NEW BATTERY TCO MODULE DESIGN WITH GIMBEL LOCK STRUCTURE

HP INC
New Battery TCO module design with Gimbel Lock structure

The TCO module in a battery is to protect a battery when it’s overheated. The module will turn the battery off to achieve the protection mechanism. However, the module could be triggered by a force from the bench drop test. It is not the TCO module function being expected.

The disclosure implements a solution called the Floating Structure Design in TCO module. This solution prevents abnormal trigger from TCO module after the Bench drop test.

The problem on abnormal triggering is because the continuous strikes come into system during the Bench Drop test. The Bimetal disk easily reserved when NB is dropped down to a table. In that case, the reversed Bimetal disk lifts the arm to open position.

People utilize a sponge or rubber to absorb the strike from the drop test. This solution, however, cannot fix the issue effectively. The abnormal triggering happens sometimes. Even though the soft material adds up a certain thickness, it cannot guarantee the test item being fixed cleanly.

Our solution is different. The concept of the solution is we design Gimbel Lock with weight block to make the TCO module as floating. When strike comes after the Bench Drop Test, the floating design changes the direction which the TCO module drops to the ground. The solution on TCO module is added a certain weight block to drag the module direction.
The way to assemble the disclosure is to add a weight block on the TCO module. The block can keep the direction always toward the ground. Further step to spin screws to fix X rail at left and right side, and then to fix Y rail at upper and lower side.

The benefits from this disclosure used, you will;

a) The X rail & Y rail will make TCO module like floating status. When the drop test performed, the rails will randomly switch the module in the central. The module will head to different directions.

b) We’d like control TCO module direction by the added weight block. The block keeps the TCO module toward a certain direction. Since the drop test has multiple direction toward the ground, the Bimetal disk could be triggered at a certain drop test direction.

c) The added weight on TCO module can make sure the Bimetal disk direction not aligned with the direction which the NB drops to the ground.

d) No matter what strike comes, the Gimbel lock can keep the TCO at a regular position and avoid the strike from outside to trigger Bimetal disk and caused abnormal trigger happened.
Bimetal Disc: When Bimetal Disc heats up, the heat will reverse bimetal disc to lift the arm to the open position. The current flows through PTC and heats it up to keep the Bimetal disc reversed until temperature and/or excessive current goes to safety level.

Structure and Operation of Breaker

- Structure

- Principle of Operation

Closed

Opened

Disclosed by Jerry Ni, Harris Tsai, Chien Kun Wang, Frankie Chu, Yi Chieh Chang and Miles Chi, HP Inc.