

Tuesday, August 26, 2014

Ground Continuity & Ground Bonding Tests on Power Supplies

I heard some discussion on this subject in our facility recently, and thought it would make a good blog article. The safety bodies (UL, CSA, IEC etc.) require that electrical and electronic products are suitably protected and tested; to ensure the user does not get an electrical shock that could injure or even kill.

One of the areas of concern is the grounding (earth) of the product, and the following tests are conducted; not just during product safety certification testing, but also in production. This is mandated on all products with a pluggable power cord.

Ground Continuity

The ground continuity test verifies the connection between the ground pin on the power cord and any exposed metal parts on the equipment. An AC or DC voltage can be used, and the current is typically quite low, less than 1A. A simple handheld device can be used for testing

Ground Bonding

Unlike the continuity test, the bonding checks the integrity of the grounding. This is typically measured using a 25 or 30A current (depending upon the rating of product's internal AC fuse or branch circuit) simulating an actual internal fault. The applied voltage is less than 12V and the maximum resistance between the earth and exposed metal surfaces is 0.1 ohm. The resistance can be determined by measuring the voltage drop. Depending upon the safety agency requirements, this test is performed for 60 to 120 seconds.

Using a higher current than the continuity test ensures that any hardware in the ground path is fully tightened, any wire joints are properly crimped, and any printed wiring board traces are truly capable of handling the current. The fuse or breaker should open before a loss of the ground connection.

There are a number of commercially available testers on the market than can be programmed for production use.

If you design your own tester there are two things you should note:

1. Make sure that you do not include the cable drops when measuring the voltage (have the meter read at the connection points)
2. Apply the test probes when there is no power applied; otherwise the resulting spark can mark the metal parts and damage the plating.

As a note ground bonding may be also be referred to as earth bonding.

Power Guy