Safety of CT04120 against overheat/ignition

RoHS REACH Hand Soldering Only

1. Overview

Murata's CT04120 is a Lithium ion secondary battery that has the capability of high power input/output in the small package. Although CT04120 is categorized as a lithium ion battery, it has safety design that no thermal runaway or ignition occurs, by using new electrode materials.

2. Features

Generally, lithium cobalt oxide is used as positive electrode active material, and graphite is used as negative electrode active material of conventional lithium ion secondary batteries. On the other hand, lithium titanate (LTO) is used as negative electrode active material of CT04120. This difference in the negative electrode active materials contributes to the safety property.

Table 1 Examples of electrode active materials

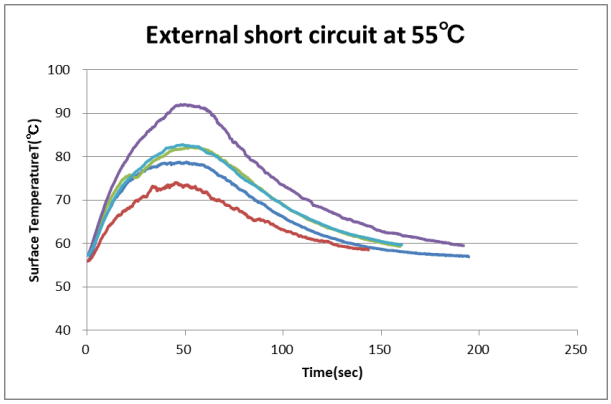
	Conventional lithium ion secondary battery	CT04120
Positive electrode active material	・Lithium cobalt oxide ・Lithium iron phosphate ・Lithium manganese oxide	Lithium cobalt oxide
Negative electrode active material	・Graphite ・Amorphous carbon	Lithium titanate (LTO)

3. Description

Although lithium titanate used for CT04120 is conductive while it absorbs lithium ions, it becomes insulating when lithium ions are released by electric discharge. When internal short circuit occurs, short-circuit current flows through the short-circuit point. However, when Li-ions are released by discharge, the point becomes non-conductive and short circuit current is suppressed. It contributes to preventing heat generation and therefore thermal runaway. Also, lithium titanate itself is flame retardant.

4. Safety verification by the actual tests

In order to cause ignition by overheating, absolute power and much energy to output such power continuously are needed. Figure 1 shows the result of external short-circuit test conducted according to UN Recommendations on the transport of dangerous goods. In this test,CT04120(3mAh) is externally short circuit with 50 cycles at 55℃, Although the cell temperature rise to 130℃ at maximum, no rupture, disassembly nor ignition is observed at both 1st cycle and 50th cycle.



<Judgement criteria>
Surface temperature does not exceed 170℃.
No rupture, no disassembly and no ignition occurs during the test or within 6 hours after the test.

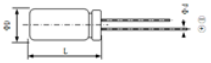
<Result>

Pretreatment	Number of samples	During the test or within 6 hours after the test			Surface temperature 170℃ or less
		Rupture	Disassembly	Ignition	
1st cycle	6	G	G	G	G
50th cycle	6	G	G	G	G

Figure 1 the result of external short-circuit test
(UN Recommendations on the transport of dangerous goods)

5. Lineup

Product name	CT04120	Dimensions	
		ΦD	4mm
Nominal Voltage	2.3V	L	12mm
Charge Voltage	2.7V	Φd	0.45mm
End of discharge Voltage	1.8V	F	1.5mm
Capacity	3mAh	Operating temp	-20~70℃



6. Support

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