



International Electronics Manufacturing Initiative

BGA Availability for High Rel Applications – EMS Perspective

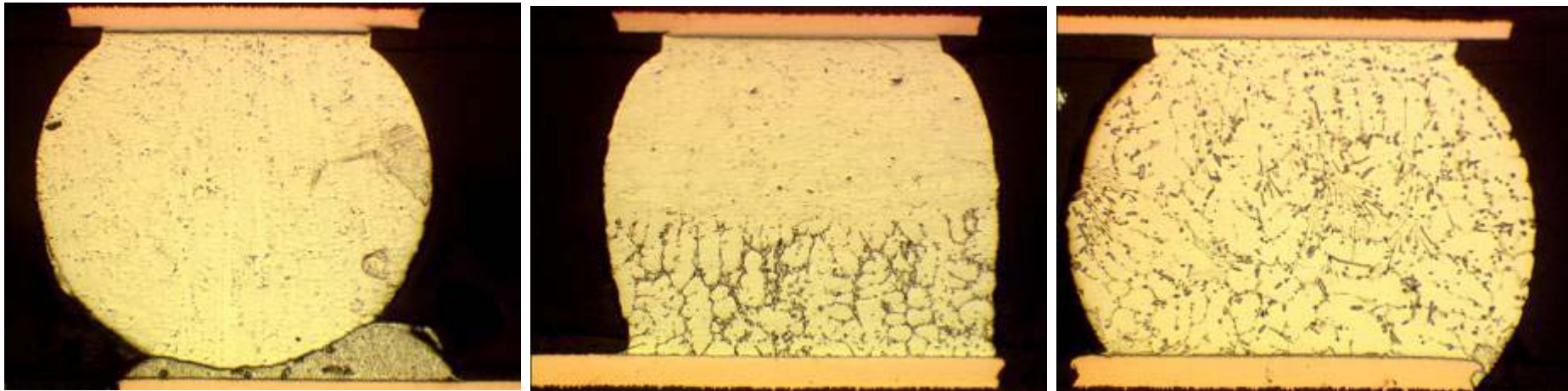


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- **Sn-Pb assembly is well understood and reliable - primary reason for taking the Pb exemption**
- **The components supply chain is rapidly converting to RoHS compliant offerings (Pb-free) with little motivation to continue to produce SnPb product**
- **Taking the Pb exemption will change the risk profile for High Reliability producers**

- Reflow profile temperatures must increase if Pb-free BGAs are introduced on SnPb soldered board
- Technically min. temperature on board should be above melting point of SnAgCu solder ball
 - May present significant thermal challenges to other components on board



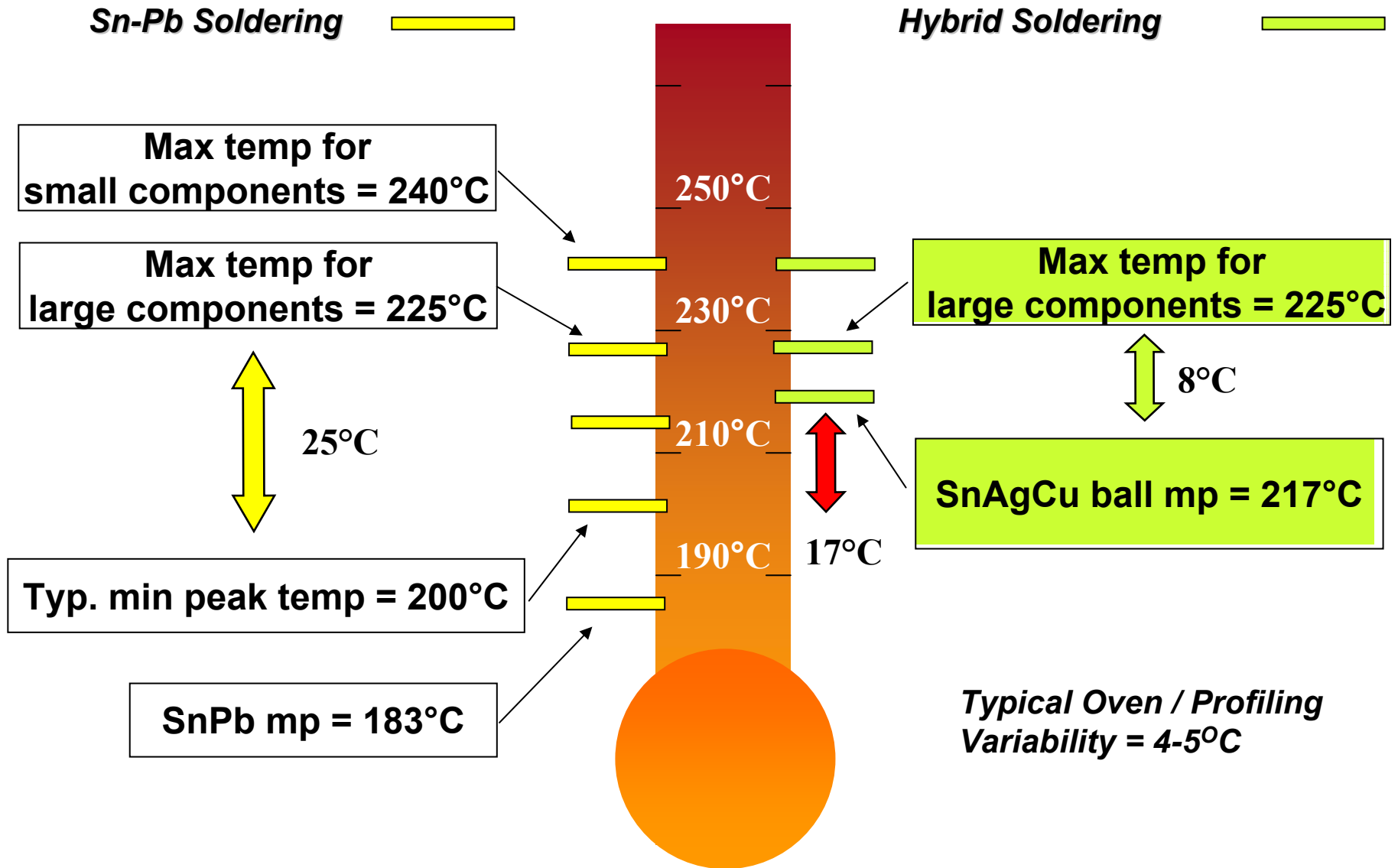
————— Increasing Soldering Temperature —————>

- **Maximum allowable peak temperature a component can experience during reflow dictated by IPC J-STD-20**
 - **Peak allowable temperature a function of amount of moisture absorbing material it contains**

Table 4-1 SnPb Eutectic Process – Package Peak Reflow Temperatures

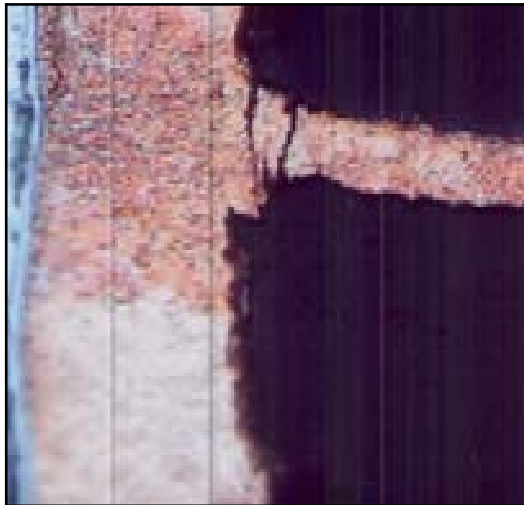
Package Thickness	Volume mm ³ <350	Volume mm ³ ≥ 350
<2.5 mm	240 +0/-5 °C	225 +0/-5°C
≥ 2.5 mm	225 +0/-5°C	225 +0/-5°C

Table from IPC J-STD-20C

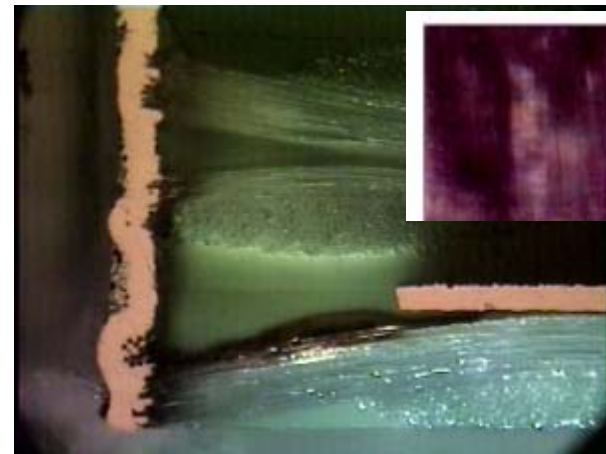


- **Current solutions are based on low to medium complexity assemblies**
- **Progress into Enterprise and Telecom products will extend Thermal profiles and produce Higher Assembly ΔT :**
 - **More overheated parts / Higher part warpage**
 - **More barrel failures from z-axis expansion**
 - **More resin Imbrittlement**

- Impact of increased peak temperature on PWB laminate survivability:
 - Z axis expansion characteristics
 - CAF (conductive anodic filament) resistance



Crack in PWB (Laminate) Barrel



CAF Failures

- **Introduction of Pb-free BGAs in a Sn/Pb process introduces significant process risk**
- **Reliability impacts:**
 - **Mixed alloy solder joints**
 - **Increased assembly temperature overstressing components and board**
- **Significant reduction in available process window for thermally challenging products**



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