DfR Solutions
RELIABILITY DESIGNED & DELIVERED

ICT ANALYSIS FAQ

Q1: What is the strain rate used in Sherlock's ICT module?
Sherlock assumes that the solder is elastic during the bending event. In terms of strain predictions, it assumes the worst-case strain rate. Sherlock uses 50,000uStrain/s as the "worst case strain rate".

Q2: Why do you use "worst case strain rate", some production line assembly process events measure lower strain rates?
Typically, strain rate values are difficult to determine which is why Sherlock assumes the "worst case strain rate".

Q3: What's the relationship between "worst case strain rate" and the 50000 uStrain/s strain rate in IPC-9704?
Sherlock's 50,000uStrain/s strain rate is based on IPC-9704 guidelines. Notably, IPC-9704 (version released in 2005) was only valid for Sn-Pb so it is not applicable to lead-free solder. Intel's studies on strain rates for lead-free solder have shown that the strain limit is much lower than the 50,000uStrain/s value. Sherlock's strain rates for lead-free solder were subsequently modified based on these findings.

Q4: How should I correlate the strain value measured using IPC-9704 guidelines with the strain value calculated by ICT module?
As mentioned above, the strain rate based on IPC-9704 guidelines is valid for Sn-Pb solder, not for lead-free. This suggests that when a Sn-Pb solder is used, there is good correlation between the strain values produced by the ICT module and the worst-case values measured using IPC-9704 guidelines. Note: as aforementioned, Sherlock utilizes a modified strain rate when lead-free solder is used since IPC-9704 strain rates are not valid for that material. Thus, one should not expect good correlation between the strain determined using IPC-9704 guidelines and the values produced by the ICT module when lead-free solder is implemented.

Q5: Does the ICT module use the strain rate when calculating Max Strain results?
We assume a maximum strain is occurring at the maximum strain rate.

Q6: Do the shock and vibration modules use strain rate when computing Max Strain results?
The shock and vibration modules do not have strain-rate sensitive guidelines.

Q7: The ICT module does not use modified Steinberg equation, correct?
Correct.

Q8: What model is the Max Strain result in ICT module based on?
The max strain result is based on the FEA results. Assuming a maximum strain rate of 50,000uStrain/s, finite element results are used to determine the strain.