IPC/EIA J-STD-032

Performance Standard for Ball Grid Array Balls

About This Document

This document is intended to report on the work being done by several organizations concerned with the design of bare die in flip chip or chip scale configurations. Details were developed by companies who have implemented the processes described herein and have agreed to share their experiences. Readers are encouraged to communicate to the appropriate trade associations or societies any comments or observations regarding details published in this document, or ideas for additional details that would serve the industry.

Users of this standard are encouraged to participate in the development of future revisions.

Contact:

EIA
Engineering Department
2500 Wilson Boulevard
Arlington, VA 22201
Phone (703) 907-7500
Fax (703) 907-7501

IPC
2215 Sanders Road
Northbrook, IL 60062-6135
Phone (847) 509-9700
Fax (847) 509-9798

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1 SCOPE

This standard establishes the construction detail requirements for balls and other terminal structures on Ball Grid Array (BGA) packages. All BGA terminals shall meet the designated standards detailed in this document and includes such diverse terminations as solder balls. The specific standards for different terminations will therefore be appropriately matched to the particular interconnection.

1.1 Purpose The purpose of this document is to establish for the manufacturer and user of ball grid array devices, a set of designations and expectations for product performance. Included in the product performance will be the flexibility to implement the best commercial practices.

1.2 Intent The intent is to recognize a large variety of terminal structures for a wide range of applications ranging from highest reliability computer, space and military applications to disposable commodity applications. Subsections in this document will provide for the flexibility to meet the cost and performance requirements of the variations.

1.3 Terms and Definitions Appendices A and B are lists of terminology and acronyms related to this standard.

2 APPLICABLE DOCUMENTS

J-STD-013 Implementation of Ball Grid Array and other High Density Technology

JEDEC Pub 95 Ball Grid Array Design Guides and Package Outlines

3 REQUIREMENTS

3.1 General Performance Requirements The solder ball forms the electrical and mechanical bridge between the package and next level assembly. It absorbs the strain between the substrate and next level of assembly caused by variations in their relative thermal expansion rates.

The solder composition of the grid array balls varies according to required mechanical and thermal properties. Common ball compositions include:

- Pb95Sn5
- Pb90Sn10
- Sn63Pb37

3.1.1 Joint Expectations Ball joint expectations are considered in terms of:

- Mechanical strength and stability
- Dimensional uniformity, required volume, height, diameter
- Electrical conductivity
- Chemical and metallurgical stability, corrosion resistance, wettability

3.2 Classes of Ball Grid Array Joints

- Meltable solder balls
- Nonmelting balls
- Partially meltable balls
- Polymeric/conductive adhesive balls

Figure 3-1 shows some examples of packages with solder balls that are reflowed.

3.2.1 Meltable Ball Process Eutectic solder spheres are most often used as the medium for ball formation when solder balls are the array method. The size of the spheres may vary depending on the package ball pitch (see Table 3-1).