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**General requirement of lithium-ion manganese oxide
battery module**

锰酸锂蓄电池模块通用要求

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General requirement of lithium-ion manganese oxide battery module

1 Scope

This standard specifies the terms and definitions, classification and models, requirements, test methods, inspection rules, markings, packaging, transportation and storage of lithium-ion manganese oxide battery module, which is composed of lithium-ion manganese oxide batteries of greater than or equal to 6 A·h.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this standard.

GB 2893-2008 safety colors

GB 2894-2008 Safety signs and guideline for the use

GB 4208-2008 Degrees of protection provided by enclosure (IP code)

GB 4824-2004 Industrial, scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement

GB/T 5465.2-2008 Graphical symbols for use on electrical equipment - Part 2: Graphical symbols

GB/T 17626.2-2006 Electromagnetic compatibility (EMC) - Testing and measurement techniques - Electrostatic discharge immunity test

GB/T 17626.3-2006 Electromagnetic compatibility - Testing and measurement techniques - Radiated radio-frequency electromagnetic field immunity test

GB/T 17626.4-2008 Electromagnetic compatibility - Testing and measurement techniques - Electrical fast transient/burst immunity test

GB/T 17626.5-2008 Electromagnetic compatibility - Testing and

The type code of the lithium-ion battery module consists of four characters:

The first character (M): Identification code of battery module;

The second character (M): Battery type, lithium-ion manganese oxide battery;

The third character (B): Battery type, see 4.1.1;

The fourth character (C): Functional configuration of battery management system (BMS), see 4.1.2.

4.2.2 Electric energy

The rated electric energy is represented by three effective Arabic numerals; the unit is kilowatt·hour (kW·h).

When the electric energy is less than 10 kW·h, keep 2 decimal places, such as 9.85 kW·h;

When the electric energy is greater than or equal to 10 kW·h BUT less than 100 kW·h, keep one decimal place, such as 13.7 kW·h;

When the electric energy is greater than or equal to 100 kW·h, it is represented by a 3-digit integer, such as 143 kW·h.

4.2.3 Nominal voltage

The nominal voltage (U) of the formed lithium-ion battery module, in the unit of V.

4.2.4 Rated discharge current/peak discharge current multiple

The rated discharge current is the rated discharge current (I) of the lithium-ion battery module, in the unit of A.

The maximum discharge current is the product of the rated discharge current value multiplied by the peak discharge current multiple (K), in the unit of A.

4.2.5 Structure code of module box

The structure code of the lithium-ion battery module box shall comply with the requirements in JB/T 11141-2011.

- 1) The communication interface shall comply with the provisions of Chapter 4 in JB/T 11138-2011.
- 2) The communication protocol shall comply with the provisions of Chapter 5 in JB/T 11138-2011.

5.4.5 Compliance and reliability

5.4.5.1 Compliance

The compliance requirements for the interface and communication protocol of the lithium-ion manganese oxide battery module are divided into:

- a) Compliance requirements for circuit interface and interface protocol, including:

- 1) Compliance of WDT circuit interface and interface protocol;
- 2) Compliance of the interface of the charge and discharge control circuit AND the interface protocol;
- 3) Compliance of the I/O charge and discharge interface circuit and interface protocol.

The circuit interface and interface protocol shall comply with the provisions of 4.2.3, 4.3.2, 4.3.3, 4.4 in JB/T 11138-2011.

- b) Compliance of communication interface and communication protocol:

When the CAN communication interface of the lithium-ion manganese oxide battery module is connected to the internal interface of the battery assembly, it is automatically set as the internal interface AND execute the communication protocol of internal interface. When connected to a charge equipment, it is automatically set as a charge and discharge interface, AND execute the communication protocol of the charge and discharge interface. For this reason, the communication interface and communication protocol of the lithium-ion manganese oxide battery module shall meet the following compliance requirements:

- 1) Compliance of internal communication interface and communication protocol;
- 2) Compliance of charge and discharge communication interface and communication protocol.

The communication interface and communication protocol of the lithium-ion battery assembly shall comply with the provisions of Chapter 5 and Chapter 6 in JB/T 11138-2011.

Range: 0 ~ 15;

Definition: The arrangement position of the battery modules in the assembly (the value range is 1 ~ 16). The module which is connected to the negative output terminal of the battery assembly is the module No.1 (the defined value is "0").

c) Number of batteries:

Length: 4 bit;

Range: 0 ~ 15;

Definition: The number of battery cells, which are connected in series, in the battery module (the value range is 1 ~ 16).

d) Initial address:

Length: 8 bit;

Range: 0 ~ 160;

Definition: The initial address of the sequence number of battery cell arrangement, which is assigned to the battery module by the battery assembly.

5.4.15 Charge equipment

The charge equipment, which is used for the lithium-ion manganese oxide battery module, shall meet the requirements of 5.2.10 in JB/T 11137-2011.

5.4.16 Electrical equipment

The electrical equipment, which is connected to the lithium-ion manganese oxide battery module, shall meet the requirements of 5.2.11 in JB/T 11137-2011.

5.4.17 Product model

The models and specifications of lithium-ion manganese oxide battery modules are divided into preferred series and reserved series.

For the preferred series of energy-type lithium-ion manganese oxide battery module, refer to Appendix B.

For the product series of power-type lithium-ion manganese oxide battery modules, they are specified in the relevant product standards.

5.4.18 Interchangeability

Ω , 1%, 0.25 W metal film resistor.

5.4.19.4 Connector

The connector of the interface of lithium-ion manganese oxide battery module shall meet the requirements of 5.2.13.4 in JB/T 11137-2011.

5.5 Safety

5.5.1 Insulation resistance

The insulation resistance of the lithium-ion manganese oxide battery module shall meet the requirements of 5.3.1 in JB/T 11137-2011.

5.5.2 Creepage distance

The creepage distance of the lithium-ion manganese oxide battery module shall meet the requirements of 5.3.2 in JB/T 11137-2011.

5.5.3 Protection level of enclosure

The protection level of the enclosure of lithium-ion manganese oxide battery module shall meet the requirements of 5.3.3 in JB/T 11137-2011.

5.5.4 Thermal management equipment

The management equipment in the lithium-ion manganese oxide battery module shall be in accordance with the provisions of 5.3.4 in JB/T 11137-2011.

5.5.5 Overcurrent disconnection equipment

5.5.5.1 The lithium-ion manganese oxide battery module AND the electrical equipment and charge equipment shall be connected, through an overcurrent disconnection equipment. When working under the maximum current and maximum voltage, once the temperature exceeds the manufacturer's specified value, it shall be able to reliably disconnect the battery FROM the charge equipment and the electrical equipment.

5.5.5.2 For the metal box lithium-ion manganese oxide battery module, which is used alone, between the batteries connected in series, it shall install at least one fast fuse (see Figure 2). The specifications and models are specified by the manufacturer in the product technical documents.

5.6.3 Atmospheric pressure

It shall meet the requirements of 5.4.3 in JB/T 11137-2011.

5.6.4 Humidity

It shall meet the requirements of 5.4.4 in JB/T 11137-2011.

5.7 Electromagnetic compatibility (EMC)

5.7.1 Overview

All immunity and emission characteristic tests are type tests, which shall be carried out under typical conditions: operating conditions and environmental conditions. It shall use the recommended wiring methods, including all necessary equipments, which are connected to network cables for communication and data transmission.

Lithium-ion manganese oxide battery modules of basic (J) and I/O (I) configurations are not required to meet the requirements of this clause.

The lithium-ion manganese oxide battery modules and the formed equipment of standard (B) and balanced (H) configuration shall meet this requirement.

5.7.2 Immunity

5.7.2.1 Implemented criteria

It shall meet the requirements of 5.5.2.1 in JB/T 11137-2011.

5.7.2.2 Electrostatic discharge (ESD) immunity

It shall meet the requirements of 5.5.2.2 in JB/T 11137-2011.

5.7.2.3 Immunity to radio frequency electromagnetic field radiation

It shall meet the requirements of 5.5.2.3 in JB/T 11137-2011.

5.7.2.4 Electrical fast transient/pulse group immunity

It shall meet the requirements of 5.5.2.4 in JB/T 11137-2011.

5.7.2.5 Surge immunity

It shall meet the requirements of 5.5.2.5 in JB/T 11137-2011.

5.7.2.6 Immunity to conducted disturbances induced by radio frequency

6.5 Consistency test of lithium-ion manganese oxide battery module

It is carried out according to the provisions of 6.3 of JB/T 11137-2011.

6.6 Interface and communication protocol

The test of the interface and communication protocol shall comply with the provisions of 6.4 of JB/T 11137-2011.

6.7 Electric energy (kW·h) test

It is carried out according to the provisions of 6.5 in JB/T 11137-2011.

6.8 Service life test

For the service life test method of lithium-ion manganese oxide battery modules, it shall be specified in relevant product standards or industry specifications.

6.9 Peak power consumption

The test of the peak power consumption of the electronic circuit power supply of the lithium-ion manganese oxide battery module shall be carried out in accordance with the provisions of 6.7 of JB/T 11137-2011.

6.10 Insulation resistance

The insulation resistance test of the lithium-ion manganese oxide battery module shall be carried out in accordance with 6.8 of JB/T 11137-2011.

6.11 Electromagnetic compatibility test

6.11.1 Overview

The electromagnetic compatibility test circuit of the lithium-ion manganese oxide battery module and its component equipment shall be as shown in Figure 3:

- a) The system shall run at the baud rate which is specified by the equipment

6.11.3 Emission

6.11.3.1 Radiation

It is carried out according to the group 1 grade A in GB 4824-2004 AND the provisions of 5.7.3.1 in this standard.

6.11.3.2 Conducted scattering

It is carried out according to the group 1 grade A in GB 4824-2004 AND the provisions of 5.7.3.2 in this standard.

7 Inspection

7.1 Classification of inspections

Inspection is divided into exit-factory inspection and type test.

7.2 Exit-factory inspection

7.2.1 For lithium-ion manganese oxide battery modules and their component equipment, before exit-factory of each batch of products, it shall randomly take samples from this batch of products, for the purpose of exit-factory inspection. The number of samples shall be greater than 5.

7.2.2 In the exit-factory inspection, if one or more items are unqualified, the batch of products shall be returned to the production department for rework and general inspection. Then it is submitted again for acceptance. If there are still one or more unqualified items in the re-inspection, the batch of products shall be determined as unqualified.

7.2.3 The product shall pass the inspection by the manufacturer's quality inspection department, AND be accompanied by a product quality inspection certificate and valid interconnection test certificate, before leaving the factory.

7.2.4 The items, technical requirements and inspection methods of the exit-factory inspection are as shown in Table 7.

7.3 Type test

7.3.1 Type test shall be carried out in one of the following situations:

- a) When the new product is trial-produced and type finalized;

- f) Weight (unit: kg);
- g) Manufacturer and related information.

For the lithium-ion manganese oxide battery module and its components, it shall indicate the product model, specification, production batch number, in the visible position.

8.1.3 Interconnection marking

For the lithium-ion manganese oxide battery modules and their network equipment, it shall indicate a product interconnection test mark and authorized use code, in a visible position.

8.1.4 Pollution emission control markings

For lithium-ion manganese oxide battery modules and the electronic products that they make up, it shall affix a pollution emission control mark, that meets the requirements of SJ/T 11364-2006, at a position that is easy to observe.

8.2 Packaging

8.2.1 The packaging box of the lithium-ion manganese oxide battery module shall meet the requirements of moisture-proof and shock-proof.

8.2.2 The following documents shall be attached in the packing box:

- a) Packing list;
- b) Product qualification certificate;
- c) Product instruction manual;
- d) Vulnerable parts.

8.3 Transportation and storage

8.3.1 Lithium-ion manganese oxide battery modules shall be transported in an incompletely discharged state. The state of charge shall comply with the requirements in 8.3 of JB/T 11137-2011.

8.3.2 During transportation, it shall avoid severe vibration, shock, sun exposure, rain exposure. The temperature in the packaging box shall be within -20 °C ~ 55 °C.

8.3.3 In the process of loading and unloading lithium-ion manganese oxide

Appendix A

(Normative)

Composition of lithium-ion manganese oxide battery module

A.1 Overview

The lithium-ion manganese oxide battery module (hereinafter referred to as the battery module) is composed of a lithium-ion manganese oxide battery, a management system, interfaces and communication protocols, a module box.

The management system in the battery module is a subsystem of the battery assembly management system. This subsystem can be EITHER connected to the internal interface (interface 1) of the battery assembly, to form the battery assembly, OR directly connected to the charge and discharge equipment, to form a charge system and a discharge system.

According to the different functional configurations of the battery management system, battery modules are divided into standard type, balanced type, basic type, I/O type.

The composition of the standard battery module is as shown in A.2, which is mainly used in the battery system for equipment that needs to provide digital information of the battery cell.

The composition of the balanced battery module is as shown in A.3, which is mainly used for the battery systems for equipment, that needs to provide battery cell's digital information and automatic balanced processing.

The composition of the basic battery module is as shown in A.4, which is mainly used in the battery system for equipment, that does not need to provide digital information of the battery cell.

The composition of the I/O battery module is as shown in A.5, which is mainly used for low-configuration battery systems, that have a charge current less than $0.2 I_1$.

A.2 Composition of standard battery modules

The composition of the standard battery module is as shown in Figure A.1.

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