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Subject: Bonds movements

Hi,
here are the results of some calculations I made on the Phi and Z jumper bonds based on the shape that Joel measured.
The distributed Lorentz force acting on the bonds is 1.42 T x 0.2 A = 0.284 N/m (or 2.84E-2 grams/mm) and (obviously) is the same for both sides. The total length of the Z bond is about 2.6 mm while the total length of the Phi side bond is about 2.36 mm. The length of the bond projected onto plane of silicon/hybrid is 1.967 mm for Z and 1.924 mm for Phi. Therefore the total vertical (i.e. perpendicular to the silicon/hybrid plane) force acting on the bonds is:
0.284 N/m x 0.001967 m = 5.6E-4 N = 0.056 grams for the Z side.
0.284 N/m x 0.001924 m = 5.46E-4 N = 0.0546 grams for the Phi side.
The magnitude of the movement due to the Lorentz force is (bonds are assumed to be 25 microns outer diameter aluminum wire)
3 microns for the Z side.
4 microns for the Phi side.
They are going to be very hard to measure.
Due to the shape of the bonds, the major component of this movement is directed sideways (i.e. along a direction parallel to the hybrid/silicon plane). This kind of movement could cause a fatigue failure of the bond. Since these are results of a calculation of a simplified model of the real bond, I would expect the movement values to be within 20-30% within the calculated ones. I’ ll try to quantify what is the expected fatigue life for the bond subjected to a repeated load like the one described above.
I won’ t be able to attend the meeting tomorrow, but I would like to be kept informed about future plans.

Stefano