

TB50 Thermal Battery Test Report

November 2023

TB50 Thermal Battery Test Report

1 Experimental basis and purpose

According to the TB50 Thermal Battery Test Outline, conduct tests on 3 pcs thermal batteries to verify whether the product meets the technical requirements of the TB50 Thermal Battery Test Outline.

2 Test time

November 2, 2023 to November 3, 2023

3 Test equipment details

The details of the testing equipment are shown in Table 1.

Table 1 List of Test Equipment Details

Number	Device Name	Equipment model	Equipment validity period	Remarks
1	Electric blast drying oven	WG-71	2024.3.9	
2	High and low temperature test chamber	YSGD-150	2024.3.9	
3	Electric vibration testing system	MPA102/L620 M	2024.7.23	
4	Vertical impact test bench	SY11-25	2024.7.23	
5	Data acquisition instrument	MR6000	2024.3.9	
6	DC electronic load	IT8818	2024.3.9	
7	Insulation resistance meter	ZC42A-2	2024.3.9	
8	Low resistance tester	ZC2512A	2024.3.9	
9	Universal Igniter	01	2024.3.9	
10	Electronic balance	YD5002	2024.3.9	
11	Caliper with meter	0-150 mm	2024.3.9	
12	Helium mass spectrometer leak detector	ZQJ-530	2024.8.15	

4 test result

The results of the thermal battery test are shown in Tables 2 to 6.

Table 2 Static Inspection Results

Number	Battery number	Insulation resistance between guide columns /M Ω	Insulation resistance between guide column and shell /M Ω	Activate circuit resistance /Ω	Outer diameter /mm	Height/mm	Weight/g	Leakage rate/Pa • m ³ /s
1	008	≥ 500	≥ 500	0.993	Φ 53.72	64.88	416.42	3.4×10 ⁻⁸
2	032	≥ 500	≥ 500	0.985	Φ 53.76	64.88	409.65	1.6×10 ⁻⁸
3	054	≥ 500	≥ 500	0.991	Φ 53.68	64.84	409.66	1.8x10 ⁻⁸
technical requirement		≥ 50	≥ 50	0.8~1.2	Φ 54max	65max	≤1200g	≤ 3.0 × 10 ⁻⁷

Table 3 Safety Current Test Results

Number	Battery number	Does it ignite	Activate circuit resistance /Ω
1	008	no	0.995
2	032	no	0.986
3	054	no	0.994
technical requirement	The thermal battery activation circuit should be powered by a continuous DC current of 1A. Within 5 minutes, the ignition head should not ignite. After the test, the resistance of the thermal battery activation circuit should meet 0.8 Ω ~1.2 Ω .		

Table 4 Transportation Vibration Test Results

Number	Battery number	exterior	Insulation resistance between guide columns /M Ω	Insulation resistance between guide column and shell /M Ω	Igniter resistance /Ω
1	008	No physical damage	≥ 500	≥ 500	0.996
2	032	No physical damage	≥ 500	≥ 500	0.986
3	054	No physical damage	≥ 500	≥ 500	0.993
technical requirement	After undergoing the specified transportation vibration test in a non-activated state, the thermal battery should have no physical damage, insulation resistance ≥ 50M Ω , and the activation circuit resistance should meet 0.8 Ω ~1.2 Ω .				

Number	Battery number	exterior	Insulation resistance between guide columns /M Ω	Insulation resistance between guide column and shell /M Ω	Igniter resistance /Ω
1	008	No physical damage	≥ 500	≥ 500	0.996
2	032	No physical damage	≥ 500	≥ 500	0.984
3	054	No physical damage	≥ 500	≥ 500	0.993
technical requirement		After undergoing this test in a non-activated state, the thermal battery should have no physical damage, insulation resistance ≥ 50M Ω , and be activation circuit resistance should meet the requirements of 0.8 Ω ~1.2 Ω .			

Table 5 Transportation Impact Test Results

Table 6 Electrical Performance Test Data

order Number	battery number	discharge state	Maximum voltage V	working hours S	Activation time S	Pulse voltage V
1	054	low temperature	31.49	140	0.540	29.38
2	008	high temperature	32.01	149	0.319	30.10
3	032	normal temperature	32.02	146	0.330	30.04
Technical indicators			26V-34V	≥ 50s	≤ 0.7s	≥ 20V

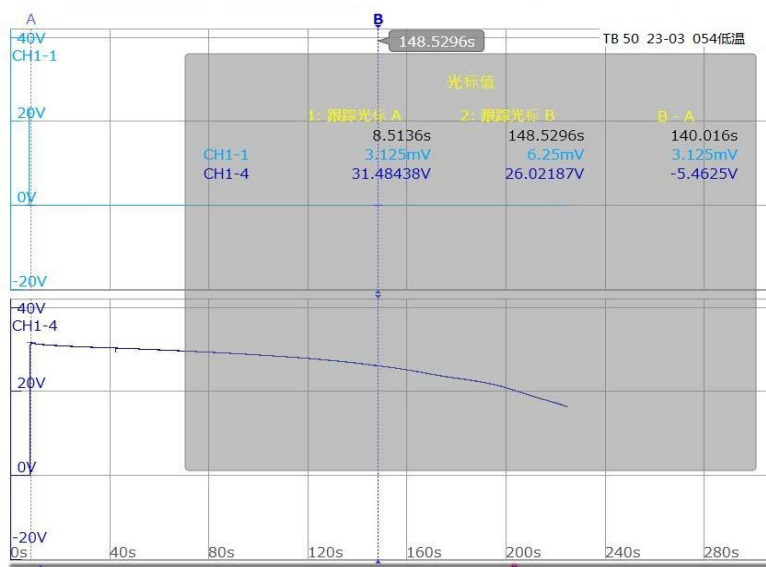


Figure 1 054 Low temperature working curve

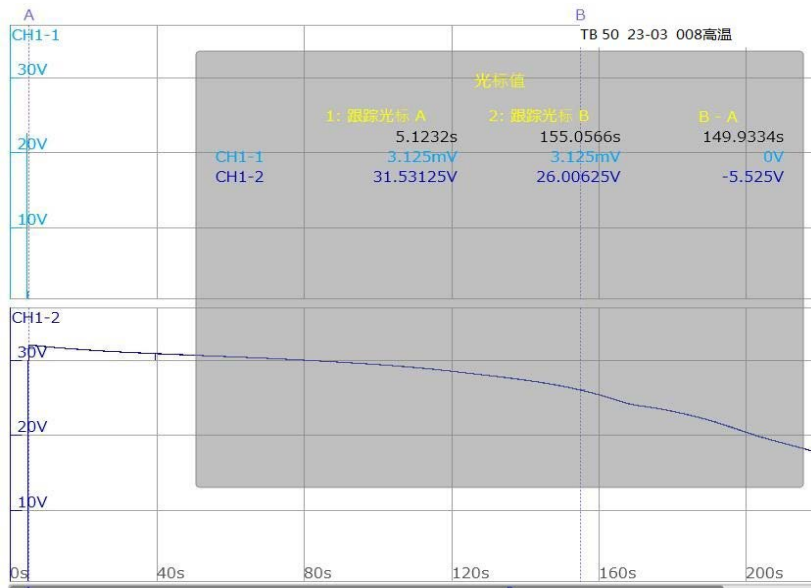


Figure 2 008 High temperature working curve

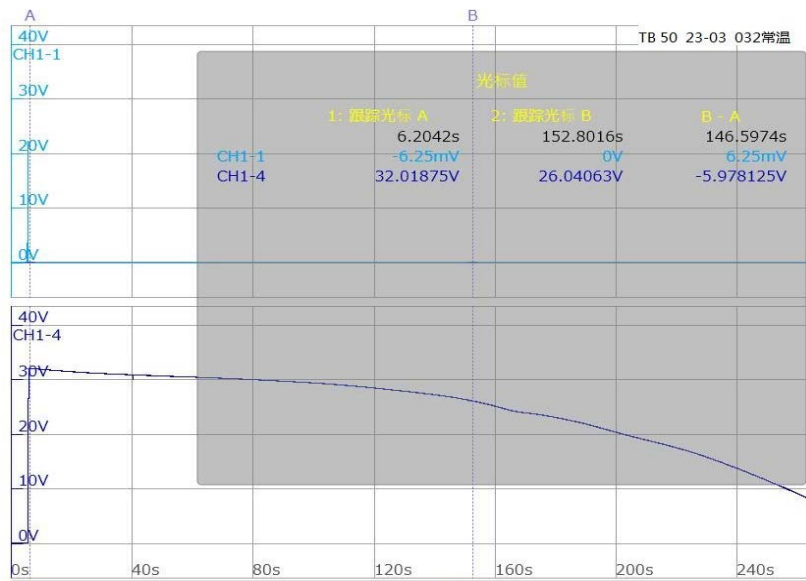


Figure 3 054 Working curve at room temperature

4 Conclusion

The technical personnel have confirmed that the instruments, testing equipment, and discharge lines used in the TB50 thermal battery test comply with the provisions of the TB50 Thermal Battery Test Outline, and the test is strictly in accordance with regulations. The specified method and procedure were used, and the test results met the requirements of the TB50 Thermal Battery Test Outline.

