Dexter-Hysol EA9361 data

Integral of CTE from 300 down to 140 is ~.0096 m/m. LBL test.

Thermal capacity is .78 J/g-K @150K and .63 J/g-K @140K. LBL test.

Lap shear @150K from moly to silicon is 2000 to 4000 psi
depending on goodness of the particular bond. LBL test.
Mfr's lit says 4000 psi @150K.

Shear strength is 4000 psi (27.6 MPa). LBL torsion test.

Shear modulus, G, is 265 ksi (1.83 GPa). LBL torsion test.
[This number seems very high - can we get an independent number?
We have a lower number from a different test, but it's suspect.]

Thermal conductivity @150K is .238 W/m-K LBL test.

<u>Shear calc</u>

The stiffnesses of the silicon and the molybdenum are very
high compared to the stiffness of the glue, so I assume all
strain takes place in the glue (or should).

This could be a transient thermal problem but we should
cool slowly enough that it's not.

Assuming we can get our bonding perfected, we should be able
to realize the full 27.6 MPa shear strength. Then the allowable
unit shearing strain will be:

$\gamma = \tau/G = 27.6$ MPa/1.83 GPa = .015

Integrated CTE difference between Si and Mo
from 300K to 140 K is .00044
[Si is -.00023 from 300K to 140K
 Mo is -.00067 from 300K to 140K]

SNAP CCD	32.76 mm x 32.18 mm
2Kx2K	32.665mm x 33.687mm
MSL 2Kx4K	63.39 mm x 33.69 mm
UCS 2Kx4K	63.321mm x 33.246mm

For the SNAP CCD, although the distance from the center to
a corner is 23.0 mm, the distance from the center to the
far edge of a glue spot is 19.5 mm So the absolute shear
will be .00044*19.5 = .0086 mm

Therefore, if a safety factor of 1 is OK, the bondline
thickness should be .0086/.015 = .57 mm
We used 0.50 mm

All of this is predicated on a correct shear modulus, but
I am not confident in that number.