A	P
13.4.3.4	Temporary supply undervoltage		P
	Temporary supply undervoltage down to $0.6 U_n$ and not exceeding 0.1 s	66Vdc, meet performance criterion A	P
13.4.3.5	Interruptions of supply voltage (Input voltage may reduce to 0V for a short period)		P
	- Class S1: > 0 ms interruptions	Unit shutdown, meet performance criterion C	P
	- Class S2: 10ms interruptions		N/A
	- Class S3: 20ms interruptions		N/A
13.4.3.6	Supply change-over		P
	- Class C1: From U_n to $0.6 U_n$ and back to U_n (without interruptions)	Meet performance criterion A	P
	- Class C2: During a supply break starting at U_n		N/A
13.4.4	Low temperature test		P
	EN 60068-2-1:2007, test Ad		P
	The temperature values shall be taken from Table 1 and according to the class specified by the user.	-40°C for 2.5 hrs	P
	Test acceptance requirements:		P
	a) no failure or damage shall occur	Meet performance criterion A	P

EN 50155			
Clause	Requirement + Test	Result – Remark	Verdict
	b) the functional check shall not show any failure or damage nor any results which are beyond the specified tolerance	Meet performance criterion A	P
13.4.5	Dry heat test		P
	EN 60068-2-2:2007, test Bd		P
	The temperature value for this test is dependent on the temperature range set by the user and the nature of equipment under test (see Table 1 for details).	55°C for 6 hrs and additional 10 mins for 70°C	P
	Test acceptance requirements:		P
	a) no failure or damage shall occur	Meet performance criterion A	P
	b) no out of tolerance results shall occur	Meet performance criterion A	P
13.4.6	Low temperature storage test		N/A
	EN 60068-2-1:2007, test Ab		N/A
	Temperature: -40°C; Duration: 16h minimum		N/A
	Test acceptance requirements:		N/A
	After the recovery period, the equipment shall work as intended within its specified limits (performance criterion A).		N/A
13.4.7	Insulation test		P
13.4.7.1	General	See below.	P
13.4.7.2	Insulation resistance test (DC 500 V)		P
	Test acceptance requirements:		P
	The minimum value of the insulation resistance after the voltage withstand test shall be higher than 20MΩ.	Input power to I/O ports > 100 MΩ. Input power to ground > 100 MΩ. USB port to LAN port > 500 MΩ.	P
13.4.7.3	Voltage withstand test		P
	AC 500 V or DC 750 V: nominal battery voltages and/or I/O voltage DC 72 V or AC 50 V _{RMS}		N/A
	AC 1000 V or DC 1500 V: nominal battery voltages and/or I/O voltage DC 72 V ≤ DC V < DC 125 V or from AC 50 to 90 V _{RMS}	Input power to I/O ports: DC 1500 V Input power to ground: DC 1500 V USB port to LAN port: DC 1500 V	P
	AC 1500 V or DC 2200 V: nominal battery voltages and/or I/O voltage DC 125 V ≤ DC V < DC 315 V or from AC 90 to 225 V _{RMS}		N/A
13.4.8	Cyclic damp heat test		P
	IEC 60068-2-30, test Dd variant 2		P
	Temperature: +55°C and +25°C		P
	Number of cycles: 2 (breathing effect)		P
	Time: 2 x 24 hours		P

EN 50155			
Clause	Requirement + Test	Result – Remark	Verdict
	Test acceptance requirements:		P
	- The results of the insulation test, the performance tests and operational checks obtained after the first and second cycles shall be within the specified tolerances and the specified operation performance, respectively.	The insulation and performance test complies with the requirements.	P
	- During all ON-phases and after the complete test, the equipment shall work as intended and within its specified limits (performance criterion A).	No failure or damaged. Complied with performance criterion A.	P
13.4.9	Electromagnetic compatibility test		P
	All EMC tests of electronic equipment shall be carried out according EN 50121-3-2:2016	Details see EMC report. (Report No. CEBDBO-WTW-P24010022-1)	P
13.4.10	Shock and vibration test		P
13.4.10.1	General	See below.	P
13.4.10.2	Simulated long life testing		P
	EN 61373:2010, Clause 9		P
	Test acceptance requirements:		P
	- no damage shall be visible after the test.	No damage.	P
	- after the test, the equipment shall work as intended and within its specified limits.	The equipment works as intended and within its specification. Details see test report No. VS-TV-1130129-02	P
13.4.10.3	Shock testing		P
	EN 61373:2010, Clause 10		P
	Test acceptance requirements:		P
	- no damage shall occur during the test.	No damage.	P
	- during the test, the equipment is monitored and shall work as intended within its specified limits. (performance criterion A).	The equipment works as intended within its specification. Complied with performance criterion A. Details see test report No. VS-TV-1130129-02	P
13.4.10.4	Functional random vibration test		P
	EN 61373:2010, Clause 8		P
	Test acceptance requirements:		P
	- no damage shall be visible after the test.	No damage.	P
	- during the test, operational checks shall be carried out and the equipment shall work as intended within its specified limits. (performance criterion A).	The equipment works as intended within its specification. Complied with performance criterion A. Details see test report No. VS-TV-1130129-02	P
13.4.10.5	Enclosure protection test (IP code)	IP20	P

EN 50155			
Clause	Requirement + Test	Result – Remark	Verdict
13.4.11	Stress screening test		N/A
	The test specification may include:		N/A
	- operation at elevated temperature;		N/A
	- thermal cycling;		N/A
	- vibration.		N/A
13.4.12	Rapid temperature variation test		N/A
13.4.13	Salt mist test		N/A
	EN IEC 60068-2-11:2021, test Ka.	48h	N/A
	Test acceptance requirements:		N/A
	- visual inspection		N/A
	- after the test a performance test shall not show any failure or damage.		N/A

Appendix 1

13.4.3.2 TABLE: Supply voltage variations				
Input Voltage (U_n)	Test voltage		Test time	Remark
110Vdc	$0.7 U_n$	77Vdc	10 mins	Criterion A
110Vdc	$1.25 U_n$	137.5Vdc	10 mins	Criterion A
Supplementary information:				

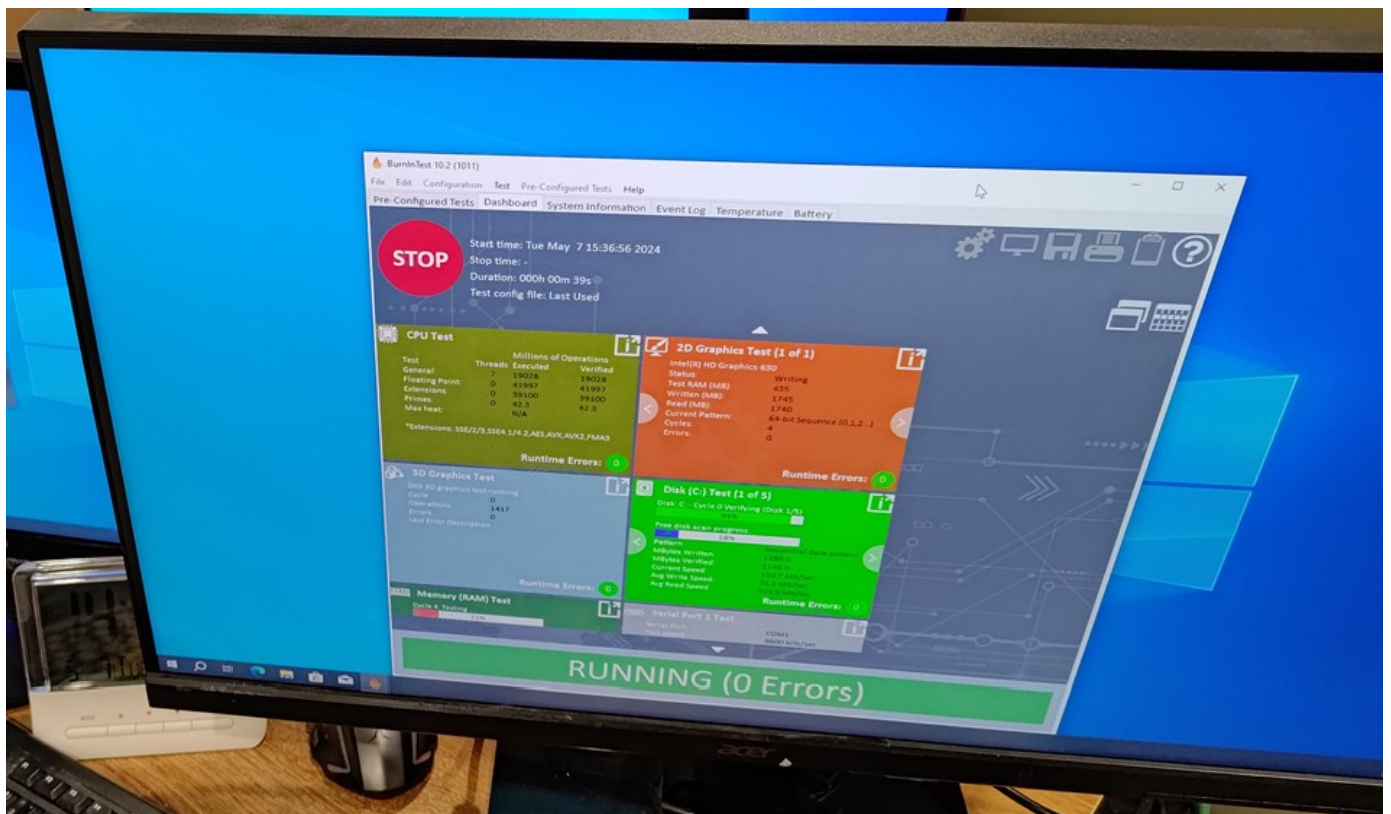
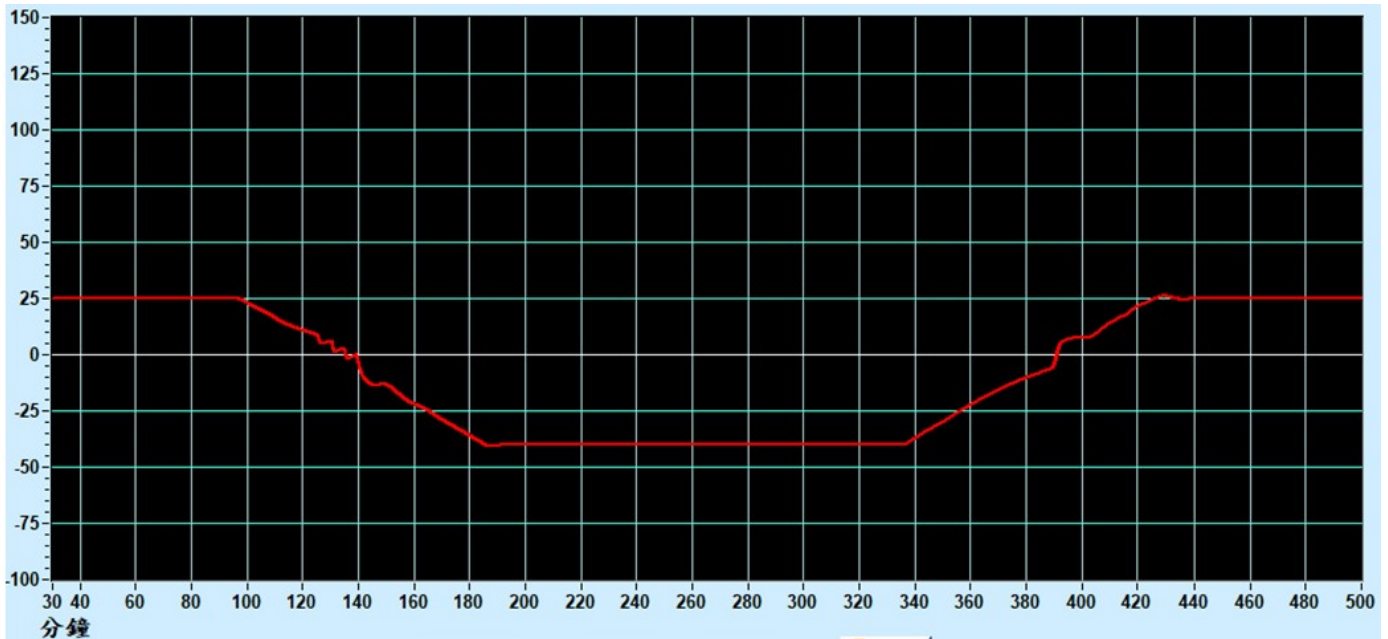
13.4.3.3 TABLE: Temporary supply overvoltage				
Input Voltage (U_n)	Test voltage		Test time	Remark
110Vdc	$1.4 U_n$	154Vdc	Not exceeding 0.1 s	Criterion A
110Vdc	$1.4 U_n$	154Vdc	Not exceeding 1 s	Criterion A
Supplementary information:				

13.4.3.4 TABLE: Temporary supply undervoltage				
Input Voltage (U_n)	Test voltage		Test time	Remark
110Vdc	$0.6 U_n$	66Vdc	Not exceeding 0.1 s	Criterion A
Supplementary information:				

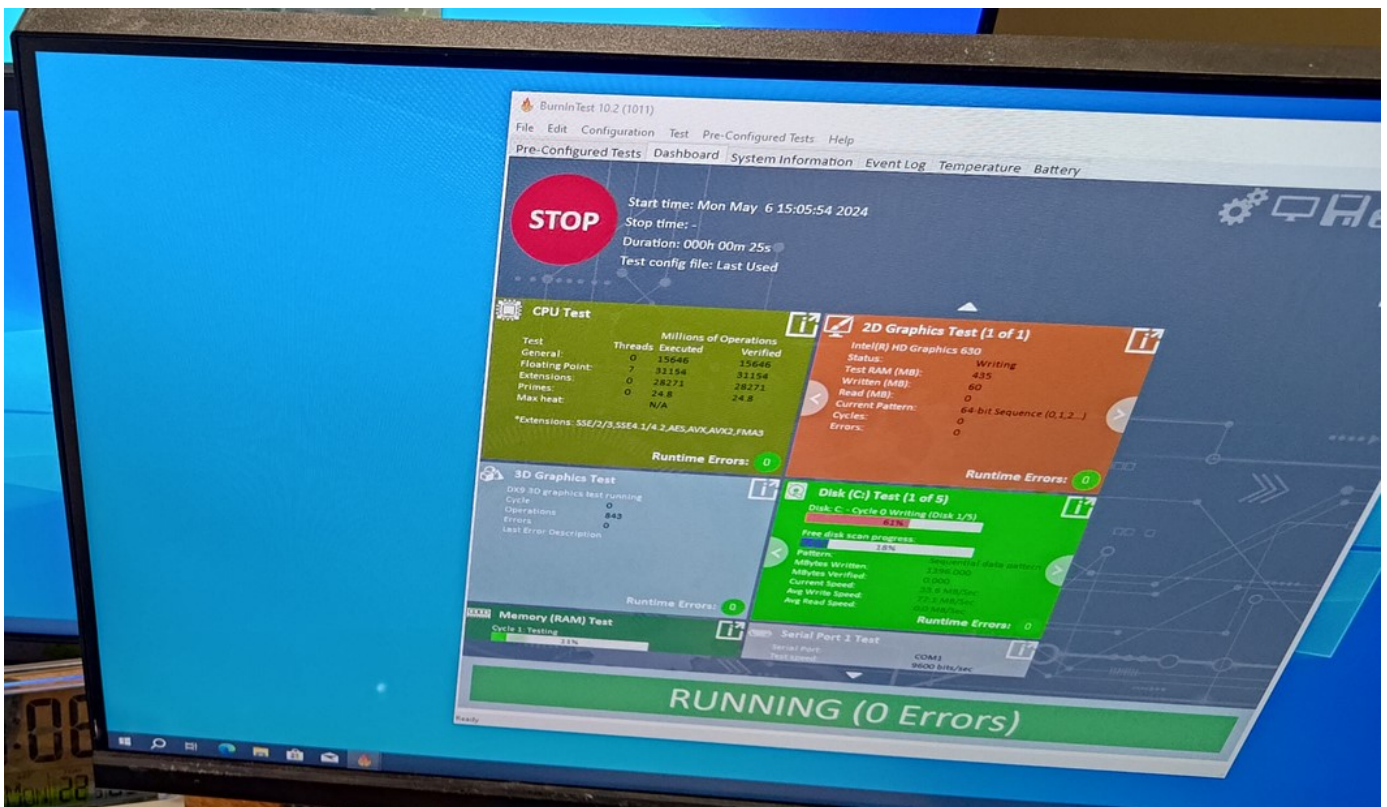
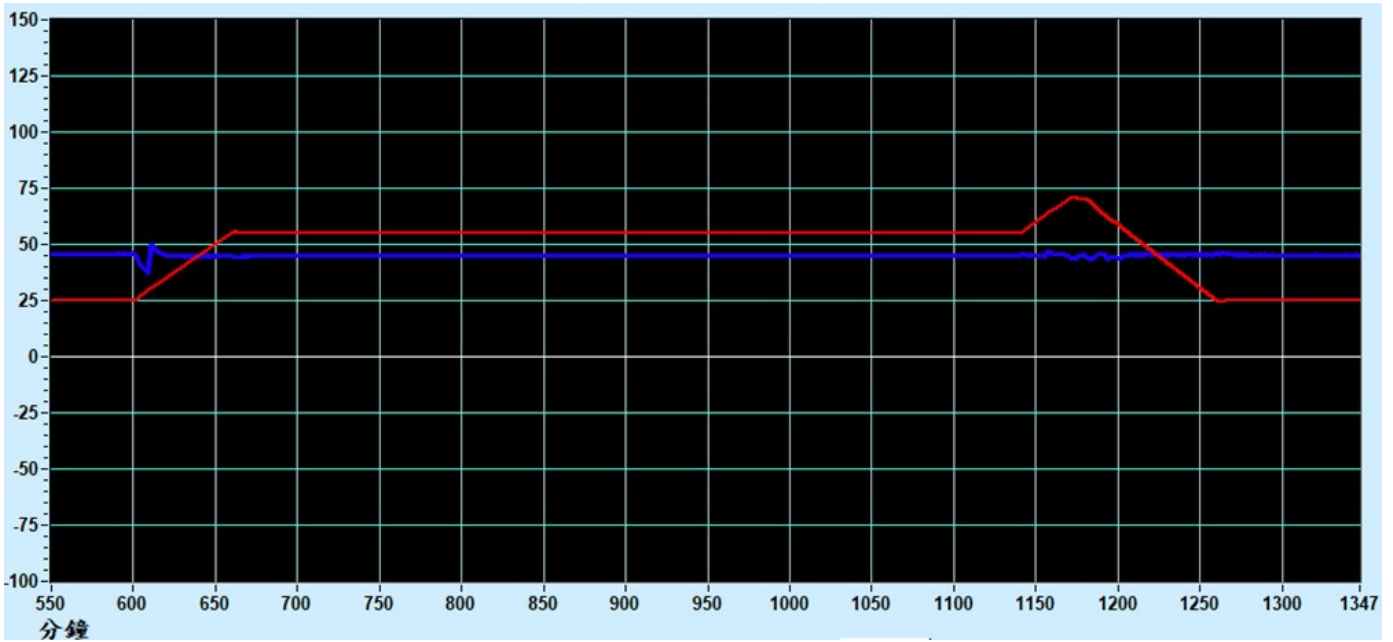
13.4.3.5 TABLE: Interruptions of supply voltage				
Input Voltage (U_n)	Interruption time	Class	Remark	
110Vdc	> 0 ms	S1	Criterion C	
Supplementary information: Unit shutdown				

13.4.3.6 TABLE: Supply change-over					
Input Voltage (U_n)	Test voltage		Class	Durations	Remark
110Vdc	$0.6 U_n$	66Vdc	C1	100 ms	Criterion A
Supplementary information: Unit shutdown					

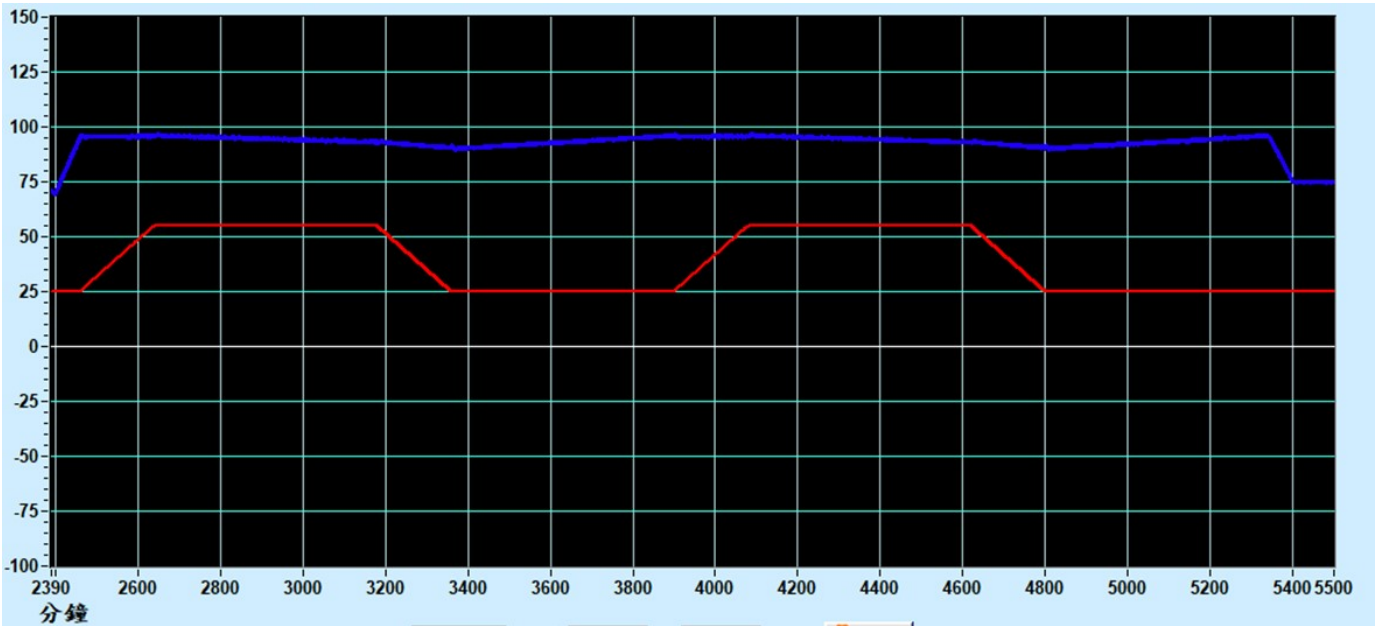
13.4.4 TABLE: Low temperature test			
Test temperature	Durations	Performance check at low temperature	Performance check at room temperature
-40°C	2.5hr	Normal operation	Normal operation

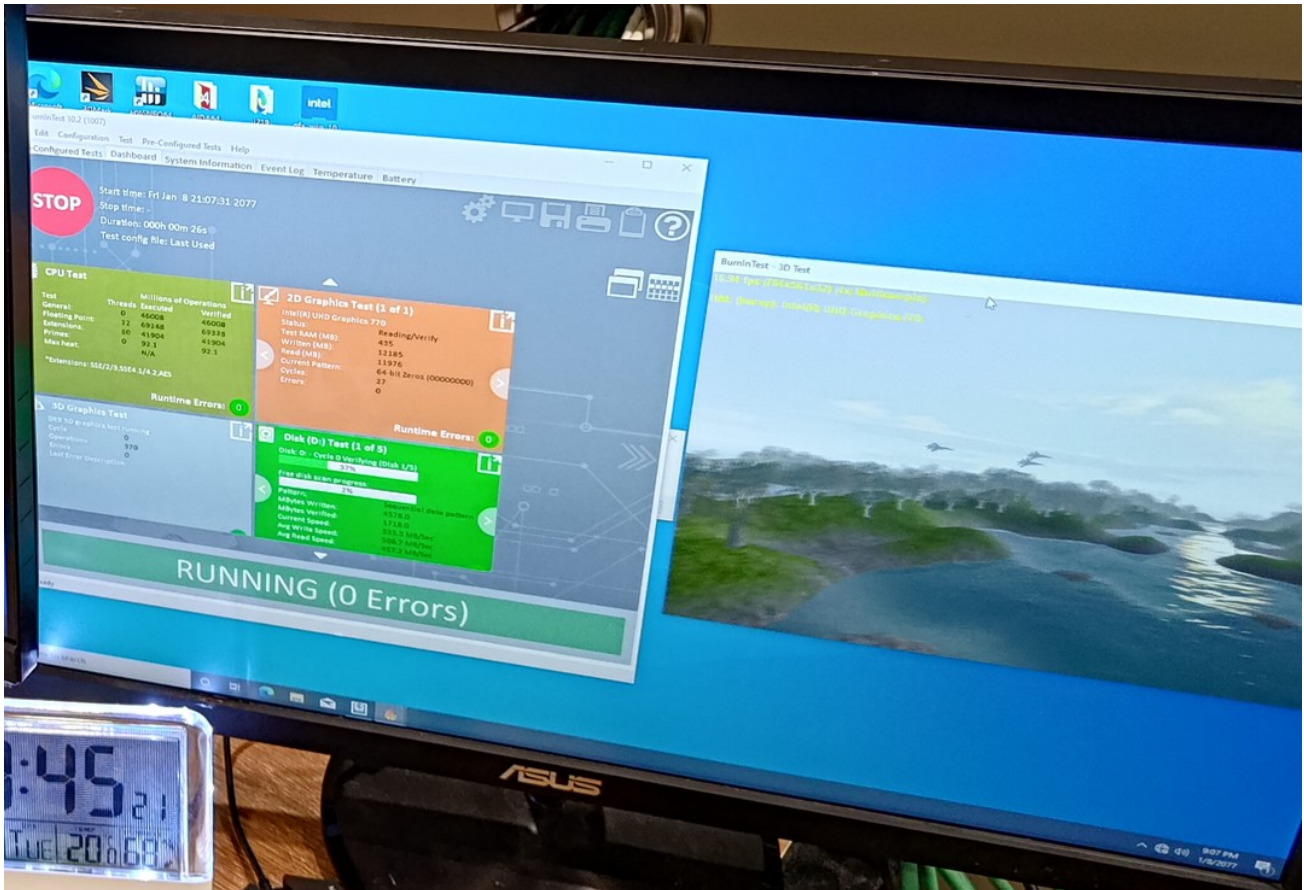


13.4.5		TABLE: Dry heat test			
Test temperature	Durations (Test temperature)	Extended temperature	Durations (Test temperature)	Performance check at high temperature	Performance check at room temperature
55°C	6 hrs	70°C	10 mins	Normal operation	Normal operation

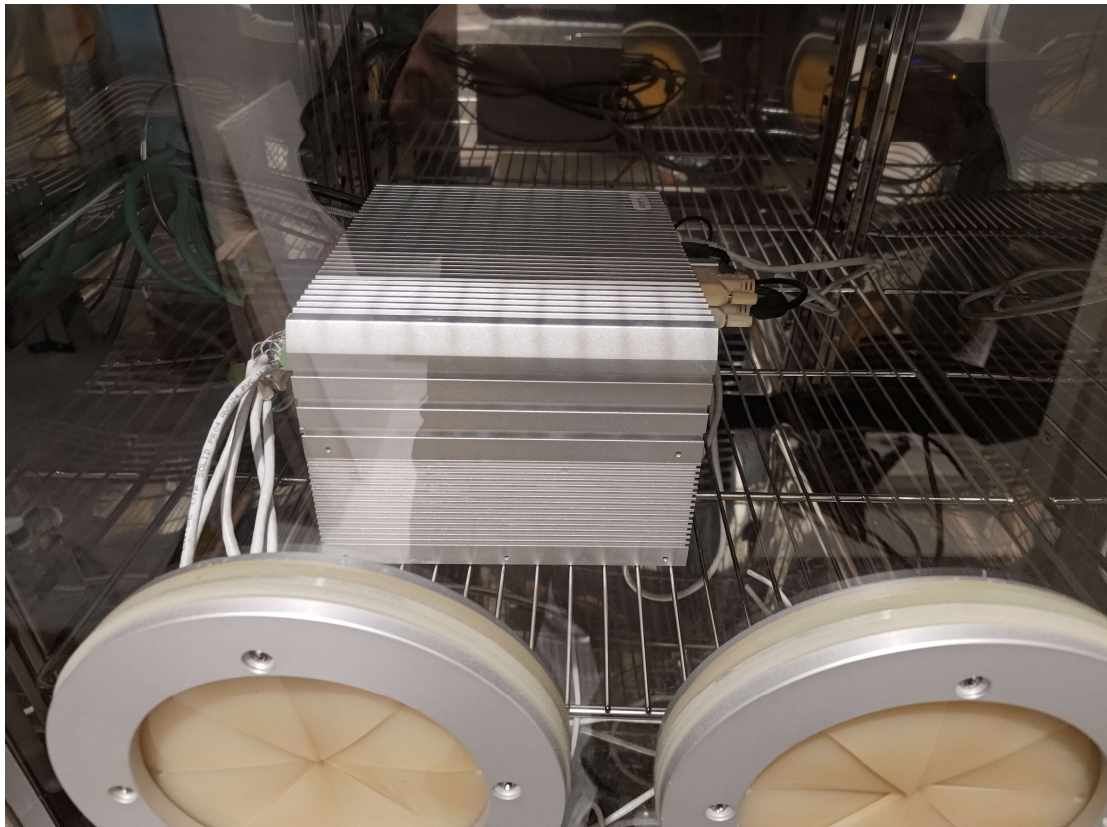


13.4.8	TABLE: Cyclic damp heat test	
Performance check at secondary cycle	Performance check at room temperature	Insulation test
Meet performance A	Meet performance A	Pass
Note: Temperature: +55°C and +25°C; Number of cycles: 2 (breathing effect); Time: 2 x 24 hours		





Test Configuration



Insulation resistance test



Voltage withstand test



Appendix 2 Photograph

External view



External view

