

Thursday, April 16, 2015

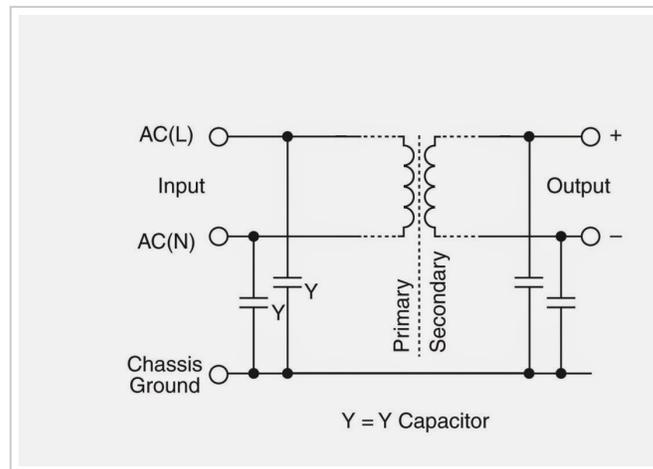
Reducing noise on open frame power supplies

We get a lot of questions on how to reduce noise, both output & EMI (ElectroMagnetic Interference), on open frame power supplies. Usually it is a result of a failure to ground the product correctly. With an enclosed power supply, encased in a metal box, it is simple as all the connections are made for the user by the chassis. Connect up the input and output wiring and everything works fine. With an open frame (pcb type) it is a little different.



TDK-Lambda's ZPSA open frame power supply

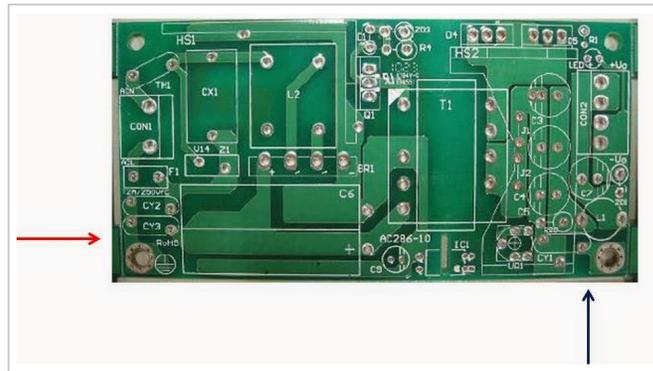
First a look at what we are aiming to do. Below is a simplified diagram of the noise decoupling capacitors in a typical power supply. The Y capacitors on the left provide a low impedance path for high frequency noise to ground. This avoids electrical noise (EMI) exiting the power supply and interfering with other devices on the AC input. The capacitors on the right have the same function, but in this case stops electrical noise from appearing on the output of the power supply and interfering with the load. In some cases, just one capacitor is sufficient.



You can see two blue Y capacitors on the ZPSA photograph, close to one of the mounting holes.



Looking at the underside of the ZPSA pcb, we can see the locations of those capacitors.

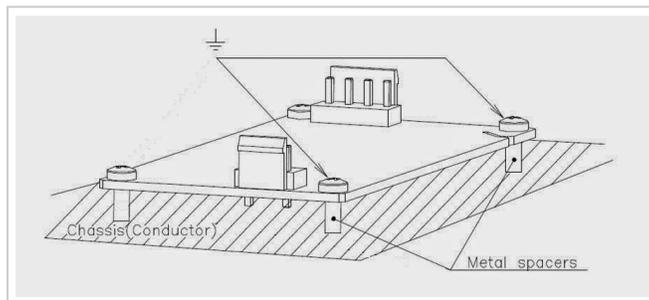


The red arrow shows the Y capacitors CY2 and CY3 are connected to a common trace that leads to the bottom left mounting hole. This hole is in fact a plated through hole and the mounting screw and standoff will make a connection with that trace.

The blue arrow shows the output to ground capacitor CY1, again connected to a copper trace leading to the bottom right mounting hole.

Note that in the case of the ZPSA, there is no pcb trace between those two holes. (The top two mounting holes do not have any traces going to them, so we can ignore them electrically.)

Looking at our schematic again, we need a connection from chassis ground to both the input and output capacitor traces to reduce the electrical noise. This we do by mounting the power supply on a grounded metal plate, with metal standoffs and screws.



Follow these guidelines and the open frame power supply will meet the EMI and output noise specifications.

Power Guy

