

AMC7932 Supply Protection Recommendation

Description of results

- When a transient on a pin exceeds the ESD trigger voltage with a fast transient edge, the ESD cell may trigger an ESD event and try to limit the pin voltage. During this time the ESD cell can carry a large current. If the system is able to deliver this current for a long time, the cell may be damaged. This would be electrical overstress and could look like a short.
- ***There are some pins on the device that can operate in both the VDD and VIO supply domains (GPIOs). This means that there can be shared ESD protection circuits, or that electrical overstress could damage sub-circuits in both domains.***
- VCC and VSS have larger ESD protection and conduct less current during a transient, so I would be less likely to cause any device damage

Recommendation

- It seems like VIO is the common failure point in these cases. The SPI pins will look like a short if VIO is shorted as well, as they cannot exceed the supply.
- If this the case, then there are two main paths we can explore:
 1. Slowing down the rise time of the transient event. A slower rise time will reduce the peak current significantly.
 2. Reduce the peak value of the transient.
- Recommend adding small series resistance to the VDD and VIO pins. This will slow voltage transients. This could also be accomplished with a ferrite bead.
- Voltage could be limited on the VDD and VIO pins with an external transient voltage suppressor (TVS) diode.
- Both of these methods could be implemented at the same time.