



BGA Lead-free Status

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Compliance to RoHS Directive

- ☐ Fully compliant in markets which require elimination of banned substances
 - Lead in external finishes
 - Various brominated compounds
- ☐ Still providing lead based solder balls to markets with exemptions to RoHS
- ☐ Still providing small percentage (<5%) of lead based platings on lead-frame packages



BGA Categories (1)

Matrix

- Predominantly used in wireless/handheld applications
- Singulation by sawing
- Body sizes 15 mm and smaller
- More than 99% converted in 2006 to SACn 125
- A few customers still request Pb/Sn
- Best drop test performance with SACn



BGA Categories (2)

PBGA

- Body sizes 17 mm and larger
- Individual cavity molding
- Traditional non-miniaturized applications (STB, printers, networks, etc)
- Conversion to Sn96.5Ag3.5 approximately 60%
- Original Pb-free choice was SAC405 but some brittleness problems were observed
- Still supplying SAC405 – down to <2%
- Remaining Pb/Sn demand managed thru frequent line conversions or subcontractor production
- Anticipate 80% conversion by mid 2007



Alloy Switching

- ▣ Conversion time approximately 30 minutes
- ▣ Proper alloy verified with XRF
- ▣ Typically switch each system 4 times/week
- ▣ Ball attach is today's capacity bottleneck in PBGA manufacturing



BGA Categories (3)

Hi-rel users of FCBGGA

- << 1% of volume (total approx 1 billion)
- Assembled by subcontractors
- No foreseen threat in this supply chain
- Uncertainties : Future legislation, dry-up of Pb/Sn suppliers and environmental perceptions are pushing some customers onto dual track



Market Criteria for Pb/Sn BGA

- ❑ Major suppliers like ST have many disparate Business Units
- ❑ Businesses where the majority of customers demand Pb-free will be reluctant to provide Pb/Sn (Memory, commodities, etc)
- ❑ Businesses where the majority of customers demand continued Pb/Sn will continue to supply
- ❑ No Business Unit will forfeit “substantial” sales over this issue or risk alienation of strategic customers
- ❑ Special note – Customers with sales exceeding \$1B can have any ball composition they specify

