

INSTALLATION FOR OPTIMUM EMC PERFORMANCE

Overview

The EMC performance of a component power supply will be affected by the final installation, compliance to the stated EMC standards and conformance to the EMC Directive must be confirmed after installation by the final equipment manufacturer.

Good EMC performance comes by carefully considering the installation of the power supply. Installation without due consideration to cable/PCB layout can lead to current carrying loops that can radiate noise into the system and that can have noise currents induced into them.

What is most important is that cables/PCB tracks are arranged to minimise current carrying loops that could radiate and to minimise loops that could have noise currents induced into them. Treat all cables and all PCB tracks as radiation sources / receivers and try and minimise their interaction.

Mounting

All equipment ideally should be mounted inside an earthed shielded metal box. Alternatively an earthed metal plate can be used to mount the power supply and load.

For open frame power supplies, all four mounting holes (one in each corner) should be utilized for best electrical and mechanical performance, with suitable height metal stand offs to achieve required creepage and clearance requirements.

For Class II equipment (without a ground connection), if the equipment does not have a fitted link wire to connect the input and output noise filtering ceramic “Y” capacitors together, then a wire or other suitable electrical connection should be used to connect the input and output filtering ‘Y’ capacitors together.

Cables

All cables (AC input, DC output, remote sense and signal) should be run as close as possible to the earthed metal box/plane. AC input cable should be a twisted group laid as flat to the earthed metal box/plane as possible. Run the remote sense and power output cables as separate pairs twisted tightly together with at least 1 twist per centimetre. Keep separate from the input cables. If the input and output cables must be run close to each other screen one (or ideally both). All cable run loops should be kept as small as possible (this should be implemented in the system PCB design also).

Other electronics within the final system can also be a source of noise, care should be taken with the design to follow good EMC design practices. Any cables that carry power or digital signals, or are known to be noisy should be treated with extra care. Their proximity to other cables or sensitive circuits should be carefully considered. This is especially true for any cables that leave the enclosure, as external cables can act as antennas.

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Additional Filtering

If additional input filtering is to be used, it should be of a suitable current rating. Care should be taken to ensure the earth leakage requirements of the system are not exceeded due to the filter. In some cases filtering can cause the conducted emissions to be higher than without the filter. Contact technical sales for support selecting a suitable filter.

Connecting between boxes

If cables must be connected between equipment boxes, then at the closest possible point to the port where the cables exit the 1st enclosure connect 100nF decoupling Y caps (between the output and earth). Note that these capacitors must be rated at the working voltage. Ideally these capacitors should be between all signal cables which have to connect between boxes although this may not be practical if fast switching [digital] signals are involved (if this is the case then smaller value Y capacitors should be used).

Earth star point

If the power supply is supplied without an IEC inlet then where the ac supply enters the equipment, this should be taken to a 'star point' chassis mounted earth point as close as possible to the ac inlet. All other earth points should be taken back to this point only.

If the power supply is supplied fitted with an IEC inlet then a 'star point' should be created as near as possible to the mounting screw closest to the inlet side of the power supply. (Note compliance with some safety standards take precedence with regard to star points). Ensure wiring and earth grounding methods comply with the appropriate safety standards and National Electrical Codes.

ESD Protection

Where signal or control ports are connected to a user accessible panel (for example PSU inhibit to a switch, module good to an indicator circuit, etc), these ports must be protected from electrostatic discharges. This can be done by selecting suitable panel controls or by fitting ESD suppression devices to the connections on the panel

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