

Multi-segment Electromigration (EM) test structures, which have more contacts or vias inside, are more close to the real IC layouts than the conventional single line EM structures. However, the contacts or vias, playing as either active sinks or reservoirs, change the local mechanical stress distribution and shorten the failure times. By including the mechanical stress analysis, TSMC researchers are able to well predict the EM statistics obtained from the multi-segment structures. Thus, EM prediction for ICs must include mechanical stress analysis.

Fig. A. The contacts or vias divide a Cu dual damascene line into multiple segments and they affect mechanical stress distribution in the line.

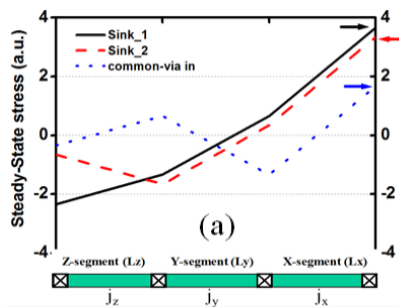


Fig. B. EM failure time is found degraded in the multi-segment structure. Monte Carlo simulation can reproduce the distribution after including the mechanical stress analysis.

