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ESD and thermal improvement for add-in cards with metal I/O

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With the increasing speed and power consumption of networking cards, EMC and thermal become more and more challenge when designing the products. Optical transceivers are the bottleneck for the thermal challenge because their working temperature is comparative low and there is usually very little space for the heat dissipation. The ESD, part of EMC test item, is dependent on the I/O design of a server and an add-in card. Since servers are usually surrounded with a metal chassis, the only way the electrical energy can escape or jump into the server is through the opening. If that energy can be spread across chassis ground before hitting sensitive electrical circuits, then ESD can be improved significantly.

Normally the network add-in cards are expected to be workable under the 60°C environment inside a server chassis, with a 70°C optical transceiver, we have only 10°C margin, which means a better cooling solution is needed. The typical solution is to add a heatsink above the I/O connector, such as a QSFP28 connector, however, due to the air gap between the connector and the limited air flow coming from heated ASIC heatsink, the benefit brought by the connector heatsink is not sufficient.

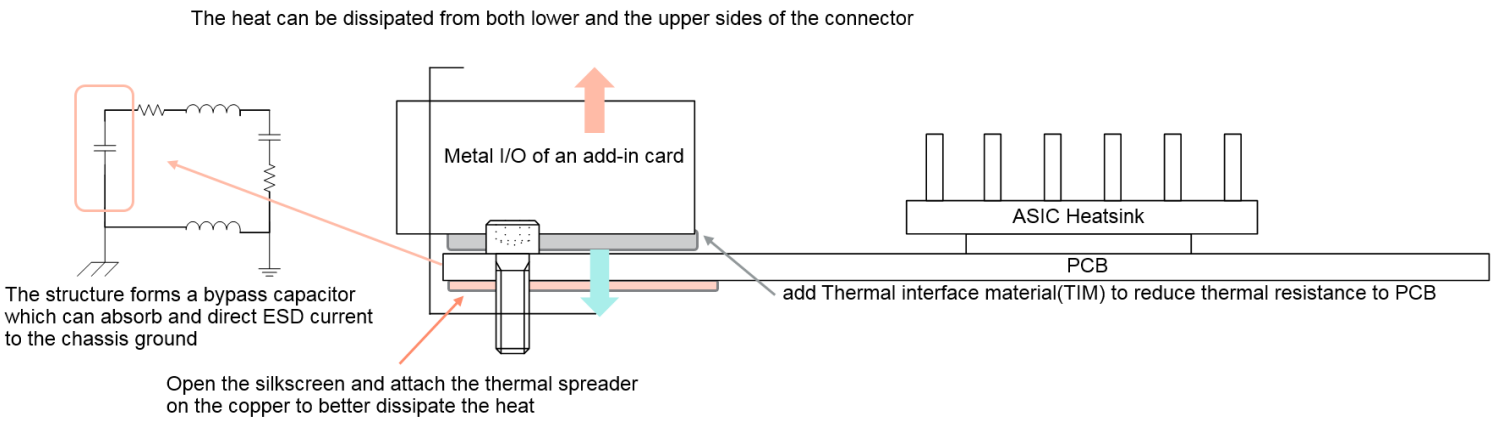
A low cost structure can be made to improve the overall thermal and ESD performance. By utilizing the PCB ground beneath the connector and add thermal interface material in between, the heat can be dissipated from connector to the bottom of PCB, which can give us few more degree C margin to the limit.

Also the structure of the metal connector cage, thermal interface material, and the PCB copper ground forms a parallel plate capacitor which can bypass and filter the high frequency ESD current from the I/O module to the chassis ground. By doing so it protects the rest of vulnerable circuitry on the PCB and enhance the ESD robustness of the card.

With this structure, you will be able to;

A) Enhance the ESD robustness for the add-in cards with I/O interface

B) Increase temperature margin when using optical transceivers or optical cables



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